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ASEM Eco-Innovation Index (ASEI) 2014

Measuring Sustainable Future for Asia and Europe

SMBA Small & Medium Business Administration

SBC Small & medium Business Corporation

ASEM SMEs Eco-innovation Center

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Abbreviations

ADB	Asian Development Bank
APEC	Asia-Pacific Economic Cooperation
ASEI	ASEM Eco-innovation Index
ASEM	Asia-Europe Meeting
BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit(Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)
CDM	Clean Development Mechanism
CIA	Central Intelligence Agency
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EcoAP	Eco-Innovation Action Plan
Eco-IS	Eco-Innovation Scoreboard
EEA	European Environment Agency
EIO	Eco-Innovation Observatory
EPI	Environmental Performance Index
ESI	Energy Sustainability Index
ETAP	Environmental Technologies Action Plan
EU	European Union
GDP	Gross Domestic Product
GEF	Global Environment Facility
GGGI	Global Green Growth Institute
GGS	Green Growth Strategy
GHG	Green House Gas
GIZ	Gesellschaft für Internationale Zusammenarbeit (Society for International Cooperation)
HDI	Human Development Index
IEA	International Energy Agency
IFC	International Finance Corporation
IIEC	International Institute for Energy Conservation
ILO	International Labour Organization
IMF	International Monetary Fund
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
LEED	Leadership in Energy and Environmental Design
NGOs	Non-Governmental Organization
OECD	Organization for Economic Co-operation and Development
SCI	Science Citation Index

SDC	Swiss agency for Development and Cooperation
SMEs	Small and Medium Sized Enterprises
SNV	Netherlands Development Organisation
SPIN	Sustainable Product Innovation Project
TBL	Triple Bottom Line
UK BIS	UK Department for Business Innovation & Skills
UN CITRAL	United Nations Commission on International Trade Law
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNGC	UN Global Compact
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
UNU-MERIT	The United Nations University-Maastricht Economic and Social Research Institute on Innovation and Technology
WB	World Bank
WEF	World Economic Forum
WWF	World Wildlife Fund

Chapter 1

Purpose of the ASEM Eco-innovation Index

The third ASEI (ASEM Eco-Innovation Index) 2014 report has not only analyzed reports regarding Eco-Innovation from other institutions but carried out analysis of the latest reports on Eco-Innovation in research journals that were not on the ASEI 2013 report. The purpose of this lies in establishing theoretical concept of Eco-Innovation, examining measurement of Eco-Innovation Index and developing Eco-Innovation evaluation index that can be used among 49 member nations of ASEM. The major goals of this report are 1) to understand the research of Eco-Innovation from its early stage to the latest stage, 2) to compare and contrast objects and scopes of Eco-Innovation studies, 3) to develop standards and indicators for evaluation of Eco-Innovation and 4) to investigate elements that lure and impede Eco-Innovation. This report is based on the analysis of research papers on the past 16 years of Eco-Innovation study, recent papers and those of other institutions. This chapter will explain scope of the project, specific details of project procedure and understanding of Eco-Innovation.

The Global community set sustainable development as the goal for present and future generations at the United Nations Conference on Environment and Development (UNCED), which was held in Rio de Janeiro in 1992. Sustainable development is “a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations.” According to the Principle 11 of Rio Declaration on Environment and Development, which was agreed by 108 states, states shall enact effective environmental legislation to achieve sustainable development and a higher quality of life for all people. Agenda 21 acknowledged business and industry play a crucial role in reducing impacts on resource use and the environment through more efficient production processes, preventive strategies and cleaner production technologies and procedures. In this context eco-innovation emerged as an important pathway towards sustainable development in the

business sector. A green economy is a way of realizing sustainable development at the national, regional and global levels and in ways that resonate with and diffuse the implementation of Agenda 21 [1].

Goal and Scope of the 3rd ASEI Project

The goal of this research is to improve ASEM Eco-Innovation index that has been already made and measure the index among ASEM member nations. This year ASEM Eco-Innovation index development project has been its third year. The main business scope can be categorized into (1) measurement of Eco-Innovation index of all member states of ASEM, (2) publicizing index evaluation logic and analysis system, (3) establishing a cooperating system with international institution and (4) promoting Eco-Innovation index. The measurement of Eco-Innovation among member nations has been conducted for 15 countries during its first year and 25 countries during second year. This year the measurement of Eco-Innovation is being conducted for 49 member nations across Asia and Europe. In terms of publicizing evaluation index and analysis system, theoretical background and storyline of evaluation index was improved to enhance validity and objectivity of previous Eco-Innovation index. Also, a frame was developed to enable multilayered analysis of Eco-Innovation among member nations to reexamine Eco-Innovation index through a more profound interpretation. As for establishing a cooperative system, a network with international experts with Eco-Innovation index research experiences was developed and an advisory panel was formed to apply opinions from experts in business. Support for promoting Eco-Innovation Index was done by presenting the research results through various channels.

Differentiation with Previous ASEI Reports

As the third year development, the research is based on the previous ASEM Eco-Innovation research for the past two years (2012~2013).

ASEI 2012(Eco-Innovation business during 2012) was a series of procedure of introducing the unfamiliar notion of Eco-Innovation and developing an appropriate index that can measure the Eco-Innovation degree of European and Asian countries. It had suggested Eco-Innovation measurement index of European and Asian nations, but there were limitations on objectivity and reliability of the index when the index was applied to Asian countries.

ASEI 2013(Eco-Innovation business during 2013) focused on developing ASEI methodology and selecting individual index to enhance logic and reliability of the gauging framework. The developed index found a wide trend of Eco-Innovation and strong points of individual nations for activating Eco-Innovation. However, the source of data was concentrated on certain references and the connection between theoretical backgrounds of the index and the measurement method was not fully systematic.

Therefore, ASEI 2014 focused on complementing the limitations of previous research and improving completeness of Eco-Innovation country-by-country. The specific contents can be summarized as follows: 1) In order to enhance theoretical backgrounds of Eco-Innovation index, ASEI 2014 analyzed reports on Eco-Innovation and established major concepts of Eco-Innovation. Also it specified relations between measuring areas and index and drew a connection of small businesses and Eco-Innovation's sustainable development. 2) In order to improve measurement of Eco-Innovation index and analysis methodology, it evaluated appropriacy of current index, enhanced specific evaluation index through data source research that is applicable to every index and developed an analysis methodology for establishing individual nation's Eco-Innovation strategy. 3) In order to provide a status quo and strategy of 49 ASEM member countries, it evaluated member nations' Eco-Innovation index, analyzed the main causes of Eco-Innovation and assessed their validity. Through this, hindering elements of Eco-Innovation among groups of nations were comprehended and came up with Eco-Innovation strategy for each nation by suggesting

ways to activate Eco-Innovation. 4) In order to promote Eco-Innovation Index, a strategy for Index advertising framing was developed with policy making and cooperation with ASEIC business. With the goals underneath it was conducted according to 〈Table 1.1〉

The Goal of the 3rd ASEI Project

- Analyzing trend of Eco-Innovation research
- Enhancing theoretical background of Eco-Innovation index
- Evaluating and comparing Eco-Innovation contents based on research target area such as size of a company and level of development in a country
- Improving current Eco-Innovation standard and index – sophistication of measurement of Eco-Innovation index and analysis methodology
- Suggesting a status quo of Eco-Innovation of 49 ASEM member nations and strategies
- Investigating main causes and hindering elements of Eco-Innovation
- Proposing methods for promoting Eco-Innovation index

〈Table 1.1〉 Specific contents on yearly sophistication of ASEI Index

Division	'12 ASEI	'13 ASEI	'14 ASEI
Evaluating Nations	· 15 nations	· 25 nations	· 49 nations(Total ASEM member nations)
Theoretical Background	· Lack of theoretical background	• Insufficient theoretical background • Lack of opinion from related experts	· Rigidification of philosophical background of evaluating model and theoretical framework · Conducting advisory panel of international expert: international index specialist, Eco-Innovation specialist, Industrial ecologist, etc.
Evaluation Model	· Evaluation areas: 4 categories · Medium division: none · Evaluation index: 20	· Evaluation Area: 4 categories · Medium division: none · Evaluation index: 20	· Large division evaluation area: 4 categories · Medium division: 13 (Suggested medium division that consist of theoretical framework of Eco-Innovation) · Evaluation index: 20
Index Measurement	•Lack of reliability due to deriving from certain data •Lack of validity evaluation methods of handling omitted data • Normalization method: Min-Max	• Lack of reliability due to deriving from certain data •Lack of validity evaluation methods of handling omitted data •Normalization method: Min-Max	· Selected meaningful data index that is reliable statistically · Handling omitted data: Applied EM(Expectation Maximization) algorithm according to International Index Development guidelines · Normalization method: Min-Max · Suggested to secure data from 49 nations and proposed methods to securing data
Index Weighting	· Equivalent Weighting	· Equivalent Weighting	· Suggested weighting through equivalent weighting and AHP analysis
Quantitative Analysis	· Absence of analysis methodology	· Analysis based on economic level	· Applied sustainable development triple purpose analysis methodology · Collected opinions of specialists through participating in domestic symposium
Qualitative Analysis	· Lack of policy research	· Lack of policy research	· Analyzed policies divided into national plan, regulation, finance, informational support · Compiled opinions of specialists through on-line presentation at International SCI forum
Presenting Strategy	· Created hostility among Asian developing countries due to suggesting European-mimetic strategy	· Absence in analysis and suggestion of strategy according to classified groups	· Suggested methods to improve according to sustainable development triple purpose groups

The third research, which is ASEI 2014, has undergone a procedure like 〈Figuree 1.3〉. First of all, in order to enhance ASEI theoretical background, it improved theoretical framework and reinforced its specific index accordingly. After that, it sophisticated index measurement and analysis methodology of ASEM 49 nations and suggested status quo and strategy for the 49 ASEI countries. Piecing together all of these, it arranged methods for advertising Eco-Innovation index, and as part of this the results were made into a thesis paper and submitted in a related academic journal.

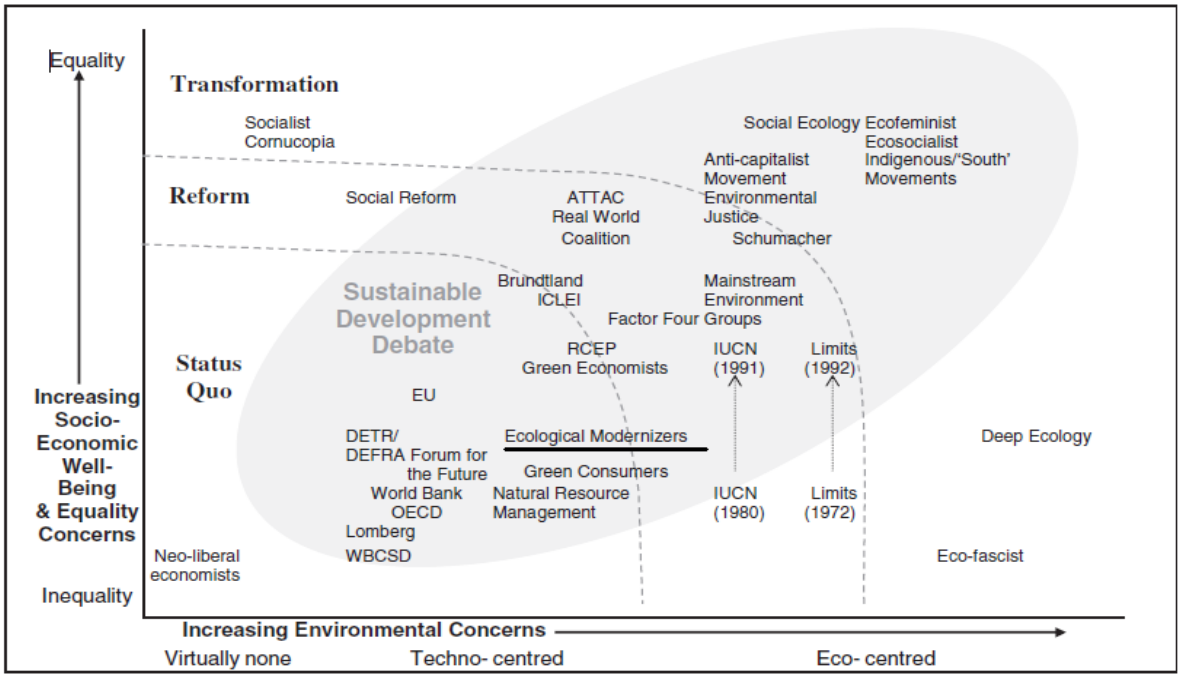
Definition of Eco-Innovation

Eco-Innovation includes various forms of innovations; it includes not only technology for environmental improvement but non-technological contents such as process, product and service and a new kind of business. Eco-Innovation refers to all series of activities that can optimize resource exploitation with either lessening environmental pollution or bringing positive effects to environment (Fussler & James, 1996; Kemp and Arundel, 1998; Hemmelskamp, 1999; Klemmer et al., 1999; Rennings, 2000; OECD, 2005; Little, 2005; European Commission, 2007; Charter & Clark, 2007; Kemp & Pearson, 2007; OECD, 2009a,b; Schiederig et al., 2012). The initial notion of Eco-Innovation only focused on the procedure of manufacture and products (Fussler & James, 1996) but gradually the scope was extended to apparatus and management system (Kemp and Arundel, 1998), creating a new market (Little, 2005) composition of organization (Charter and Clark, 2007), policy (OECD, 2009) and so on. However, it is not easy to define the general meaning of the term Eco-Innovation. European Commission (2012) suggested a definition that embraces conceptual transformation about Eco-Innovation as such: “Eco-Innovation refers to all kinds of innovation that aims for significant and provable progress which is sustainable through fulfilling the goal of either lessening the environmental pollution or exploiting resources efficiently and responsibly, including environmental technology, process, system, service and environmental effects of innovation regardless of its intention.”

Theoretical Background of Eco-Innovation

As one can see from the definition of Eco-Innovation, Eco-Innovation refers to various kinds of innovations that can reach for sustainable development. Sustainable development has various approaches according to its combination of environment, society and economy (Hopwood et al., 2005,) and among all ecological modernization which stresses technology and market is a theory that best describes Eco-Innovation.

〈Figure 1.1〉 Mapping for sustainable discourse



Ecological modernization emerged around early 1980s in Western Europe. Ecological modernization is a concept that focuses on innovation and structural transformation of ecological industrial development (Simonis, 1989). In ecological modernization, technology and science function as a central element for ecological innovation and economic agent and market take important roles. Government does not stop at post treatment but it tries to put policy into practice through participations of various members while propelling preventive environment policies (Mol, 1997). Likewise, eco-Innovation embraces characteristics of ecological modernization. The process of development of

ecological modernization which pursues technology-based and innovative environment policy while stressing connection between environment and economy can be categorized into three steps (Mol and Sonnenfeld; 2000: 4-5). First is environmental technique innovation step and second step is where balanced roles and institutional transformation of government and market is being reinforced. Third step is an ecologically orienting transformative stage of consuming behavior. This research aims to compare and analyze development of Eco-Innovation in each nation through utilizing such steps. Although ecological modernization is being criticized for its lack of suggestion to the third world since it is a discourse that deals with developed countries that already possess environmental technology (Dryzek, 1997), recently national policies and businesses in developing countries are increasing as well. The comparison and analysis of each nation regarding Eco-Innovation will contribute to understanding ecological modernization as an international transition.

Trend of Eco-Innovation Research

Eco-Innovation emerged as a way for sustainable development and improving competitiveness of nations and businesses and has been developed in various sectors. Eco-Innovation manifested into a technical approach that enables resources to be sustainably exploited and in order to support this there are various policy based approaches such as transnational, national, local and business-wise. For reference, through Ngram Viewer that Google provides, the keyword occurrence trend has been increasing after 1992 (Picture 1.5). In order to apprehend Eco-Innovation research trend, this research browsed all the academic treatises that have ‘eco-innovation’ or ‘ecoinnovation’ in their titles using SCOPUS research engine, and as the result extracted and scrutinized 92 treatises. The result showed that related treatises have been issued since 2000 and the number of research increased after 2009. The service searches 5 million digitalized books that were issued from 1500s to 2008 and can retrace not only the first moment a certain term was

used but also increase or decrease trend of frequency of its use. SCOPUS is the world's biggest citation and abstract database that was issued by Elsevier publisher and it provides citation information of selected journals among 14,000 Peer reviewed Journals with convenient interface. It has 5,400 works in science technology field, 6,500 works in medical/bioscience field, 2,000 works in social science field. Like one can see in 〈Figure 1.6〉, when seeing the research trend regarding Eco-Innovation, related researches have increased since 2005. Especially researches on European nations accounted for more than half 〈Figure 1.7〉, this could be an aftermath of policies that European Commission established Environmental Technology Action Plan (ETAP) in 2004 and accordingly activated Eco-Innovation activities and developed environment techniques and enlarged their usages. The purpose of ETAP is to be an international leader through enhancing competitiveness of environment technique among European countries through dealing with various environmental techniques. Later in between 2011 and 2012 the research of Eco-Innovation has been actively conducted. This is because European Commission established Eco-Innovation Action Plan (EcoAP) which stresses Eco-Innovation instead of "environment technique" at the same time. European Commission mentioned that "EcoAP is an important progress for Europe to promote general Eco-Innovative process, product and service other than green technology." European Commission announced a report under the name of "Eco-Innovation Measurement (2009)" with UNU-MERIT. The Eco-Innovation Index evaluation reference of Eco-Innovation Observatory (EIO) which was made in 2008 is utilized as policy information for EcoAP and Europe INNOVA. The start of Eco-Innovation in Europe was an environment technique, and after 1992 Rio de Janeiro environment conference was regarded as enhancing competitiveness through a new growth engine in the trend of sustainable development. OECD regards Eco-Innovation as a method for improving national competitiveness as a sustainable development engine.

〈Table.1.2〉 Empirical research of eco-innovation classification (articles)

Company Nation	Large Firms	Small and Medium Company	Both	Total
Developed countries	21	4	9	34
Developing countries	2	-	2	4
Both	2	-	-	2
Total	25	4	11	40

Retrieved treaties can be classified into objective researches that include measurement (40 pieces), researches about concepts (32 pieces) and others (20 pieces). As one can see in 〈table 1.2〉, if objective researches of Eco-Innovation are classified into nations, researches targeted for advanced nations are 34 pieces whereas researches aimed for developing countries are only 4 pieces. When looking at the research according to scale of businesses, more than half is targeted for big businesses while only four studied small businesses. If we look into researches that aimed for big businesses, **Cantono et al.(2008)** analyzed how hydride battery in transportation, which is a included in technology innovation of Eco-Innovation, will affect European economy and environment through using input-output analysis and Life cycle tools. As a result, it reported that it has effective influence in reduction of carbon dioxide and economic ripple effect according to increase in the number of related employees. **Horbach et al.(2012)** conducted a research on how different causes affect different types of Eco-Innovation that have environmental influences. Independent variables were policy measurement (system, subsidy), voluntary dedication of a business, consumer demand, cost saving, technology towing, information, cooperation, competition condition. Dependent variables were energy efficiency, reduction of greenhouse gas, increase in recycling, decrease in water usage and loss in soil. According to the research, the present government was paying a special attention for companies to lessen pollutants and the most critical motivation of energy and resource

saving was cost cutting. Main causes for Eco-Innovation was role of energy, cost of raw materials and tax. Also, consumer's demand was also an important cause of Eco-Innovation. It found out that they prefer products with environmentally improved results, procedures that can improve efficiency of resources and products which lessen energy consumption and dangerous substances usage. Cheng et al (2014) proceeded Eco-Innovation research targeted for big companies in one developing country, Taiwan. It classified Eco-Innovation into three; product, process and organization, and analyzed their relations and relative influences to outcome of business. Independent variables were three innovations and as for dependent variables competitive advantage and outcome of business were set. According to the result, Eco-Innovation to organization had the biggest influence to the outcome of business and additionally Eco-innovation to product and process came out to result in mediate effect. Also, product innovation showed mediate effect to how process innovation influences business outcome. Meanwhile, when looking at Eco-Innovation research targeted for small businesses which do not have many research results, **Klewitz et al. (2012)** researched the role of mediation for sustainable development of Eco-Innovation and analyzed causes and discouragement of Eco-Innovation. As for independent variables, it set information provision, knowledge, gate-keeping, mediation, standard and commercialization. As for dependent variables, it scored price of a product, danger, sales profit, brand power and innovation. The result showed that prior engagement where public becomes mediation becomes one of the important elements of catalyzing Eco-Innovation, but the effect seemed incomplete for small businesses. It reports that in order to enhance Eco-Innovation of small businesses, various types of support that go along with different scales of Eco-Innovation should be done. **Triguero et al. (2003)** analyzed potential systems that influence different types of Eco-Innovation in European small businesses. Independent variables were 1) aspect of supply (technology management ability, cooperation with research institution and university, accessibility toward exterior information and knowledge, scale, price of resource and energy), 2) aspect of demand (market share, market demand of green product), 3) environmental

policy (current policy, awaiting policy, availability of subsidy, incentive). According to the research result, businesses that successfully conducted collaboration with research institution and university showed active outcomes of all kinds of Eco-Innovation and market demand increase on green product turned out to be a good influence towards all kinds of Eco-Innovation. It found that market share has positive influence only to product innovation and organization innovation whereas process of cutting cost turned out to benefit Eco-Innovation on procedure. **Bocken et al.(2014)** conducted a research on the early stage of Eco-Innovation. The research was done on 42 small businesses in Netherland and conducted in a way to find answers to 6 research question: 1) how did elements that consist of Eco-Innovation manifested in the early stage of Eco-Innovation? 2) what elements consist of progress for sustainability of an environment? 3) What are the causes for Eco-Innovation? 4) What tools and systems were used in order to produce ideas? 5) Who initially participated in Eco-Innovation and what kind of technology was used? 6) What kind of outside partaker interacted with small businesses and how did the interaction proceeded? Small businesses could accommodate unofficial and organized innovation approach in the early stage of Eco-Innovation and it turned out that creative and environmental knowledge was inevitable in the process. When categorizing the researches on Eco-Innovation, there can be largely five categories (Figure 1.8). But the boundary of each research was not clearly ramified and each research was influencing other researches with relevance. First research scale is about definition and classification of Eco-Innovation. It turned out that researches regarding this have been conducted from the early stage of study to present. **Rennings(2000)** introduced terms of Eco-Innovation in his research of reestablishing concepts of Eco-Innovation and described procedure of Eco-Innovation that pursues sustainability in both economic and environmental perspective. **Hellström(2007)** analyzed Eco-Innovation in an established theoretical perspective. It described structure that current innovation can be stabilized, weak points of current innovation and methods to be improved. Also, it argued in Eco-Innovation, gradual process of innovation where hardware and software combine and technology and

social demand agreement is important. **Carrillo-Hermosilla et al.(2010)** developed a framework to analyze various elements that consist of Eco-Innovation (design, user, product service, governance). The selected case studies suggest that Eco-Innovation constitutes several elements that generally belong to some categories. It turned out the elements influence each other and play a significant role in conducting Eco-Innovation. Through this, Eco-Innovation is seen as a new way to create a novel business area, and to do so, various stakeholders in each field should collaborate during the innovation process. **Karakaya et al.(2014)** conducted a research under the topic of spread of Eco-Innovation and according to this established concepts regarding diffusion of Eco-Innovation and analyzed increasing studies on Eco-Innovation through research journals that were categorized yearly. It described that the diffusion of Eco-Innovation led to market hypothesis and derived new trends of study such as sustainable transformation and ecological modernization. With new trends of study, it also argued that the spread of Eco-Innovation will continue even without policy support. It suggested that there should be studies about understanding consumer behaviors and decision making on Eco-Innovation. Second is research regarding specific innovation types in Eco-Innovation. In order to constitute measurement index, it is important to conceptually comprehend specific details of innovation that Eco-Innovation should contain. Based on the studies up to present, types of innovation that should be included when measuring Eco-Innovation are Product Innovation, Process Innovation, Marketing Innovation, Organizational Innovation, Material Flow Innovation and Social Innovation **(OECD and Eurostat, 2005; EIO, 2012)**. The following 〈Table 1.3〉 is each of its contents. **OECD(2005)** included product innovation, process innovation, marketing innovation, organizational innovation in the types of Eco-Innovation whereas **EIO(2012)** stressed the significance of material flow innovation and social innovation and thereby included these two types of innovation into very significant types of Eco-Innovation. As its scope has extended, Eco-Innovation could acquire various environment around companies and interaction between stakeholders. This signifies that material flow is simultaneously considered along with economic activity

and the scope of consideration regarding Eco-Innovation index development and measurement is extended to exterior elements by thinking about intimate interaction between human and nature **(Cheng & Shiu, 2012; Klewitz & Hansen, 2014)**.

〈Table 1.3〉 Type and Content of Innovation

Innovation	Content	Resource
Product Innovation	Refers to characteristic of product or service and purpose of usage notably enhanced, thereby having user friendly functional characteristic such as having technical expertise, changing substance and using integrated software	OECD & Eurostat, (2005:48-51)
Process Innovation	Refers to putting novel or significantly improved intermediate product or exploiting new development method and this accompanies technical, apparatus or software	
Marketing Innovation	Refers to conducting a new marketing strategy that includes new methods such as product design, package, product organization and pricing	
Organizational Innovation	Refers to adopting new organizational composition to organizing working environment and relationship with exterior stakeholder	
Material Flow Innovation	Refers to improved activity in terms of value chain system of substance that can enhance quality of life and lessen usage of resource when considering all kinds of material flow which is exploited, used and discarded	EIO(2012:9)
Social Innovation	Refers to planning value creation and entire change of society; General transformation of society that embraces civil society such as public sector and NGO	

Third research is about deciding cause, ripple effect and mutual relation of Eco-Innovation. Regarding nation-by-nation Eco-Innovation measurement, researches that describe

deciding cause of Eco-Innovation, mutual relation of company's interior and exterior stakeholder and ripple effect provide important reasons for preparing research framework and detailed index. **Kemp & Pearson (2007)** picked regulation, cost cutting, benefits due to commercialization, pressure from community, green spirit and enhancement of company's image as the cause of Eco-Innovation. **Horbach(2005, 2008)** set technological capability and market feature as for demand aspect and picked nation and related company as for supply aspect when talking about deciding cause of Eco-Innovation. **Ganapathy et al.(2014)** reported that bigger the economic ripple effect of one nation's major eco-friendly companies, the higher possibility of imitation of other companies and enthusiasm of Eco-Innovation within themselves, which implied that successful Eco-Innovation of a business can be spread to other Eco-Innovation. According to a survey conducted by Accenture and UN Global Compact, among worldwide 766 businesses CEO, 93% answered that sustainable management is a significant issue for future and 91% agreed that they plan to introduce environmental innovation technology as a part of sustainable management (UN Global Compact & Accenture, 2013). When looking at researches on Corporate Social Responsibility (CSR) as a part of sustainable management, CSR is highly dependent upon philosophy and practice will of Top Management Team including CEO **(Walls et al., 2012).** Companies that try to conduct sustainable management with the lead of CEO try to focus on practice in various environmental managements (Flammer, 2012) and this signifies that there is a high possibility of leading to introduction of new technology and innovation. **Mi Hong Lee (2002)** analyzed that it is not easy for industrial circles to voluntarily conduct environmental innovation and in order to solve this government should lead to construct a social constitution where companies can produce eco-friendly product and service. **Leitner et al.(2010)** conducted a research on the effect of regulation and support to Eco-Innovation. The research showed that the cause for Eco-Innovation is not only governmental regulation but competition among companies in market and technology that contains ripple effect by itself through analyzing the procedure of looking into effects that national environmental regulation have in

innovation. Also, in a previous study, the cause for Eco-Innovation was governmental regulation on environment (Porter and van der Linde, 1995; Kammerer, 2009) and through various case studies abiding by governmental regulation could lead to an opportunity for introducing new technology. (Doran & Ryan, 2012).

〈Table 1.4〉 Mutual relation, deciding cause and ripple effect of Eco-Innovation

Division	Element and area	Content	Reference
Mutual relation element and deciding cause	Government	Related regulation, support, financial system	Porter and van der Linde (1995); Lee(2002); Kemp(2007); Kammerer(2009); Leitner et al.(2010)
	Research institution	Support in technical R&D	Charles(1995) Scarpellini et al.(2012)
	Industry	Industrial system, classification, competition among companies	Ganapathy et al.(2014)
	Company	CEO, vertical hierarchy, organizational system, value chain, investment in worker	Walls et al.(2012); Flammer(2012)
	Consumer	Pressure from community, recognition of image, purchasing green product	Horbach(2005, 2008); Kemp(2007)
Ripple Effect	Economy	Market outcome of green product, variety of technology, procurement of sustainability in industrial system	Doran & Ryan(2012) Sierzchula et al.(2012)
	Society	Creating eco-friendly lifestyle, improvement in quality of life and welfare	Sarkar(2013); Satish et al.(2014)
	Environment	Introduction of recyclable resource, cutting carbon dioxide through green	Dangelico & Pujari(2010)

		technology, improvement in environment	

Doran & Ryan (2012) studied comparison between companies that conducted Eco-Innovation and those without Eco-Innovation and reported positive influence of Eco-Innovation for outcome of businesses. Sarkar (2013) argued that all kind of business activity that endorses Eco-Innovation leads progress in environment-friendly sector and it is a significant action to enhance sustainable development of the world including Europe. Satish et al. (2014) insisted Eco-Innovation could be improved through R&D activity and investment for employees related to innovation and sustainable development could be pursued through Eco-Innovation activity based on empirical study of Indian manufacture industry. Other than that, Sierzchula et al. (2012) described that technological variety could be improved when Eco-Innovation is active based on empirical study on automobile industry and concluded that enough support should be prepared in order to endorse long-term Eco-Innovation. By arranging previous studies in the following table, it suggests related stakeholders and elements to consider as a deciding cause through the process of national unit of revelation of Eco-Innovation. Also, it shows opinions of previous studies by categorizing the fields that Eco-Innovation affects by economic, social and environmental sector.

The fourth is study on measurement of Eco-Innovation. According to recent studies which analyzed Eco-Innovation empirically (EEA 2006; Kemp & Pearson 2007; Huppes et al., 2008; Arundel & Kemp, 2009; Johnstone & Hascic, 2009), Input measures, Intermediate output, Direct measures and Indirect measures are the major measuring standard (Arundel & Kemp, 2009), and this research tried to reflect all of these in detailed index. Each content is shown in <Table 1.5>.

〈Table 1.5〉 Measuring Criteria of Eco-Innovation

Measuring Criteria	Content	Reference
Input measurement	R&D expenditure and as such are mostly included and utilized as main index of innovation in existing innovation study	Coad & Rao(2010); Leipoonen & Helfat(2010)
Intermediate input result measurement	Outcome of innovative inventions such as number of patent and science-related publication are included	Artz 외(2010); Dodgson & Hinze(2000)
Direct measurement	Type or number of service and product which are produced and sold through innovation	Cheng & Shiu(2012)
Indirect measurement	Efficiency of resource usage and environment such as degree of increase of greenhouse gas emission compared to value increase and change in productivity are included	WBCSD(2000); Cheng & Shiu(2012)

The fifth research is about measuring criteria and framework of Eco-Innovation. OECD and Eurostat (205) tried to measure Eco-Innovation by largely categorizing Cost factor, Knowledge factor, Market factor and Institutional factor. Horbach (2008), Bleischwitz et al. (2009) prepared an index that measures Eco-Innovation nation-by-nation through dividing large categories into supply, demand and regulation/policy aspects. EIO (2012) analyzed environmental, innovative, social/economic framework and Eco-Innovation, and based on this showed 16 detailed index under 5 categories of Eco-Innovation inputs, Eco-Innovation activities, Eco-Innovation outputs, Environmental outcomes and Socio-economic outcomes. However, there is no completely settled consensus on development of index for Eco-Innovation measurement in nation unit and it is still progressing. Global Clean tech Innovation Index (Cleantech & World Wide Fund for Nature, WWF), Environmental Performance Index (Yale Center for Environmental Law, YCELP & Center for International Earth Science Information Network, CIESIN), Green Growth Indicator

(OECD) including EIO contain limitation of apprehending Eco-Innovation statically as framework of Input and Output.

Existing study measures input elements such as governmental policy, green technology capacity, investment level and social recognition separately from outcome of Eco-Innovation as an output element (Environmental Performance Index, 2010; EIO Methodology report, 2013; Green Growth Indicator, 2013; Global Cleantech Innovation Index, 2014).

A framework with high application will be created when index measurement is conducted based on the fact that Eco-Innovation revealed by actual business activity does not stand by itself but through interaction between interior and exterior elements. Therefore, it is significant to prepare a framework that can reflect dynamics of Eco-Innovation. Eco-Innovation index measurement by nation unit should be invented through comprehending limitation of Input and Output framework that current Eco-Innovation measurement index possesses and more systematic and dynamic characteristics should be reflected (Triebswetter & Wackerbauer, 2008).

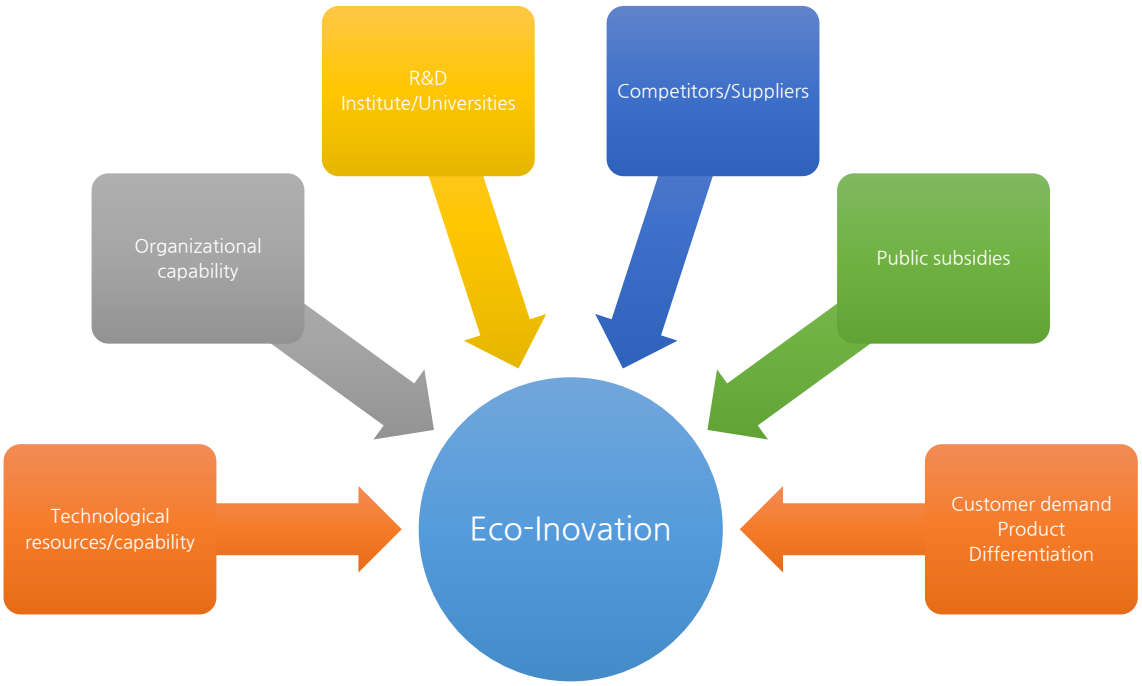
Meanwhile, Eco-Innovation related researches up to now are focusing on manufacture industry of big businesses and those of small businesses and service industry were limited. When practically considering environmental influence, the number of small businesses is much higher than that of big businesses. Also, types of small businesses are much various than big businesses, so the effect on environment of Eco-Innovation will be inadequate without participation of small businesses. Hereupon, there is a significance and great necessity for a more active study on Eco-Innovation of small businesses. The research topics related to Eco-Innovation that should be conducted afterwards are as follows.

First, research on empirical study of outcome of Eco-Innovation among small businesses in not only developed countries but developing nations, and barriers to of Eco-Innovation should be studied. Second, there should be research on capability necessary for small businesses to fulfill the same level of Eco-Innovation as big businesses. Thirdly, current studies on Eco-Innovation are focusing on manufacture such as automobile, chemical and metal, but there should be studies on various industrial sectors and service industry which influences environment. Lastly, as various studies are mentioning, there should be research on interaction among stakeholders (producer, consumer, competitor, NGO, research institute, university and government) in order to conduct Eco-Innovation.

SMEs and Eco-Innovation

SMEs are a heterogenic group with varying fields and sizes and with different standards (employees, sales volume, total earnings) per country, making it difficult to clearly define (Hillary, 2006). In earlier studies, SMEs were defined as an enterprise with 100~500 employees (Ayyagari et al, 2007; Klewitz & Hansen, 2014). SMEs create jobs in various fields and serve as the central axis of both developed and developing countries' economic growth and social formation. SMEs' creativity and variety not only result in the industry's eco-innovation development but as their own beneficiaries of green technology. Like this, the SMEs take an important place in the green technology industry and growth, which are main elements of eco-innovation (OECD, 2010). As each country's awareness towards new environmental policies and sustainable technology development leads to new possibilities of enterprise activity through eco-innovation. The continuously growing economy demands the need for sustainable technology regarding energy and material resources and the efficiency of a systematic solution.

〈Figure 1.10〉 Determinants of Eco-innovation for SMEs



Source: Horbach(2008)

Eco-innovation research since its inception has always been done with the focus on large corporations. Earlier studies done about the relationship between eco-innovation and SMEs reports the following. Jesus & Beartriz (2003) pointed out limited funds, systematic structure, management style, human resource education, environmental management capacity, simple manufacture process, environmental pollution prevention technologies, innovation capacity, and limited outside cooperation as SMEs' eco-innovation impediments. The various implementations of corporation regulations are favored towards larger corporations in relation to SMEs but reports that through developing programs supporting SMEs' environmental management system, continuous environment friendly technology consulting, environment protection management strategy awareness education, technology research to replace current supplies, and sharing philosophies between eco-innovation vitalization personnel can lead to SMEs contributing to eco-innovation vitalization. Moore & Manring (2009) reported that because SMEs can gather and form a large international network, the contribution

towards reducing environmental pollution policies can be bigger than large corporations and sustainable development interest is higher than larger corporations due to having flexible production structures and the ability to focus on specific technologies and markets, leading to more efficient results. Zeng at al. (2011) divided SMEs' eco-innovation improvement factors as government (incentives, regulations, and support), society (local society participation, environment association, and media exposure), market (competition and consumer demands) and corporation (market expansion and profit improvement) studied the effects of the factors in both polluted and non-polluted areas. The region with high pollution showed the government, society and market factors highly affecting environmental results and the region with less pollution had government and market support increasing environmental results. This environmental result increase was also shown to have correlation with the economy's growth. Klewitz et al. (2012) reported that setting up a network for SMEs to receive support on their own is more important than government support policies in order to increase SMEs' eco-innovation. Maria et al. (2014) reported in a study on the difference between eco-innovation and general innovation that a corporation's voluntary eco-innovation accreditation effort is more effective than government aid and that reducing government financial regulations for eco-innovation participating companies had a significant effect on the vitalization of eco-innovation. Klewitz & Hansen (2014) stated that the SMEs' faster ability to change company values due to its leaner structures allowed SMEs to pursue eco-innovation significantly faster than larger corporations. The different systematic structure and specialized ability of SMEs also allowed various attempts at eco-innovation in comparison to larger corporations. Johanna & Erik (2014) reported that the innovative capacity of SMEs can increase through frequent interaction with outsiders (consumer, government and research facilities). These points of view provide a prospect of SMEs being the major engine for eco-innovation development and increase jobs for various fields and vitalize each country's economy. Also in this process, the participation of various local structures, research facilities and universities will provide a new frame for eco-innovation vitalization and contribute towards industry and

area specialized eco-innovation regulation development (Azzone & Noci, 1998; Scarpellini, 2012; Panapanaan et al, 2013; Horbach, 2014).

Eco-innovation is the essence of environmental issues and the future's social demand. It is a method for reducing the environmental impact of both developed and developing countries and achieving economic growth and has special interest in SMEs with various fields and units. SMEs' eco-innovation related research has to be continuoued.

Summary

- Eco-innovation encapsulates varying forms of innovation and not only includes environmental improvement technologies but also non-technological content like process, product and service and new business forms.
- ASEI 2014 improved the current Index by strengthening its eco-innovation index's theoretical backgrounds and applied the index on all 49 member countries suggesting each country group's eco-innovation hindrance factors and provides applicable vitalization solutions.
- Literature analysis of the eco-innovation research trends allows the division of the studies into largely eco-innovation definition and categorization, measurement, cause and hindrance factors, decision factors and specific innovation types and influence and mutual relations analysis research.
- The focus of research is mostly on developed countries and larger corporations but researches focused on SMEs with their important eco-relation activities and influence are necessary.

Chapter 2

Framework & Indicators of ASEI

ASEI eco-innovation measurement framework and index develop is founded with theoretical background through literature review performed on previous research papers and reports. Analysis results show that eco-innovation needs 3 circulative steps of 'basis', which is the execution and adaptation framework level, real private fields' 'execution' level, and the 'adaptation' level that leads to sustainable development results. Unlike current eco-innovation measurement indices that focused on private fields' execution stage, the ASEI index wishes to measure the whole eco-innovation process. The basic stage includes 'eco-innovation capacity', 'eco-innovation support environment', the advance level with 'eco-innovation activities' and the adaptation level including 'eco-innovation performance' with a total of 4 fields (capacity, support environment, activity, performance). 20 indicators were chosen for the real measurement of the 4 fields through earlier research. This chapter describes start of the measurement indicator evaluation and update proposal to the framework deduction and the final stage of indicators being arranged.

Eco-Innovation Measurement Reform

Eco-innovation's quantitative analysis has the benefits of making relative comparisons between national indices and help discover eco-innovation promoting conditions and understand how eco-innovation can lead to a sustainable economic development. Specifically Arundel & Kemp (2009) explained the benefits of eco-innovation quantitative analysis in the following 3 points.

- Regulation makers can check the overall eco-innovation trend and provide literature to create appropriate policies and encourage eco-innovation to related people by acknowledging the various economic, industrial, entrepreneurial etc. which are benefits of eco-innovation
- Comparisons between eco-innovation research results and economic growth allow the separation and understanding of environment pollution and economic growth allowing countries to be assessed as either striving only for economic growth or achieving both economic growth and reduction of pollution.
- Consumers can compare the environmental results of their life style (product consumption and use etc.) and become aware of sustainable consumption.

Eco-innovation is a concept containing our society's desire for the transition to a sustainable development. Eco-innovation's each country index allowed the overall analysis of each country's efforts towards sustainable development and encourages each country's concerned personnel's effort towards sustainable development. ASEI eco-innovation index brings sustainable development achievement one step closer by selecting measurement ranges through structured preliminary research and by setting an appropriate framework.

ASEI (ASEM Eco-Innovation Index) Index Improvement

This chapter covers how the index should be developed in order to measure the eco-innovation of all the 49 countries of ASEM following up on the 2012, 2013 ASEI Index development projects. The previous project (2013 1st improvement project) had 4 sections (capacity, support environment, activity, performance) and 60 of 1st indicators under the sections and proposed 20 indicators after going through the Analytic Hierarchy Process (AHP). However, there were limitations with the 4 sections deduction framework and indicator selection validity process. This study now gave theoretical evidence for the

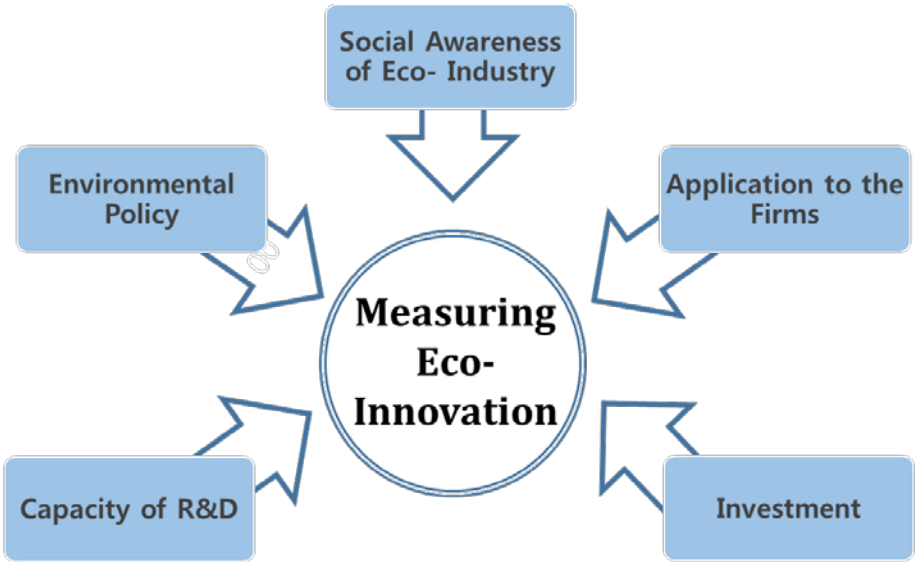
deduced framework and selected indicators and updated the definition of the framework and indicators considering the innovation's content and meaning, along with their mutual relation and eco-innovation expedite and hindrance components.

Also in 2013's ASEI 1st improvement project, 20 indicators were chosen to measure index of 25 countries among all the ASEM countries, and went through the screening process of improving and expanding the indicators to cover all 49 ASEM countries in 2014. In 2014's ASEI's framework 4 sections and 20 detailed indicators were chosen. The first section is eco-innovation capacity that reflects the driving force and potential for the sustainable development of eco-innovation. The second section is eco-innovation support environment, measuring the overall corporate and economic Influences from eco-innovation support regulations. The third sector is the ability to qualitatively measure real eco-innovation activities and the 4th sector is eco-innovation performance indicating the health of eco-innovation's sustainable development.

Current eco-innovation measurement related studies[1] were done with the limitation of capturing statistically meaningful eco-innovation status. Eco-innovation is not an input-output one way process but a complex process with regulations, thus surrounding environment and related personnel all having mutual relations with one another affecting eco-innovation. Therefore the creation of appropriate framework to capture the dynamic nature of eco-innovation was necessary. 〈Figure 2.1〉 summarizes the current eco-innovation measurement process of an input-output analysis model.

[1] Global Competitiveness Index (World Economic Forum), World Competitiveness yearbook (International Institute for Management Development), Global Innovation Index (INSEAD), Global Cleantech Innovation Index (Cleantech, WWF), Environmental Performance Index (YCELP, CIESIN), Green Growth Indicator (OECD)

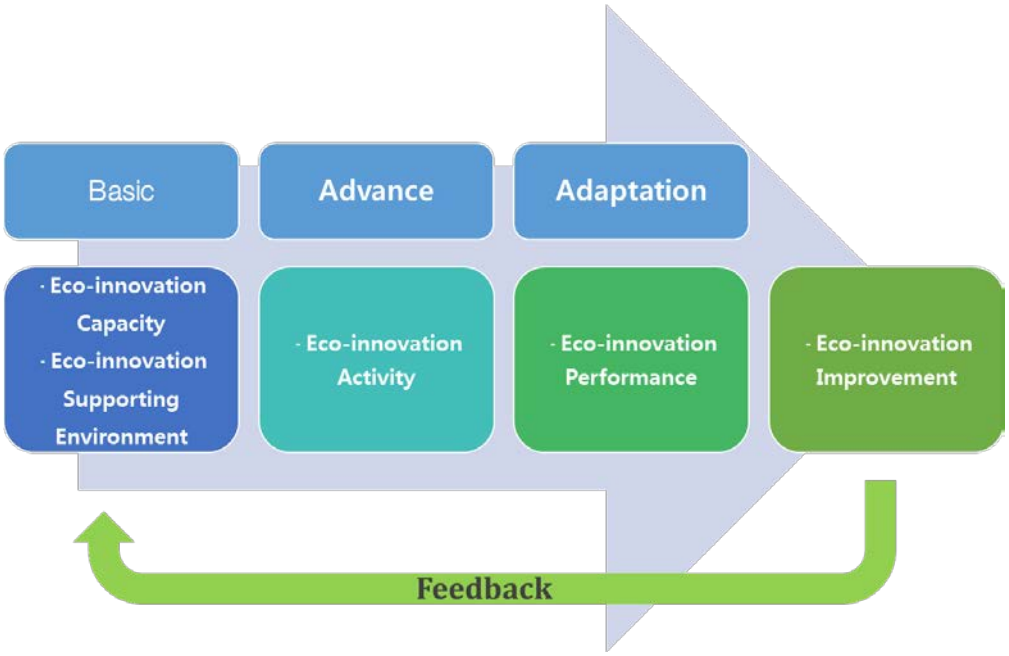
〈Figure 2.1〉 Input-Output model of existing eco-innovation measurement



Thus the ASEI framework's goal is to focus on the dynamic process of eco-innovation and to create an improved framework with current research and analysis and its derived indicators in mind. First the ASEI framework set the 'capacity' and 'support environment as the basic level. The basic level's 'eco-innovation capacity and support environment' influences both the advance and adaptation stage. The following stage after basic is advance stage, where knowledge and experience from the first stage is put into action. Without the basic activities of 'capacity' and 'support environment', it shows the difficulty in putting the activities into motion. The third eco-innovation creation stage is adaptation showing the eco-innovation's performance that shows the successful project from the numerous activities in the 2nd stage. Once these stages have been finished and eco-innovation improvement has been achieved, it leads to a virtuous cycle of improving capacity and support environment. However because the amount of resources the individual countries have are different, and it is impossible to compare the same amount of input and output thus making it necessary for incorporating a threshold as each country's situation and environment difference to exist between the basic stage and the advanced / adaptation stage. This states that each country will experience a different efficiency limit depending on environment related regulations and policies, national

general capacity, and support environment standards increasing chance of the rate of return for eco-innovation investment. Also eco-innovation's unit of analysis is a country and as each country has a different development rate, these variables are hard to compare absolutely so needs to be relatively compared according to each country's development paths. The below drawing is ASEI's framework's analysis frame and it is based off literature analysis of current researches and reports examined in the papers.

〈Figure 2.2〉 Framework for quantitative analysis of ASEI



Eco-innovation's dynamic relationship, cycle oriented around the transition point, individual country development paths etc. present useful evidence for European and Asian countries' eco-innovation measurement and analysis along with solutions for improvement. The ASEI Framework attempted to specify the above discussion's stages and each section's detailed indicators. Indicators for each sector usually referenced current eco-innovation related reports' variables. Also while trying to maintain the eco-innovation related research paper's goal of quality eco-innovation analysis and depth, detailed indicators were made in attempt to match this paper's goal and ASEI's framework. Each section's detailed indicators and the specific content is indicated in 〈Table 2.1〉.

〈Table 2.1〉 ASEM Eco-Innovation Indicators

Stage	Criteria	Indicators
Foundation	1. Eco-innovation Capacity	1.1 Country's Economic Competitiveness 1.2 Country's General Innovation Capacity 1.3 Green Technology R&D Institution Capacity 1.4 Green Technology possessed/acquired Firms 1.5 Awareness of Sustainability Management
	2. Eco-innovation Supporting Environment	2.1 Government's R&D expenditure in Green Industry 2.2 Implementation of Environmental Regulations 2.3 Maturity of Investment Setting for Green Technology Industry 2.4 Investment Scale of Green Technology SMEs
Implement	3. Eco-innovation Activities	3.1 Commercialization Level of Green Technology 3.2 Firms' Participation on Environmental Management System 3.3 Economic Influence of Leading Environmentally Responsive Firms 3.4 Green Patents 3.5 Activeness of Renewable Energy Utilization
Effect	4. Eco-innovation Performance	4.1 Level of Environmental Impact on Society 4.2 CO2 Emission Intensity 4.3 Country's Energy Sustainability Level 4.4 Water Consumption Intensity 4.5 Jobs in Green Technology Industry 4.6 Green Industry Market Size

Eco-innovation Capacity

〈Table 2.2〉 Eco-innovation Capacity

Level	Field	Subsection	Content
Basis	Eco-innovation Capacity	Indicator	1.1 Country's Economic Competitiveness 1.2 Country's General Innovation Capacity 1.3 Green Technology R&D Institution Capacity 1.4 Green Technology possessed/acquired Firms 1.5 Awareness of Sustainability Management
		Analysis Subject and Scope	National level eco-innovation trigger elements, personnel concerned, social components, innovation abilities and capacity presented in existing research
		Importance	Eco-innovation is a driving force of numerous new business and innovation opportunities (del Río, Carrillo-Hermosilla, & Könnölä, 2010; Rennings, 2000). Eco-innovation capacity looks at a country's eco-innovation related capacity on the basis level of eco-innovation execution possibilities. The eco-innovation potential that each country holds can change future policy designs, and even change the whole eco-innovation direction, and thus its evaluation (del Río et al., 2010). This makes it a good indicator for the extent of future eco-innovation development.

Eco-innovation capacity is measured through 1.1 Country's Economic Competitiveness, 1.2 Country's General Innovation Capacity, 1.3 Green Technology R&D Institution Capacity, 1.4 Green Technology possessed/acquired Firms, 1.5 Awareness of Sustainability Management and represent current eco-innovation activity abilities or future potential.

Importance

Eco-innovation is a driving force of numerous new business and innovation opportunities (del Río, Carrillo-Hermosilla, & Könnölä, 2010; Rennings, 2000). Eco-innovation capacity looks at a country's eco-innovation related capacity on the basis level of eco-innovation execution possibilities. The eco-innovation potential that each country holds can change future policy designs, and even change the whole eco-innovation direction, and thus its evaluation (del Río et al., 2010). This makes it a good indicator for the extent of future eco-innovation development.

Analysis Subject and Scope

To provide the eco-innovation capacity indicators, this research analyzed the innovative abilities and potential, innovation elements, persons concerned and social formation elements according to broad eco-innovation standards. Eco-innovation capacity was chosen as a field because eco-innovation capacity supports critical elements such as the social/economic framework and innovation environment when analyzing overall eco-innovation. Thus the process of assessing eco-innovation capacity focuses on each country's eco-innovation and related current abilities and potential. The indicator and considerations to measure eco-innovation capabilities are listed below.

Eco-innovation capacity includes product, process, marketing, structural and social innovation, material flow eco-innovation, etc. as part of capacity that can be innovated on itself while being part of eco-innovation. Eco-innovation capacity covers individual nations' information that influence eco-innovations, shown by existing researches, such as social/economic framework, innovation environment, etc. Current EIO or OECD reports with information assessed with social/economic framework and innovation environment is regarded as included in the 'eco-innovation capacity' field under the ASEI framework.

Indicator Selection

Eco-innovation capabilities first indicator is a country's economic competitiveness. After analysis of national level organizations, infrastructures, macro-economic environment, health, education, commodity market efficiency, labor market efficiency, financial market efficiency, technological sustainment, market size, management philosophy, innovation etc. which are announced in the World Economic Forum's Global Competitiveness Index (GCI). Eco-innovation capacity analyzing each country's current and potential capacity makes it appropriate to borrow the WEF's CGI. For example, Brunnermeier & Cohen (2003) discovered that a country with a higher standard of competitiveness was capable of more active eco-innovation activities and explained the importance of overall country's economic competitiveness as it influences eco-innovation. This index's data was analyzed with each country's various capacity that compose eco-innovation and allows understanding of the respective country's overall social and economic innovation environments. The suitability and relevance of using this data for eco-innovation assessment is high because it matches the flow of current researches measuring eco-innovation by classification of social, economic innovation frameworks and innovation environments.

The second eco-innovation capacity indicator is a country's general innovation capacity. The indicators for National Standard Innovation are based on INSEAD's Global Innovation Index (GII). According to Baumol (2002), innovations are a driving force for additional innovations and thus the driving force of eco-innovation and capacity can be deducted from general innovation measurements. Thus assessing the country's general innovation capacity field can provide a basis for elementary causes of eco-innovation capacity (Cooke, 2011; Grossman, 1993). If a country's economic competitiveness increase, potential is found through examining the groundwork for eco-innovation and a country's standard capacity for innovation, as the country's general innovation capacity

takes national level 'general innovation capacity' into account leading to eco-innovation. The GII is used to calculate the country's general innovation capacity as it covers general innovation. The GII derives a country's knowledge, technology resource, and creative achievements etc. as results from input data such as institutions, human resources and research areas.

The third index for eco-innovation capacity is the green technology R&D institution capacity. Scarpellini et al. (2012) emphasized the importance of university labs or technology centers' R&D activity capacity as they can expedite eco-innovation from companies, especially small and medium enterprises (SME). Charles (1995) showed R&D influencing not only its field's growth, but society as a whole, and further researches emphasized the importance of R&D capacity. ASEI research showed that a country's R&D capacity related to green technology is an important element of influence for overall eco-innovation and is added to the indicator to assess eco-innovation capacity.

Following that, the eco-innovation capacity is assessed by analyzing green technology possessed/acquired by firms. The UK government's report "Building a low carbon economy: unlocking innovation and skills" (2008) states that innovative green technologies will lead the economic growth in the 21st century and offers a new driving force of economic growth to countries. Bartlett et al. (2010) finds that green technologies are an important factor for eco-innovation, so the amount of green technologies a country possess is an important indicator for the country's eco-innovation capacity. To quantitatively measure the amount of green technologies, this ASEI research found the number of firms holding at least one green technology per country and attempted to assess each country's eco-innovation capacity.

If a country's overall capacity and research facilities'/companies' green technologies were measured in earlier specific indicators to assess the eco-innovation capacity, the following procedure of taking a look at the awareness of sustainability management, the direct basis for eco-innovation from a company's point of view is very important. Sustainable management is a new company management strategy that promises not only financial

results but also maximizing environmental and social results, fulfilling the responsibilities as a component of society. According to Accenture and UNGC (UN Global Compact[2])'s joint poll filled out by 766 CEOs 93% of respondents answered that sustainable management is a very important future issue and 91% of CEOs stated that they were planning on implementing innovative environmental technologies as a part of sustainable management. Companies that recognize and fulfill sustainable management focus mostly on carrying out environmental management (Flammer, 2012) and leads to a high chance of new technological implementations and innovation.

Supporting Environment of Eco-innovation

〈Table 2.3〉 Eco-Innovation Support Environment

Level	Field	Subsection	Content
Basis	Eco-Innovation Support Environment	Indicator	2.1 Government's R&D expenditure in Green Industry 2.2 Implementation of Environmental Regulations 2.3 Maturity of Investment Setting for Green Technology Industry 2.4 Investment Scale of Green Technology SMEs
		Analysis Subject and Scope	Large corporation, SME included economy, overall industry's eco-innovation resource supply ability, green technology support capabilities(environment-friendly industry included), company responses toward regulations and support, innovative mutual relations

[2] The corporate sustainability initiative UN Global Compact, a branch under UN, have numerous companies realizing the importance of sustainable development and continue to voluntarily participate. Corporations joining UNGC must announce their acknowledgement of the importance of sustainable development and promise to fulfill the implementation of the ten UNGC principals.

		Importance	Government support expediting company activities related to eco-innovation is obvious and regulations also encourage R&D activities resulting in earning profits through innovation. (Hart, 2004; Popp, 2005; Rhothfels, 2002) It is a fact that eco-innovation support, represented by government support and regulation, can increase the chance of a win-win relation with eco-innovative companies (Rhothfels, 2002). This makes it essential to figure out the eco-innovation support environment.

Eco-innovation support environment indicators measured by 2.1 Government's R&D expenditure in Green Industry, 2.2 Implementation of Environmental Regulations, 2.3 Maturity of Investment Setting for Green Technology Industry, 2.4 Investment Scale of Green Technology SMEs etc. are incentives for performing eco-innovation and maximizing its capabilities.

Importance

Even with an abundance of eco-innovation capacity, it is difficult for a country to maximize its capacity without strong government centered eco-innovation support. This is because it is difficult to anticipate the spread and vitalize eco-innovation in a standalone market. It is important to measure eco-innovation capacity and support levels considering its influence in eco-innovation activities and results. Government support leading to the expedition of company activities related to eco-innovation is obvious and regulations also encourage R&D activities resulting in earning profits through innovation (Hart, 2004; Popp, 2005; Rhothfels, 2002). It is a fact that eco-innovation support, represented by government support and regulation, can increase the chance of a win-win relation with eco-innovative companies (Rhothfels, 2002), making it essential to figure out the eco-innovation support environment.

Analysis Subject and Scope

Considering how government regulations regarding environmental issues can be the driving force behind company innovation in eco-innovation, the eco-innovation support environment field attempts to include both government eco-innovation related support and company responses toward environment issue related regulations. Also support is classified as overall economy Green R&D, investment towards green technology R&D and investments toward SMEs handling green technology and relying on government support. Dividing these contents will allow detailed analysis on the influence that main actors fulfilling eco-innovation receive. The indicators above were formed with consideration of the previous context. However to assess the eco-innovation support environment with more detail, the examination of government activity and qualitative analysis is needed. This ASEI study used specific indexes' data from Demirel & Kesidou's (2011) qualitative analysis, and to do deeper analysis, researched and analyzed 49 countries' eco-innovation related regulative structures with the detailed content written in a separate chapter.

Indicator Selection

This study included the government's R&D expenditure in green industry first to qualitatively assess eco-innovation support. Government's R&D expenditure in green industry per country is based off of OECD's statistical data, being an overarching indicator for assessing a country's eco-innovation support. Considering a specific field's R&D government expenditure is criterion for the country's interest in that field (Scarpellini, Aranda, Aranda, Llera, & Marco, 2012), and a high level of R&D investment result in the specific field's innovation and growth (Charles, 1995), making each country's government's R&D expenditure in green industry.

Next is the indicator for implementation of environmental regulations, the assessment on how much regulated companies adhere to government regulations. Many scholars argue that government regulation regarding environment is the main driving force behind eco-

innovation (Porter and van der Linde, 1995; Kammerer, 2009). Specifically, cases where following government regulations leade companies to implement new technologies have been documented (Doran & Ryan, 2012). Considering these facts, this ASEI study used an index containing the assessment of the number of companies adhering to each country's government regulations to measure the adherence of environmental regulations.

The next specific index is the maturity of investment setting for green technology Industry. As green technology has a direct connection to eco-innovation activity (Bartlett & Trifilova, 2010) it was inferred that having a high level of green technology industry government support would lead to more efficient eco-innovation. This ASEI study used that as evidence for setting the maturity of investment for green technology Industry as an indicator of measuring the eco-innovation support environment.

A majority of innovative green technologies that companies use are outsourced to SMEs that produce green technology and these SMEs' capabilities are the main driving force behind achieving eco-innovation. However, because these SMEs lack the finances of big corporations, investment towards these green technology SMEs are needed to achieve eco-innovation. Thus the investment scale of SMEs that are the actual driving force of innovative green technologies, and it is a good criterion for judging a country's interest in accomplishing eco-innovation. Thus this AESI study set the indicators as government's R&D expenditure in green industry, implementation of environmental regulations, maturity of investment setting for green technology industry and investment scale of green technology SMEs

Eco-Innovation Activities

〈Table 2.4〉 Eco-Innovation Activities

Level	Field	Subsection	Content
Execution	3. Eco-Innovation Activities	Indicator	3.1 Commercialization Level of Green Technology 3.2 Firms' Participation on Environmental Management System 3.3 Economic Influence of Leading Environmentally Responsive Firms 3.4 Green Patents 3.5 Activeness of Renewable Energy Utilization
		Analysis Subject and Scope	Company eco-innovation promises and fulfillment, overall economy's environmental friendly resource usage
		Importance	This study's measurement of eco-innovation activity indicators are overall firms' participation on environmental management system, activeness of renewable energy utilization including green technology, patents etc. are done to capture the technological advances and structure changes that ultimately lead to sustainable development. (Jaffe et al., 2002; Popp et al., 2009; Popp, 2010).

Eco-innovation activities is the actual company eco-innovation fulfillment measured by the indicators of 3.1 Commercialization Level of Green Technology, 3.2 Firms' Participation on Environmental Management System, 3.3 Economic Influence of Leading Environmentally Responsive Firms, 3.4 Green Patents and 3.5 Activeness of Renewable Energy Utilization.

Importance

Eco-Innovation activity is considered the execution level in the ASEI eco-innovation qualitative analysis framework and captures the actual companies' eco-innovation activities based off of the examined basis levels of eco-innovation capacity and support

environment. Capturing not only each country's eco-innovation overall standard of progress, but also the economic influence of leading environmentally responsive firms have is an essential procedure for this study's purpose of analyzing each country's eco-innovation. This study's measurement of eco-innovation activity indicators are overall firms' participation on environmental management system, activeness of renewable energy utilization including green technology, patents etc. which are done to capture the technological advances and structure changes that ultimately lead to sustainable development. (Jaffe et al., 2002; Popp et al., 2009; Popp, 2010).

Analysis Subject and Scope

Technological advancement and eco-innovation activities from companies are necessary to solve environmental issues and achieve the ultimate goal of sustainable development (Marin, 2014). Analysis subjects under the field of eco-innovation activity are companies' environmental activity, incorporating new management plans as active responses to environment regulations, and actually developed green technology levels. Current studies assessing Eco-innovation also set indicators related to eco-innovation activities and focus on green technology advancements. Setting the previously examined eco-innovation basis level capacity and support environment as a foundation, this study captures the overall companies' environmental management participation level and the amount of green patents per country taking the advancement and progress of technology into consideration, along with whether actual commercialization of the green technologies happened or not. Additionally, capturing the activeness of renewable energy utilization in private and public sectors and overall economy allows the measurement of material flow related to environmentally friendly resources usage and evaluate the economic influence of leading environmentally responsive firms, assessing each country's economy in close relationship with eco-innovation. A company's self-centered technological progress, environment management, material flow innovation and economic influence of

environmentally responsive firms penetrating the overall economy are what this eco-innovation activity field attempts to cover.

Indicator Selection

Companies trying to utilize green technology in their production and commercialization are an activity that is directly expected by the eco-innovation activity field. As it is a green technology centered micro study of eco-innovation, there ASEI study included it in the eco-innovation activity sector and considered it the main act of companies partaking in eco-innovation. Seeing the progress of green technology and how far they succeeded in commercializing the technology can be used as evidence on the standard of eco-innovation activity. It can also be an indicator for the performance of eco-innovation including future green technology jobs or green industry market size. that influence the overall economy (Bartlett & Trifilova, 2010).

In addition to this, this study set an indicator for each country's firms' participation on environmental management system. Various research (Wagner, 2007) shows that companies that are pro-active regarding environmental management are also active in eco-innovation activities and as environmental management defines the overall company management strategy of developing and implementing green technology, it has to be done in conjunction with counting the number of green technologies. This study has hence set separate indicators for green patents and commercialization as well as a firms' participation on environmental management system.

Also activeness of renewable energy utilization is added as a indicator. Assessing each country's activeness of renewable energy utilization is an important process for evaluating the country's material flow related innovation achievement. It is also an important analysis index for each country's decrease in reliance upon fossil fuel, the main cause of CO2 emissions. As resource usage can lead to various environment quality decreases, and as the problem of CO2 emissions specifically can be improved through the usage of

renewable energy, it is important to separate the activeness of renewable energy utilization.

The last indicator includes examining each country's economic influence of leading environmentally responsive firms. Examining this shows how much the country's industry and overall economy is currently intertwined and has a complementary relationship with environmental friendly management and eco-innovation. It also allows the direct inspection of how much eco-innovation is carried out in the actual economy. Also the bigger the economic influence of leading environmentally responsive firms, surrounding companies are also likely to compete with environmentally friendly technologies and imitate eco-innovation activities allowing speculation of potential eco-innovation activity trends.

Eco-Innovation Performance

〈Table 2.5〉 Eco-Innovation Performance

Level	Field	Subsection	Content
Adaptation	4. Eco-Innovation Performance	Indicator	4.1 Level of Environmental Impact on Society 4.2 CO2 Emission Intensity 4.3 Country's Energy Sustainability Level 4.4 Water Consumption Intensity 4.5 Jobs in Green Technology Industry 4.6 Green Industry Market Size
		Analysis Subject and Scope	Economic, social, environmental results through eco-innovation practice
		Importance	As eco-innovation has the goal of improving environmental quality decline and reducing various concerns (Rennings, 2000; Wagner & Llerena, 2011), inspecting the progress is the ultimate reason for analyzing the eco-innovation of each country

Eco-innovation results are measured with specific indexes 4.1 Level of Environmental Impact on Society, 4.2 CO2 Emission Intensity, 4.3 Country's Energy Sustainability Level, 4.4 Water Consumption Intensity, 4.5 Jobs in Green Technology Industry , 4.6 Green Industry Market Size etc. and define the direct and indirect results of eco-innovation activities and adaptation of eco-innovation.

Importance

The measurements of the eco-innovation results section is a very important activity of assessing the achievement of sustainable development, the ultimate goal of eco-innovation, accomplished through various eco-innovation activities. As eco-innovation has the goal of improving environmental quality decline and reducing various concerns (Rennings, 2000; Wagner & Llerena, 2011), inspecting progress is the ultimate reason for analyzing the eco-innovation of each country.

Analysis Subject and Scope

If the eco-innovation base infrastructure and background, and the eco-innovation activity status was assessed, through the measurements of indicators of earlier fields of eco-innovation capacity, support environment, activities, this eco-innovation results field will assess the economic, social and environmental influences resulted by eco-innovation activity. The attempt to separate results achieved from eco-innovation economy, social, and environmental areas has become important evidence for Triple Bottom Line (TBL) (Colbert, 2007; Chang & Ahn, 2012), a sustainable progress measurement tool. Many economic, social, environmental results will be influenced by eco-innovation progress but qualifying all those are limited, so this ASEI study takes existing studies' eco-innovation influences and set responding indicators to encapsulate all of the economic, social, and environmental effects.

Indicator Selection

By setting a level of environmental impact on society indicator, the environmental impact of eco-innovation practices that our society members feel can be assessed. Considering an study that argues that a company's surrounding personnel's' profits can be increased through companies' social responsibility management including environmental management, level of environmental impact on society measurement holds a large importance as it is an index confirming that eco-innovation practices lead to righteous social results. As there are studies stating that an important goal for eco-innovation is the improvement in quality of life (Dangelico & Pujari, 2010), it further is evidence to support the selection of this indicator.

CO2 emission intensity, country's energy sustainability level, water consumption Intensity measurement indicators allow the assessment of how helpful eco-innovation activities were for environmental issues such as climate change and resource circulation and usage. The 2012 EIO report also includes C02 emission intensity, energy production and water resource production intensity when assessing the environmental outcomes field. This ASEI study also includes part of EIO report's results in the environmental result section out of the economic, social, and environment results.

Jobs in green technology industry and green industry market size reflect economic, social effects through practicing eco-innovation. During the process of measuring the green industry market size, it is possible to assess the economic growth from eco-innovation related activities and each country's eco-innovation interest. Through the index of measuring jobs in the green technology industry, it is possible to assess the amount of jobs created by eco-innovation. However, it is also possible to examine each industry's employment rate and deduct which industry had the most maximized job creation effect and which industry has more potential for eco-innovation development. It is also possible to assess the distribution of economic efficiencies to society members and the indicator can be expanded into social results.

This study presents a framework of basis, execution, adaptation levels and below 4 fields of capacity, support environment, activity and results along with 20 indicators and their

theoretical validities. Out of the 20 indicators, the lack of data covering all the 49 ASEM countries led to only 12 indicators being measured when performing actual quantitative analysis. Other assessments were supplemented with qualitative analysis.

Summary

- Eco-innovation's quantitative analysis has the benefits of making relative comparisons between national indexes and help discover eco-innovation promoting conditions and also allow understanding of how eco-innovation can help a sustainable economic development.
- In 2014's 2nd ASEI index improvement project, the last project's 20 key indicators' theoretical evidence was presented along with a framework differentiating it from other miscellaneous measurement indexes.
- Identical to the current index, 4 criteria and 20 key indicators were presented but the lack of data covering all 49 ASEM countries led to 12 indicators being utilized.

〈Table 2.2〉 Eco-innovation index indicators and data collection

Step	Category	Indicators	Research	Obtained data	Data source (year)	Data formation
Basic	Capacity	Nation's Economic Competitiveness	Grossman (1993) Baumol, 2002,	Global Competitiveness Index (GCI)	World Economic Forum (2014)	Composite Index
		Nation's General Innovation Capacity	Brunnermeier & Cohen, 2003; Cooke, 2011	Global Innovation Index (GII)	INSEAD (2014)	Composite Index
		Green Technology R&D Institution Capacity	Charles, 1995; Scarpellini et al., 2012	-	-	-
		Green Technology possessed/acquired Enterprises	Ganapathy et al, 2014	-	-	-
		Awareness of Sustainability Management	Walls et al, 2012; Flammer, 2012	UN Global Compact (UNGC) Business Sector participants	UNGC (2014)	Number of participating enterprise
	Supporting Environment	Government's R&D expenditure in Green Industry	Scarpellini et al, 2012	OECD Statics	OECD (2011)	Size of expenditure
		Implementation of Environmental Regulations	Porter & van der Linde, 1995; Kammerer, 2009; Doran & Ryan, 2012	WEF Executive Opinion Survey	World Economic Forum (2014)	Composite Index
		Maturity of Investment Setting for Green Technology Industry	Bartlett & Trifilova, 2010	-	-	-
		Investment Scale of Green Technology SMEs	Jesus& Beartriz, 2003	-	-	-
Advance	Activities	Commercialization Level of Green Technology	Jaffe et al, 2002;	-	-	-

		Enterprises' Participation on Environmental Management System	Horbach, 2005; 2008	ISO 14001 environmental certificates	IMF (2013)	Number of participating enterprise
		Economic Influence of Leading Environmentally Responsive Enterprises	Wagner, 2007	World's Greenest Companies	Trucost [News Week (2014)	Amount of annual sales
		Green Patents	Popp, 2010	OECD Environmental technology patent statistics	OECD (2012)	Number of patent
		Activeness of Renewable Energy Utilization	EIO, 2012	-	-	-
Adaptation	Performance	Level of Environmental Impact on Society	Colbert,2007; Dangelico &Pujari, 2010;	EPI (Environmental Performance index)	EPI (2014)	Composite Index
		CO_2 Emission Intensity	EIO, 2012	Key World Energy STATISTICS	International Energy Agency (2013)	Amount of Carbon dioxide generated
		Country's Energy Sustainability Level	EIO, 2012	ESI(Energy Sustainability Index)	World Energy Council (2013)	Composite Index
		Water Consumption Intensity	EIO, 2012	LCEGS (Low Carbon and Environmental Goods & Services) Country Market Size(2011-12)	UK Department for Business Innovation & Skills (2011)	Green Industry total sales
		Jobs in Green Technology Industry	Freeman, 1982; Barnett & Salomon, 2012	-	-	-
		Green Industry Market Size	Bartlett & Trifilova, 2010	-	-	-

Chapter 3

ASEM Eco-Innovation Index Result

Scoring the ASEM eco-innovation indicators is performed through the theoretical review, data collection and data imputation. ASEI is calculated after adopting min-max standardization method and equal weighting method in order to compare every ASEM member country in equal level<Table 3.1>.

<Table 3.1> ASEM Eco-Innovation Index Result

COUNTRY	CAPACITY	ENVIRONMENT	ACTIVITY	PERFORMANCE
Australia	50.13	72.41	12.38	46.82
Austria	49.31	53.96	13.84	45.81
Bangladesh	8.11	25.47	7.68	6.45
Belgium	49.57	51.35	8.92	37.44
Brunei Darussalam	32.90	47.04	17.40	37.18
Bulgaria	29.34	35.89	32.90	36.91
Cambodia	15.81	30.01	4.67	8.97
China	44.36	46.18	83.37	54.13
Cyprus	34.91	40.15	9.63	29.29
Czech Republic	34.23	36.34	35.81	43.91
Denmark	60.65	51.44	22.86	45.55
Estonia	40.57	77.96	32.80	39.54
Finland	60.76	52.35	18.24	41.83
France	72.30	41.10	41.34	45.91
Germany	63.33	61.58	40.45	52.75
Greece	21.81	14.85	10.55	36.27
Hungary	32.23	30.43	22.32	36.86
India	27.96	38.03	16.34	26.64
Indonesia	25.05	36.41	6.70	27.78
Ireland	49.97	40.07	8.80	38.14
Italy	38.01	41.13	35.55	41.82
Japan	57.62	44.45	61.34	50.78
Korea	51.80	44.04	34.86	33.04
Lao PDR	22.28	32.79	13.90	18.79
Latvia	33.00	40.94	16.79	31.93

Lithuania	31.28	41.95	26.12	30.95
Luxembourg	51.50	51.46	6.65	42.34
Malaysia	43.83	50.40	11.13	36.34
Malta	39.28	43.65	10.37	28.89
Mongolia	16.77	25.86	5.42	38.15
Myanmar	2.10	16.70	0.00	3.84
Netherlands	61.44	45.86	20.49	43.95
New Zealand	49.75	55.43	10.16	43.34
Norway	55.81	61.25	11.50	43.58
Pakistan	3.95	20.05	10.50	14.78
Philippines	20.93	34.69	6.47	23.18
Poland	31.23	39.59	9.85	37.38
Portugal	34.09	44.46	15.60	38.85
Romania	25.53	31.88	57.34	27.68
Russian Federation	25.55	36.98	14.22	41.16
Singapore	61.59	64.21	14.55	38.17
Slovakia	26.68	29.79	26.92	40.49
Slovenia	32.66	44.57	18.86	39.54
Spain	71.73	57.28	42.42	49.39
Sweden	64.63	52.23	28.30	45.70
Switzerland	68.68	64.13	32.02	50.78
Thailand	29.63	40.02	14.48	27.48
United Kingdom	64.80	59.21	61.70	51.52
Vietnam	22.23	32.01	8.49	24.07

Analysis of the results

Eco-innovation capacity shows a range from minimum value 2.10 (Myanmar) to maximum value 72.30 (France). Mean is 39.63 and standard deviation is 18.03. Eco-innovation supporting environment shows a range from minimum value 14.85 (Greece) to maximum value 77.96 (Estonia). Mean value is 43.47 and standard deviation value is 13.42. Eco-innovation activity shows a range from minimum 0.00 (Myanmar) to maximum 70.34 (Japan). Mean is 20.34 and standard deviationis 17.79. Eco-innovation performance shows a range from minimum value 3.84 (Myanmar) to maximum 54.13 (China). Mean

is 36.25 and standard deviation is 11.67. Descriptive statistics of ASEM eco-innovation criteria and indicators are presented in 〈Table 3.2〉 and 〈Table 3.3〉.

〈Table 3.2〉 Descriptive Statistics of ASEM Eco-innovation criteria

Variable		Obs	Mean	Std. Dev.	Min	Max
ASEI	Eco-innovation Capacity	49.00	39.63	18.03	2.10	72.30
	Eco-innovation Supporting Env.	49.00	43.47	13.43	14.85	77.96
	Eco-innovation Activities	49.00	20.34	17.80	0.00	70.34
	Eco-innovation Performance	49.00	36.25	11.67	3.84	54.13

〈Table 3.3〉 Descriptive Statistics of ASEM Eco-innovation Indicators

Variable		Obs	Mean	Std. Dev.	Min	Max
Capacity	Country's Economic Competitiveness	49	4.6	0.6	3.2	5.7
	Country's General Innovation Capacity	49	46.1	10.7	23.3	66.6
	Awareness of Sustainability Management	49	104.2	221.4	0.0	1256.0
Supporting Env.	Government's R&D expenditure in Green Industry	49	2.7	0.9	0.9	6.7
	Implementation of Environmental Regulations	49	4.9	1.0	2.6	6.7
Activities	Firms' Participation on Environmental Management System	49	35.5	28.7	0.3	100.0
	Economic Influence of Leading Environmentally Responsive Firms	49	338884.9	523180.4	0.4	1892316.0
	Green Patents	49	1358.8	3310.2	0.0	17325.0
Performance	Level of Environmental Impact on Society	49	64.2	16.9	25.6	87.7
	CO2 Emission Intensity	49	0.6	0.6	0.1	3.2
	Country's Energy Sustainability Level	49	6.0	2.0	1.8	9.4
	Green Industry Market Size	49	41853.2	77575.7	328.3	444324.3

Some of the ASEM member countries show relatively higher score. Eco-innovation activities of Japan is 70.34 because “Economic Influence of Leading Environmentally Responsive Firms” and “Green Patents” of Japan are high despite the low value in “Firms’ Participation on Environmental Management System”. Even Spain receives mean score but shows high value in the sector of “eco-innovation capacity” with 71.73. This is due to the fact that Spain’s Awareness of Sustainability Management is the highest among ASEM member countries. Switzerland is shown as low as 34.25 in the “eco-innovation activity” because “Economic Influence of Leading Environmentally Responsive Firms” and “Green Patents” are relatively lower than the leading countries, but all of the sectors shown high scores. France shows a high score on the “eco-innovation capacity” because “Country’s Economic Competitiveness” is somewhat higher and “Awareness of Sustainability Management” appeared in the top.

Looking at each ASEM members separately, European and Asia show noticeable differences : First, the results of the T-test of four sectors show the difference between the European and Asian countries in the sector of “Eco-innovation Capacity”, “Eco-innovation Activities” and “Eco-innovation Performance” (in respect p=0.002, p=0.064, p=0.000) but there is no difference in the “Eco-innovation Supporting Environment”.

〈Table 3.4〉 Descriptive statistics of eco-innovation index analysis

Variable		Obs	Mean	Std.Dev.	Min	Max
Eco-innovation	Capacity	49	39.63	18.03	2.1	72.3
	Supportive Environment	49	43.47	13.43	14.85	77.96
	Activity	49	26.70	15.61	6.11	83.37
	Performance	49	36.25	11.67	3.84	54.13
TBL	Economy	49	2.53	1.14	1	4

	Society	49	2.53	1.14	1	4
	Environment	49	2.53	1.14	1	4

To test if eco-innovation index reflects the three categories (economic, social, and environmental) of TBL, total of three different analyses were conducted. Using the 49 nations of ASEM, the one-way ANOVA was conducted 12 times setting each of 4 eco-innovation index factors (capacity, supportive environment, activity, & performance) as individual dependent variables (DVs) and each TBL category (economic, social, and environmental) as individual independent variables (IVs). The three-way ANOVA was conducted 4 times setting each factors of eco-innovation index as each individual DVs and the 3 categories as one IV. Lastly, MANOVA was conducted once setting 4 factors as one DV and 3 categories as one IV. [Table 5] demonstrates the descriptive statistics of the present study. Correlation analysis was conducted to examine the relationship between the factors (Table. 6). All factors were statistically correlated to each other at the 0.5% significance level.

〈Table 3.5〉 Correlation among ASEM eco-innovation index four factors

Variables	1	2	3	4
Eco-innovation Capacity	1			
Eco-innovation Supporting Environment	0.7747*	1		
Eco-innovation Activities	0.5092*	0.2931*	1	
Eco-innovation Performance	0.8020*	0.6524*	0.5689*	1

* $p < 0.05$

Difference in eco-innovation level (Europe vs Asia)

Previous studies have reported that the eco-innovation level differ according to the countries' development level. In many cases, developed countries displayed higher eco-innovation level than less developed countries. According to Kemp & Pearson (2007), Huppes et al. (2008), and Arundel & Kemp (2009), this is because the amount of additional financial input for implementing eco-innovation differs according to the level of countries' development. While enterprises in developed countries consider implementing eco-innovation as exploitation of their already existing resources, enterprises in developing countries do not hold the same type of resources to implement eco-innovation rapidly. They are required to put more efforts and finances to get themselves prepared for new innovation. Such explanation applies especially to the small-medium enterprises because the intangible assets are more available in developed countries than less developed countries. For instance, small-medium enterprises in wealthy countries are able to hire scientists or environmental professionals more easily than those in developing countries. Based on this perspective, it is assumed that the eco-innovation level of European countries and Asian countries differ. To examine this assumption, T-test analysis was conducted.

〈Table 3.6〉 Results of Europe vs Asia based on dependent variables

Variables	Pr(T<t)
Eco-innovation Capacity	0.0028**
Eco-innovation Supporting Environment	0.0646+
Eco-innovation Activities	0.1223
Eco-innovation Performance	0.0004**

N=49(19 Asian nations, 30 European nations)

As demonstrated in table 3.6, the capacity and the performance level was significantly different for European and Asian countries. While the activity level did not differ for both

nations, the support environment level differed partially. The activity factor included the indicators such as Commercialization Level of Green Technology, Enterprises' Participation on Environmental Management System, Economic Influence of Leading Environmentally Responsive Enterprises, Green Patents, and Activeness of Renewable Energy Utilization. While Germany placed highest rank for eco-innovation activity, other Asian countries such as Japan, China, and Singapore also placed high. This may be the reason why the analysis showed no significant difference between the European and Asian countries for eco-innovation activity.

Eco-innovation supports innovation toward sustainability with three critical concepts; Economic, social, and environmental (Hellstrom, 2007). We examine the explanatory power of each eco-innovation factors for BLT's three categories (economic, environmental, and social). One-way ANOVA was conducted to confirm that each IV (economic, social, and environmental) significantly distinguish each DV (capacity, support environment, activity, and performance). Three factors of eco-innovation (capacity, support, and environment) except activity were significantly distinguished in the economic, social, and environmental categories (Table 3.7). Similar to the result of t-test presented above, there were no significant difference between each quartile's activity score.

〈Table 3.7〉 One-way ANOVA results

IV	DV	R-squared	Partial SS	df	MS	F-value	Prob > F
Economy	Capacity	0.6758	10548.81	3	3516.27	31.27	0.00
	Supporting Environment	0.4417	3822.97	3	1274.32	11.87	0.00
	Activities	0.1341	1567.52	3	522.51	2.32	0.09
	Performance	0.4539	2968.66	3	989.55	12.47	0.00
Society	Capacity	0.7459	11643.33	3	3881.11	44.04	0.00
	Supporting Environment	0.6096	5276.21	3	1758.74	23.42	0.00

	Activities	0.1049	1226.97	3	408.99	1.76	0.17
	Performance	0.5654	3698.09	3	1232.70	19.51	0.00
Environment	Capacity	0.6732	10507.94	3	3502.65	30.90	0.00
	Supporting Environment	0.5227	4523.99	3	1507.99	16.43	0.00
	Activities	0.1237	1446.59	3	482.20	2.12	0.11
	Performance	0.5384	3521.92	3	1173.97	17.50	0.00

The differences between eco-innovation factors based on TBL are presented in Table 3.8. Three-ANOVA analysis was conducted to examine if the nations' capacity, support environment, activity, and performance scores are distinguished well based on the IV (economic, social, and environment). The result showed that nations' capacity, support environment, activity, and performance scores were significantly distinguished only based on the economic category.

〈Table 3.8〉 Three-way ANOVA results

IV	DV	R-squared	df	F	Prob > F
Economy · Society · Environment	Capacity	0.8106	9	18.55	0.00
	Economy		3	3.59	0.02
	Society		3	2.35	0.09
	Environment		3	1.18	0.33
	Supporting Environment	0.6392	9	7.68	0.00
	Economy		3	0.40	0.75
	Society		3	2.58	0.07
	Environment		3	0.88	0.46
	Activities	0.3937	9	2.81	0.01
	Economy		3	4.71	0.01
	Society		3	3.17	0.03
	Environment		3	1.23	0.31
	Performance	0.6461	9	7.91	0.00
	Economy		3	1.59	0.21
	Society		3	1.35	0.27
	Environment		3	1.44	0.25

To test explanatory power of four DVs (capacity, supportive environment, activity, and performance) on three independent variables (economy, social, environment), MANOVA was conducted (Table 3.9). The significant level of Wilks lambda indicates our model to be adequate. The result showed that the three IVs (economic, social, and environmental) significantly explained the four DVs (capacity, support environment, activity, and performance). However, corresponding to the result of three-way ANOVA conducted for the present study, only economic category significantly distinguished four DVs when each IVs were considered separately. This result indicates DVs can be distinguished well only based on the economic category.

〈Table 3.9〉 MANOVA results

IV	DV	Wilks' lambda	df	F(df1)	F(df2)	F-value	Prob>F
Model		0.0706	9	36.0	136.6	3.90	0.00
Economy	Capacity · Supporting Environment · Activities · Performance	0.4529	3	12.0	95.5	2.78	0.00
Society	Capacity · Supporting Environment · Activities · Performance	0.6578	3	12.0	95.5	1.37	0.20
Environment	Capacity · Supporting Environment · Activities · Performance	0.7860	3	12.0	95.5	0.76	0.69

The result of correlation between criteria shows significant correlation in the level of 0.05.

〈Table 3.10〉 Correlation Analysis of ASEM Eco-Innovation Index

Criteria	1	2	3	4
Eco-innovation Capacity	1			
Eco-innovation Environment and Support	0.7747*	1		
Eco-innovation Activity	0.5092*	0.2931*	1	
Eco-innovation Performance	0.8020*	0.6524*	0.5689*	1

* $p < 0.05$

Chapter 4

Result Analysis

In Elkington(1998)'s a seminal work titled as 'Cannibals with forks; triple bottom line of 21st century business', he pointed out economic, social, and environmental categories as the three major areas which must be considered when measuring the business' efforts and achievements for sustainability. Originally, the term 'Bottom Line' indicated the enterprise's net income and it represented the firms' financial achievement.

The use of Triple Bottom Line to measure businesses' achievement in economic, social and environment has increased as people began to accept 'value maximization' perspective more than 'profit maximization' perspective. Since Elkinton(1998)'s introduction of TBL for measuring businesses' achievement, institutions such as GRI(Global Reporting Initiative) and EIO(Eco Innovation Observatory) began to use TBL as guidelines for national firms and enterprises. In addition, many managers recognized TBL as practical tool for measuring group's achievement for sustainability (Colbert & Elizabeth, 2007)

The TBL dimensions are also commonly used for measuring three Ps: people, planet and profits. TBL is a powerful tool which enables one to measure the organizations' or enterprises' achievement not only based on their economic profits but also based on their influence on social and environmental factors. The primary purpose of measuring organizations' activity based on TBL is to explore the influence of organizations' activities on world's economic, social, and environment and to go one step closer to our sustainable development goal. To make proper decision for long-term development, TBL categories must be measured individually and quantified to set appropriate direction for sustainable development (Slaper & Hall, 2011). The present study will conduct analysis to examine the explanatory power of eco-innovation index for measuring each nations' economic, social

and environment scores. To do this, nation's economic, social, and environmental scores will be compared to nations' capacity, environment support, activity, and performance scores. Each nation's GDP per capita was used as a measurement tool for each nation's economic achievement and their scores for social achievement, and environmental achievement were obtained from WEF (2014)'s report. Since 2011, WEF (2014) have been reporting the reliable nation's sustainability (economic, social, environmental) scores each year. In their report, nation's economic achievement scores in addition to other contributors for improving people's quality of life were presented. For social category, people's happiness related to the society's welfare, health, and security were measured. Lastly, for environment category, variety of contributing factors related to the effective use of resources for next generation were introduced. <Table. 4.1> presents the summary of WEF (2014)'s measurement index.

Evaluation for 49 ASEM member nations' eco-innovation in each TBL category

Eco-innovation evaluation for each TBL category were conducted using the 49 nations of ASEM. This result revealed which aspect of the specific nation is doing well or falling behind compared to the nations in the same quartile. According to the result, European nations where eco-innovation policy was adapted in the early stage ranked high as a leading group. In the meantime, Asia nations, the second mover for eco-innovation, ranked low. Implications for analyzing ASEM's forty-nine nations' eco-innovation scores based on TBL perspective are as follows. First, nations with eco-innovation scores higher than the average scores of same quartile for all TBL category should keep tabs on the current government policy, enterprises strategy, and social-environmental change progressed by nations in the higher quartile. Switzerland is the only nation which belongs to the 1st quartile and showed higher score than its average score in all TBL categories. Australia's case is also similar to Switzerland. However, its capacity score in economic

category was lower than the average score. This result represents the fact that many nations still have space to develop eco-innovation within their quartile. Second, nations with high scores in one or two area of the TBL category need to put effort to balance their growth. All three categories of TBL must be satisfied for successful eco-innovation sustainability. For instance, Bulgaria ranked higher than the average score of its quartile for economic category. For social category, Bulgaria's activity and performance factors were higher than the average score of its quartile. For environmental category, all factors' scores were lower than the average score of its quartile. In order to balance all three categories of TBL, it may be possible to obtain extra resources from their enhanced economic level to use them for their social and environmental development. Rumania's case was the opposite of Bulgaria. All factor's scores for social and environmental category were higher than its quartile's average score. However, only the activity score was higher than its quartile's average for the economic category. Therefore, Rumania is recommended to complement its economic sector by transferring the benefiting outcome from its social & environmental category. Third, it is necessary for low ranking nations to benchmark the eco-innovation of higher ranking nation in their quartile. For example, although India belonged to the 4th quartile in economic, social, and environmental category, all factor scores in each category were higher than its quartile's average score. In Asia, Bangladesh has similar economic, social, cultural circumstances with India. Therefore, it is possible for Bangladesh to apply reformed eco-innovation activities for their country by analyzing India's eco-innovation policy and the historical eco-innovation process.

〈Table 4.1〉 ASEI Results for Economic value (GDP per capita, 2014)

PEER GROUPING	COUNTRY	CAPACITY	ENVIRONMENT	ACTIVITY	PERFORMANCE	ASEI AVERAGE
First Quartile	Australia Austria Belgium Denmark Finland Ireland Luxembourg Netherlands Norway Singapore Sweden Switzerland	57.00	55.06	15.97	43.34	44.45
Second Quartile	Brunei Darussalam Cyprus France Germany Italy Japan Korea Malta New Zealand Spain United Kingdom	50.76	48.30	33.39	41.96	44.22
Third Quartile	Czech Republic Estonia Greece Hungary Latvia Lithuania Malaysia Poland Portugal Romania Russian Federation Slovakia Slovenia	31.67	39.63	20.86	36.78	33.86
Fourth Quartile	Bangladesh Bulgaria Cambodia China India Indonesia Lao PDR Mongolia Myanmar Pakistan Philippines Thailand Vietnam	20.66	31.85	11.87	23.94	24.52

〈Table 4.2〉 ASEI for Social level (WEF social index, 2014)

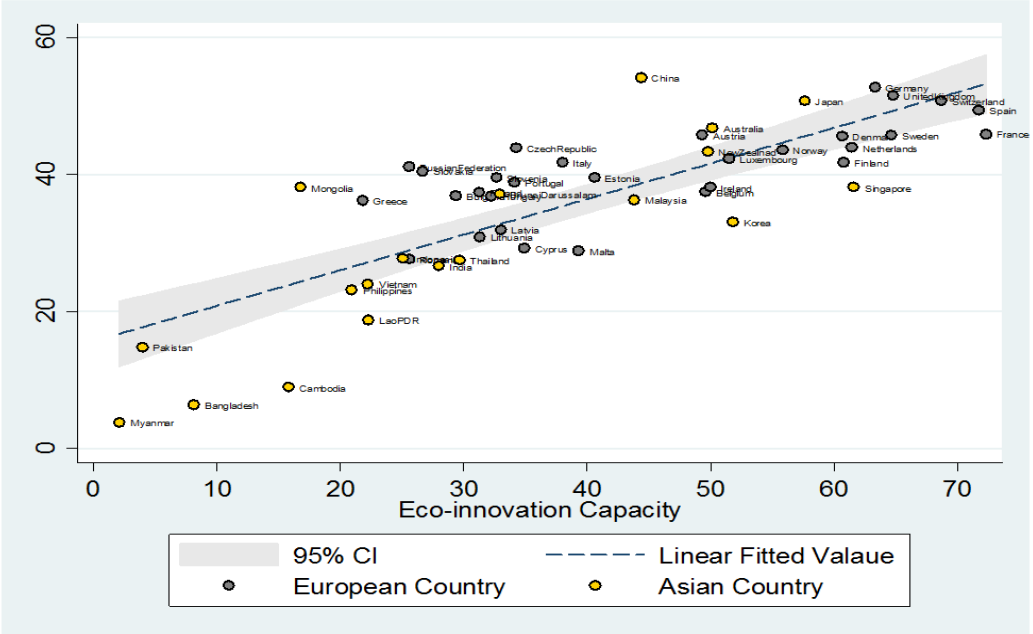
PEER GROUPING	COUNTRY	CAPACITY	ENVIRONMENT	ACTIVITY	PERFORMANCE	ASEI AVERAGE
First Quartile	Austria Denmark Finland Germany Japan Luxembourg Netherlands Norway Singapore Sweden Switzerland United Kingdom	60.01	55.18	29.60	46.06	48.36
Second Quartile	Australia Belgium Brunei Darussalam China Czech Republic Estonia France Ireland Korea Malaysia New Zealand	46.56	50.50	21.69	40.39	41.80
Third Quartile	Bulgaria Cyprus Hungary Italy Latvia Lithuania Malta Poland Portugal Russian Federation Slovenia Spain Thailand	35.30	41.12	19.75	36.80	34.89
Fourth Quartile	Bangladesh Cambodia Greece India Indonesia Lao PDR Mongolia Myanmar Pakistan Philippines Romania Slovakia Vietnam	18.40	28.35	11.11	22.85	22.18

〈Table 4.3〉 ASEI for Environment level (WEF environment index, 2014)

PEER GROUPING	COUNTRY	CAPACITY	ENVIRONMENT	ACTIVITY	PERFORMANCE	ASEI AVERAGE
First Quartile	Austria Finland Germany Japan Luxembourg Netherlands New Zealand Norway Singapore Sweden Switzerland United Kingdom	59.10	55.51	28.39	45.88	47.90
Second Quartile	Australia Belgium Brunei Darussalam Czech Republic Denmark France Ireland Korea Latvia Lithuania Malaysia	45.19	46.80	19.67	38.90	39.20
Third Quartile	Bulgaria China Estonia Hungary Indonesia Italy Malta Poland Portugal Slovakia Slovenia Spain Thailand	36.85	43.57	23.72	38.29	37.67
Fourth Quartile	Bangladesh Cambodia Cyprus Greece India Lao PDR Mongolia Myanmar Pakistan Philippines Romania Russian Federation	19.07	29.19	10.42	23.02	22.45

Comparison of eco-innovation: Asia vs. Europe

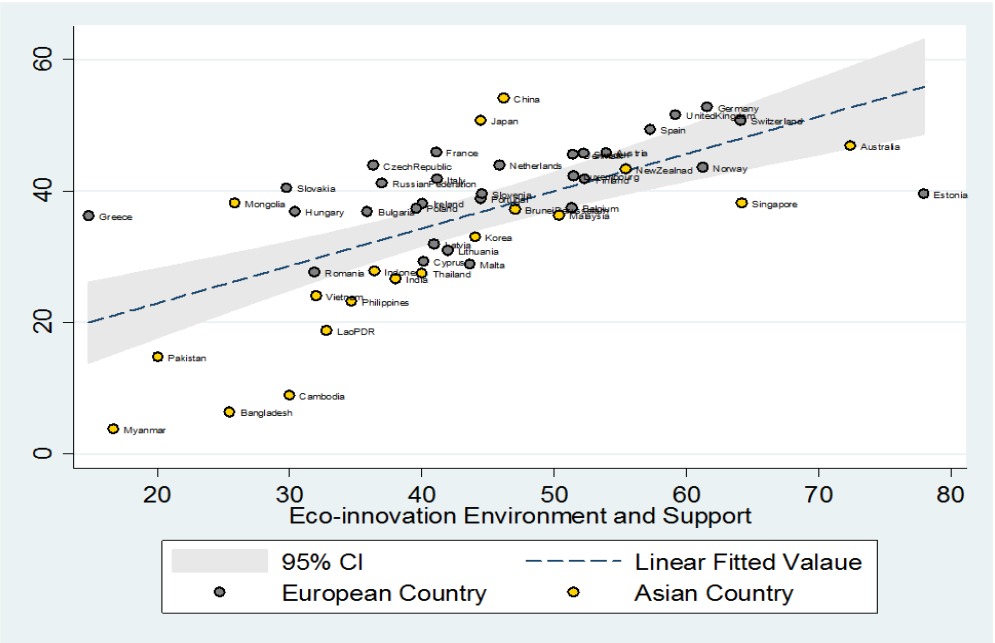
Each nations' performance for each factor are presented in 〈Figure 4.1〉, 〈Figure 4.2〉, and 〈Figure 4.3〉. Gray circles represent European countries and yellow circles represent Asian countries. As presented in Figure 4.1, European countries such as Switzerland, Germany,



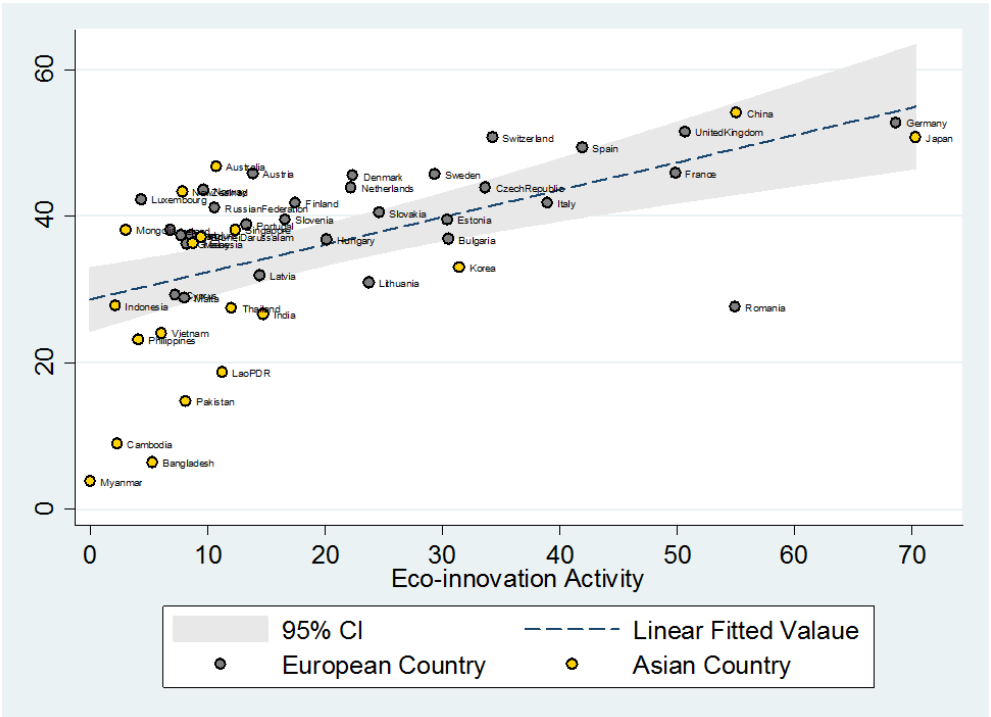
〈Figure 4.1〉 Eco-innovation Capacity-Performance

Britain, Sweden, France and other nations showed high level of capacity performance. Asian countries such as Japan, Singapore, South Korea, china, and Malaysia were also part of high capacity group. Meanwhile, countries such as Myanmar, Cambodia, Laos, Vietnam, and the Philippines were categorized in low capacity level group. Each graph's symmetric information shows performance compared to capacity, supporting environment and activity. While majority of nations showed similar trend for their performance and capacity, France, Singapore, and Korea showed low level of performance compared to their capacity. While China performed well compared to its' capacity and supporting environment, Cambodia, Bangladesh, and Myanmar's performance were low compared

to their supporting environment. Such results suggest nation's motivations and efforts as other critical factors to determine their eco-innovation performance.



〈Figure 4.2〉 Eco-innovation Supporting Environment-Performance

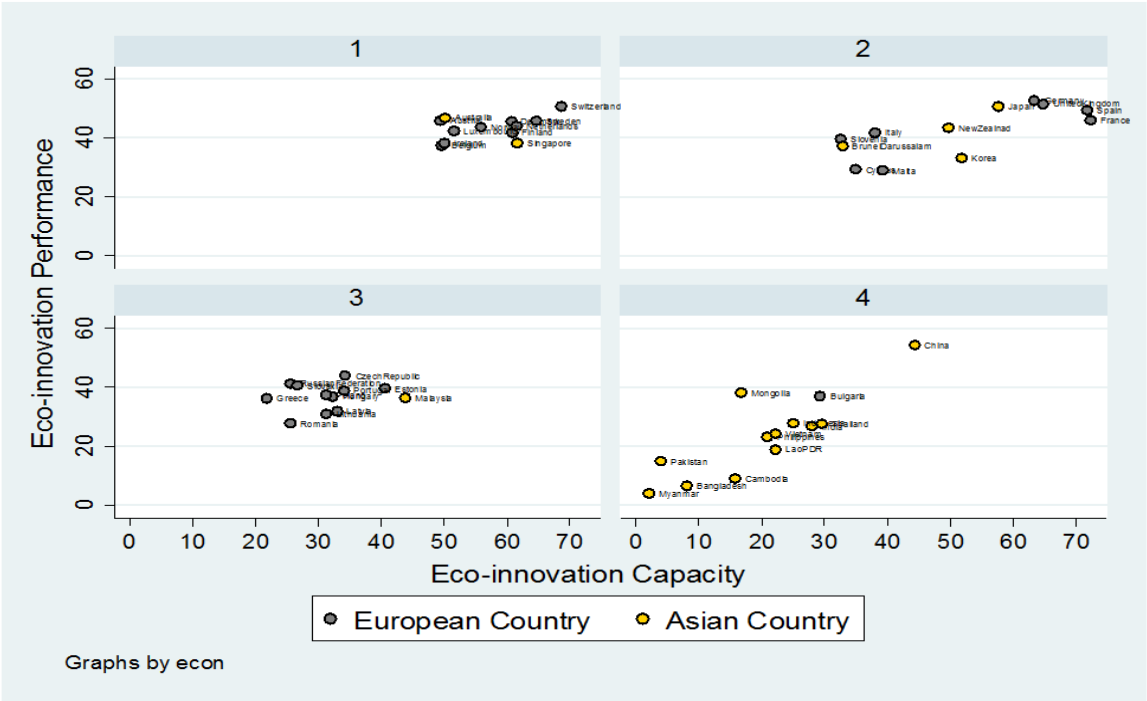


〈Figure 4.3〉 Eco-innovation Activities-Performance

〈Figure 4.3〉 showed significant difference in European and Asian countries' activity. It seems like countries in Asia are struggling to use their capacity and supporting environment to take piratical actions. Countries with low level of activity compared to their supporting environment need to prioritize the use of direct way such as appropriate technology transfer to promote and spread eco-innovation activities.

Comparison of eco-innovation in 4 quartile: Asia vs. Europe

In chapter 3, three-way ANOVA and Multivariate ANOVA were conducted. The three-way ANOVA analysis was significant only for the economic category. MANOVA test also revealed the similar result: only economic level significantly distinguished DV when considered individually. Therefore, the scatterplot which presents the current state of eco-innovation under the economic category is presented (Figure 4.4).



〈Figure 4.4〉 Eco-innovation Capacity-Performance in economic category

Chapter 5

Country Level Analysis

This chapter provides country level analysis for 49 ASEM member countries in TBL(Triple Bottom Line) perspective. Country level analysis includes country profile, ASEI quantitative analysis and qualitative analysis for each 49 ASEM member country and comprehensive analysis for all ASEM member countries.

Country profile provides the information about flag of the country, per capita GDP, population, industry structure (1^{st}:2^{nd}:3^{rd}), Human Development Index (HDI), social and environmental sustainability index and geographic location information. The Flag of the country, per capita GDP, population, industry structure (1^{st}:2^{nd}:3^{rd}) and geographic location information are collected from the date of Central Intelligence Agency (CIA) [4] which is updated in Nov. 2014. Human Development Index (HDI) is collected from the UN Development programme (UNDP)'s 2014 report[5]. Sustainable social and environmental index are collected from the national competitiveness index of the WEF[6].

The quantitative analysis consisted of ASEI quantitative analysis of country and a comparative analysis for economic, social and environmental level and ASEI analysis and policy recommendations. ASEI qualitative analysis includes eco-innovation policy and present condition. At the end of this chapter comprehensive analysis provides summary of country level analysis for each 49 ASEM member countries.

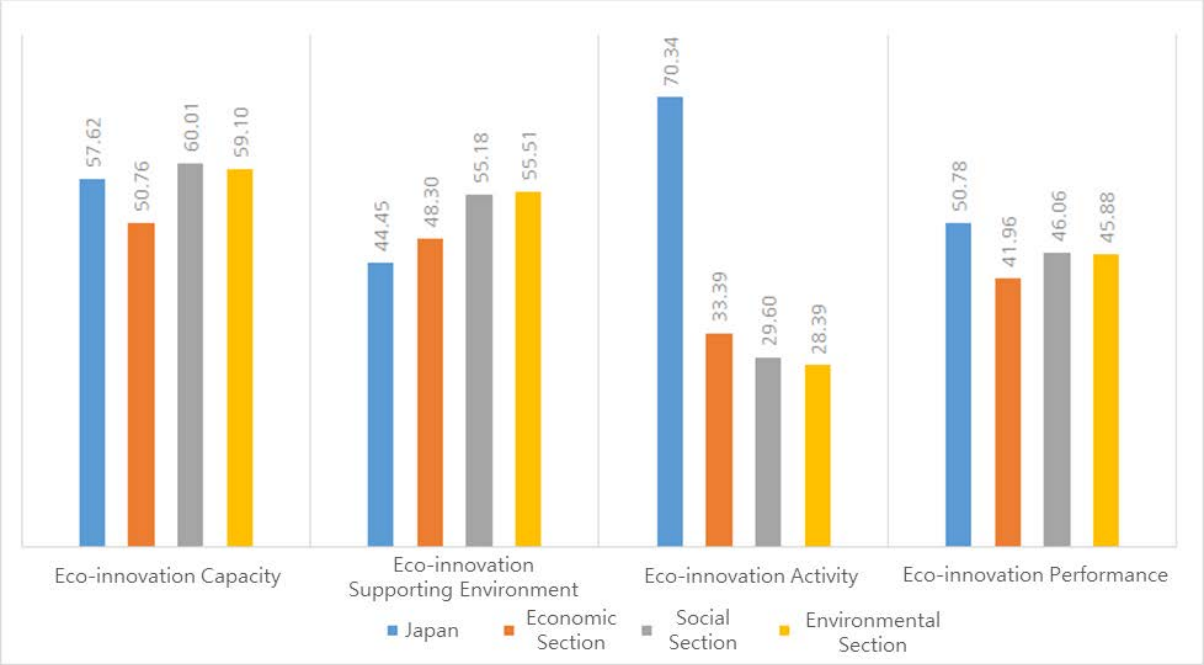
Division	Contents
Country Profile	- Flag of the country, per capita GDP, population, industry structure (1st:2nd:3rd), Human Development Index (HDI), social and environmental sustainability index and geographic location information
ASEI Quantitative Analysis	- ASEI quantitative analysis of country - Comparative analysis for economic, social and environmental level - ASEI analysis and policy recommendations
ASEI Qualitative Analysis; Eco-innovation Policy Analysis	- Eco-innovation policy investigation - Eco-innovation present condition analysis
Comprehensive Analysis	- Comprehensive Analysis for ASEM member countries

[4] https://www.cia.gov
[5] http://hdr.undp.org/en/content/human-development-index-hdi
[6] http://www.weforum.org/

Japan

	38,492	127.1 million	1:26:73	0.890 Very High	6.15	5.52	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.1〉 ASEI quantitative analysis of Japan



- Eco-innovation capacity, activity and performance of Japan are higher than the average score of the second country group in the economic sector quartile. However eco-innovation supporting environment score is low.
- Eco-innovation activity and performance of Japan are higher than the average score of the first country group in the social sector quartile. However eco-innovation capacity and supporting environment scores are low.

■ Eco-innovation activity of Japan is higher than the average score of the second country group in the environmental sector quartile. However eco-innovation capacity and supporting environment scores are low.

〈Table 5.1〉 Comparative analysis of TBL quartile for Japan

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Japan	57.62	44.45	70.34	50.78	
Economic	50.76	48.30	33.39	41.96	2
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

■ Eco-innovation supporting environment of Japan is relatively lagged behind compared to other developed countries. Nevertheless the scores of eco-innovation activity scores high and breakthrough performance category imply the current level of employment in related industries and substantial green market share. It is recommended to improve the awareness of firm level which shows low recognition in ASEI and to prepare a program to increase the green R&D investment.

〈Table 5.2〉 Eco-innovation Policy instruments of Japan

National plan and strategy	Sustainability	■ Japan's Strategy for a Sustainable Society (2007)
	Eco-innovation	■ New growth strategy (2009-2010) ■ Green Innovation Strategy (2010) ■ Strategic Energy Plan (2010) ■ Third Science and Technology Basic Plan (2006-2010)
Programmes and actions	National	■ Top runner program ■ The Japan Environmental Technology Verification Programme (J-ETV) (2003) ■ Eco Leaf Program ■ Eco-Action 21 ■ Eco-Town project ■ Carbon Footprint Program ■ The Cool Earth Innovative Energy Technology Programme (2008) ■ 3Rs (Reduce, Reuse, Recycle) Programme
	International	-

Legislation	■ Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services (Green Purchasing Law) ■ Act on Special Measures Concerning Procurement of Renewable Electric Energy Operators of Electric Utilities (2012)
Finance	■ Environment research and technology development fund
Information	■ Water Environment Partnership in Asia (2003) ■ Asia-Pacific Regional Inception Workshop on Environmentally Sound Management of Electronic and Electrical Wastes (2005) ■ Eco Mark Program & Global Eco-labeling Network ■ Green purchasing network ■ Regional Innovation Cluster Programme ■ Keidanren voluntary action plan

Japan has early attempted eco-innovation in energy sector with basis of superior technologies. The government of Japan has established and developed eco-innovation policies to support its implement in energy sector; solar, wind, geothermal, hydroelectric energy so on. At the same time, technological innovation to reduce environmental burden have been implemented in the existing energy sectors, such as, nuclear, fuel and LP gas. Specific plans and programs to promote eco-innovation have been developed for sustainable development by establishing the “New growth strategy”, “Green Innovation Strategy” and “Strategic Energy Plan”. In order to foster high technology in the medium-long term, “Third Science and Technology Basic Plan” and Top runner program” have been operated for capacity building of eco-innovation of the companies. Policies to support eco-innovation of Japan are established even in the technology sector, environmental management and market side. The technology sector has typically “Top Runner Approach”. This program sets performance of the companies which achieved the highest level of energy efficiency as a target baseline, and expand the regulatory or incentive policies so that other industry competitors are able to achieve it. The government sets the target for improvement rate of energy efficiency by 22.8% and if the Japanese car companies have achieve the goals for early 2005 in an effort to receive and respond to regulation and

incentive policies. These policies have contributed the Japanese company to acquire comparative advantage as first mover in the global market place through environmentally friendly vehicles, as well as, “Eco-town project” and “3Rs” [7] for environmental management and “Carbon Footprint Program” and “The Eco-point Program” for environment-friendly society and green market activation.

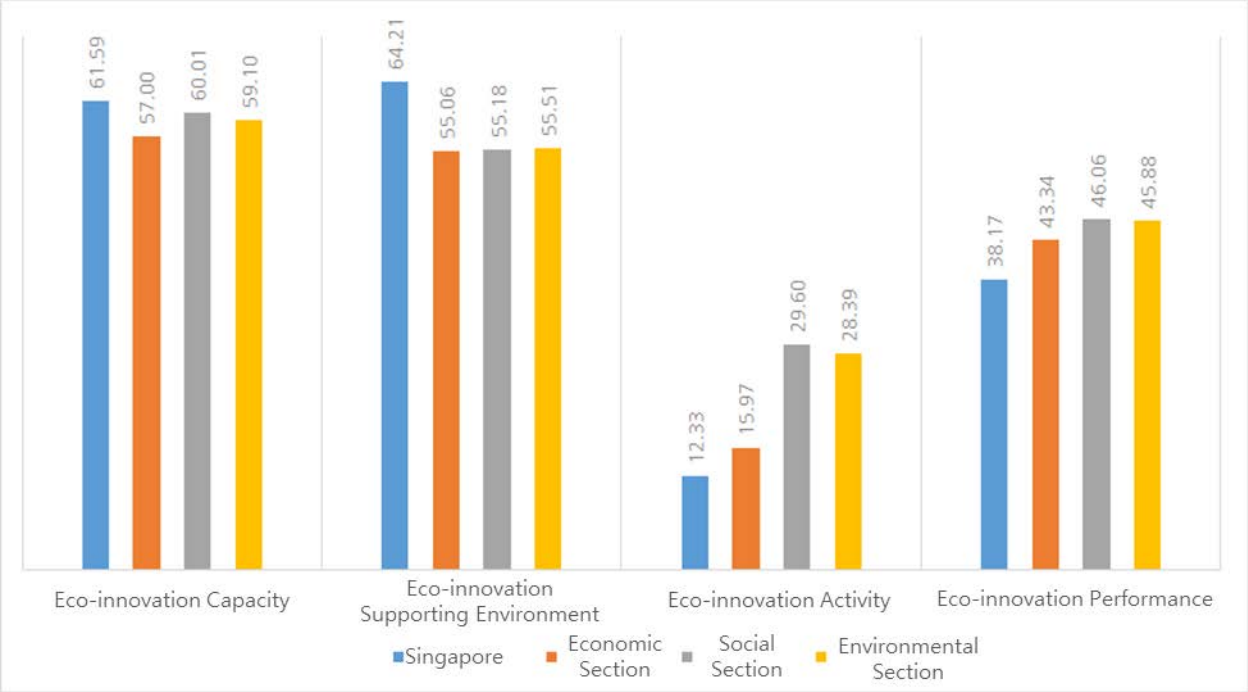
METI[8] is the major organization which is main axis establishing the eco-innovation policies especially through economic incentive instrument. In late 1998, Japan has provided incentives to improve energy efficiency, promoting the national energy plan. Ministry of Environment has also established the “Eco-Action 21”, “The Japan Environmental Technology Verification Programme (J-ETV)”, “New Action Plan towards a Global Zero Waste Society” and “Environment research and technology development fund (ERTDF)”.

[7] 3Rs(Reduce, Reuse, Recycle) Programme
[8] Ministry of Economy, Technology, and Industry(METI)

Singapore

	55,182	5,4 million	0:29:71	0.901 Very High	-	-	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.2〉 **ASEI quantitative analysis of Singapore**



- Eco-innovation capacity, supporting environment of Singapore are higher than the average scores of the first country group in the economic sector quartile. However eco-innovation activity and performance scores are low.
- Eco-innovation capacity, supporting environment of Singapore are higher than the average scores of the first country group in the social sector quartile. However eco-innovation activity and performance scores are low.

■ Eco-innovation capacity, supporting environment of Singapore are higher than the average scores of the first country group in the environment sector quartile. However eco-innovation activity and performance scores are low.

〈Table 5.3〉 Comparative analysis of TBL quartile for Singapore

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Singapore	61.59	64.21	12.33	38.17	
Economic	57.00	55.06	15.97	43.34	1
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

■ Singapore has scored higher than similar quartile country group but eco-innovation activity and performance is relatively low. Although Singapore has built foundation and enabling environment of eco-innovation, “Economic Influence of Leading Environmentally Responsive Firms” and “Green Industry Market Size” are relatively low. It is recommended to introduce specific eco-innovation program so that Singapore’s eco-innovation capacity and supporting environment can help transition to sustainable development.

〈Table 5.4〉 Eco-innovation Policy instruments of Singapore

National plan and strategy	Sustainability	■ The Sustainable Singapore Blueprint 2009
	Eco-innovation	■ Maritime Singapore Green Initiative
Programmes and actions	National	■ Green Ship Programme ■ Green Port Programme ■ Green Technology Programme
	International	-
Legislation		■ Environmental Protection and Management Act ■ Hazardous Waste Act (1998)
Finance		■ Innovation for Environmental Sustainability Fund ■ 3R Fund
Information		■ Green Pledge

Eco-innovation policies of Singapore have been developed in line with the national plan

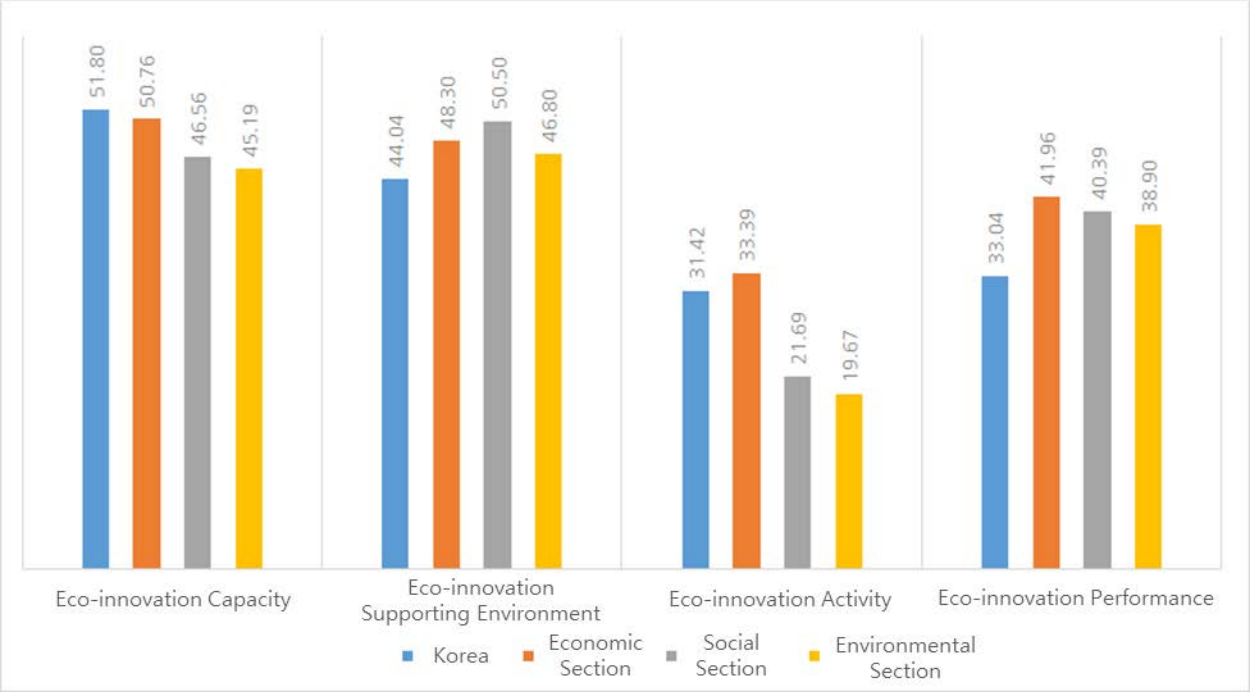
of science technologies. Past 20 years, Singapore has successfully entered into a knowledge and innovation economy of the country. Singapore has achieved innovation through R&D investment[9]. GDP of Singapore has increased 3.9 times from 1990 to 2009 and R&D spending accounted for 2.3% of GDP[10]. 20.7% and 68.5% of GDP accounted from secondary and tertiary industry respectively[11]. Singapore have made great advances in service sectors as logistics hub in Asia based on a geopolitically advantageous position even Singapore has weak primary industries. Eco-innovation polices of Singapore has been implemented in line with national development strategy. "Maritime Singapore Green Initiative" was established in the part of trade and distribution sector which is key industries of Singapore. The government of Singapore support implementation of eco-innovation by introducing the "Green Ship", "Green Port", "Green Technology"[12]. "Green Ship[13]" and "Green Port[14]" are working to reduce the environmental pollution caused by the use of the harbor.

[9] A*STAR, 2011, STEP 2015 (8p)
[10] A*STAR, 2011, STEP 2015 (2p)
[11] MTI, 2012, Economic Survey of Singapore (iiip)
[12] http://www.mpa.gov.sg/sites/maritime_singapore/msgi/maritime-singapore-green-initiative.page
[13] http://www.mpa.gov.sg/sites/maritime_singapore/msgi/green-shipping-programme.page
[14] http://www.mpa.gov.sg/sites/maritime_singapore/msgi/green-port-programme.page

Republic of Korea

	25,977	74 million	3:39:58	0.891 Very high	5.33	4.61	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.3〉 ASEI quantitative analysis of Republic of Korea



- Eco-innovation capacity, activity of Korea are higher than the average scores of the second country group in the economic sector quartile. However eco-innovation supporting environment and performance scores are low.
- Eco-innovation capacity, activity of Korea are higher than the average scores of the second country group in the social sector quartile. However eco-innovation supporting environment and performance scores are low.

■ Eco-innovation capacity, activity of Korea are higher than the average scores of the second country group in the environmental sector quartile. However eco-innovation supporting environment and performance scores are low.

〈Table 5.5〉 Comparative analysis of TBL quartile for Republic of Korea

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Korea	51.80	44.04	31.42	33.04	
Economic	50.76	48.30	33.39	41.96	2
Social	46.56	50.50	21.69	40.39	2
Environmental	45.19	46.80	19.67	38.90	2

Republic of Korea is slightly higher score in capacity and activity of eco-innovation but shown low score in the part of performance and supporting environment. It shows excellent potential in the private sector. Increasing the R&D investment from the government, expanding the green market and increasing the intensity of greenhouse gas would lead to better performance of eco-innovation.

〈Table 5.6〉 Eco-innovation Policy instruments of Korea

National plan and strategy	Sustainability	■ Green Vision 21 (1996-2005) ■ National Action Plan for the Implementation of Agenda 21 (1996) ■ State Environmental Mission for a New Millenium (2001)
	Eco-innovation	■ Green growth strategy (2009-2050) ■ The Green New Deal (2009-2012) ■ National Energy Master Plan (2008) ■ The Five-Year Plan for Green Growth (2009-2013) ■ Ten-year Basic Plan for the Development and Dissemination of New and Renewable Technologies
Programmes and actions	National	■ Mandatory energy-efficiency standards and labeling (1992) ■ The high-efficiency appliance certification (1996) ■ Standby electricity reduction programme (1999) ■ GHG & Energy target management system (2010) ■ Carbon point scheme ■ The Greening Cities project

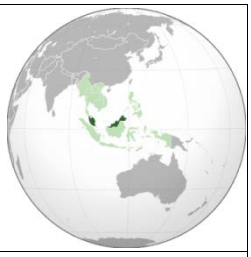
		■ Climate Change Adaptation Model City project ■ The Eco-city project and the low carbon, green village project
	International	
Legislation		■ Act on Promotion of Purchase of Green Products (2005) ■ Framework Act and Low Carbon and Green Growth (2010) ■ Act on the Allocation and Trading of Greenhouse-Gas Emission Permits (2012)
Finance		■ Environmental Improvement Fund ■ Recycling Industry Promoting Fund
Information		■ Seoul Initiative Network on Green Growth (2005) ■ Local Green Networks ■ Green Technology Network(GTNET) (2009) ■ East Asia Climate Partnership (2008)

Republic of Korea has announced a five-year plan (2009-2013) and aims to grow green power to enter the top five in the world by 2050. It is composite of three strategies and major ten policy sectors. Three strategies are adaptation to climate change, energy independence and new growth engines. Policy sectors are to efficiently reduce greenhouse gas emissions, de-oil and enhancement of energy independence, capacity building of climate change adaptation, green technology development, the greening of industry and green industry development, upgrading industrial structure, construction of foundation for green economy, green land and transportation, green life style, Implementation of global green growth model country. As a follow up measure, the regulatory and financial support were conducted to realize those policy goal. Framework Act and Low Carbon and Green Growth was enacted in 2010. Establishment of "Ten-year Basic Plan for the Development and Dissemination of New and Renewable Technologies[15]" and "Mandatory energy-efficiency standards and labeling[16]" have made enabling environment of eco-innovation to support technology development and market condition in Korea. KEITI (Korea Environmental Industry and Technology Institute) have operated "New Excellent Technology & Environmental Technology Verification Project" and "KEITI

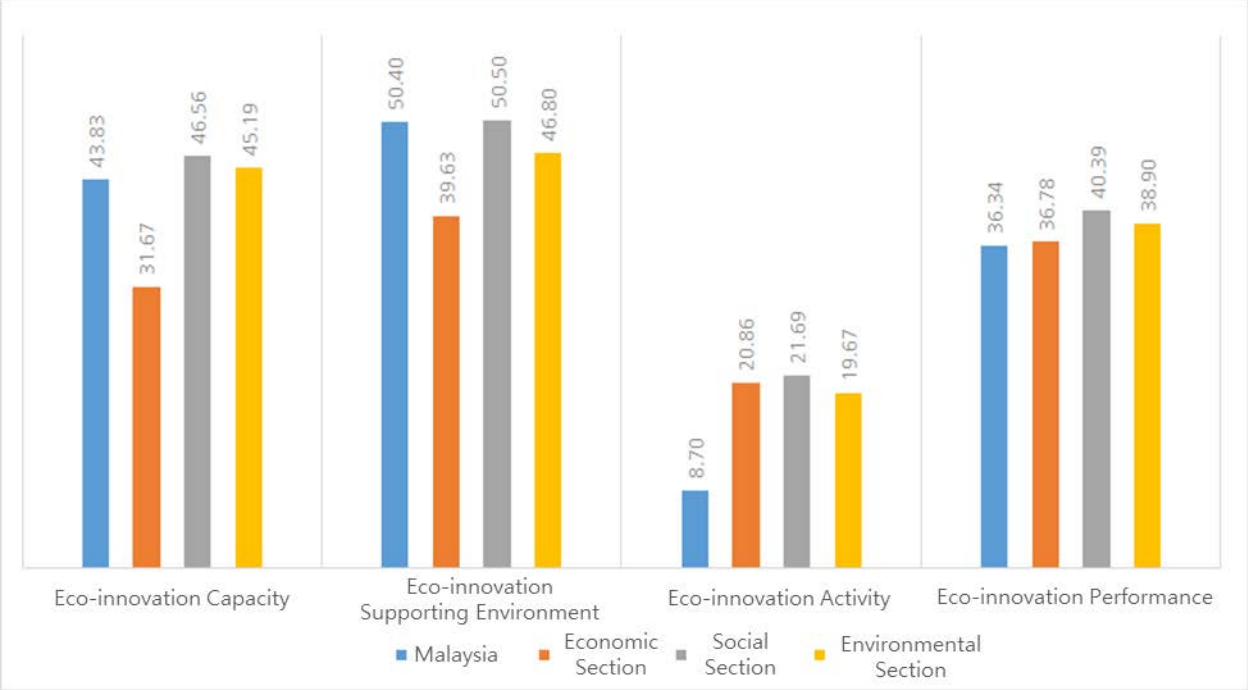
[15] Ten-year Basic Plan for the Development and Dissemination of New and Renewable Technologies (released in 2003)
[16] Mandatory energy-efficiency standards and labeling (1992)

Environmental Venture Center: helping start-ups/enVinance system" in order to develop capacity to enter top 7 countries in the world. KEMCO (Korea Energy Management Corporation) have supported implementation of eco-innovation by establishing the "Stand-by Korea 2010". Moreover Korea government introduced the "Emission Trading Scheme" in order to effectively manage the greenhouse gases in Korea.

Malaysia

	10,514	29.7 million	11:41:48	0.773 High	4.41	5.18	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.4〉 ASEI quantitative analysis of Malaysia



- Eco-innovation capacity and supporting environment of Malaysia are higher than the average scores of the third country group in the economic sector quartile. However eco-innovation activity score is low.
- Eco-innovation capacity and supporting environment of Malaysia are higher than the average scores of the second country group in the social sector quartile. However eco-innovation activity and performance scores are low.
- Eco-innovation supporting environment of Malaysia is higher than the average scores of the second country group in the environmental sector quartile. However eco-innovation capacity, activity and performance scores are low.

〈Table 5.7〉 Comparative analysis of TBL quartile for Malaysia

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Malaysia	43.83	50.40	8.70	36.34	
Economic	31.67	39.63	20.86	36.78	3
Social	46.56	50.50	21.69	40.39	2
Environmental	45.19	46.80	19.67	38.90	2

- Capacity and supporting environment of eco-innovation of Malaysia show higher score than same quartile country group. But activity and performance of eco-innovation show somewhat low score. Increasing "Economic Influence of Leading Environmentally Responsive Firms" and "Green Industry Market Size" is recommended.

〈Table 5.8〉 Eco-innovation Policy instruments of Malaysia

National plan and strategy	Sustainability	■ The 10th Malaysia Plan
	Eco-innovation	■ Green Technology Master Plan 2030
Programmes and actions	National	■ Government Green Procurement program ■ Green TAG Endorse program ■ Small Renewable Energy Programme (SREP)
	International	■ Malaysia-New Zealand Environmental Cooperation Agreement
Legislation		■ Environmental Quality Act 1974 ■ Renewable Energy Act 2011
Finance		■ Green technology financing scheme ■ Renewable Energy Fund
Information		■ The Malaysia-Europe Forum (MEF) Roundtable Series on Sustainability: 'Future Cities - Urban Mobility'

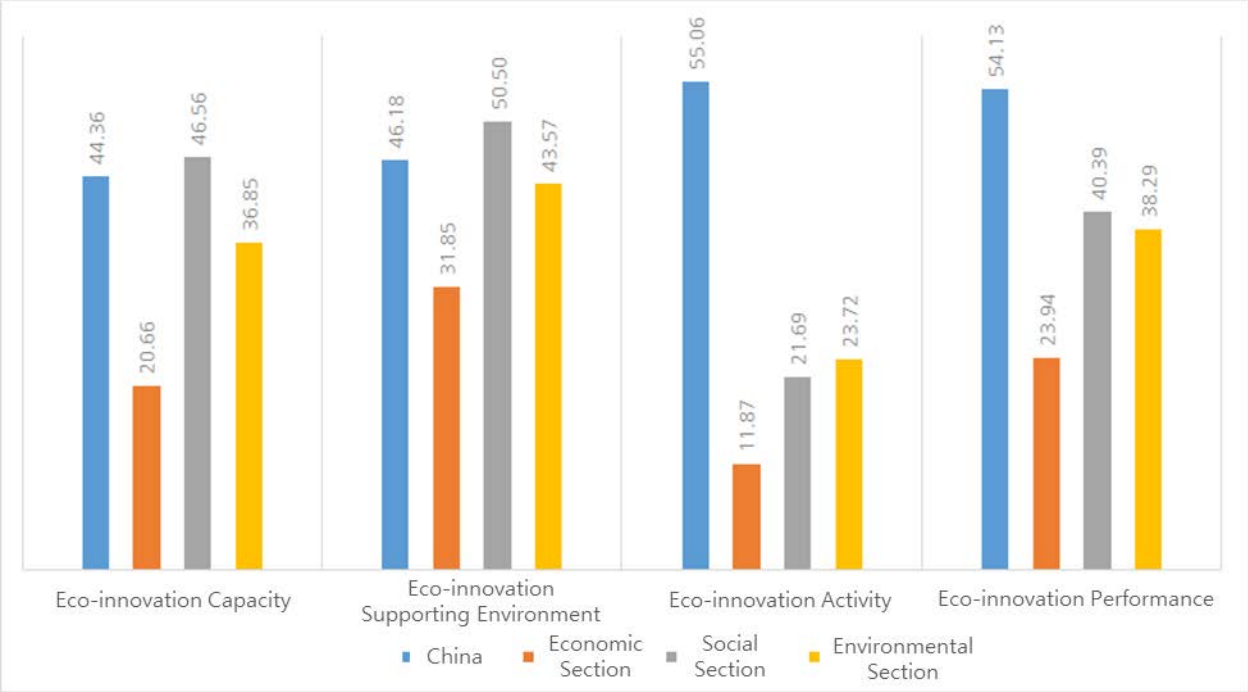
Malaysia has established national development plan at an interval of five years. 8th national plan (2001-2005) included development instrument focusing on renewable energy and energy efficient and 10th national plan (2011-2015) emphasized green technology policies. Ministry of Energy, Green Technology and Water is in charge of green technology policies

and makes effort to progress economic development while reducing energy consumption. The Malaysian government has invested intensively in promising green technology to secure an international competitiveness. The main subject in green technology policies is energy, buildings, waste, water, transportation. The Malaysian government established a 'Green Technology Master Plan 2030' to promote green technology policy. This master plan includes human capital, funding, infrastructure, legal and innovation. The Malaysian government introduced a certification system for environmentally-friendly products as part of a green technology policy (eco-labeling) and emphasized green procurement. Currently pilot project of green procurement is implemented and green technology finance institution has supported the firms with 1.5 billion RM (USD 48 billion).

China

	6,807	1385.6 million	10:44:46	0.719 High	4.83	4.47	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.5〉 ASEI quantitative analysis of China



- Eco-innovation capacity, supporting environment, activity and performance of China are higher than the average scores of the fourth country group in the economic sector quartile.
- Eco-innovation activity and performance of China are higher than the average scores of the second country group in the social sector quartile. However eco-innovation capacity and supporting environment scores are low.

■ Eco-innovation capacity, supporting environment, activity and performance of China are higher than the average scores of the third country group in the environmental sector quartile.

〈Table 5.9〉 Comparative analysis of TBL quartile for China

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
China	44.36	46.18	55.06	54.13	
Economic	20.66	31.85	11.87	23.94	4
Social	46.56	50.50	21.69	40.39	2
Environmental	36.85	43.57	23.72	38.29	3

■ China has shown a level significantly higher than other ASEM member country. But capacity and supporting environment comparing with the same social quartile countries are low. Investment and green technologies such as renewable energy are actively proceeding but there is still a room for improvement.

〈Table 5.10〉 Eco-innovation Policy instruments of China

National plan and strategy	Sustainability	■ The 12th five-year plan (2011-2016) ■ National Plan for Science and Technology Development (2006-2020)
	Eco-innovation	■ Energy Saving and New Energy Vehicle Development Plan (2011-2020)
Programmes and actions	National	■ New and renewable energy development program (1996-2010) ■ Government energy efficiency programs (2006) ■ China Greentech Partner Program
	International	
Legislation		■ Renewable Energy Law (2005) ■ Energy Conservation Law (2008) ■ China Circular Economy Promotion Law (2009)
Finance		■ China CDM Fund ■ Mobilizing financing from national new products program & national key technologies R&D program ■ National Key Laboratories Programmes-Public investment in environmental R&D
Information		■ The Regional Inclusive Innovation Policy Forum (2012) ■ China-Japan-US Forum on Sustainable Built Environment (CJUFSBE) ■ The 30th Meeting of APECSMEWG (Small and Medium Enterprises

	Working Group) (2010) ■ The 6th China International Energy Saving and New Energy Vehicle Technology Exhibition (EVCHINA 2014)

The Chinese government has established long-term national plan for 2006-2020 to improve energy efficiency and capacity building for innovation[17]. In line with the national plan, 'Energy Saving and New Energy Vehicle Development Plan'[18] is also established to reach the goal of sustainable development in social and industry sector from 2011 to 2020. Ministry of Commerce has established 'Energy Conservation Law' and 'Renewable Energy Law'. Especially 'Renewable Energy Law' promoted eco-innovation through renewable energy development program and tax benefits and subsidies were paid from 1996 to 2010. After legislation, Energy Research Institute has established a monitoring foundation to improve energy efficiency of the national industry by introduction of the 'Thousand Enterprises program'[19]. It has a purpose to enhance energy efficiency for top 1,000 companies and start their program in 2006. It expand the target companies from 1,000 to 10,000 by criteria of energy consumption. China has implemented a strong government-led policy to improve energy efficiency and switch to renewable energy. In 2009, a national plan was established to build a 'Smart Grid' by 2010 and carried out plan whit the local government energy company[20]. China is actively working with international organizations for the development of renewable energy such as IEA, HNZ Industry Media Group, USAID and held the relevant forum. The Chinese government has enacted 'China Circular Economy Promotion Law (2009)' for sustainable resource use, environmental improvements and sustainable development. This law has great significance as legal for

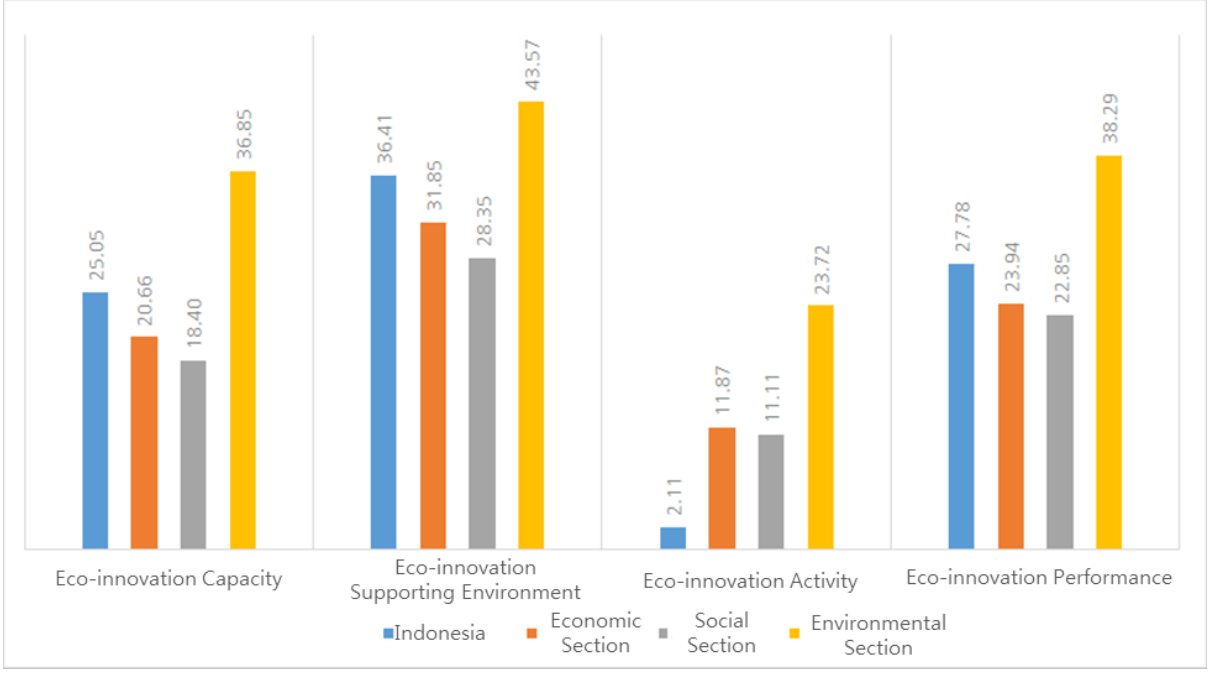
[17] National Plan for Science and Technology Development (2006-2020): prioritized field of research includes energy, water, environment etc.
[18] Energy Saving and New Energy Vehicle Development Plan (2011-2020)
[19] Thousand Enterprises program (2006)
[20] State Grid Corporation of China(SGCC)

eco-innovation. ‘Ministry of Science and Technology’ introduced the ‘National High-tech R&D program: 863 program’ to promote innovation. ‘973 Program’ is a national key basic research project and focus on national priorities of innovation and technology in socio-economic area.

Indonesia

	3,475	249.9 million	14:47:39	0.684 Medium	4.26	4.43	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.6〉 ASEI quantitative analysis of Indonesia



- Eco-innovation capacity, supporting environment and performance of Indonesia are higher than the average score of the fourth country group in the economic sector quartile. However eco-innovation activity score is low.
- Eco-innovation capacity, supporting environment and performance of Indonesia are higher than the average score of the fourth country group in the social sector quartile. However eco-innovation activity score is low.

■ Eco-innovation capacity, supporting environment, activity and performance of Indonesia are higher than the average score of the fourth country group in the environmental sector quartile.

〈Table 5.11〉 Comparative analysis of TBL quartile for Indonesia

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Indonesia	25.05	36.41	2.11	27.78	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	36.85	43.57	23.72	38.29	3

■ Indonesia shows comparative advantage in the scores of supporting environment when compared with the countries that comes in 3rd and 4th place. It's a country with high possibilities of maximizing the effects from eco-innovation, if it could be actively applied to private sectors; since the level of government support is high for eco-innovation and its related sectors. If they increase their environment management participation level to strengthen their currently low level of eco-innovation activities and improve their economic influence of their main eco-friendly corporations, they will be able to step up as a better eco-innovation development nation.

〈Table 5.12〉 Eco-innovation Policy instruments of Indonesia

National plan and strategy	Sustainability	■ Vision 25/25
	Eco-innovation	■ The 2005-2025 National Energy Policy Blueprint
Programmes and actions	National	■ Public Disclosure Pollution Control Program(PROPER) ■ Eco-industry program ■ Green Investment Program ■ Low Cost Green Car (LCGC) program
	International	■ The APEC Policy Partnership on Science, Technology and Innovation (PPSTI) ■ Indonesia-Singapore Environmental Partnership (ISEP) (2002)
Legislation		■ Law No. 32/2009 on Environmental Protection and Management

Finance	■ Green Investment Program ■ Environmental Soft Loans(for SMEs) ■ The Indonesia Climate Change Trust Fund
Information	■ BAPEDAL Regional Network Project (1996~2005) ■ 7th Regional Environmentally Sustainable Transport(EST) Forum

Through the recent industrial development, the manufacturing and service business takes big part of Indonesia as well as their agriculture based industry; created from their abundant resources. They are also one of the biggest exporter of palm oil, cocoa, tin, steel, copper, rubber, and fish. Indonesia is in need of a innovation for sustainable development since the current Indonesian industrial structure is composed of agricultural and industrial forms that sustains by gathering and collecting natural resources. The infrastructure of Indonesia especially works as an important element in improving the country's competitiveness as distribution center of Eastern Asia. Indonesia has already realized their need for technical development in order to improve their data communication technology. However, the educational state of 50% of their population remains at an elementary level while only 8% of the whole population have received a higher education while the country requires high-quality manpower in order to do so.

Under these conditions, the Eco -Innovation policy has been running mainly around renewable energy along with the National Action Plan on climate change. Wind and water power energy development businesses are being developed intensively with a policy that diversifies electricity energy source and raise effectiveness of electric power supply. The related programs and initiatives takes the cooperative structure of international organizations such as GEF, UNDP, and World Bank. They provide economic incentives such as tax cuts for developmental businesses for renewable energy. The Indonesia government has chosen and propels the measure which provides economic incentives rather than restrictions for environmental improvement. The Indonesian Environmental Agency is

running a clean technology investment support policy in alliance with financial institutions for small to medium sized countries. This is mainly run by the Indonesian Development Planning Institute. The Development Planning Institute created and runs an Indonesia Climate Change Trust fund together with UNDP.

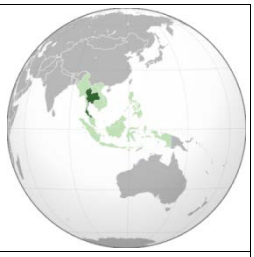
The Indonesian Environmental Agency[21] separates factories to 5 different levels by its pollution level based on the Public Disclosure Pollution Control Program(PROPER), and provides incentives if a factory advances in a level. Many different East-Asian countries have started to benchmark the example shown by the Indonesian government after it has proven to show positive outcomes. These kinds of environmental programs were based on the Ability Strengthening project experiences of the ADB and the World Bank. The ADB as supported the network project of the local environmental office for the ability strenghtening of Indonesian environmental agencies for the past 10 years(1996~2005), while the World Bank has supported the Environmental Office's Development Technical Assistance project to strengthen the Environmental Office's technological capability enhancement(1992-1999). They also supported a network business of construction for the creative innovation of green technology of East-Asian countries including Indonesia. The Global Green Growth Institute(GGGI) supports the green growth program of Indonesia. Many other international cooperation programs also supports Indonesia's green growth program. Multiple international cooperation programs contributes to Indonesia's eco-innovation ability improvement. INAGREENTHEC contributes to the spreading of Eco-Innovation awareness through networks in the related field of green buildings, eco-friendly products and technology, green energy, green transportation, green ICT, green policies, and water resources/ waste management.

Indonesia's Eco-Innovation looks like a well-needed effort for lasting development, and in order to grow Indonesia's technological competitiveness for a self-sufficient economy.

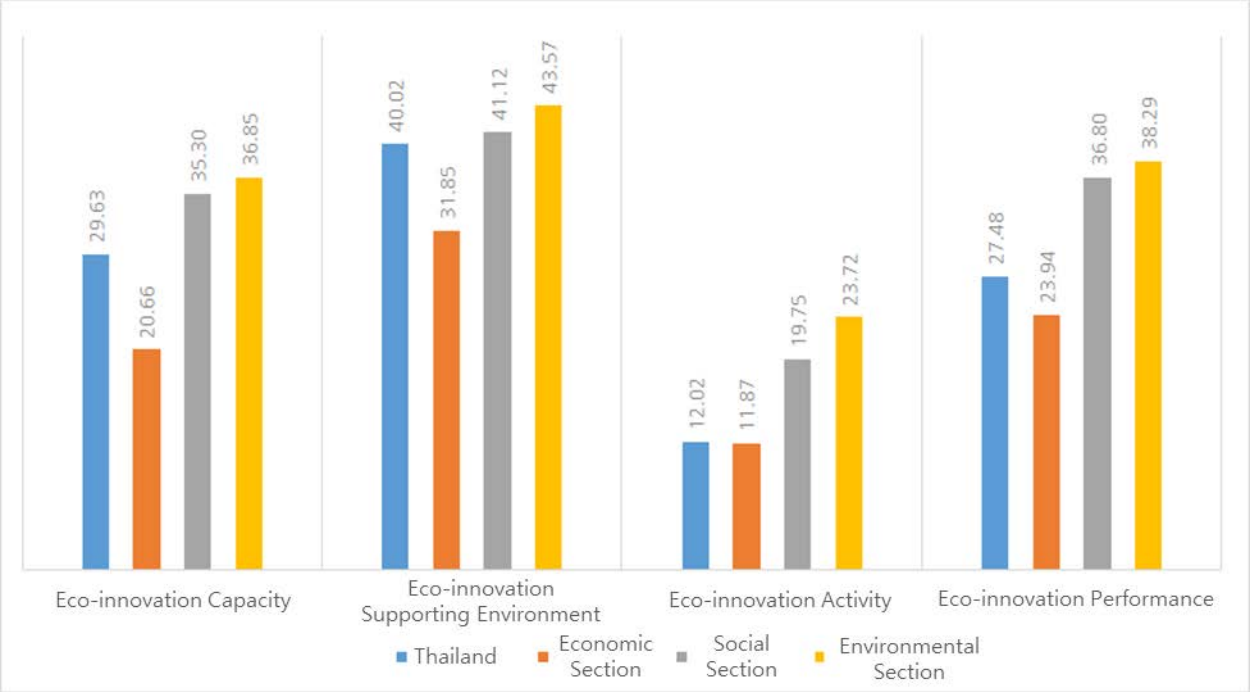
[21] IndonesiaHigh-tech R&D progrpact and Management Agency (BAPEDAL)

They will need a plan to increase manpower by supporting high-quality human resources in a long term for Eco-Innovation. Also, they will need to support technological development for a short period of time in order to push progress along for its Eco-Innovation technology for a self-sufficient economy, which is the direction of improvement for its country.

Thailand

	5,779	67 million	12:44:44	0.772 High	4.58	4.38	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.7〉 ASEI quantitative analysis of Thailand



- Eco-innovation capacity, supporting environment and performance of Thailand are higher than the average scores of the fourth country group in the economic sector quartile. However eco-innovation activity score is low.
- Eco-innovation supporting environment of Thailand is similar with the average scores of the third country group in the social sector quartile. However eco-innovation capacity, activity and performance scores are low.

■ Eco-innovation capacity, supporting environment, activity and performance of Thailand are lower than the average scores of the third country group in the environmental sector quartile. However eco-innovation activity score is low.

〈Table 5.13〉 Comparative analysis of TBL quartile for Thailand

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Thailand	29.63	40.02	12.02	27.48	
Economic	20.66	31.85	11.87	23.94	4
Social	35.30	41.12	19.75	36.80	3
Environmental	36.85	43.57	23.72	38.29	3

■ Compared to other 3rd world countries, Thailand received relatively low scores in competence, action, and outcome charts. This implies that the importance awareness of Eco-Innovation and sustainable development for the overall economy. It seems that it needs to work to raise energy sustainability levels, economic influence of main eco-friendly corporations, and strengthen competence areas that doesn't show too much of a difference with other 3rd world countries.

〈Table 5.14〉 Eco-innovation Policy instruments of Thailand

National plan and strategy	Sustainability	-
	Eco-innovation	■ Thailand's green and inclusive innovation policy ■ Thailand 20-Year Energy Efficiency ■ Development Plan (2011 - 2030) ■ Environmental Quality Management Plan (1999- 2006)
Programmes and actions	National	■ Carbon Reduction Labeling ■ Carbon Footprint Program
	International	-
Legislation		■ Enhancement and Conservation of National Environmental Quality Act (1975)
Finance		■ Energy Conservation Promotion Fund (ECPF)
Information		■ Thailand Business Council for Sustainable Development ■ The 9th Sustainable Energy and Environment Forum (SEE Forum) 2012

	■ Thailand country development partnership-environment (2004) ■ Science and Innovation for Sustainable Development Forum ■ A Quest for Sustainable Development: Goals for Asia and Europe (Asia-Pacific Ministerial Dialogue) (2013) ■ The Fifth Regional Environmentally Sustainable Transport (EST) Forum in Asia (2010) ■ Pilot project on waste exchange programs

The GDP ratio of key industries, agriculture, manufacture and service, are 1:4:5; and the average yearly economic growth rate of Thailand is 3.9%. Although the leading export, manufacture and agricultural goods, are mainly exported - and the added value of the service industry due to its development in tourism, the imported goods outnumber that of exports by 4 times the size of exports, and the influence of foreign investment is tremendous in the economic activation of Thailand. Especially in the manufacturing business where most of its shares belong to the Japanese or other foreign corporations, they realize that their weak point is their scientific field, and they are mentioning the scientific field as well as the Eco-Innovation field as their crucial points in improving their country's basic competitiveness. Although agriculture takes up one of the most crucial points in their own economy, most are being exported as a primary product in manufacturing.

Most Eco-Innovation policies are focused on the energy-related field. The carbon footprint program has been progressing alongside with the tourism business due to the development of the said business based on environmental goods. They have plans on improving lacking fields such as science and technology in their country development plans, and have recently proceeded with a national policy for 2012-2021 on innovation capacity building. Many pilot programs on running Eco-Innovation for each categories and long-term plans have been progressing. These such pilot programs are about waste management and recycling, and eco-labeling. Thailand is not only putting much effort for the green-production of producers, but also am trying to improve green-communication

with the consumers. This shows that the level of consciousness of their citizens as well as the number of tourists who are interest in eco-tours are rising due to the development of the tourism industry.

Most funding has been coming from energy preserving funds, research funds, and the small and medium industry bank. Funds from the small and medium industry bank has been invested by the ministry of Finance. The Office of Small and Medium Enterprises Promotion (OSMEP) that manages and controls the general affairs of universities/organizations/cooperations/small and medium corporations that seeks to support a small and medium corporation. It does not support any supporting policy[22] for Eco-Innovation even though it suggests visions about the vision of small and medium corporation promotion through the small and medium corporation promotion plans. Most Eco-Innovation is focused on the energy field, and a national plan at a current nation development plan is at a progressing level for the increase of technology that are currently falling behind. Although the technical progress hasn't proceeded enough, technology transfer actions that takes the form of pilot projects related to Eco-Innovation such as eco-labeling and environment improvement business will work as a catalyst for Thailand's Eco-Innovation execution.

Like other countries, international cooperation is taking place in network actions. Also, since many separate organizations for environmental conservation and sustainable development have been established, the propelling of Eco-Innovation is anticipated; and for this, science and technological fields and infrastructures are being supported for a long-term tactic. The environment research institute is a NGO that provides consultation about the responsive strategy for environmental problems for the country, local government, corporations, and civic groups. This institution has been chosen as the world's 70th environmental sink tank two years in a row between 2013 and 2014, and

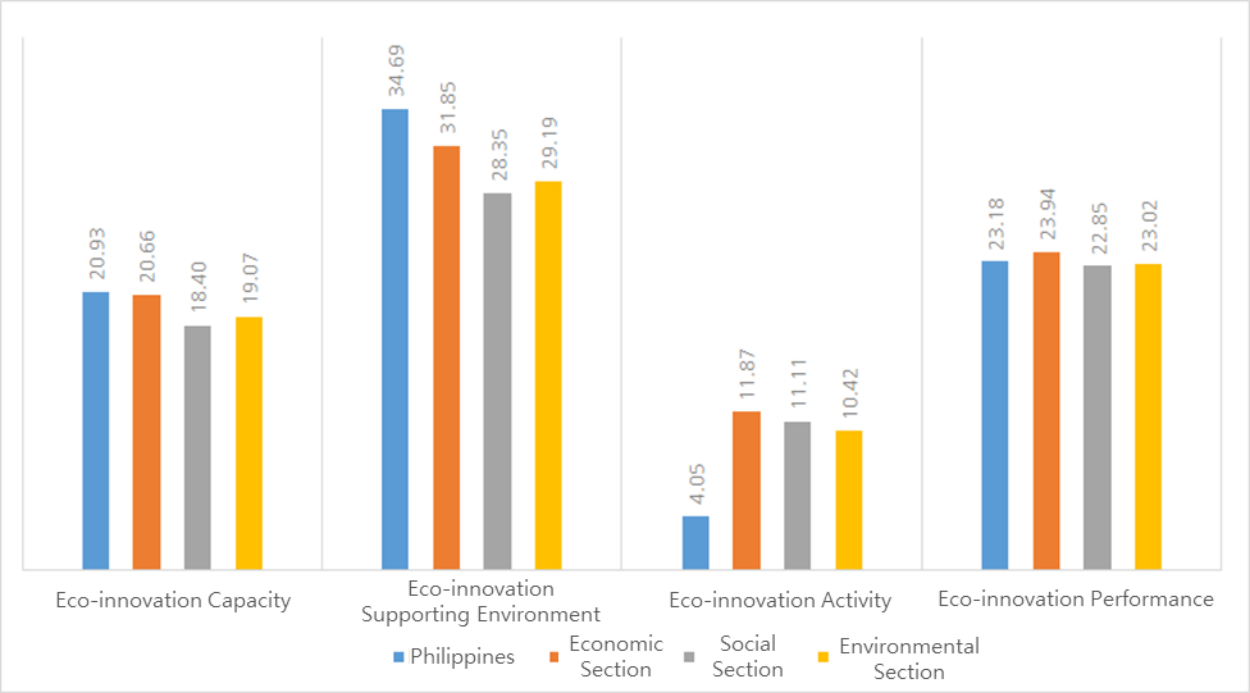
[22] SME Promotion Plan

has received positive feedback from the Ministry of Science and Technology in 2012 about their systemic approach to innovation. Although it's in an introductory stage of the innovation policy, they will be able to attempt for a more rapid development on Eco-Innovation by building capacity for the implementation of Eco-Innovation through short-term manufacturing and architectural business technology transfer.

Philippines

	2,765	98.4 million	11:32:57	0.660 Medium	4.12	4.48	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.8〉 ASEI quantitative analysis of the Philippines



- Eco-innovation capacity, supporting environment and performance of the Philippines are higher than the average scores of the fourth country group in the economic sector quartile. However eco-innovation activity score is low
- Eco-innovation capacity, supporting environment and performance of the Philippines are similar or higher than the average scores of the fourth country group in the environmental sector quartile. However eco-innovation activity score is low`

■ Eco-innovation capacity, supporting environment and performance of the Philippines are higher than the average scores of the fourth country group in the economic sector quartile. However eco-innovation activity score is low

〈Table 5.15〉 Comparative analysis of TBL quartile for Philippines

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Philippines	20.93	34.69	4.05	23.18	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

■ The Philippians, like other South East Asia countries, shows a lack of eco-innovation centric market activity from the private organizations relative to the government's supportive environment. The country's interest rate itself is high but the lack of eco-innovation activities from the companies indicates that the economic atmosphere is focused on the industry's growth itself. To encourage continuous development, it is necessary to increase corporate sustainability management perception and environment management participation levels along with increasing the green market size.

〈Table 5.16〉 Eco-innovation Policy instruments of Philippines

National plan and strategy	Sustainability	■ Philippine Agenda 21 (1996)
	Eco-innovation	
Programme and actions	National	■ National Energy Efficiency and Conservation Program
	International	
Legislation		■ Biofuels Act (2006) ■ Renewable Energy Act (2008)
Finance		■ Philippines Sustainable Energy Finance Program ■ Sustainable Entrepreneurship Enhancement and Development Program(SEED) ■ Clean Technology Fund Investment Plan for the Philippines
Information		■ Sub-regional Conference on Waste water Management: Promoting Innovations and Sustainable

	Investments (2013) ■ The Asia Low Emission Development Strategies (LEDS) Forum (2013) ■ Philippines sustainable development network (PSDN)

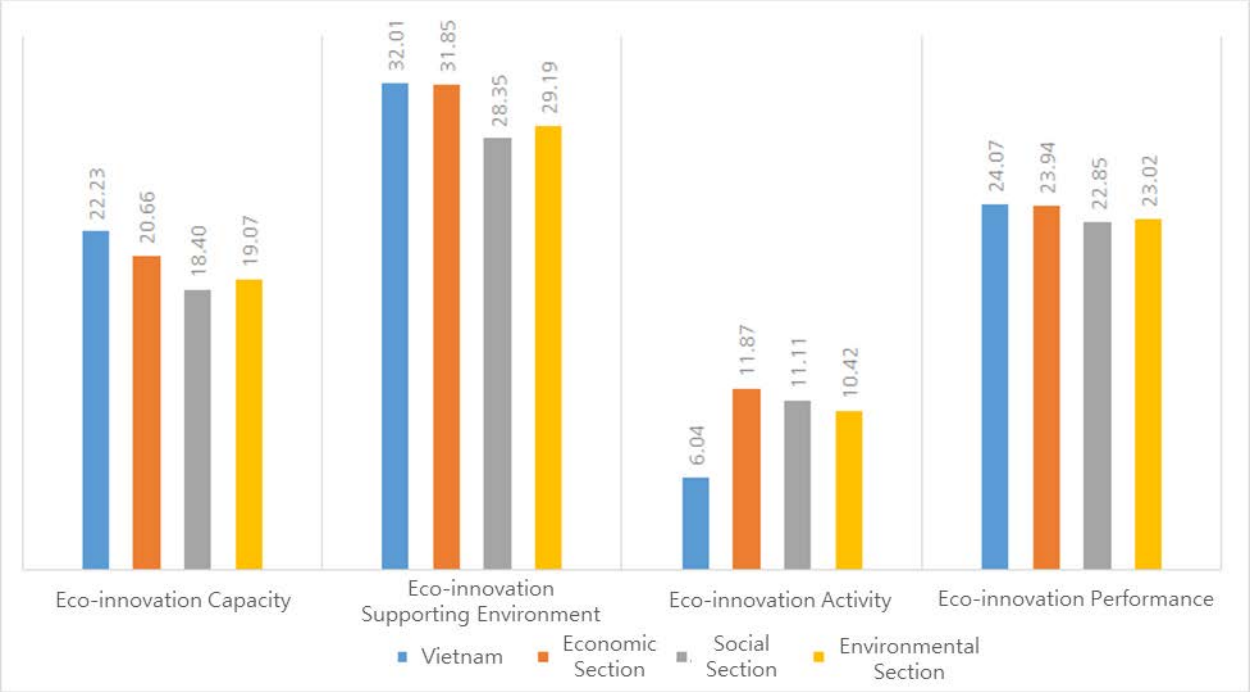
Eco-innovation vision and strategy of the Philippians are centered on energy. The Philippians has established national plans to increase energy efficiency[23] and has enacted specific laws regarding biofuel and new renewable energy. In order to meet these plans, the Philippians government has cooperated with various international organizations such as GEF, ADB, SWITCH-Asia, and UNIDO to pursue programs for increasing energy efficiency. Particularly the Philippians Development Bank[24] is operating a financial support program for continuous development, specifically supporting social infrastructures, public services and community development, small and medium enterprise (SME) promotion, and environment initiatives.

[23] Energy Efficiency and Conservation Plan of Action
[24] DBP(Development Bank of Philippines)

Vietnam

	1,911	91.7 million	19:39:42	0.638 Medium	3.93	3.73	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.9〉 ASEI quantitative analysis of Vietnam



- Eco-innovation capacity, supporting environment and performance of Vietnam are higher than the average scores of the fourth country group in the economic sector quartile. However eco-innovation activity score is low.
- Eco-innovation capacity, supporting environment and performance of Vietnam are higher than the average scores of the fourth country group in the social sector quartile. However eco-innovation activity score is low.

■ Eco-innovation capacity, supporting environment and performance of Vietnam are higher than the average scores of the fourth country group in the environmental sector quartile. However eco-innovation activity score is low.

〈Table 5.17〉 Comparative analysis of TBL quartile for Vietnam

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Vietnam	22.23	32.01	6.04	24.07	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

■ Vietnam's potential regarding eco-innovation and supportive environment ranked relatively high compared to its 4th division countries in addition to the nation's growth. Also Vietnam scored relatively high for eco-innovation performance which reflects the country's atmosphere for sustainable development. However the eco-innovation activity scores were low indicating the need for private organizations' participation and activities. If the private organizations' automatous action activities were cultivated it would synergize with the other areas' comparative advantages and lead to stronger eco-innovation results.

〈Table 5.18〉 Eco-innovation Policy instruments of Vietnam

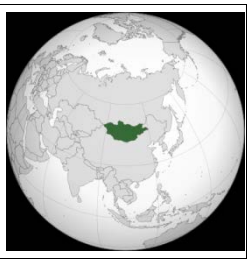
National plan and strategy	Sustainability	■ Socio-economic development strategy for 1991-2000 ■ Strategic Orientation for Sustainable Development (Vietnam Agenda 21) (2004)
	Eco-innovation	■ National Green Growth Strategy for the period 2011-2020 with a vision to 2050(2013) ■ National Energy Master Plan
Programme and actions	National	■ A Guideline for Energy Efficiency Standard and Labeling (2006) ■ Vietnam Clean Production and Energy Efficiency Project ■ Vietnam Energy Efficiency Program (VNEEP) (2006)
	International	■ Sustainable Product Innovation Project (SPIN)
Legislation		■ Environmental Protection Law (2005)

Finance	■ The Vietnam Energy Efficiency and Cleaner Production (EECP) Financing Program
Information	■ 15th Forum on Eco-innovation: ECUNEP ■ Roundtable on Eco-innovation (2013) ■ Green Innovation Forum-Energy Efficiency and Renewable Energy (2011)

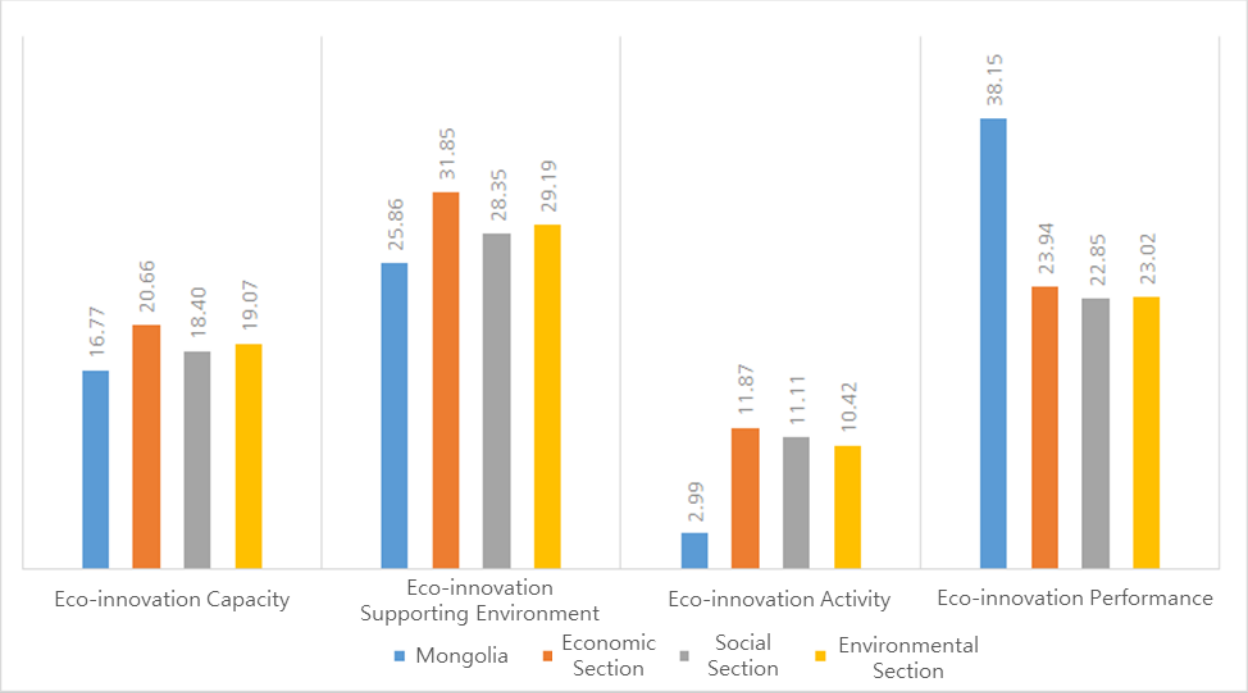
Vietnam's eco-innovation national vision and strategy includes technology development and energy procurement strategies. In 2013 the Vietnam government created the National Green Growth Strategy and urged the increased usage of new renewable energy and minimization of greenhouse gas emissions as well as increased Green Production and Green Consumption. It provided a guideline for energy efficiency to achieve Green growth and is operating an eco-labeling system in cooperation with the Australian government that provides environment friendly consumption information to the consumer. Viet is cooperating with various countries and organizations to achieve eco-innovation. A demonstration project is underway for wind power generation as part of new renewable energy development and several pilot projects in cooperation with international organizations such as WB, SNV, BMU, GIZ, IIEC, and IFC are underway. Also The World Bank and Hanoi organization are pushing for a city plan eco-innovation for the development of Hanoi's transportation sector. Vietnam is also establishing eco-innovation partnerships with south East Asia countries that share close borders and are in the vicinity of Mekong River such as Laos and Cambodia. It also operates a forum[25] regarding eco-innovation, energy efficiency and new renewable energy.

[25] Green Innovation Forum – Energy Efficiency and Renewable Energy

Mongolia

	4,056	2.8 million	16:33:51	0.698 Medium	3.44	3.41	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.10〉 ASEI quantitative analysis of Mongolia



- Eco-innovation performance of Mongolia is higher than the average scores of the fourth country group in the economic sector quartile. However eco-innovation capacity, supporting environment and activity scores are low.
- Eco-innovation performance of Mongolia is higher than the average scores of the fourth country group in the social sector quartile. However eco-innovation capacity, supporting environment and activity scores are low.

■ Eco-innovation performance of Mongolia is higher than the average scores of the fourth country group in the environmental sector quartile. However eco-innovation capacity, supporting environment and activity scores are low.

〈Table 5.19〉 Comparative analysis of TBL quartile for Mongolia

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Mongolia	16.77	25.86	2.99	38.15	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

■ Mongolia was not found to have high interest in eco-innovation from both the government and private organizations but had a high will in sustainable development. The previous culture of an environment friendly life style seems to have led to Mongol's high will in sustainable development. With additional capacity increase and market function vitalization on the national level in conjunction with Mongolia's will for sustainable development can lead to stronger eco-innovation.

〈Table 5.20〉 Eco-innovation Policy instruments of Mongolia

National plan and strategy	Sustainability	■ Mongolian National Sustainable Development Agenda (2005)
	Eco-innovation	
Programme and actions	National	■ National Programme for Sustainable Development 2011 ■ "National Program for Renewable Energy (NPRE)" 2005, 2007 ■ "One Hundred Thousand Solar Lights" Programme
	International	
Legislation		■ Environmental Protection Law (1995)
Finance		■ GEF Small Grants Programme
Information		■ National forum "Sustainable development and environ- mental governance" (2012) ■ National Forum on Green Development ■ "World Clean Coal 2014 〃 conference ■ National Committee for reducing air pollution ■ Consultation "Implementation Status of Agenda 21 for sustainable education (MNET and UNDP)" 2012

Mongol has developed a legislative system for sustainable development in the past 20 years 26. A series of national strategies have been chosen and 304 official policies have been created in the past 15 years in combination with overall national development plans. Even with these developments, there needs to be improvements to allow these policies to be carried out. Also there is a strong need to continuously work on strengthening capacity to move on to the next stage 27 Mongol's eco-innovation policy goals have not been specifically planned but can be found in national vision and strategies for sustainable development.28 5 tasks of traffic, chemical substances, waste, mining, and continuous consumption have been set out for sustainable development. As part of a bill for sustainable development29 to establish a sustainable energy system, the government has decided to increase energy efficiency and new renewable energy's importance, develop cleaner coal energy technology and cooperate with international organizations to acquire advanced technologies. Partnership for Action on Green Economy (PAGE) collaboration organizations UNEP, ILO, UNDP, UNITAR, and UNIDO have partnered and formed a group initiative to strengthen Green economy capacity by 2020. Mongolia has reinforced international cooperation to expedite its previous weak policies in face of environmental problems of environmental pollution and lack of water from mining along with desertification. The Department of Industry has been in charge of promoting small and medium enterprises and has internationally cooperated with organizations such as UN Country Office, EU, EBRD, UN CITRAL and SDC (Swiss Agency for Development and Cooperation) to secure public financing to improve the business environment and

[26] Constitution of Mongolia (1992), Mongolia's Development Strategy (1996), Mongolia's Agenda 21 (1998), Mongolian National Development Programme (2005), "Mongolia's National Security Concept", "Mongolia's Foreign Policy Concept", "Strategic Document for Economic Growth and Poverty Reduction", "Mongolia's Regional Development Strategy", "Mongolia's Millennium Development Goals" (2005), "Mongolia's National Reports on Millennium Development Goals" and Mongolia's Regional Development Programme: and others.
[27]UNDP, 2012, MONGOLIA'S SUSTAINABLE DEVELOPMENT AGENDA: PROGRESSES, BOTTLENECKS AND VISION FOR THE FUTURE, UNDP, ULAANBAATAR (11~15pp)
[28] Mongolia National Report On Sustainable Development For The 18th Session of the Commission on Sustainable Development
[29] Mongolian National Sustainable Development Agenda (2005), 76pp,

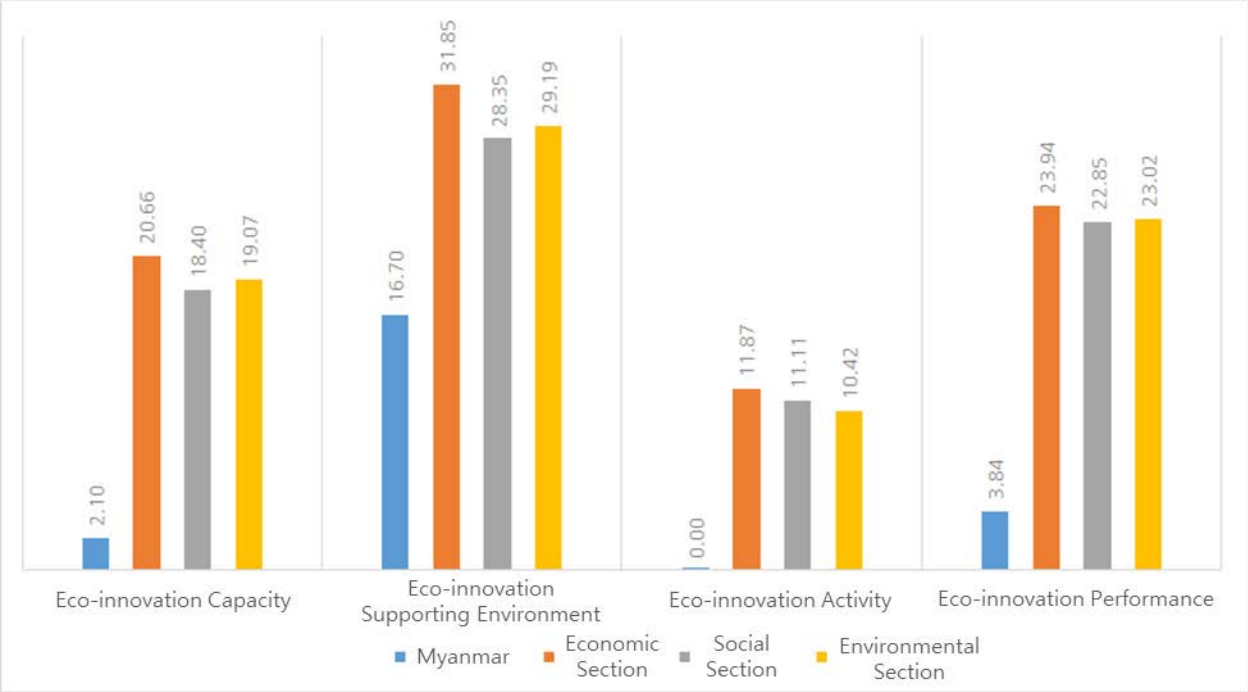
strengthen the capacity of small and medium enterprises. In 2007 the CDM business regulations were modified in regards to renewable energy policies. The Mongolian government started NPRE programs[30] in 2005 and improved its energy system standards by 2007. The original plan's goal was to produce 3~5% of all energy by 2010 but has been currently changed to produce 20~25% by 2020. After pushing forward programs across all Mongolian provinces, over 90% of cotton has been connected to the central electricity grid and 70~90% of stock farmers are able to use solar and wind generated electricity. The country's "One Hundred Thousand Solar Lights" program has allowed stock farmer families to use solar energy and has been able to succeed through each district's appropriate regulations along with public and private partnership[31]. To further carry out Mongolia's eco-innovation, it is important to consider Mongolia's unique socio-cultural background and environment along with its economic infrastructure businesses when planning national development strategies and eco-innovation strategies.

[30] "National Program for Renewable Energy (NPRE)" 2005, 2007
[31] UNDP, 2012, MONGOLIA'S SUSTAINABLE DEVELOPMENT AGENDA: PROGRESSES, BOTTLENECKS AND VISION FOR THE FUTURE, UNDP, ULAANBAATAR (11~15pp)

Myanmar

	-	53.3 million	38:20:42	0.524 Low	-	-	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.11〉 ASEI quantitative analysis of Myanmar



- Eco-innovation capacity, supporting environment, activity and performance of Myanmar are lower than the average scores of the fourth country group in the economic sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of Myanmar are lower than the average scores of the fourth country group in the

social sector quartile.

- Eco-innovation capacity, supporting environment, activity and performance of Myanmar are lower than the average scores of the fourth country group in the environmental sector quartile.

〈Table 5.21〉 Comparative analysis of TBL quartile for Myanmar

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Myanmar	2.10	16.70	0.00	3.84	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

- Myanmar has showed a low score relative to other 4th division countries. However, the supportive environment area's score difference is relatively low indicating government centric eco-innovation advances will be efficient. Potential increase in various sectors, market economy vitalization, and promotion of sustainable development perception through economic growth has to be done in parallel with government centric eco-innovation growth.

〈Table 5.22〉 Eco-innovation Policy instruments of Myanmar

National plan and strategy	**Sustainability**	■ Myanmar Agenda 21 (1997)
	Eco-innovation	
Programme and actions	**National**	
	International	
Legislation		■ Natural Environmental Framework Legislation
Finance		
Information		■ ESCAP-Myanmar Partnership ■ Sustainable Business Myanmar ■ Myanmar Green Economy Green Growth Forum (2011~.annually) ■ A pilot Resource Efficient and Cleaner Production (RECP) programme in Myanmar ■ Myanmar Green Energy Summit 2014 ■ Renewable Energy Association Myanmar (REAM)

	(1993)

In 1997, Myanmar's National Environment Committee[32] announcement of Myanmar Agenda 21 established Myanmar's national vision and strategy along with Myanmar's eco-innovation as a threefold goal of sustainable development. Afterwards, in cooperation with UNEP in 2009, the Forestation Department proposed a national road map for sustainable development. Myanmar currently is focused on technological developments to support small and medium enterprises and does not show a clear eco-innovation policy goal and means yet. At the "Myanmar's Legislative Reform for Sustainable Development" seminar hosted by UNDP, the Japanese government, and the Japan International Cooperation Agency[33], the Myanmar government stated that even though a legislative reform is necessary for stable and sustainable national development, its legislation is in poor state due to the country undergoing a political transition[34]. Myanmar has prepared a sustainable development strategy to establish a sustainable national roadmap for the environment, economics, and social sectors.

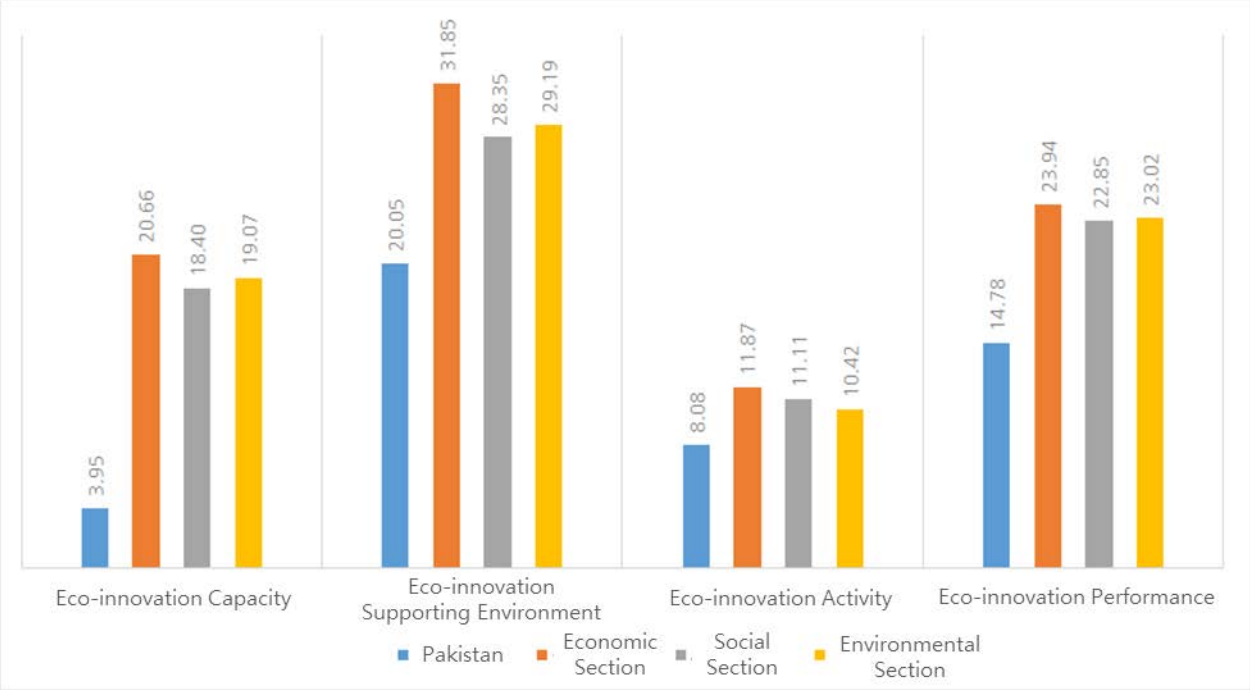
Ministry of Agriculture and Irrigation[35] and UNESCAP have partnered to provide local support for the agricultural sector's overall sustainable development and organizations such as UNIDO and SECO are also in cooperation in order to promote eco-innovation. After Myanmar's recent change of government, the UMFCCI[36] held the Myanmar Green Energy Summit (2014) showing increased interest in new renewable energy financing and facilities, starting with information exchange of related technologies.

[32] National Commission for Environmental Affairs(NCEA)
[33] Japan International Cooperation Agency(JICA)
[34] http://www.mm.undp.org/content/myanmar/en/home/presscenter/speeches/2014/04/opening-remarks--towards-sustainable-development-of-myanmar/
[35] Ministry of Agriculture and Irrigation
[36] UMFCCI(The Republic of the Union of Myanmar Federation of Chambers of Commerce & Industry)

Pakistan

	1,299	182.1 million	25:22:53	0.537 Low	2.93	2.91	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.12〉 ASEI quantitative analysis of Pakistan



- Eco-innovation capacity, supporting environment, activity and performance of Pakistan are similar with the average scores of the fourth country group in the economic sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of Pakistan are lower than the average scores of the fourth country group in the social sector quartile.

■ Eco-innovation capacity, supporting environment, activity and performance of Pakistan are lower than the average scores of the fourth country group in the environmental sector quartile.

〈Table 5.23〉 Comparative analysis of TBL quartile for Pakistan

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Pakistan	3.95	20.05	8.08	14.78	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

■ Pakistan received the lowest score across all areas compared to the same division countries, but its similar activity relative to the 4th division countries gave the country a relative edge in eco-innovation fulfillment activities. However the eco-innovation capacity, supporting environment and result areas that allow a virtuous cycle show significant lacking, showing the urgent need for a solution for bigger growth.

〈Table 5.24〉 Eco-innovation Policy instruments of Pakistan

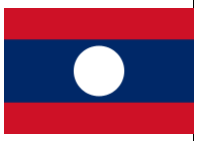
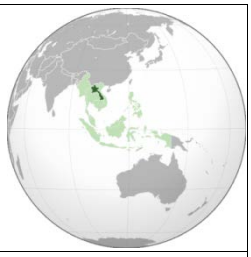
National plan and strategy	Sustainability	■ National Sustainable Development Strategy (2012)
	Eco-innovation	■ Alternative and Renewable Energy Policy 2011 ■ Pakistan Energy Vision 2035 ■ National Climate Change Policy 2012 ■ Clean Development Mechanism - National Operational Strategy (2006)
Programmes and actions	National	■ Pakistan Sustainable Transport Project (2011-2016)
	International	
Legislation		■ The Pakistan Environmental Protection Act 1997 ■ National Environmental Quality Standards (self-monitoring and reporting by industries) Rules (2001)
Finance		■ Provincial Sustainable Development Funds (PSDFs) 2011
Information		■ Sustainable Development Conferences (SDCs) ■ Pakistan Sustainability Network ■ Pathways to Resilience in Semi-Arid Economies (PRISE) 2014-2018

	■ Sustainable Ship-breaking Initiative (SSI) for Trade and Sustainability in Ship-breaking Industry of Pakistan 2011-2016 ■ Secure Livelihoods Research Consortium (SLRC) 2011-2017 The Centre for Capacity Building [CCB]

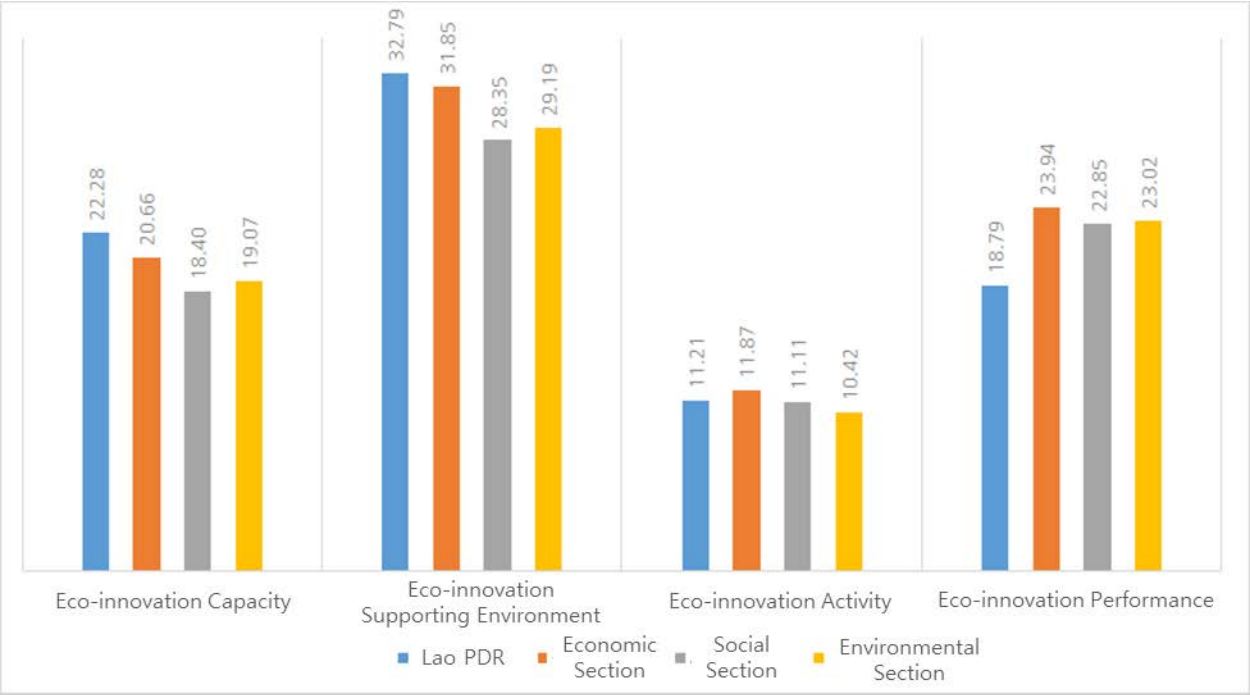
Pakistan established its Plan for Alternative Energy and New Renewable Energy in 2011[37] under its national vision and strategy of sustainable development and climate change responses. However, instead of R&D policies for developing new renewable energy, Pakistan is receiving 2300MW worth of solar and wind electricity support from China's Wind Electric and is participating in the project to reduce the transportation area's energy consumption and greenhouse emissions in cooperation with IUCN (2011-2016) [38]. Recently Pakistan has established a national strategy in 2012 [39] for sustainable development while strengthening its sustainable development policies. The Pakistan Environmental Protection Agency[40] improved the Pakistan environment protection Act[41] enacted in 1997 and established regulations regarding environment management standards as part of pushing its sustainable development policies ahead.

[37] Alternative and Renewable Energy Policy(2011)
[38] Pakistan Sustainable Transport Project
[39] National Sustainable Development Strategy(2012)
[40] Pakistan Environmental Protection Agency(PAK-EPA)
[41] Pakistan Environmental Protection Act

Lao PDR

	1,646	6.8 million	25:32:38	0.569 Medium	-	-	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.13〉 ASEI quantitative analysis of Lao PDR



- Eco-innovation capacity, supporting environment, activity of Lao PDR are higher than the average scores of the fourth country group in the economic sector quartile. However eco-innovation performance score is low.
- Eco-innovation capacity, supporting environment, activity of Lao PDR are higher than the average scores of the fourth country group in the social sector quartile. However eco-innovation performance score is low.

■ Eco-innovation capacity, supporting environment, activity of Lao PDR are higher than the average scores of the fourth country group in the environmental sector quartile. However eco-innovation performance score is low.

〈Table 5.25〉 Comparative analysis of TBL quartile for Lao PDR

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Lao PDR	22.28	32.79	11.21	18.79	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

■ Laos has a slightly higher or similar score in comparison with the same 4th division countries in regard to capacity, supporting environment, and activity areas but had a lower score in its results area, an area that leads sustainable development in eco-innovation. It appears that maturity in leading sustainable development is needed on a national level as well as the establishment of an overall environment to promote economic growth and social, environmental value maximization.

〈Table 5.26〉 Eco-innovation Policy instruments of Lao PDR

National plan and strategy	Sustainability	■ Strategic Framework for National Sustainable Development Strategy 2008 ■ Long-Term Strategy of Socio-Economic Development to the Year 2020
	Eco-innovation	■ Sustainable Transport Strategy 2020 ■ Renewable Energy Strategy to 2025 ■ Ecotourism Action Plan 2005-201
Programmes and actions	National	-
	International	■ Sustainable Product Innovation Project (SPIN)
Legislation		-
Finance		-
Information		-

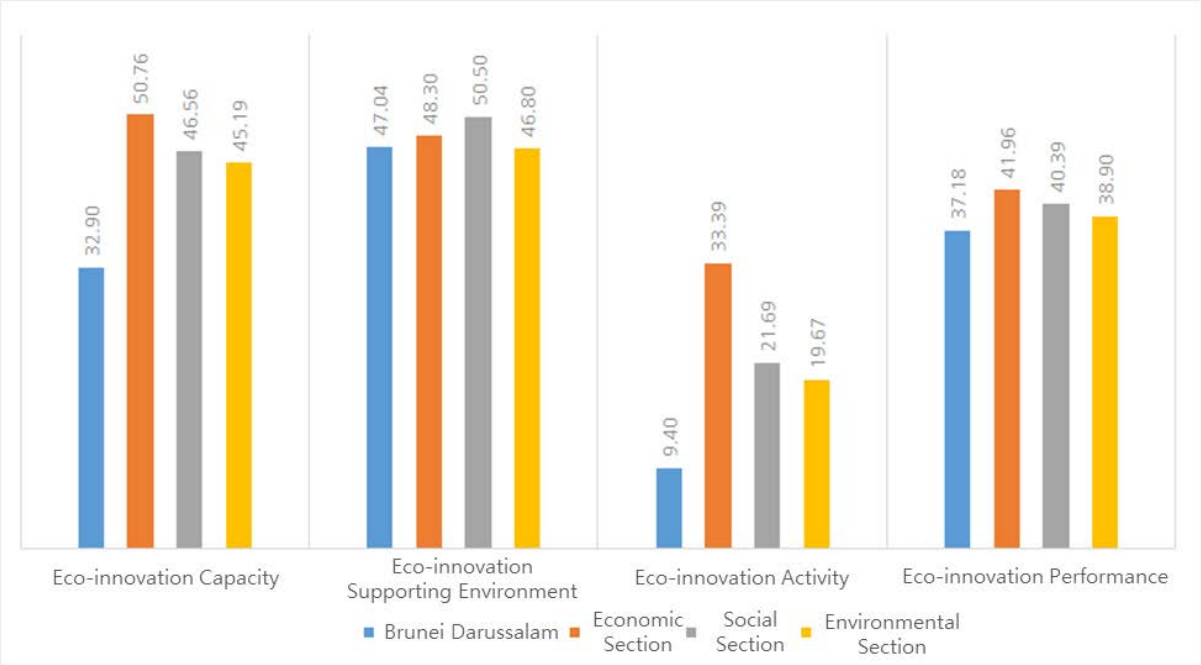
Laos's transportation and energy sector's national strategy for sustainable development includes eco-innovation national strategies and vision. Laos is receiving support from the international cooperation program of eco-innovation, SWITCH Asia[42]. Lao PDR's clean production center[43] was constructed in cooperation with UNIDO and is under the management of Ministry of Industry and Commerce[44] while receiving financial support from the Swiss government. SPIN[45], a project of EU's SWITCH-Asia program for sustainable product innovation in Laos, Cambodia, and Vietnam, aims to increase the environmental and societal quality of the products and services of its respective countries and includes marketing and branding skill trainings for SMEs.

[42] http://www.switch-asia.eu/projects/
[43] Clean Production Center Lao PDR(CPC-L)
[44] Ministry of Industry and Commerce
[45] Sustainable Product Innovation Project(SPIN)

Brunei Darussalam

	38,563	0.4 million	1:71:28	0.852 Very high	-	-	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.14〉 ASEI quantitative analysis of Brunei Darussalam



- Eco-innovation supporting environment and performance of Brunei are similar with the average scores of the second country group in the economic sector quartile. However eco-innovation capacity and activity scores are low.

- Eco-innovation supporting environment and performance of Brunei are similar with the average scores of the second country group in the social sector quartile. However eco-innovation capacity and activity scores are low.
- Eco-innovation supporting environment and performance of Brunei are similar with the average scores of the second country group in the environmental sector quartile. However eco-innovation capacity and activity scores are low.

〈Table 5.27〉 Comparative analysis of TBL quartile for Brunei Darussalam

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Brunei Darussalam	32.90	47.04	9.40	37.18	
Economic	50.76	48.30	33.39	41.96	2
Social	46.56	50.50	21.69	40.39	2
Environmental	45.19	46.80	19.67	38.90	2

- Brunei shares scores with similar standard countries but lacks in the capacity and activity fields. Firms must increase their participation on environmental management system and their awareness of sustainability management has to be improved as those areas showed relatively lower scores and the green industry market size must be increased as well.

〈Table 5.28〉 Eco-innovation Policy instruments of Brunei Darussalam

National plan and strategy	**Sustainability**	■ Wawasan Brunei 2035 (Vision Brunei 2035)
	Eco-innovation	-
Programmes and actions	**National**	-
	International	-
Legislation		-
Finance		-
Information		-

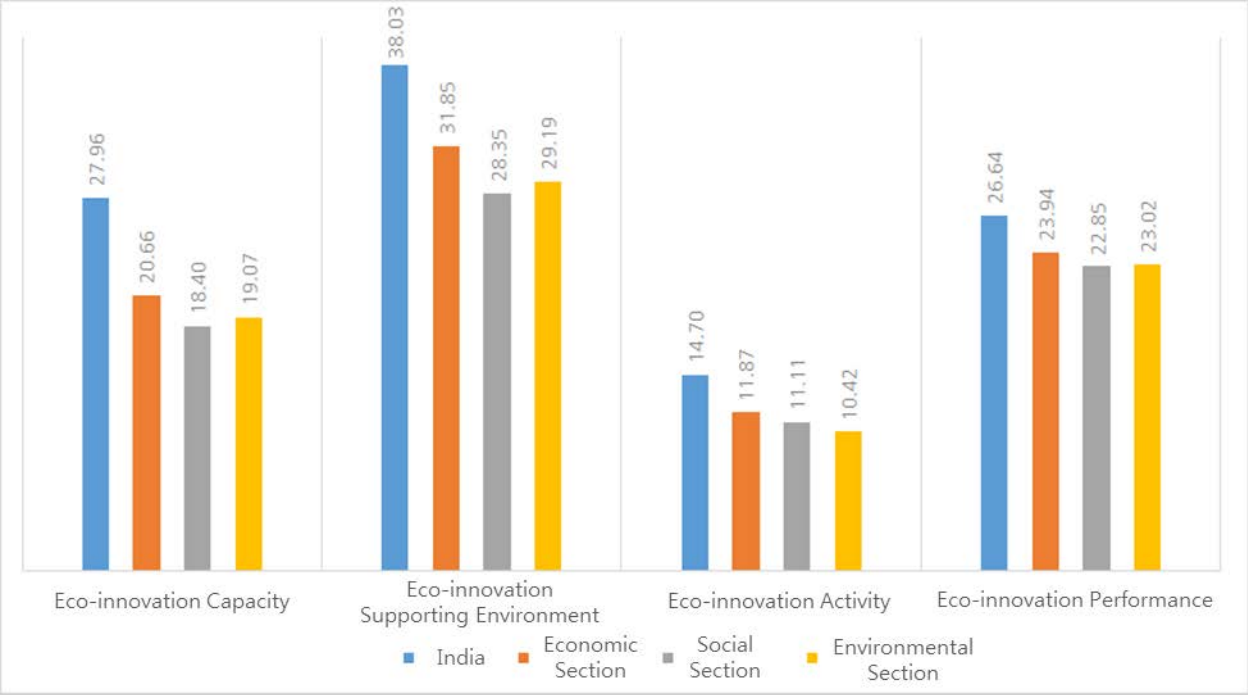
While Brunei has emphasized sustainable economy at WAWASAN BRUNEI 2035, it has focused more on economic development relative to environment protection and management. As Brunei does not have a Ministry of Environment, sustainable

development related polices are responsible by either the Ministry of Development or Ministry of Industry and Primary Resourced. SMEs' innovation and technology transfer is emphasized but eco-innovation related strategies and investment is lacking.

India

	1,499	1252.1 million	17:26:57	0.586 Medium	4.07	3.79	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.15〉 ASEI quantitative analysis of India



- Eco-innovation capacity and supporting environment of India are higher than the average scores of the fourth country group in the economic sector quartile. However eco-innovation activity and performance scores are low.
- Eco-innovation capacity, supporting environment, activity and performance of India are higher than the average scores of the fourth country group in the social sector quartile.

■ Eco-innovation capacity, supporting environment, activity and performance of India are higher than the average scores of the fourth country group in the environmental sector quartile.

〈Table 5.29〉 Comparative analysis of TBL quartile for India

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
India	27.96	38.03	14.70	26.64	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

■ India's high national growth in the field of technology and research has been taken into consideration and thus their capacity and support environment scored relatively high compared to the same 4th division countries. However the interest in eco-innovation itself and importance of sustainable development showed similar levels with 4th division countries resulting in not so high scores in the field of activities and performance. As eco-innovation related potential and support environments showed relative superiority, higher activities and performance can be achieved with the private section's eco-innovation awareness increased.

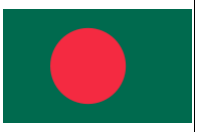
〈Table 5.30〉 Eco-innovation Policy instruments of India

National plan and strategy	Sustainability	■ Ninth Five-year Plan with SD recognized 1997-2002
	Eco-innovation	■ Science, Technology and Innovation Policy 2013 ■ National biofuel policy (2008) ■ Strategic plan for new and renewable energy sector (2011-2017)
Programmes and actions	National	■ Performance Related Incentive Scheme
	International	-
Legislation		■National Green Tribunal Act (NGT) ■Environmental compliance program -
Finance		-
Information		■ Environmental Information System

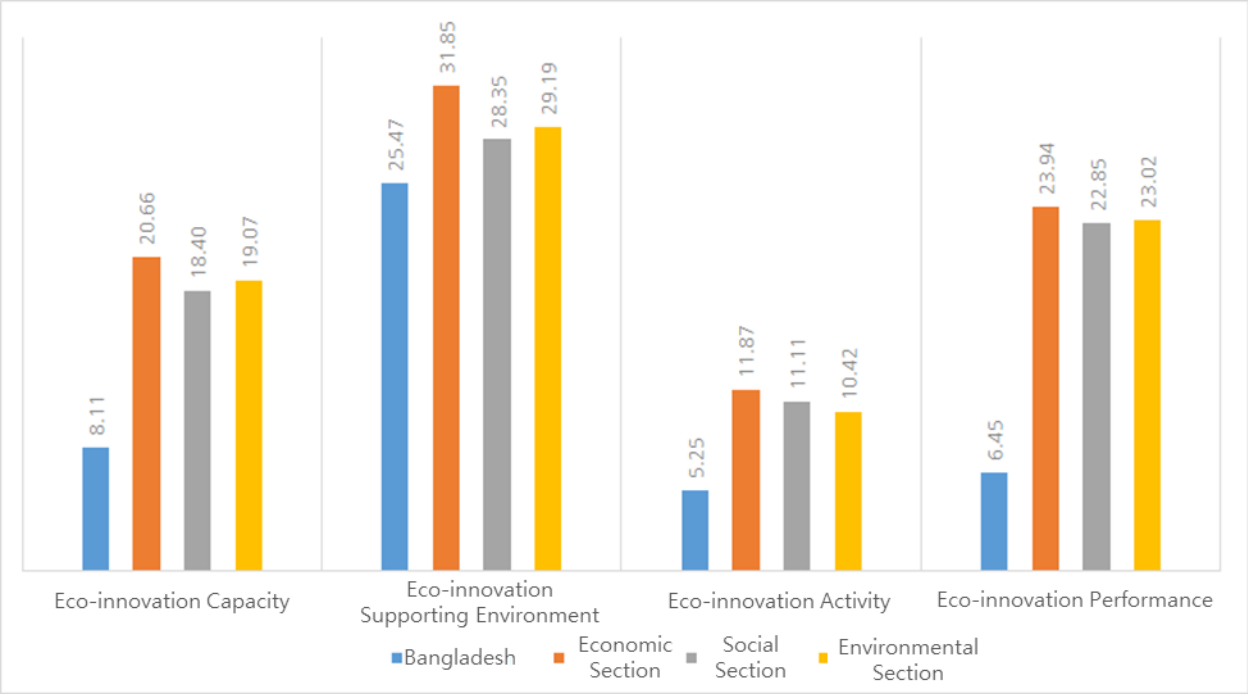
India's eco-innovation related national strategy is technology development and acquiring renewable energy. The strategy of acquiring renewable energy is included in the National Action Plan for Climate Change (NAPCC) (2008). The national energy map[46] proposed an energy sector innovation vision to increase the sustainability of energy utilization. The Ministry of new and Renewable Energy has adopted the National Bio-Fuel Policy (2008) and New and Renewable Energy Plan[47] (2011-2017) policies to support the energy sector eco-innovation. The Indian government has enacted the National Green Committee Law[48] for environment regulation and also operates environment programs[49] in fields such as energy, waste, transportation and agriculture. India is cooperating with international organization for eco-innovation. The World Wildlife Fund (WWF) has supported the Climate Solver Program[50] in order to endorse SMEs' clean technology. Grassroots Innovation Augmentation Network, a private network, is also supporting any firms that are not receiving support from the government or international organizations.

[46] National Energy Map for India
[47] Strategic plan for new and renewable energy sector
[48] National Green Tribunal Act (NGT)
[49] Environmental compliance program
[50] http://west.gian.org/

Bangladesh

	829	156.6 million	17:29:54	0.558 Medium	3.48	0.42	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.16〉 ASEI quantitative analysis of Bangladesh



- Eco-innovation capacity, supporting environment, activity and performance of Bangladesh are lower than the average scores of the fourth country group in the economic sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of Bangladesh are lower than the average scores of the fourth country group in the social sector quartile.

■ Eco-innovation capacity, supporting environment, activity and performance of Bangladesh are lower than the average scores of the fourth country group in the environmental sector quartile.

〈Table 5.31〉 Comparative analysis of TBL quartile for Bangladesh

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Bangladesh	8.11	25.47	5.25	6.45	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

■ Bangladesh has scored lower than the 4th division average scores in all fields but has a superior supporting environment and the government's high interest in eco-innovation compared to its private counterparts can be identified. The low standards of sustainable development importance awareness and execution will are obstacles but with the relative superiority in the country's support environment, the precedence of government oriented eco-innovation support activities can be the driving force behind achieving the overall virtuous cycle.

〈Table 5.32〉 Eco-innovation Policy instruments of Bangladesh

National plan and strategy	Sustainability	■ National Sustainable Development Strategy (2009)
	Eco-innovation	■ National Environment Management Action Plan (NEMAP) (1995)
Legislation		■ Bangladesh Climate Change Trust Fund Act (2010)
Finance		■ The Clean Technology Fund ■ Bangladesh Climate Change Resilience Fund (2010)
Information		■ A seminar entitled "Opportunities for UK-Bangladesh ■ Business Collaborations for Environmental Sustainability and Resource Efficiency" ■ Sustainable agri business supply chain workshop (2013) ■ Jointly arranged to broker supply chain partnerships between companies and NGOs who are directly involved in agri business value chains

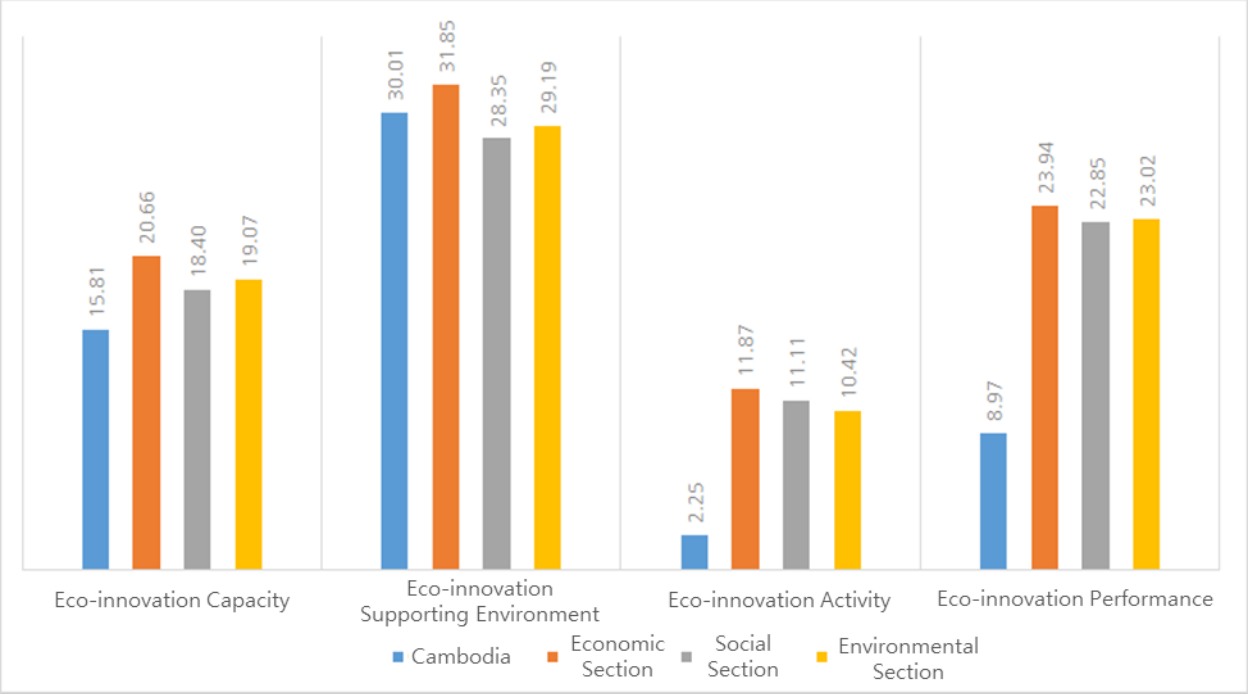
Bangladesh has pursued the National Sustainability Strategy[51] established in 2009. The National Sustainability Strategy centers around sustainable economic growth, agriculture and local development, societal security and management of environment and national resources. Green technology inclusive eco-innovation policies are unclear and programs for CO2 reduction and endorsing environmental friendly products have not been arranged yet.

[51] National Sustainable Development Strategy

Cambodia

	1,008	15.1 million	35:24:41	0.584 Medium	3.76	4.02	
Flag	per capita GDP	Population	Industry structure (1st2nd3d)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.17〉 ASEI quantitative analysis of Cambodia



- Eco-innovation supporting environment of Cambodia is similar with the average scores of the fourth country group in the economic sector quartile. However eco-innovation capacity, activity and performance scores are low.
- Eco-innovation supporting environment of Cambodia is similar with the average scores of the fourth country group in the social sector quartile. However eco-innovation capacity, activity and performance scores are low.

■ Eco-innovation supporting environment of Cambodia is similar with the average scores of the fourth country group in the environmental sector quartile. However eco-innovation capacity, activity and performance scores are low.

〈Table 5.33〉 Comparative analysis of TBL quartile for Cambodia

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Cambodia	15.81	30.01	2.25	8.97	
Economic	20.66	31.85	11.87	23.94	4
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

■ Cambodia has similar standards in comparison with 4th division countries but had poor results in the advanced and adaptation stages. Working towards increasing the standards of Firms' awareness of sustainability management and Participation on Environmental Management System and expanding the green industry market size can increase the eco-innovation development rate.

〈Table 5.34〉 Eco-innovation Policy instruments of Cambodia

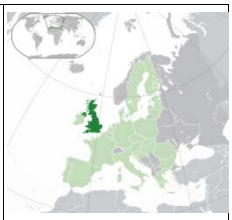
National plan and strategy	Sustainability	National Strategic Development ■ Plan (NDSP 2009 to 2013 update) 29)
	Eco-innovation	■ The National Green Growth Roadmap (2009)
Programmes and actions	National	-
	International	■ Sustainable Product Innovation Project (SPIN)
Legislation		■ Law on Environmental Protection and Natural Resource Management (1996)
Finance		-
Information		■ Community Based Natural Resource Management (CBNRM) ■ Emerging Trends, Challenges and Innovations (2009) ■ The 1st National Consultative workshop on drafting the National Policy on Science and Technology(NPSTI) organized by The Cambodian National Committee on Science and Technology(NCOST) and UNESCO ■ Fostering policies and capacity building in science, technology and innovation for sustainable development ■ TT-Pilot (GEF-4): Climate Change Related Technology

	Transfer for Cambodia: Using Agricultural Residue Biomass for Sustainable Energy Solutions

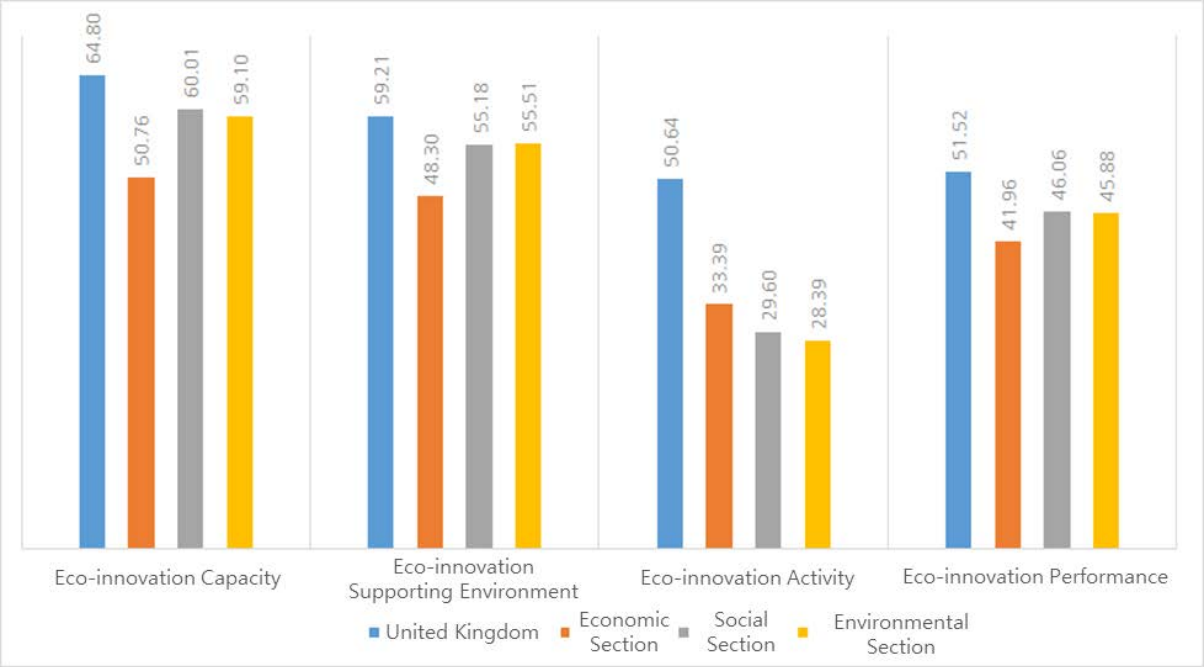
Cambodia has emphasized energy development in its national development plan and is focusing on establishing stable power sources and electricity supply chains. Specifically, electricity (energy)'s sustainable production, supply, and management is being emphasized. Cambodia's 90% of population live in farming villages and practice agriculture. The 2008 global financial crisis staggered economic growth rates but green industry growth and reducing CO2 emission strategies are being pursued with support from internal organizations such as the World Bank, Global Environment Facility and Economic and Social Commission for Asia and the Pacific.

Cambodia obtains its fuel through logging and with the increase in cutting volumes, it has the 9th world's highest forest conversion rates (Maplecroft, 2011). Cambodia's government is pursing policies in increasing energy efficiency and sustainable forest management but has not arranged any eco-innovation related programs or regulations.

The United Kingdom

	39,351	63.1 million	1:20:79	0.892 Very high	5.96	5.73	
Flag	per capita GDP	Population	Industry structure (1st2nd3d)	HDI	Sustainable social index	Sustainable env. index	geographic location

〈Figure 5.6〉 ASEI quantitative analysis of The United Kingdom



- Eco-innovation capacity, supporting environment, activity and performance of the United Kingdom are higher than the average scores of the second country group in the economic sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of the United Kingdom are higher than the average scores of the first country group in the social sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of the United Kingdom are higher than the average scores of the first country group in the environmental sector quartile.

〈Table 5.11〉 Comparative analysis of TBL quartile for the United Kingdom

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
United Kingdom	64.80	59.21	50.64	51.52	
Economic	50.76	48.30	33.39	41.96	2
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

■ UK shows a higher score than the countries that belong to the same level of economic, social and environmental quartile. Especially activity of eco-innovation is noticeably high score. Capacity of eco-innovation and enabling environment for sustainable development look robust features. Practical activities at the national level seem that there appears eco-innovation in particular actively being made.

〈Table 5.12〉 Eco-innovation Policy instruments of the United Kingdom

National plan and strategy	Sustainability	■ UK Sustainable Development Strategy (2005) ■ Securing the future-sustainable development strategy (2006)
	Eco-innovation	■ A Roadmap to a Green Economy (2011) ■ Waste Prevention & Waste Management - DEFRA[52] ■ Carbon Reduction Commitment Energy Efficiency Scheme(CRC EES) (2010) ■ the Micro-generation Strategy ■ UK Bioenergy Strategy 2011 ■ Anaerobic Digestion Strategy in 2011 ■ Combined Heat and Power schemes ■ Carbon Plan (2011) ■ 'The Greenest Government Ever' campaign ■ The 'Building a low carbon economy: unlocking innovation and skills' strategy (2008) ■ National Low Carbon Strategy ■ The Low Carbon Industrial Strategy, and the Low Carbon Transition Plan (2009) ■ Planning Policy Wales (PPW) - Guidance on renewable and low carbon energy projects ■ Overarching National Policy Statement for Energy, DECC (2011) ■ Resource Security Action Plan

[52] The UK Department for Environment, Food and Rural Affairs website

Programmes and actions	National	■ WRAP (Waste & Resources Action Programme) ■ Renewable Transport Fuel Obligation (RTFO) (2008) ■ Community Energy Saving Programme (CESP) (2009) ■ Green Deal: The Energy Bill (2012) ■ National Sustainable Procurement Training Programme ■ Green Deal: The Energy Bill (2012) ■ Carbon Emission Reduction Target (CERT) (2008) ■ The northwest eco-innovation programme ■ Technical Advice Note 8 Renewable Energy (TAN8) ■ Ultra Low Carbon Vehicle Demonstrator Programme ■ The Low Carbon Vehicle Integrated Delivery Programme ■ the Central Government Low Carbon Technology Programme ■ Carbon Reduction Commitment Energy Efficiency Scheme (CRC EES) -2010
	International	
Legislation		■ The Energy Act (2011) ■ Climate Change Act (2008)
Finance		■ Green Investment Bank (GIB) (2012)
Information		■ UK-Japan Symposium on Green Manufacturing and Eco-innovation (2010) ■ The 10th European Forum on Eco- Innovation 'Towards a Resource-Efficient Economy - from Policy to Action' (March 2011) ■ Scotland & Northern Ireland Forum for Environmental Research (SNIFFER) ■ Environmental Sustainability Knowledge Transfer Network (ES KTN) (2009)

The UK is building a strategy for achieving sustainable development[53], green economy[54], low-carbon society[55]. In order to reach those goals, the UK has established eco-innovation vision and plan in the sector of waste[56], energy[57], industry[58], building[59], resource use[60]. The UK has treated more than 50% of the EU waste with Germany, France and Romania. Anaerobic Digestion Strategy was established in 2011. From 2012, landfill waste disposal is being rapidly replaced by anaerobic treatment because landfill disposal become the most expensive treatment in the UK (Brocklehurst, 2013). The UK introduced WRAP

[53] UK Sustainable Development Strategy, Securing the Future Sustainable Development Strategy(2006)
[54] A Roadmap to a Green Economy(2011)
[55] National Low Carbon Strategy, Carbon Plan(2011)
[56] Waste Prevention & Waste Management – DEFRA, Anaerobic Digestion Strategy(2011)
[57] Carbon Reduction Commitment Energy Efficiency Scheme(CRC EES)(2010), the Microgeneration Strategy, UK Bioenergy(2011), Planning Policy Wales(PPW)-Guidance on Renewable and Low Carbon Energy Projects, Overarching National Policy Statement for Energy DECC(2011)
[58] The Low Carbon Industrial Strategy, and the Low Carbon Transition Plan(2009)
[59] The 'Building a Low Carbon Economy: Unlocking Innovation and Skills' Stategy(2008)
[60] Resource Security Action Plan

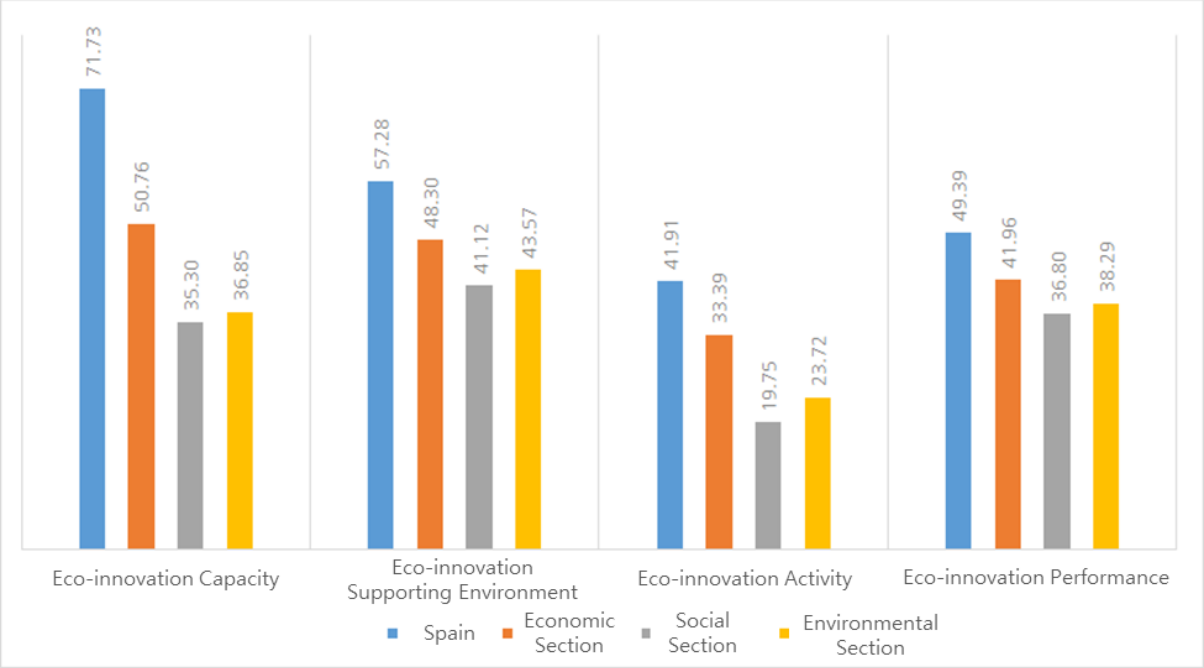
(Waste & Resources Action Programme) to reuse waste in order to form a new market of eco-innovation products [3]. With a regal basis for energy[61], the policies of energy efficiency in transportation[62] and renewable energy[63] were carried out. Eco-innovation policy in the industry sector include climate change law[64] and instruments[65]. Financial support[66] and National Sustainable Procurement Training Programme are introduced to promote low-carbon activity for the companies in UK. In particular, The Northwest Eco-Innovation Programme[67] has been operated to support production of environmentally-friendly goods and to achieve a low-carbon objectives for SMEs. Information instruments are also introduced such as Symposium[68] and forum[69] as well as network and partnership between the companies and research including universities[70].

[61] The Energy Act(2011)
[62] Community Energy Saving Programme(CESP)(2009), Ultra Low Carbon Vehicle Demonstratior Programme, The Low Carbon Vehicle integrated Delivery Programme
[63] Renewable Transport Fuel Obligation(RTFO), Green Deal: The Energy Bill(2012), Technical Advice Note 8 Renewable Energy(TAN 8)
[64] Climate Change Act(2008)
[65] Carbon Emission Reduction Target(CERT)(2008), The Central Government Low Carbon Technology Programme
[66] Green Investment Bank(GIB)(2012), Environmental Transformation Fund(ETF)
[67] The Northwest Eco-Innovation Programme (http://www.ctechinnovation.com/#sthash.vMGpq2p F.dpbs)
[68] UK-Japan Symposium on Green Manufacturing and Eco-Innovation(2010)
[69] The 10th European Forum on Eco-Innovation 'Towards a Resource Efficient Economy from Policy to Action'(2011.03), Scotland & Northern Ireland Forum for Environmental Research(SNIFFER)
[70] Environmental Sustainability Knowledge Transfer Network(ES KTN)(2009)

Spain

	29,118	46.9 million	3:26:71	0.869 Very high	4.74	4.69	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	geographic location

〈Figure 5.7〉 ASEI quantitative analysis of Spain



- Eco-innovation capacity, supporting environment, activity and performance of Spain are higher than the average scores of the second country group in the economic sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of Spain are higher than the average scores of the third country group in the social sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of Spain are higher than the average scores of the third country group in the environmental sector quartile.

〈Table 5.13〉 Comparative analysis of TBL quartile for Spain

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Spain	71.73	57.28	41.91	49.39	
Economic	50.76	48.30	33.39	41.96	2
Social	35.30	41.12	19.75	36.80	3
Environmental	36.85	43.57	23.72	38.29	3

- Support environment, activity and performance of eco-innovation are high as equal quartile countries in the economic, social and environmental sectors. In particular, improving the enabling environment and strengthening the drivers of firm level eco-innovation would make development in eco-innovation performance as capacity shows higher score.

〈Table 5.14〉 Eco-innovation Policy instruments of Spain

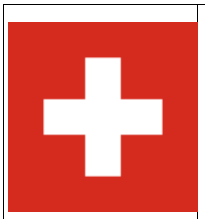
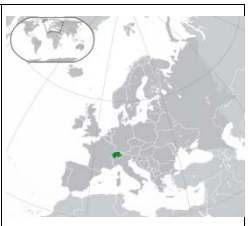
National plan and strategy	Sustainability	■ Spanish Strategy on Sustainable Development 2007 ■ Sustainable Economy (BOE nº 55, March 5th) 2011
	Eco-innovation	■ Strategy for Entrepreneurship and Youth Employment 2013-2016 ■ Spanish Strategy for Science, Technology and Innovation 2013-2020 ■ National Integrated Plan on Waste (2008-2015) ■ Irrigated Lands Sustainable Modernization National Strategy-Horizon 2015 ■ Spanish Strategy on Energy Efficiency and Saving 2004-2012 ■ Renewable Energy National Action Plan (PANER) 2011-2020 ■ Strategic Plan on Infrastructures and Transport (2005-2020) (PEIT). ■ Spanish Strategy on Sustainable Mobility (EEMS) 2009 ■ Tourism Plan 2020 ■ National Plan on Agricultural Environmental Quality 2007 ■ National Plan on Adaptation to Climate Change ■ Spanish Strategy on Biodiversity Sustainable Use and Conservation
Programme and actions	National	■ Green Jobs programme (Emplea Verde Programme) 2014 ■ National Action Plan on Energy Savings and Efficiency 2011-2020 ■ National Plan for the improvement of Air Quality 2011 ■ The National Sub-Programme For Training ■ EMPLEA Programme ■ The INNODEMANDA programme ■ Technical Code on Building 2007 ■ Green Public Procurement (GPP) 2008

		■ A.G.U.A. Programme 2004 ■ Green Public Contracting and Purchase ■ Spanish Forest Strategy (1999) ■ National Programme on Combating Desertification (PAND) 2008 ■ IDAE (Energy Diversification and Saving Institute) initiatives on Energy Efficiency and renewable ■ Spanish Action Plan for Energy Savings and Energy Efficiency 2011-2020
	International	
Legislation		■ Law 3/2001 of Sea Fisheries ■ State Soil Law 2008 ■ Marine Environment Planning Law 41/2010 ■ Sustainable Economy Act 2011
Finance		■ INNPRONTA programme ■ NEOTEC Venture Capital ■ INNVIERTE programme
Information		■ Centre for Industrial Technological Development(CDTI) ■ Spanish Technology Platform for Environmental Technologies ■ Eco-Union ■ Environmental Education National Centre (CENEAM)

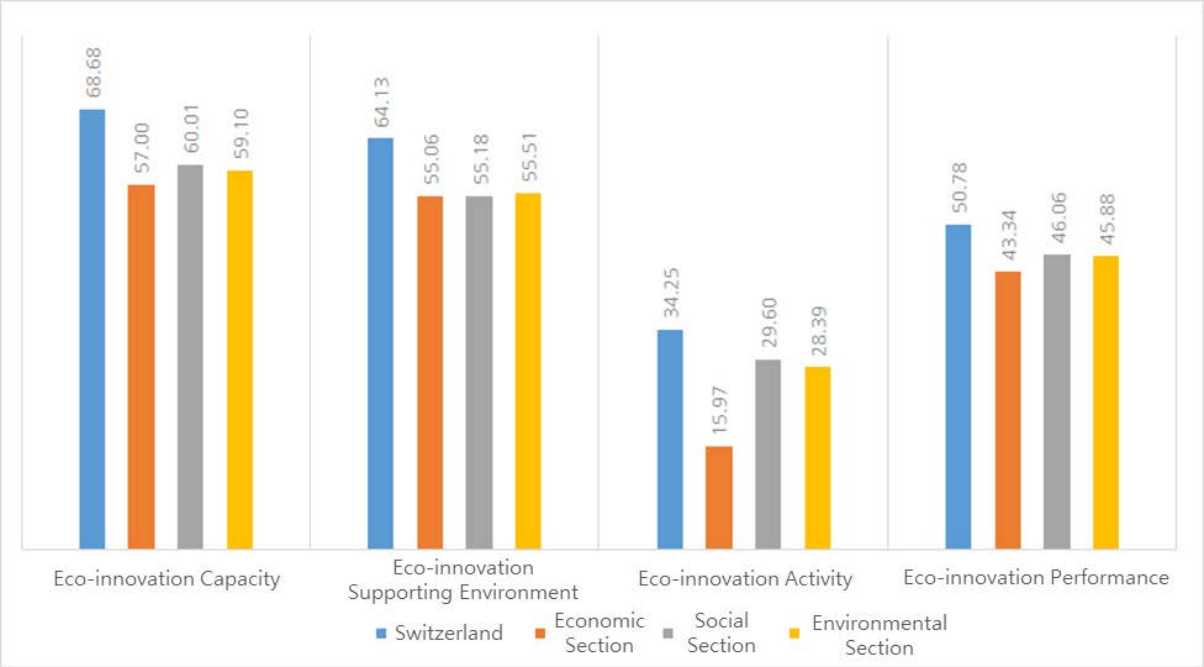
The total amount of the investment in early stage of eco-innovation is only 31%. Also in 2012, the budget and expenditures of environment and R&D of energy were lower by 30% than the average. Financial support for innovation in the public sector and the private sector was affected by the economic crisis. Public policy for the eco-innovation comprehensively combined policy instruments of technologies and resources of pollution control and energy efficiency. Eco-innovation in Spain include resource efficiency, environmental innovation, green technologies, sustainable development in national and regional level. In recent years, Spain has established the strategy, policies and program for eco-labeling. Those policies include transport infrastructure, clean energy, climate change, sustainable development, energy conservation and efficiency, sustainable mobility, sustainable economic plans and strategies. The most important eco-innovations and trends in the area of waste management, eco-design, green technology, energy efficiency, sustainable construction, urban greening system and water systems and water efficiency. The drivers of Spanish eco-innovation is the pressure of the European regulatory and domestic law, well-designed strategy and program to respond a changed business conditions, importance of green economy, green jobs, transition to resource efficiency and eco-friendly. On the other hand there is the barrier of eco-innovation in Spain. The lack of

financial support for eco-innovation in the public and private sectors [4].

Switzerland

	80,528	8.1 million	1:27:72	0.917 Very high	6.74	6.80	
Flag	per capita GDP	Population	Industry structure (1st2nd3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.20〉 ASEI quantitative analysis of Switzerland



- Eco-innovation capacity, supporting environment, activity and performance of Switzerland are higher than the average scores of the first country group in the economic sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of Switzerland are higher than the average scores of the first country group in the social sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of Switzerland are higher than the average scores of the first country group in the

environmental sector quartile.

〈Table 5.39〉 Comparative analysis of TBL quartile for Switzerland

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Switzerland	68.68	64.13	34.25	50.78	
Economic	57.00	55.06	15.97	43.34	1
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

- Swiss has received a balanced high score in all fields of capacity, support environment, activity and performance in comparison to 1st division countries. The national awareness, well-arranged various environments and high private execution wills towards achieving eco-innovation can be noticed. Creating an atmosphere of Eco-innovation manifestation through real market activity can lead to continuous excellent eco-innovation activities.

〈Table 5.40〉 Eco-innovation Policy instruments of Switzerland

National plan and strategy	Sustainability	■ Sustainable Development Strategy 2012-2015 ■ National Biodiversity Strategy 2011 ■ Green Economy Action Plan 2013
	Eco-innovation	■ Swiss Cleantech Masterplan (SCMP) 2012-2014 ■ Energy Strategy 2050
Programme and actions	National	■ 1996 Swiss Planning Policy Guidelines ■ The Swiss Energy program 2001 ■ Sustainable public procurement 2010 ■ The Action Plan Wood ■ the commission for technology and innovation(CTI) ■ the SME handbook on work and family ■ Green Economy Program 2010 ■ The Strategy on Air Quality Management 2009
Legislation		■ CO2 Act 2000

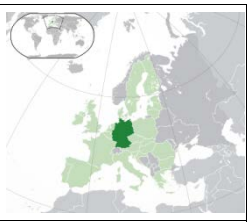
Swiss had created a green technology master plan vision in order to reduce resource usage to its natural state and established an execution plan[71] in order to create a sustainable

[71] Green Economy Action Plan 2013

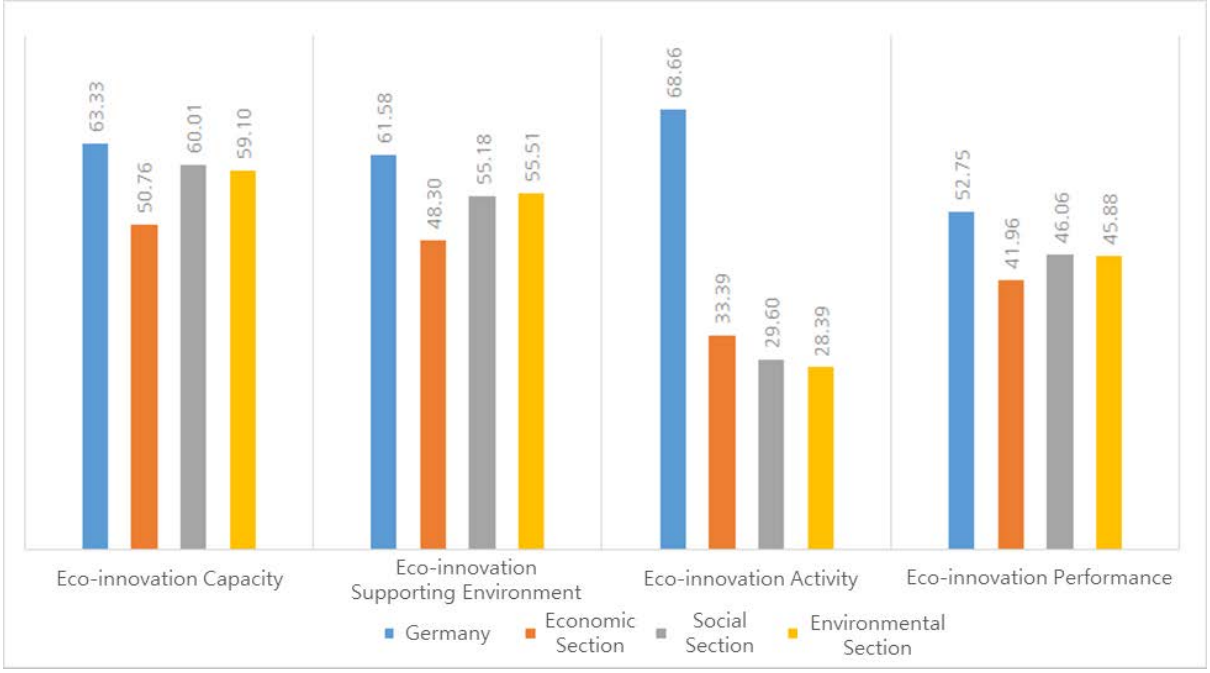
development plan[72] and transition to a green economy. An energy program[73] was implemented using the Energy Strategy 2050 as a basis. Energy Strategy 2050 has defined that there is no other solution besides a green economy in order to have social sustainable development and an environment of simultaneous environment preservation and welfare increase. The Green Economy Action Plan (2010) that responds to climate changes and remove nuclear reactors has been established to reform resource utilization efficiency, provide information for resource utilizing and pollution causing products (Environment Labelling) and assess the environment tax revision validity. This has been revised into the 2012 Clean Technology Master Plan[74] and focused on increasing resource utilization efficiency, raw-material substitution and recycling and strengthening concerned personnel participation and monitoring. The Swiss government also supports the Green Growth Knowledge Platform and the Federal Parliament enacted the Green Economy Action Plan in March of 2013. It is composed of 4 fields of consumption/production, waste/raw-material, tax and performance assessment (Set goal – Monitoring – Provide information – Report) and 27 strategy plans.

[72] Sustainable Development Strategy 2012-2015
[73] Green Economy Program 2010
[74] Swiss Cleantech Masterplan (SCMP) 2012-2014

Germany

	45,085	82.7 million	1:30:69	0.911 Very high	6.41	6.05	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.21〉 ASEI quantitative analysis of Germany



- Eco-innovation capacity, supporting environment, activity and performance of Germany are higher than the average scores of the second country group in the economic sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of Germany are higher than the average scores of the first country group in the social sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of Germany are higher than the average scores of the first country group in the

environmental sector quartile.

〈Table 5.41〉 Comparative analysis of TBL quartile for Germany

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Germany	63.33	61.58	68.66	52.75	
Economic	50.76	48.30	33.39	41.96	2
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

■ Germany, in similarity with Swiss, has balanced high scores in capacity, support environment, activity and performance in comparison with economy, social, environment 1st division country's average. Germany can be called the leading group of classic eco-innovation with its balanced eco-innovation development. Increasing eco-innovation activities in the economy and creating a solution for increasing capacity in the social and environmental aspect and lead to continuous eco-innovation development..

〈Table 5.42〉 Eco-innovation Policy instruments of Germany

National plan and strategy	Sustainability	■ The German Federal Sustainable Development Strategy (2002)
	Eco-innovation	■ High-Tech Strategy(2006) (renewed in 2010) ■ The Framework Research Programme for Sustainable Development ■ National ICT Strategy "Germany Digital 2015" and Action Plan "Germany: Green IT Pioneer" ■ National Research Strategy for BioEconomy 2030 ■ The High-Tech Strategy 2020 for Germany (2010) ■ National Raw Material Strategy (2010)
Programme and actions	National	■ Eco-Innovation Programme ■ The Master plan on environmental Technology (2008) ■ ProgRess programme promoting the understanding of resource efficiency as a competitive advantage ■ Research programme on Material Efficiency and Resource Conservation (MaRess) ■ Integration of the closed-cycle and waste management into a sustainable resource conserving substance management (2004) ■ Identification of Relevant Substances and Materials for a Substance

		Flow-Oriented, Resource-Conserving Waste Management (2006) ■ 5th Federal government energy research Programme ■ The "Saarländisches Umweltmanagement- Förderprogramm" - Goal is an increase of EMAS-certified enterprises in order to tackle the sustainable resource-management issue ■ The project WING (Materials innovation for industry and society) ■ The Research for Sustainable Development Programme of the Federal Ministry of Education and Research (2010) ■ The national eco-label scheme "Blue Angel" ■ The Integrated Energy and Climate Package (2007) ■ The National Energy Efficiency Plan (2008) ■ National Biomass Action Plan (2009) and Action Plan for the Industrial use of Biomass (2009) ■ National Resource Efficiency Programme (2011) ■ Material Innovation for Industry and Society(WING)
	International	
Legislation		■ Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal (1994, latest update 2006; now under revision)
Finance		■ The federal government runs three subsidy programs - A subsidy program for renewable energy (MAP) - An energy advice program - A program for remodeling federal government buildings
Information		■ NeMAT (Netzwerken zur Materialeffizienz) programme ■ Solar Valley-grid parity for solar power in Germany ■ Cool silicon-climate friendly communications ■ The Centre for Resource Efficiency(VDI ZRE) (2009) ■ International partnerships for sustainable climate protection and environmental technologies and services(CLIENT) ■ The national Resource Efficiency Network

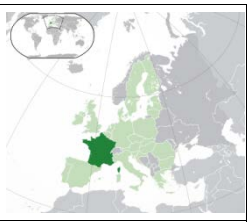
Germany has composed a sustainable development policy along with its eco-innovation policy. Especially the green technology endorsement policy[75] was well developed and the program for green technology development was created to support it[76]. Germany has clearly chosen eco-innovation subjects and utilized related policy means such as technology demands, regulations, guidelines and incentives to establish an eco-innovation market (EIO, 2013f). Especially a strong policy framework, established in order to increase resource utilization efficiency, supported climate changes and renewable energy, waste

[75] High-Tech Strategy(2006) (renewed in 2010), The High-Tech Strategy 2020 for Germany (2010)
[76] Eco-Innovation Programme (former, Environmental Technology Programme), The Master plan on environmental Technology (2008), Material Innovation for Industry and Society(WING)

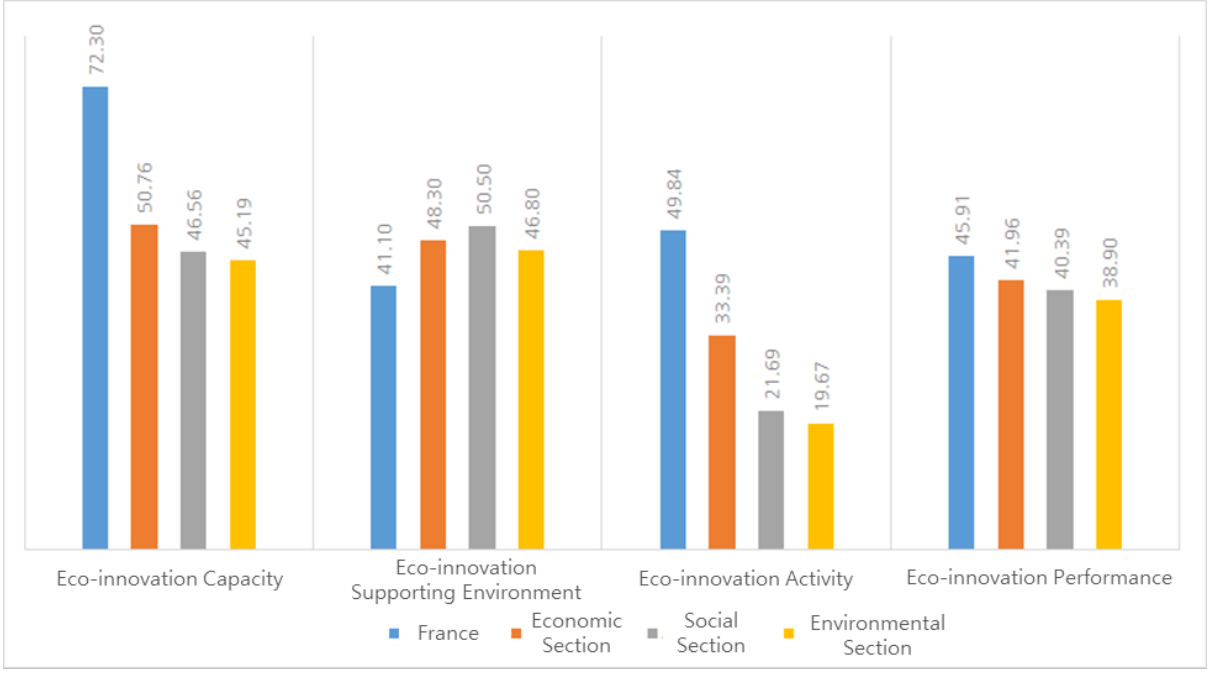
related eco-innovation [77]. In order to encourage eco-innovation, waste disposal regulations[78] were created and renewable energy and public institutions' remodelling related economic resource support[79] measures were arranged. Related networks were established and various information sharing events furthered eco-innovation awareness as well[80].

[77] ProgRess programme promoting the understanding of resource efficiency as a competitive advantage
[78] Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal (1994, latest update 2006; now under revision)
[79] The federal government runs three subsidy programs
[80] NeMAT (Netzwerken zur Materialeffizienz) programme, Solar Valley-grid parity for solar power in Germany, Cool silicon-climate friendly communications, The Centre for Resource Efficiency(VDI ZRE) (2009), International partnerships for sustainable climate protection and environmental technologies and services(CLIENT), The national "Resource Efficiency Network"

France

	41,421	64.3 million	2:19:79	0.884 Very high	5.57	5.54	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.22〉 ASEI quantitative analysis of France



- Eco-innovation capacity, activity and performance of the France are higher than the average scores of the second country group in the economic sector quartile. However eco-innovation supporting environment score is low.
- Eco-innovation capacity, activity and performance of the France are higher than the average scores of the second country group in the social sector quartile. However eco-innovation supporting environment score is low.
- Eco-innovation capacity, activity and performance of the France are higher than the average scores of the second country group in the environmental sector

quartile. However eco-innovation supporting environment score is low.

〈Table 5.43〉 Comparative analysis of TBL quartile for France

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
France	72.30	41.10	49.84	45.91	
Economic	50.76	48.30	33.39	41.96	2
Social	46.56	50.50	21.69	40.39	2
Environmental	45.19	46.80	19.67	38.90	2

- France showed its weaknesses in the support environment field in comparison to economic, social, environment field 2nd division countries. Capacity, activity, and performance fields showed high standards relative to same division countries but the national awareness and various environments towards achieving eco-innovation had low scores. This signifies the lack of actual momentum towards sustainable eco-innovation development. The low scoring Government's R&D expenditure in Green Industry must be increased and the support environment field needs priority management.

〈Table 5.44〉 Eco-innovation Policy instruments of France

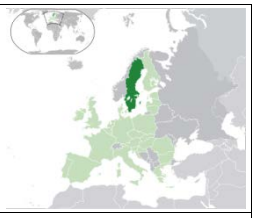
National plan and strategy	Sustainability	■ National Strategy for Sustainable Development(NSSD) (2010-2013)
	Eco-innovation	■ Systemic approach to addressing environmental issues ■ Water framework directive in 2000 ■ A Waste Action Plan (2009-2012) ■ The national climate change adaption plan ■ Development plan for renewable energy (2008)
Programme and actions	National	■ Ecotech 2012 (2012) ■ Eco-industry call (2009) ■ The Ecophyto Plan 2018 (2008 - 2018) ■ Fuel cell research programme H-PAC ■ Excellence Institutes in the field of carbon-free energies (IEED) (Instituts d'excellence sur les énergies décarbonnées) ■ Sustainable Energy programme
	International	
Legislation		■ General Tax on Polluting Activities(TGAP)
Finance		■ BPI Finance

		■ ADEME(French Environment and Energy Management Agency) ■ The Strategic Investment Fund (FSI)
Information		■ The Club ADEME International ■ Cluster of Axelera in Rhone Alpes ■ Eco-technology clusters

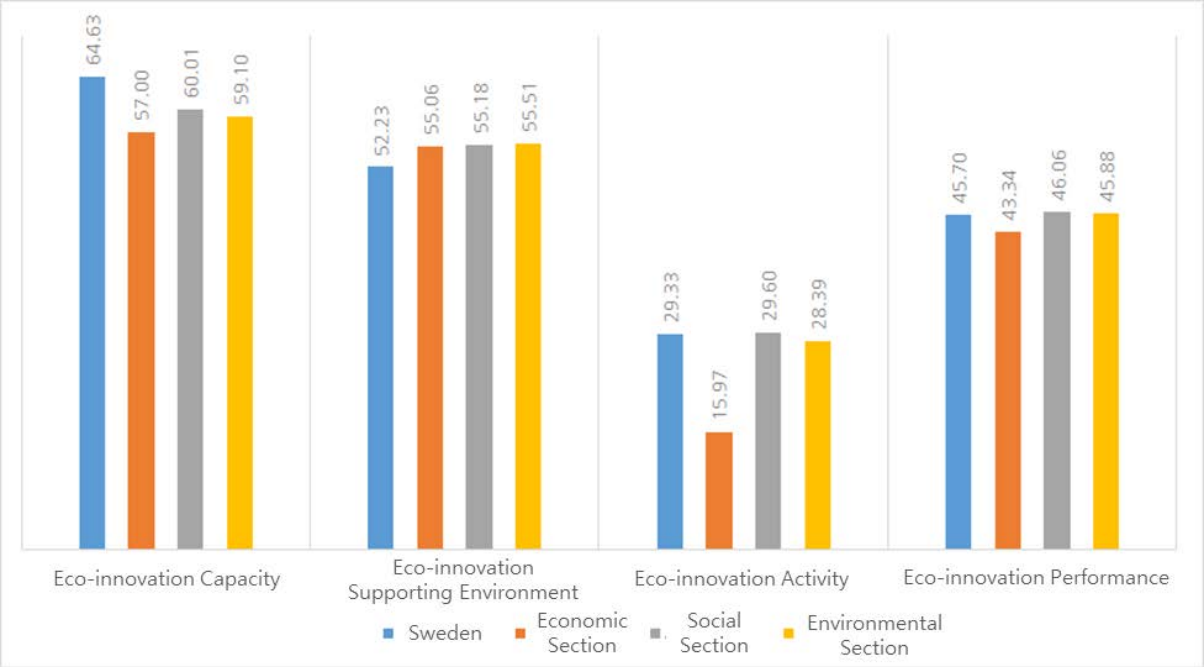
France has established a sustainable policy[81] along with an eco-innovation policy[82] related to water resource management, waste management, climate change adaptation, renewable energy. France's eco-innovation policies are focused around eco-innovation industry support with its main policy measure being financial support of BIP funds and agency of environment and energy management (ADEME)[83] that supports waste related regulations[84] and researches. France's economic policies and regulations are assessed to be an important part of expanding eco-innovation across multiple fields (EIO, 2013e). ADEME[85] also established international partnerships along with economic support. France especially developed an industrial complex increasing the resource and energy utilization efficiency achieving a systematic approach to eco-innovation[86].

[81] National Strategy for Sustainable Development(NSSD) (2010-2013)
[82] Water framework directive in 2000, A Waste Action Plan (2009-2012), The national climate change adaption plan, Development plan for renewable energy (2008)
[83] ADEME(French Environment and Energy Management Agency)
[84] General Tax on Polluting Activities(TGAP)
[85] The Club ADEME International
[86] Cluster of Axelera in Rhone Alpes, Eco-technology clusters

Sweden

	58,164	9.6 million	2:31:67	0.898 Very high	6.18	6.23	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.23〉 ASEI quantitative analysis of Sweden



- Eco-innovation capacity and activity of the Sweden are higher than the average scores of the first country group in the economic sector quartile. However eco-innovation supporting environment score is low.
- Eco-innovation capacity of the Sweden are higher than the average scores of the first country group in the social sector quartile. However eco-innovation performance, activity, and supporting environment score is similar.
- Eco-innovation capacity and activity of the Sweden are higher than the average scores of the first country group in the environmental sector quartile. However eco-innovation performance and supporting environment score is low.

〈Table 5.45〉 Comparative analysis of TBL quartile for Sweden

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Sweden	64.63	52.23	29.33	45.70	
Economic	57.00	55.06	15.97	43.34	1
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

- Sweden achieved similar scores to the even averages of all fields of capacity, support environment, activity and performance in comparison to the countries in the 1st division. Capacity and activity fields showed slightly higher scores while performance and support environment scores were relatively lower. Increasing the Green Technology R&D investment support and trying to connect it to performance will allow more advanced eco-innovation actives.

〈Table 5.46〉 Eco-innovation Policy instruments of Sweden

National plan and strategy	Sustainability	
	Eco-innovation	■ 16 Swedish Environmental Quality Objectives (1999) ■ Integrated climate and energy policy (2009) ■ The Environmental Technology Strategy (2011) ■ The Strategy for Development and Export of Environmental Technology (2011-2014) ■ Environmental technology Action Plan ■ National Innovation Strategy for 2020 [87] ■ Action Plan for Swedish Cleantech (2009)
Programme and actions	National	■ five-year energy efficiency programme for 2010-2014 ■ Delegation for Sustainable Cities (2008) ■ Nordic Cleantech ■ National system for Green certificates in electricity production ■ SymbioCity ■ Swedish Environmental Code (1998)
	International	
Legislation		■ National Waste Plan (2005) ■ A National Program for Waste Prevention (2013)

[87] The Swedish Innovation Strategy, National Innovation Strategy for 2020 Government Offices of Sweden. A good innovation climate lays the foundations for more jobs, a more sustainable society with better quality of life for all inhabitants and growth throughout the country

Finance		■ Innovationsbron AB[88] ■ VINNOVA[89] ■ Sustainable Technologies Fund[90] ■ The research and innovation bill (Bill 2008/9:50) - the government's support for eco-innovation research programmes ■ The Swedish Environmental Protection Agency ■ Arbetsförmedlingen
Information		■ The International Cooperation for Eco- Innovations Programme (2012) ■ Swedish American Green Alliance (SAGA) ■ SEMCo - the Swedish government's expert body on environmental and other sustainable procurement ■ The Swedish Environmental Technology Council(SWENTEC) ■ Swedish energy agency

Sweden chose eco-innovation as a solution to achieve the policy goals for future generations (EIO, 2013s). Sweden established an eco-innovation policy basis including increasing quality of environment frameworks[91], climate change and energy policies[92]. Furthermore, environment technology plans and strategies were established along with strategies to export them[93]. Sweden also simultaneously prepared a sustainable solution for both climate change and environment destruction and pursued activities promoting new businesses and employment (EIO, 2013s). Various programs for green technology development such as increasing energy efficiency, city plans, corporate environment technology capacity development and green product certification were also enacted[94].

[88] providing business incubation support for Swedish enterprises focusing on environmental technology

[89] VINNOVA http://www.vinnova.se/en/About-VINNOVA/
VINNOVA - Swedish Governmental Agency for Innovation Systems - is Sweden's innovation agency. Mission is to promote sustainable growth by improving the conditions for innovations, as well as funding needs-driven research. VINNOVA's vision is for Sweden to be a world-leading country in research and innovation, an attractive place in which to invest and conduct business. VINNOVA is a Swedish government agency working under the Ministry of Enterprise, Energy and Communications and acts as the national contact agency for the EU Framework Programme for R&D

[90] A private equity growth fund seeking investment opportunities in companies within Sustainable Technologies

[91] 16 Swedish Environmental Quality Objectives (1999) (EQOs)

[92] Integrated climate and energy policy

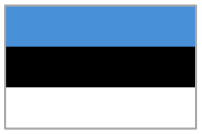
[93] The Environmental Technology Strategy (2011), The Strategy for Development and Export of Environmental Technology, Action Plan for Swedish Cleantech (2009), Action Plan for Swedish Cleantech (2009)

[94] five-years energy efficiency programme for 2010-2014, Innovationsbron AB . providing business incubation support for Swedish enterprises focusing on environmental technology, Nordic Cleantech, National system for Green certificates in electricity production

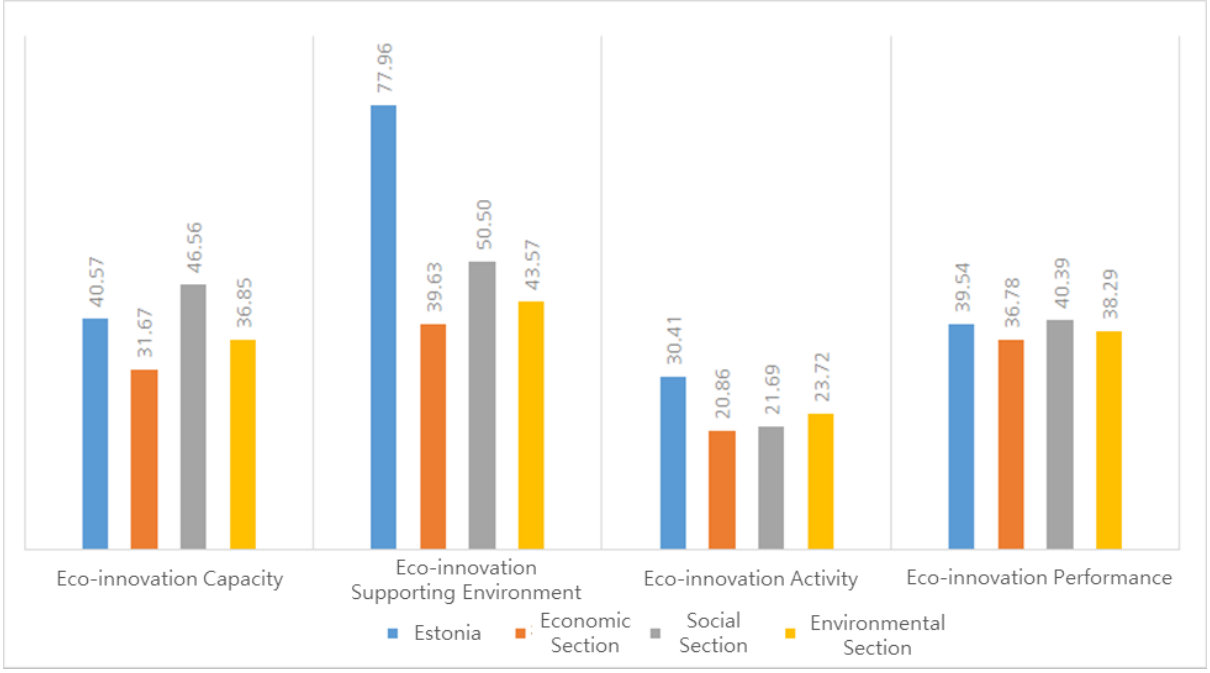
Sweden is financially supporting eco-innovation activities through venture finances[95], publicly guaranteed funds[96], R&D funds[97], joint subsidies, and tax support[98]. The Sweden government has created the INNOVA[99] in order to facilitate international cooperation of eco-innovation programs. This organization has the goal of strengthening eco-innovation international research and development cooperation networks (EIO, 2013s). 'SymbioCity' is a government initiative operated by Business Sweden. Business Sweden is managing the 'SmbioCity' trademark and encouraging national exports in place of the government and the industry such as SWENTEC[100]. The Sweden government is working towards exporting green technology know-hows and related technologies and services (EIO, 2013s).

[95] Innovationsbron AB
[96] VINNOVA, Environment-Driven Business Development programme- for SME, Swedish energy agency
[97] The research and innovation bill, Swedish energy agency, The Swedish Environmental Protection Agency
[98] Arbetsförmedlingen
[99] Swedish Governmental Agency for Innovation Systems
[100] The Swedish Environmental Technology Council(SWENTEC)

Estonia

	18,478	1.3 million	4:30:66	0.840 Very high	4.93	4.93	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.24〉 ASEI quantitative analysis of Estonia



- Eco-innovation supporting environment of the Estonia are higher than the average scores of the third country group in the economic sector quartile. However eco-innovation capacity score is low.
- Eco-innovation supporting environment, performance of the Estonia are higher than the average scores of the second country group in the social sector quartile. However eco-innovation capacity score is low.
- Eco-innovation capacity, supporting environment, activity and performance of the Estonia are higher than the average scores of the third country group in the environmental sector quartile.

〈Table 5.47〉 Comparative analysis of TBL quartile for Estonia

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Estonia	40.57	77.96	30.41	39.54	
Economic	31.67	39.63	20.86	36.78	3
Social	46.56	50.50	21.69	40.39	2
Environmental	36.85	43.57	23.72	38.29	3

- Estonia in comparison to same division countries scored low in the capacity field which is the driving force of pursuing eco-innovation. On the other side, the support environment field that shows the national awareness and various environments towards achieving eco-innovation scored significantly high. With the basis of a proactive eco-innovation support environment through methods such as increasing firm's sustainability management awareness, Estonia's eco-innovation can develop further by increasing eco-innovation potential.

〈Table 5.48〉 Eco-innovation Policy instruments of Estonia

National plan and strategy	Sustainability	■ Sustainable Estonia 21 (2005) ■ National Environmental Action Plan of Estonia 2007-2013 ■ Estonia 2020 (Competitiveness Plan) (2011)
	Eco-innovation	■ the R&D and Innovation Strategy 2014-2020 ■ the Entrepreneurship Growth Strategy 2014-2020 ■ Estonian Environmental Strategy 2030 (2007) ■ Development Plan for Enhancing the Use of Biomass and Bio energy
Programme and actions	National	■ Green ICT program(funded by the Norwegian and EEA Grants) ■ National Development Plan for Energy Sector until 2020 (2009) ■ Energy Conservation Program for Estonia 2007-2013
	International	
Legislation		■ Estonian Development Fund, 2013
Finance		■ the Industrial Emissions Act, 2013
Information		■ Year of Innovation in Estonia in 2009 ■ Estonian R&D strategy Knowledge-based Estonia for the years 2007–2013

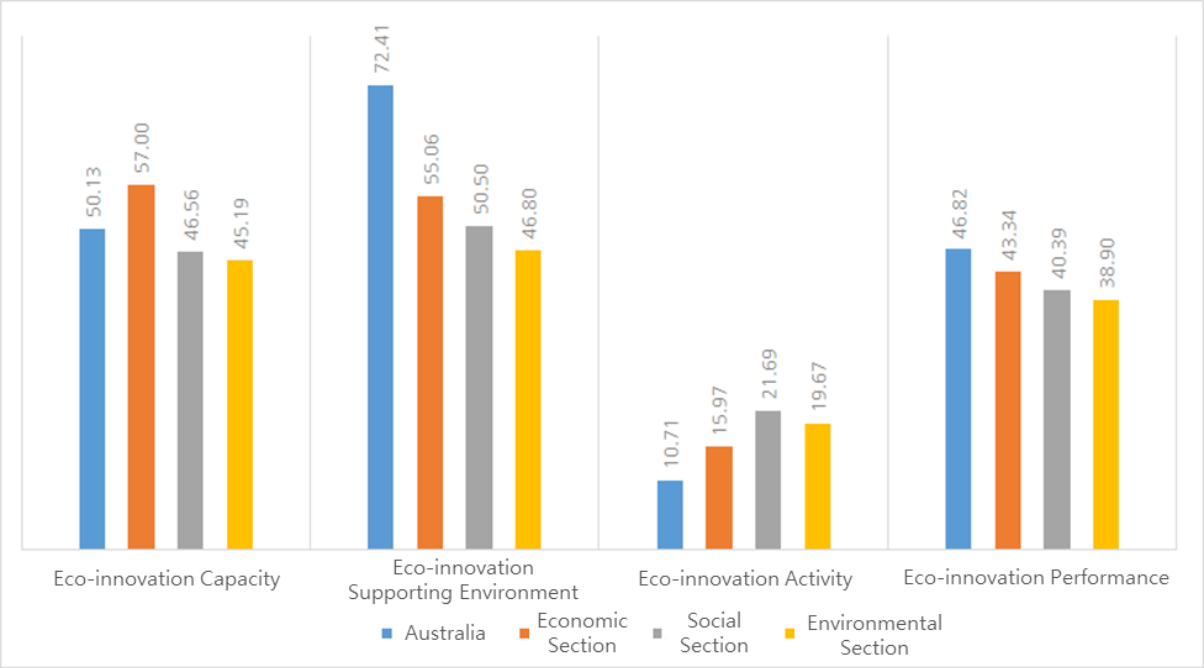
Estonia shows change in the following three fields. Firstly, the Estonian government enacted the new Research Development Innovation Strategy 2014-2020[101]. The Ministry of Education and Research was authorized as the leader of the nation's research development policies and each department's research development sector leader. Secondly, Estonia established a Smart Specialization Strategy in 2013. This strategy emphasizes information communication technology, health technology and resource efficiency, 3 areas of high growth potential. These three fields are currently compatible with active eco-innovation fields (ICT, material technology, energy etc.). Also the 2014-2020 strategy emphasizes fields that solve important social-economic issues such as environment, energy, security and health management. In comparison to EU, Estonia's material, water, energy production investments are low compared to their standards and resource efficiency is low due to using outdated technology. Processes and new product development can optimize environment friendly technologies. However, ecological progress related investment expenditures and environment friendly product's high prices cause difficulties in innovation strategy execution. The opportunities to receive supportive funds from the EU is each committee's eco-innovation execution motivation (EIO, 2013c).

[101] R&DI Strategy(Research, Development and Innovation Strategy) for 2014-2020

Australia

	67,468	23.3 million	4:27:69	0.933 Very high	5.77	5.22	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.25〉 ASEI quantitative analysis of Australia



- Eco-innovation performance and supporting environment score of the Australia are higher than the average scores of the first country group in the economic sector quartile. However eco-innovation capacity and activity score is low.
- Eco-innovation capacity, performance and supporting environment scores of the Australia are higher than the average scores of the second country group in the social sector quartile. However eco-innovation activity score is low.
- Eco-innovation capacity, performance and supporting environment scores of the Australia are higher than the average scores of the second country group in the

environmental sector quartile. However, eco-innovation activity score is low.

〈Table 5.49〉 Comparative analysis of TBL quartile for Australia

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Australia	50.13	72.41	10.71	46.82	
Economic	57.00	55.06	15.97	43.34	1
Social	46.56	50.50	21.69	40.39	2
Environmental	45.19	46.80	19.67	38.90	2

■ Australia's comparison with similarly developed countries show that eco-innovation achievement awareness and various environments are well arranged allowing Australia to have a strong basic level for eco-innovation vitalization. However, the actual activity fields showed low scores making it necessary to further the motivation for private eco-innovation pursuits and create an atmosphere of eco-innovation manifestation through actual market activity.

〈Table 5.50〉 Eco-innovation Policy instruments of Australia

National plan and strategy	Sustainability	■ National Climate Change Adaptation Framework (2006)
	Eco-innovation	■ Backing Australia's Ability (2004) ■ Renewable Energy Target (MRET) ■ National Average Fuel Consumption (NAFC) target ■ The Australian National Research Priorities (2002) ■ Building Code Australia
Programme and actions	National	■ Renewable Energy Development Initiative (REDI) (2004) ■ Solar Cities (2004) ■ Solar Hot Water Rebates Programme ■ Green Power Scheme (1997) ■ Nation-wide House Energy Rating Scheme ■ National Solar School Programme ■ National Plan for Water Security ■ Low Emissions Technology and Abatement (LETA) (2005) ■ Greenhouse Challenge Plus ■ Measures for a Better Environment (greenhouse gas reduction programmes) (2000)

		■ Local Greenhouse Action - Cities for Climate Protection (CCP) - Travel Demand Management - Cool Communities ■ Advanced Electricity Storage Technologies (AEST) ■ Australia's Climate Change Policy (2007)
	International	-
Legislation		■ Renewable Energy (Electricity) Act (2000)
Finance		■ Australian Government Water Fund ■ Biofuel Capital Grants (2003) ■ Low Emissions Technology Demonstration Fund
Information		■ Commonwealth Scientific and Industrial Research Organisation (CSIRO) ■ Victorian Eco-Innovation Lab ■ Clean Energy Finance Corporation ■ Australian Renewable Energy Agency (ARENA)

Australia has provided an activity guide in 2006 on establishing a climate change framework[102] and how to respond to climate changes. As part of a response to climate change, the Australian government's ministry of Environment has implemented a renewable energy goal policy[103]. This policy is designed to produce Australia's 20% of electricity through renewable energy and operates large[104] and small[105] scale projects. Large scale operated specific programs support renewable energy generator construction with economic incentives and set a goal to expand the production to 41,000G Wh by 2020. Small scale projects give economic support to standard stores, businesses and community groups to install renewable energy systems. Especially solar heat, solar light, and small scale wind and water generation are supported and the Solar Towns Programme has contributed to local scale renewable energy proliferation. This policy is mainly responsible independently by the Australia Renewable Energy Agency(ARENA). The country has also set an average fuel consumption goal and has implemented

[102] National Climate Change Adaptation Framework (2006); http://www.environment.gov.au/climate-change/adaptation/adaptation-framework
[103] Renewable Energy Target (MRET); http://www.environment.gov.au/climate-change/renewable-energy-target-scheme
[104] Large-scale Renewable Energy Target
[105] Small-scale Renewable Energy Scheme

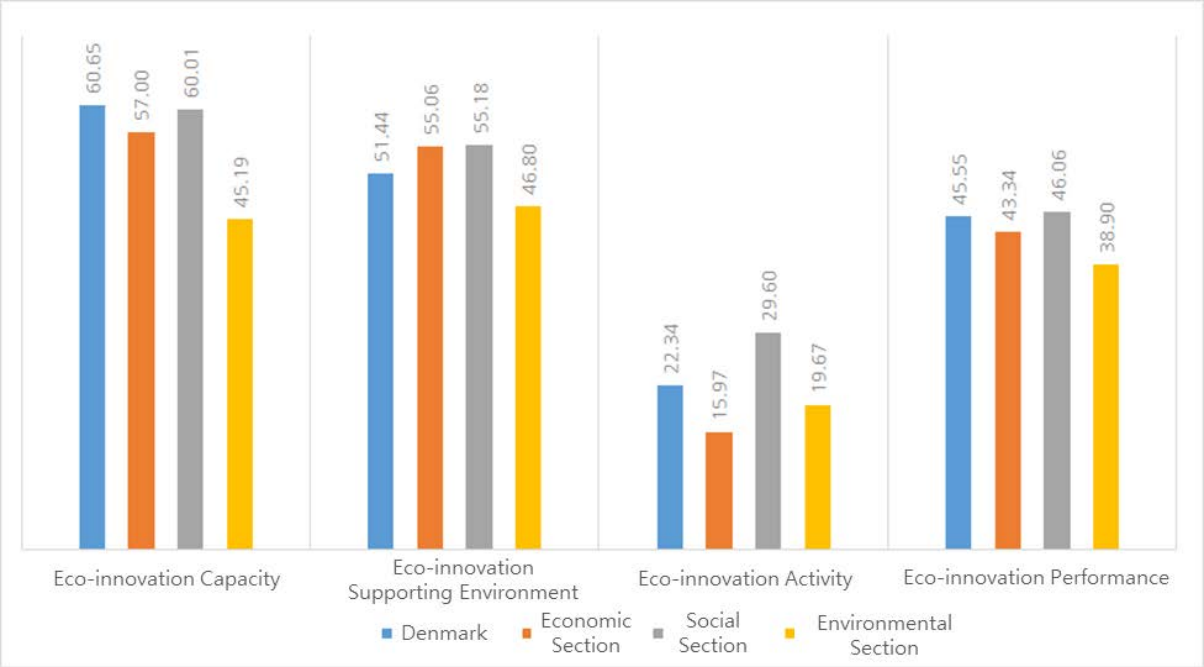
renewable energy related programs[106] with a focus on solar power in order to achieve this goal.

[106] Renewable Energy Development Initiative (REDI) (2004), Solar Cities (2004), Solar Hot Water Rebates Programme, Green Power Scheme (1997), Nation-wide House Energy Rating Scheme, National Solar School Programme

Denmark

	58,930	5.6 million	1:22:77	0.900 Very high	6.03	5.29	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.26〉 ASEI quantitative analysis of Denmark



- Eco-innovation capacity, performance and activity score of the Denmark are higher than the average scores of the first country group in the economic sector quartile. However eco-innovation supporting environment score is low.
- Eco-innovation capacity and performance scores of the Denmark are higher than the average scores of the first country group in the social sector quartile. However eco-innovation supporting environment and activity scores is low.
- Eco-innovation capacity, supporting environment, activity and performance scores of the Denmark are higher than the average scores of the second country group in the environmental sector quartile.

〈Table 5.51〉 Comparative analysis of TBL quartile for Denmark

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Denmark	60.65	51.44	22.34	45.55	
Economic	57.00	55.06	15.97	43.34	1
Social	60.01	55.18	29.60	46.06	1
Environmental	45.19	46.80	19.67	38.90	2

■ Denmark in comparison to similarly developed countries shows balanced high scores in overall fields proving that it is a well-developed country with balanced eco-innovation. In the economic field, activity and environment fields' capacities showed high scores and the social-economic field's support environment showed slightly low scores. In order to achieve eco-innovation in the social-economic field, interest in national awareness advocacy and arranging various environments will allow progressed eco-innovation vitalization.

〈Table 5.52〉 Eco-innovation Policy instruments of Denmark

National plan and strategy	Sustainability	■ Danish Strategy for Sustainable Development (2009)
	Eco-innovation	■ Energy Strategy 2050 ■ The National Energy Agreement (2008 - 2011) ■ Green Growth (2009) ■ Environmental technological action plan 2010-2011 ■ The Waste Strategy (2009-2012) ■ Green Growth agreement (2009) & Green Growth agreement 2.0 (2010)
Programme and actions	National	■ A visionary Danish Energy Policy 2025 (2008) ■ New Eco-innovation Programme ■ The Green Development and Demonstration Programme (GUDP) ■ Eco-label Denmark ■ An enhanced effort for green procurement (2008-2009)
	International	
Legislation		■ The Raw Materials Act
Finance		■ The growth Fund ■ The Energy Technology Development and Demonstration Programme ■ The Fund for Green Conversion and Commercial Renewal

		■ Four largest water research programmes
Information		■ The 7th European Forum on Eco-Innovation- Adapting to Climate Change through Eco-Innovation (Nov 2009) ■ Business climate strategy (2009)

Denmark has established an Energy Strategy 2050 with a sustainable development policy[107] as its base in order to become independent from fossil fuels. In order to respond to climate changes in the energy field, the Denmark Energy Agreement[108] used from 2008 to 2011 was revised to a Renewable Energy Agreement[109] in 2012 March. This agreement states that Denmark will supply 50% of its electricity through wind generation and produce over 35% of its final energy using renewable energy or bio-gases[110]. The energy policy containing the vision till 2025 was established[111]. The Denmark Ministry of Environment is operating eco-innovation programs[112]. The Ministry of Agriculture-Fishing Food provides beneficial influence for the environment in the agri-food field and is operating green industry development and test programs[113] in order to promote promising green technologies that have market potential. Through the Eco-Label program and Green Procurement programs[114], policy efforts are made to promote positive conditions for eco-innovation supply. Denmark is promoting conditions for eco-innovation fulfilment by providing economic support through venture finances[115], publicly guaranteed funds[116], R&D funds[117], joint subsidies, and tax support[118]. Climate change

[107] Danish Strategy for Sustainable Development(Vækst med Omtanke) (2009)
[108] The National Energy Agreement (2008 – 2011)
[109] new Energy Agreement – "Our Future Energy"
[110] Danish Energy Agency, 2014, Danish Climate and Energy policy. Available at http://www.ens.dk/en/policy/danish-climate-energy-policy
[111] A visionary Danish Energy Policy 2025 (2008)
[112] Ministry of the Environment, 2014, Programme for Eco-innovation - Danish priorities in 2012. Available on http://www.mst.dk/English/About+the+Danish+EPA/News/Programme_for_Ecoinnovation_Danish_priorities_2012.htm
[113] The Green Development and Demonstration Programme, Danish Ministry of Food, Agriculture and Fisheries, 2014, GUDP (Grønt Udviklings- ogDemonstrations Program). Available at http://naturerhverv.dk/tvaergaaende/gudp/
[114] Eco-label Denmark, An enhanced effort for green procurement (2008-2009)
[115] Danish Venture Capital and Private Equity Association (DVCA), The Growth Fund, Innovation Environments-DTU Symbion Innovation, Southern Technological Innovation (SDTI)
[116] The Energy Technology Development and Demonstration Programme (EUDP)
[117] DEPA(Danish Council for Strategic Research)/ Eco-Innovation, The Danish National Advanced Technology Foundation, Danish Council for Strategic Research (DCSR), The Energy Technology Development and Demonstration Programme (EDDP), Green Development and Demonstration Programme (GUDP), Energinet.dk, The Green Transition Fund, The Green Industrial Symbiosis program, Green business models, The Maritime Transition Fund, Fund
[118] 25% Tax Scheme

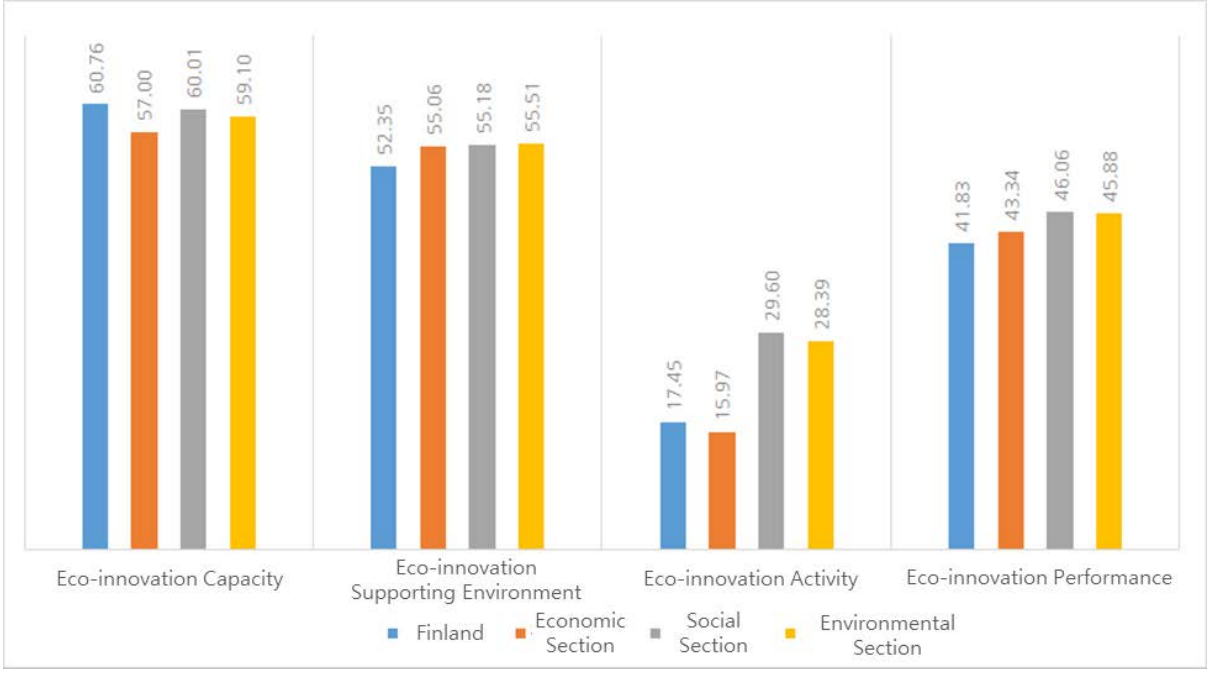
adoption through eco-innovation forum was held and shared related information on how business climate strategies relate to climate change adaptation efforts[119].

[119] The 7th European Forum on Eco-Innovation- Adapting to Climate Change through Eco-Innovation (Nov 2009), Business climate strategy (2009)

Finland

	47,219	5.4 million	3:25:72	0.879 Very high	6.43	6.36	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.27〉 ASEI quantitative analysis of Finland



- Eco-innovation capacity, performance, supporting environment and activity scores of the Finland are similar with the average scores of the first country group in the economic sector quartile.
- Eco-innovation capacity score of the Finland is similar with the average scores of the first country group in the social sector quartile. However eco-innovation performance, activity and supporting environment scores is low.
- Eco-innovation capacity score of the Finland is higher than the average scores of the first country group in the environmental sector quartile. However,

performance, activity and supporting environment scores are low.

〈Table 5.53〉 Comparative analysis of TBL quartile for Finland

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Finland	60.76	52.35	17.45	41.83	
Economic	57.00	55.06	15.97	43.34	1
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

■ Finland is seen to have balanced development in each eco-innovation field when comparing with same division countries. The performance-activity field had slightly low scores shows that while the basic step of eco-innovation potential and desire and basis environment to achieve eco-innovation is well prepared but the momentum for private field's fulfilment activities to lead to sustainable development is needed.

〈Table 5.54〉 Eco-innovation Policy instruments of Finland

National plan and strategy	Sustainability	■ Green Growth, Towards a Sustainable Future 2011-2015
	Eco-innovation	■ Climate Change and Energy Strategy (2008) ■ The Climate and Energy Strategy (2009) ■ National waste plan until 2016 (2008) ■ The National Resources Strategy (2009) ■ A Natural Resource Strategy for Finland: Using natural resources intelligently (2009) ■ The National Innovation Strategy (2009) ■ Bioeconomy Strategy (2010) ■ Finland's Mineral Strategy (2010)
Programme and actions	National	■ Towards a Smart Resource Economy - Government Report to Parliament on Natural Resources (2010) ■ The Programme for the Built Environment (2010) ■ Energy and eco-efficiency standards for new buildings ■ The ERA17 programme for an energy smart built environment 2017 (2010) ■ The Strategic Programme for Cleantech Business (2012) ■ Resolution on Sustainable public procurement (2009) ■ Proposals for Finland's national programme to promote sustainable

		consumption and production (2005) ■ Energy efficiency label scheme
	International	
Legislation		■ Acquisition law: energy efficiency requirement in public investment
Finance		■ Tekes - Finnish Funding Agency for Technology and Innovation, funded by Ministry of Transport and Communications ■ The Finnish Innovation Fund(Sitra)
Information		■ Cleantech Finland Business Forum ■ Green Net Finland ■ The Finnish National Environmental Innovation Panel ■ The Energy Efficiency committee (2008) ■ The 11th European Forum on Eco-Innovation working with emerging economies for green growth (Oct 2011) ■ The Finnish Cleantech Cluster ■ SHOK (Strategic Centres for Science, Technology and Innovation) ■ Motiva Ltd: Equipment procurements, Energy procurements and Material efficiency ■ Wood energy advisors network

Finland has established a green growth plan in order to define new potential growth motivators for a sustainable economy. The green growth plan is based off of the economic activity of sustainable usage of natural resources and increasing energy efficiency (EIO, 2013d). In order to respond to climate changes, a national plan and strategy was established to cover energy policies[120], waste management[121], resource utilization[122], and national innovation[123]. Basing off public acquirement regulations[124], the eco-innovation market was created and the firms' eco-innovation participation was encouraged. Finland has provided economic support through venture finances[125], publicly guaranteed funds[126], R&D funds[127], joint subsidies, and tax support in order to create conditions for eco-innovation fulfilment. Finland is partaking in various activities such as technology platform

[120] Climate Change and Energy Strategy (2008), The Climate and Energy Strategy (2009), Bioeconomy Strategy (2010)
[121] National waste plan until 2016 (2008)
[122] The National Resources Strategy (2009), A Natural Resource Strategy for Finland: Using natural resources intelligently (2009), Finland's Mineral Strategy (2010)
[123] The National Innovation Strategy (2009)
[124] Acquisition law: energy efficiency requirements in public investment, which also regulate competition concerning acquisitions in accordance with sustainable development related to energy, the environment, transport, welfare and health
[125] Finnvera(Environmental Loan): Finnvera acts according to the export guarantee act, Sitra(Finnish Innovation Fund)
[126] Finvera: Environmental guarantee
[127] Tekes: grants funding and sudsidies, Academy of Finland

and innovation network support[128], industrial complex group creations[129], consumer awareness increase[130] and consulting support[131] to promote firms' eco-innovation. The Finland Ministry of Environment and Ministry of Transportation and Communications are supporting the establishment of a research development infrastructure.

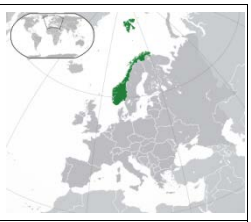
[128] Cleantech Finland Business Forum, Green Net Finland, The Finnish National Environmental Innovation Panel, The Energy Efficiency committee (2008), The 11th European Forum on Eco-Innovation working with emerging economies for green growth (Oct 2011), Tekes: programmes: biorefine, sustainable community, green growth

[129] The Finnish Cleantech Cluster, SHOK (Strategic Centres for Science, Technology and Innovation): SHOKs related to eco-innovations: CLEEN Ltd/ Energy and environment, forest cluster, built environment

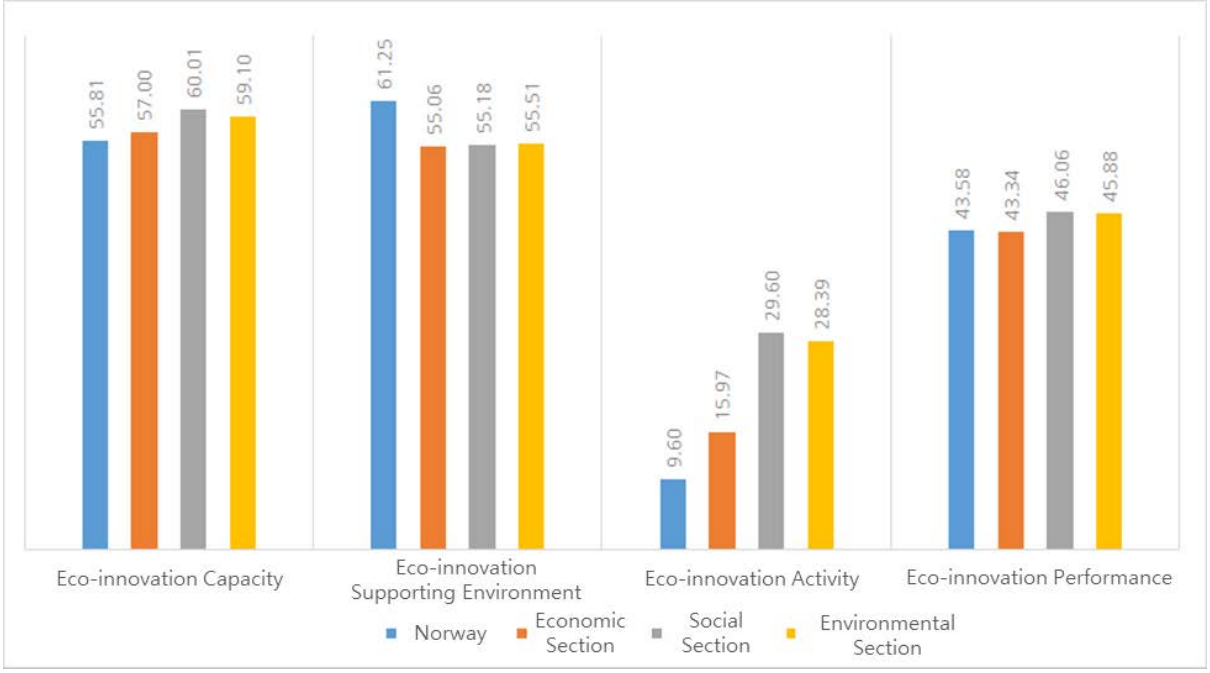
[130] Motiva Ltd: Equipment procurements, Energy procurements and Material efficiency

[131] Tekes, Wood Biomass Advisors Network

Norway

	100,819	5 million	1:42:57	0.944 Very high	6.39	6.19	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.28〉 ASEI quantitative analysis of Norway



- Eco-innovation supporting environment of the Norway is higher than the average scores of the first country group in the economic sector quartile. However, eco-innovation activity score is low.
- Eco-innovation supporting environment score of the Norway is higher than the average scores of the first country group in the social sector quartile. However eco-innovation capacity, performance and activity scores are low.
- Eco-innovation supporting environment score of the Norway is higher than the average scores of the first country group in the environmental sector quartile.

However, capacity and performance scores are similar.

〈Table 5.55〉 Comparative analysis of TBL quartile for Norway

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Norway	55.81	61.25	9.60	43.58	
Economic	57.00	55.06	15.97	43.34	1
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

- Norway in comparison with same division countries show a slightly higher support environment score and a slightly low activity field score. Like other north European countries, Norway has well established national awareness and various environments toward achieving eco-innovation and can be called as a country with a strong basic stage for classic eco-innovation vitalization, effort towards eco-innovation manifestation through actual market activity is needed.

〈Table 5.56〉 Eco-innovation Policy instruments of Norway

National plan and strategy	Sustainability	■ the Sustainable Development Strategy
	Eco-innovation	
Programme and actions	National	■ The Rural Development Support Scheme(RDSS) ■ "Technology for reduction of greenhouse emissions" 1997
	International	
Legislation		■ 2009 Nature Diversity Act
Finance		■ Green Industry Innovation programme (Norway Grants) 2009-2014 ■ EEA and Norway Grants
Information		■ European Economic Area (EEA) 1994

Norway has established a sustainable development strategy. Any Eco-innovation related national strategies are missing but support of eco-innovation through local development support policies[132] and CO2 reduction technology policies[133]. Related laws allowed the

[132] The Rural Development Support Scheme(RDSS)

[133] Technology for reduction of greenhouse emissions (KLIMATEK) 1997 Green Industry Innovation programme (Norway Grants) 2009-2014

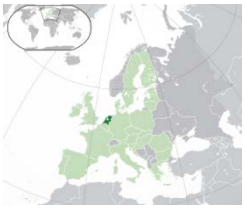
enactment of the Varied Environment Law[134] in relation to land usage and green industry innovation programs are financially supported[135]. Norway is financially supporting Europe SMEs' green technology development in conjunction with the EEA[136].

[134] 2009 Nature Diversity Act

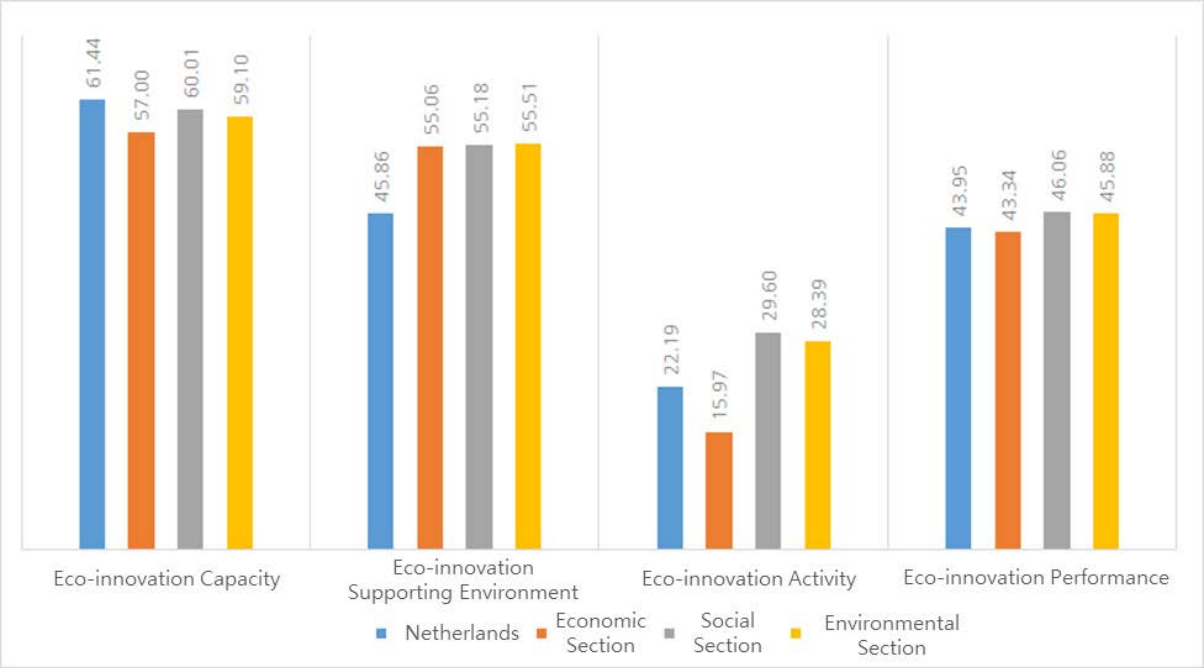
[135] Green Industry Innovation programme (Norway Grants) 2009-2014

[136] EEA(European Economic Area) and Norway Grants

Netherlands

	47,617	16.8 million	3:25:72	0.915 Very high	6.4	5.85	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.29〉 ASEI quantitative analysis of Netherlands



- Eco-innovation capacity, performance and activity of the Netherlands are similar with the average sores of the first country group in the economic sector quartile. However, eco-innovation supporting environment score is low.
- Eco-innovation capacity and performance environment score of the Norway are similar with the average scores of the first country group in the social sector quartile. However eco-innovation supporting environment and activity scores are low.
- Eco-innovation capacity and performance score of the Norway are similar with the average scores of the first country group in the environmental sector quartile.

However, supporting environment and activity scores are low.

〈Table 5.57〉 Comparative analysis of TBL quartile for Netherlands

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Netherlands	61.44	45.86	22.19	43.95	
Economic	57.00	55.06	15.97	43.34	1
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

- Netherlands in comparison with same division countries show low scores in the support environment and activity field. Netherlands is identified as a country lacking the basic stage for eco-innovation vitalization in relation to same division. Increasing low scoring fields such as Government's R&D expenditure in the Green Industry, strengthening private eco-innovation fulfilment enthusiasm in order to increase the activity field's capacity and creating an atmosphere for eco-innovation manifestation through actual market activity is important.

〈Table 5.58〉 Eco-innovation Policy instruments of Netherlands

National plan and strategy	Sustainability	■ Sustainability Agenda (2011) [137]
	Eco-innovation	■ Dutch ETAP roadmap (2006) (EU ETAP roadmap) ■ Green Deal (2011)
Programme and actions	National	■ Green deal programme ■ Programme Environment & Technology
	International	
Finance		■ Groen Beleggen[138] ■ VAMIL/MIA[139] ■ Tax incentive for low CO2 cars ■ EIA: fiscal support for purchasing innovative energy investment goods ■ MEP Scheme ■ Renewable energy incentive scheme (SDE+) ■ Green fund scheme
Information		■ The 12th European Forum on Eco- Innovation- Scaling up sustainable construction through value chain innovation (April 2012)

[137] EIO, (2011), Eco-innovation in Netherlands
Sustainability Agenda (Sustainability Agenda, 2011) does promote 'green growth' and focuses on 'resources and product chains', 'sustainable water and land use', 'food', 'climate and energy' and 'mobility'

[138] Green investment tax reduction e.g. eco-innovative or green business activities

[139] Fiscal support for purchasing environmental innovative investment goods

		■ Renewable energy, sustainable mobility and healthy food ■ Energy valley ■ Netherlands Water Partnership (NWP)

Netherlands has adopted sustainable development as a national topic[140] and established an environment technology roadmap[141]. The Green Deal established in 2011 supports sustainable company activity. Support of active networking, regulation framework, sustainability, innovation related knowledge sharing is more focused in relation to financial support. About 150 firms are partaking (Green Deals, 2013). The Netherlands government is supporting sustainable industries in areas where firms have difficulty operating in[142].

The Netherlands provides tax reduction benefits[143] towards green industry investment and green products. Especially a policy for providing economic incentives for low carbon green consumption[144] has been implemented. Environment technology support fund policies have been pursued since the 1980s. Consumer support policies were pursued not only for the eco-industry but also for the eco-market and eco-innovation support outside of technological fields have been provided after the 1990s (EIO, 2013u). Netherlands produces producers who provided renewable energy to the public grid has received fixed fees in the past 10 years through the MEP policy. The SDE policy[145] implemented afterwards is similar to the MEP policy (EREC, 2009). The Green fund scheme does low interest investments towards eco-innovation fulfilment or green business activity. Any individual or private organization who have deposited money into these funds receive tax reductions according to their deposit amount (NL Agency, 2010). The Netherlands has

[140] Sustainability Agenda (2011)
[141] Dutch ETAP roadmap (2006) (EU ETAP roadmap)
[142] http://www.government.nl/issues/energy-policy/green-deal
[143] Groen Beleggen, VAMIL/MIA, EIA: fiscal support for purchasing innovative energy investment goods
[144] Tax incentive for low CO2 cars
[145] Renewable energy incentive scheme (SDE+)

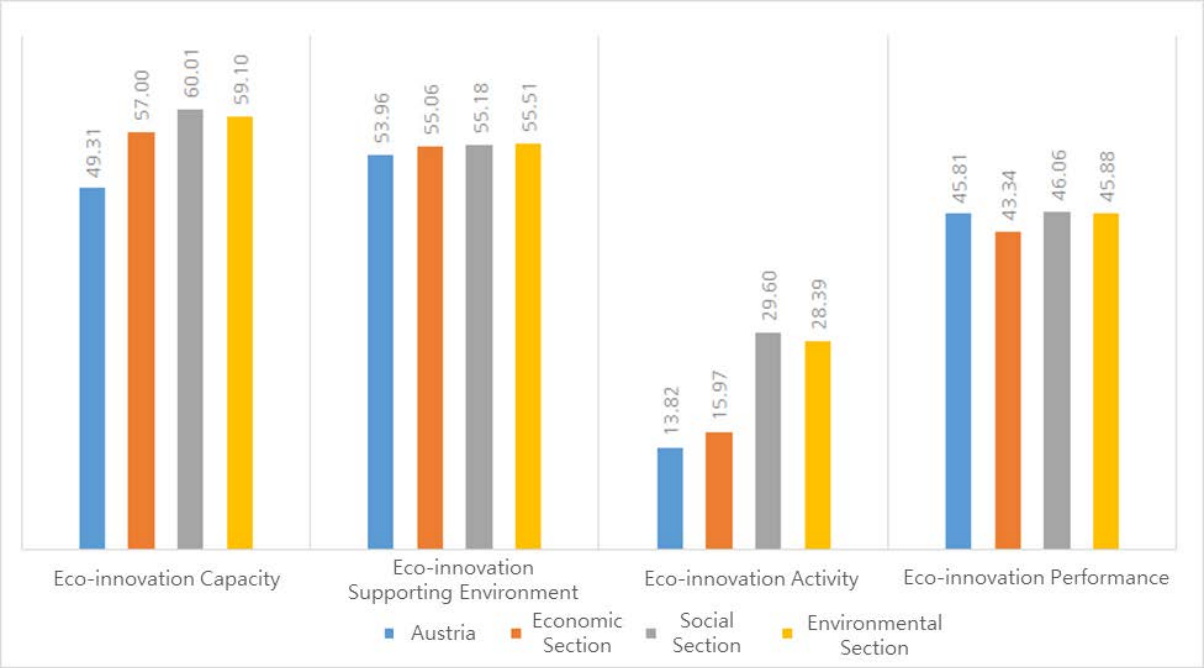
held forums[146] for increasing social eco-innovation awareness and established local networks and partnerships for the water resource[147] and energy fields[148] but no specific eco-innovation related networks have been created (EIO, 2013u).

[146] The 12th European Forum on Eco- Innovation- Scaling up sustainable construction through value chain innovation (April 2012)
[147] Netherlands Water Partnership (NWP)
[148] Energy valley

Austria

	49,074	8.5 million	2:29:69	0.881 Very high	6.06	5.90	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.30〉 ASEI quantitative analysis of Austria



- Eco-innovation performance and supporting environment of the Austria are similar with the average sores of the first country group in the economic sector quartile. However, eco-innovation capacity and activity score are low.
- Eco-innovation capacity and performance of the Austria are similar with the average scores of the first country group in the social sector quartile. However eco-innovation supporting environment and activity scores are low.
- Eco-innovation performance and supporting environment of the Austria are similar with the average scores of the first country group in the environmental sector quartile. However, capacity and activity scores are low.

〈Table 5.59〉 Comparative analysis of TBL quartile for Austria

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Austria	49.31	53.96	13.82	45.81	
Economic	57.00	55.06	15.97	43.34	1
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

- Austria has low scores in the capacity and activity field in comparison with same division countries. Firms' awareness of sustainability management and environmental participation rates must be increased as they scored relatively lower and there is a necessity to increase the eco-innovation driving force potential through measures such as expanding the green industry market. It is also important to strengthen private eco-innovation fulfilment enthusiasm and create an atmosphere for eco-innovation manifestation through actual market activity.

〈Table 5.60〉 Eco-innovation Policy instruments of Austria

National plan and strategy	Sustainability	■ Austrian Strategy for SD (NSTRAT) (2002) ■ A new Austrian Sustainable Development Strategy (SDS) (2010) ■ Master plan Sustainable Energy ■ Growth in Transition ■ Master plan's strategies ■ Austrian Climate Strategy and the Energy Efficiency Action Plan (2007)
	Eco-innovation	■ The Austrian Raw Materials Plan ■ Resource Efficiency Action Plan (REAP) (2007) ■ Waste Prevention and Recycling Strategy (2006) ■ Master Plan Environmental Technologies(MUT) ■ Strategy 2020-Research, Technology and Innovation for Austria ■ The National Action Plan for Sustainable Public Procurement (2010) ■ Master Plan Green Jobs
Programme and actions	National	■ Environmental technology export initiative (2005) ■ Green Brands seal (2011) ■ Smart Energy Demo (2011)[149] ■ Green Public Procurement (2008- 2013)

[149] The Smart Energy Demo- FIT for SET(Sustainable Energy Technology) programme strategy is accordingly guided by the European Research Strategy for smart cities

		■ Waste Prevention Programme (2011)
	International	
Legislation		■ The new Green Electricity Act 2012
Finance		■ The Climate and Energy Fund(KLIEN) ■ The programme on Technologies for Sustainable Development (2005) - Building of Tomorrow - Factory of Tomorrow - Energy systems of Tomorrow
Information		■ Austrian Clean Technology (ACT) (2008) ■ COMET (Competence Centers for Excellent Technologies)[150]

Austria has established national plans and strategies[151] for sustainable development and have established resource policies for original material[152] and waste recycling[153]. A national plan for green technology development[154], sustainable public acquirement policies[155] and green industry[156] jobs was established to create a policy basis for encouraging firms' eco-innovation. The Ministry of Science, Research, and Economy have supported environment technology export strategy development in cooperation with the Austrian Chamber of Commerce & Industry[157]. The environment labelling policy for awarding marks to brands who have contributed to environmental sustainability has been in operation[158]. Climate change and Energy Fund (KLIEN) and sustainable technology programs[159] are focused on R&D support. KLEIN especially supported the smart energy[160] test project[161]. Austria is pursuing education program[162] and network establishment policies[163] in order to strengthen corporation capacity for eco-innovation.

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150 Competence Centres for Excellent Technologies. The competence centre programmes initiated in 1998 (Kplus, K_ind K_net) belong to the most successful innovations of technology policy in Austria.

151 Austrian Strategy for SD (NSTRAT) (2002), A new Austrian Sustainable Development Strategy (SDS) (2010), Master plan Sustainable Energy, Growth in Transition, Master plan's strategies

152 The Austrian Raw Materials Plan, Resource Efficiency Action Plan (REAP) (2007)

153 Waste Prevention and Recycling Strategy (2006), Green Public Procurement (2008- 2013)

154 Master Plan Environmental Technologies(MUT), Strategy 2020-Research, Technology and Innovation for Austria

155 The National Action Plan for Sustainable Public Procurement (2010)

156 Master Plan Green Jobs

157 Environmental technology export initiative (2005)/ www.go-international.at

158 Green Brands seal (2011)/ http://www.green-brands.org/en/seal/

159 The programme on Technologies for Sustainable Development (2005)

160 Smart Energy Demo (2011)

161 https://www.ffg.at/smart-energy-demo-fit4set-1-ausschreibung

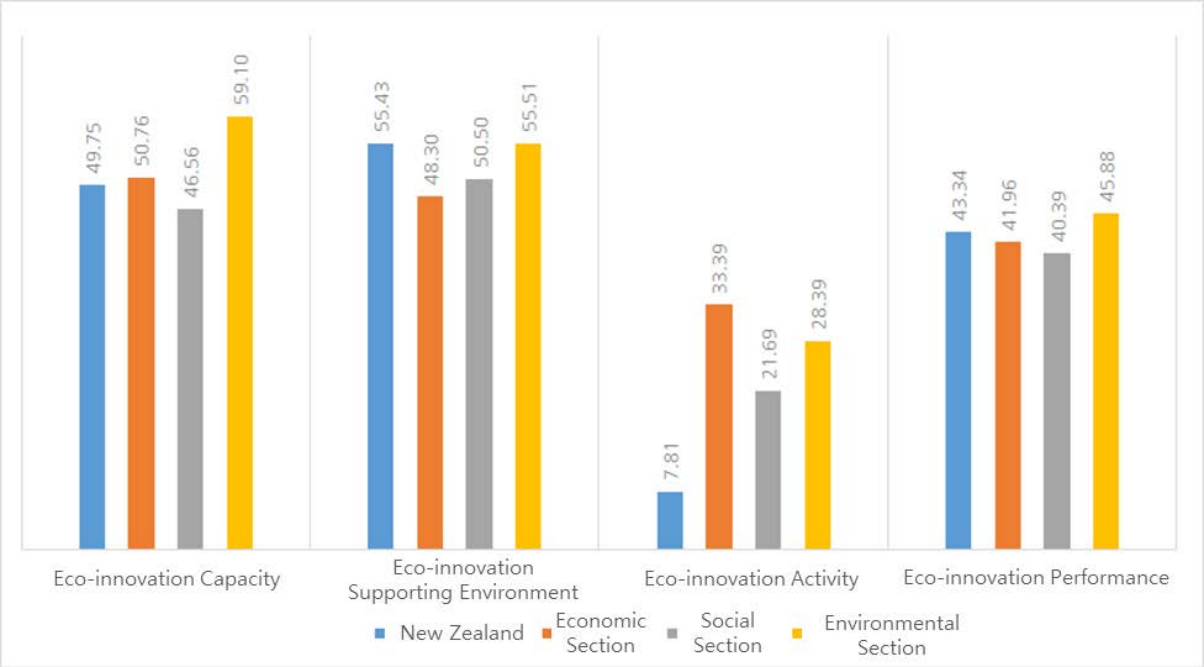
162 Austrian Clean Technology (ACT) (2008)

163 COMET (Competence Centers for Excellent Technologies)

New Zealand

	40,842	4.5 million	5:25:70	0.910 Very high	5.84	5.72	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.31〉 ASEI quantitative analysis of New Zealand



- Eco-innovation supporting environment of the New Zealand is higher than the average sores of the second country group in the economic sector quartile. However, eco-innovation activity score is low.
- Eco-innovation capacity, performance and supporting environment of the New Zealand are higher than the average scores of the second country group in the social sector quartile. However eco-innovation activity score is low.
- Eco-innovation performance and supporting environment of the New Zealand are similar with the average scores of the first country group in the environmental

sector quartile. However, capacity and activity scores are low.

〈Table 5.61〉 Comparative analysis of TBL quartile for New Zealand

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
New Zealand	49.75	55.43	7.81	43.34	
Economic	50.76	48.30	33.39	41.96	2
Social	46.56	50.50	21.69	40.39	2
Environmental	59.10	55.51	28.39	45.88	1

- New Zealand in comparison with similarly developed countries shows a lower score in the activity field. Eco-innovation driving force potential and the national awareness and various environments for eco-innovation achievement is well prepared but the creating an atmosphere for eco-innovation manifestation through actual market activity field shows some unimpressive results. There is a need of effort for strengthening private eco-innovation fulfilment will for it to lead to proactive activity.

〈Table 5.62〉 Eco-innovation Policy instruments of New Zealand

National plan and strategy	Sustainability	■ The Sustainable Land Management and Climate Change action plan
	Eco-innovation	■ the Energy Strategy 2007 ■ The New Zealand Waste Strategy ■ The New Zealand Energy Efficiency and Conservation Strategy 2007 ■ The New Zealand Transport Strategy ■ The Growth and Innovation Framework (GIF)
Programme and actions	National	■ Sustainable Business Initiatives ■ the Emission Trading Scheme 2007 ■ Selected local initiatives on green R&D ■ the Framework for a New Zealand Emissions Trading Scheme 2007 ■ Cleaner Production ■ Auckland Regional Council Programmes for Cleaner Production ■ Green light ■ The Energy Intensive Business (EIB) project ■ The Govt3 programme ■ Single procurement policy ■ Waste management and recycling procurement

		■ The Pastoral Greenhouse Gas Research Consortium (PGgRc) 2002
	International	
Legislation		■ National Environmetal Standards ■ Minimum Energy Performance Standards (MEPS) 2002 ■ New Zealand Packaging Accord ■ the Resource Management Act (1991) (RMA) ■ Hazardous Substances and New Organisms Act 1996 (HSNO) ■ Ozone Layer Protection Act 1996 ■ Hazardous Substances and New Organisms Act 1996 ■ Waste Minimisation Act 2008
Finance		
Information		■ Australia-New Zealand Climate Change Partnership 2003 ■ United States-New Zealand Climate Change Partnership 2002 ■ Trade and Environment

New Zealand has established a sustainable land management and climate change national plan[164] and established a national development and innovation framework[165]. Specifically energy[166], waste[167], transport[168] related national strategies were made. Implementation of emission right policies[169] and sustainable business incentives[170] were creating a basis for firms' eco-innovation execution. Also New Zealand is pursuing various environment regulation policies[171].

[164] The Sustainable Land Management and Climate Change action plan

[165] The Growth and Innovation Framework (GIF)

[166] the Energy Strategy 2007, The New Zealand Energy Efficiency and Conservation Strategy 2007

[167] The New Zealand Waste Strategy

[168] The New Zealand Transport Strategy

[169] the Emission Trading Scheme 2007

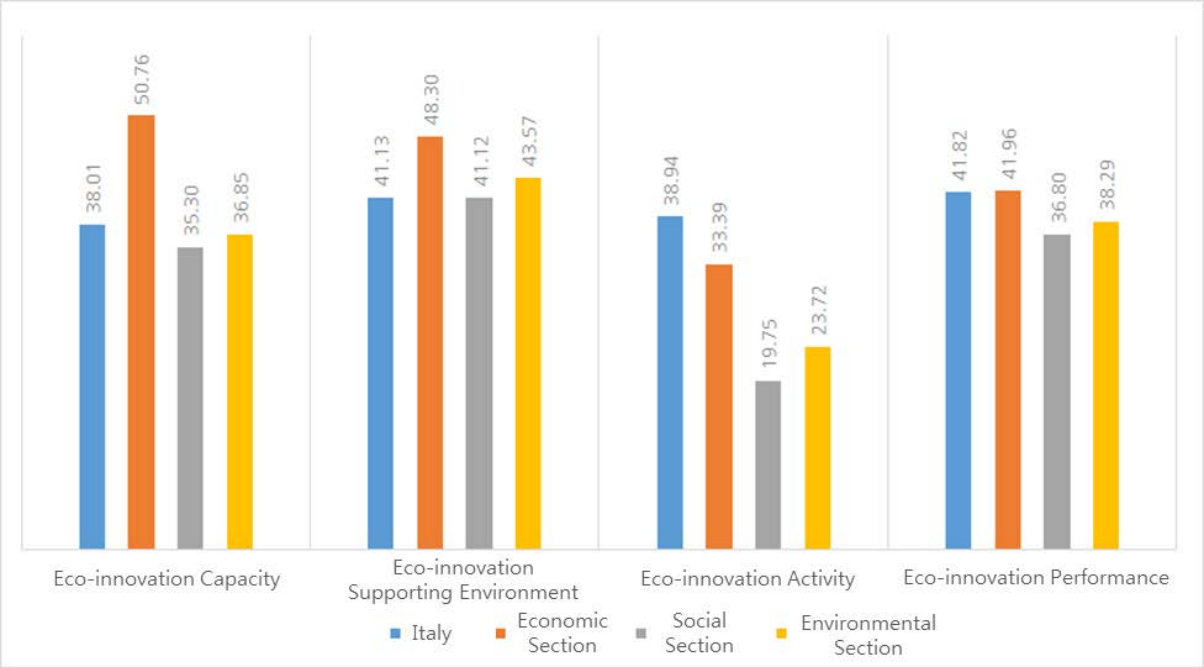
[170] Sustainable Business Initiatives

[171] National Environmental Standards, Minimum Energy Performance Standards (MEPS) 2002, New Zealand Packaging Accord, the Resource Management Act (1991) (RMA), Hazardous Substances and New Organisms Act 1996 (HSNO), Ozone Layer Protection Act 1996, Hazardous Substances and New Organisms Act 1996, Waste Minimisation Act 2008

Italy

	34,619	61 million	2:24:74	0.872 Very high	4.44	4.55	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.32〉 ASEI quantitative analysis of Italy



- Eco-innovation activity of the Italy is higher than the average sores of the second country group in the economic sector quartile. However, eco-innovation capacity and supporting environment scores are low.
- Eco-innovation capacity, activity, performance and supporting environment of the Italy are lower than the average scores of the third country group in the social sector quartile.
- Eco-innovation capacity, activity, performance and supporting environment of the Italy are lower than the average scores of the third country group in the environmental sector quartile.

〈Table 5.63〉 Comparative analysis of TBL quartile for Italy

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Italy	38.01	41.13	38.94	41.82	
Economic	50.76	48.30	33.39	41.96	2
Social	35.30	41.12	19.75	36.80	3
Environmental	36.85	43.57	23.72	38.29	3

- Italy shows balanced above average scores in all fields in comparison with similarly developed countries but scored low points in the economic field's capacity and support environment. Economy field related eco-innovation potential reinforcement and improvement of national awareness and various environments can lead to a balanced eco-innovation development country.

〈Table 5.64〉 Eco-innovation Policy instruments of Italy

National plan and strategy	Sustainability	■ Environmental Action Strategy for Sustainable Development(EASSD) (2002)
	Eco-innovation	■ Italian National Energy Efficiency Action Plan (2007) - approximately 9.6% energy savings target by 2016 ■ Italian National Renewable Energy Action Plan (2010) ■ The National Plan for the Integrated Management of Water Resources(2012) ■ Italian National Action Plan on Green Public Procurement (2008)
Programme and actions	National	■ Leadership in Energy and Environmental Design scheme(LEED) ■ The Zero Energy House in Friuli Venezia-Giulia Region ■ Programme "Industria 2015" ■ ROP (Regional Operational Programme) [172] ■ Italia degli Innovatori- an initiative sponsored by the Agency for Innovation for the diffusion of technology innovation, in collaboration with the Department of digitization and technological innovation, which aims to bring out the best examples of innovation and Italian technological excellence

[172] ERDF, DISTRICT+_Component 3_Good Practice description_"Fondo Toscana Innovazione"
"Fondo Toscana Innovazione", active from the 1st June 2008 with a budget of 44.4 million Euro, aims to invest in small and medium enterprises that have identified a business idea or have been recently started and that are in the so-called early stage phase (from seed to start-up), but it also aims to invest in already existing firms that want to grow up and to set up new industrial developments (expansion). Fund main activity sectors are: renewable energy, robotics, ICT, biotechnology and life sciences.

	International	
Information		■ The national network of scientific and technological parks (PSTs); a number of PSTs have areas that are focused on eco-innovation ■ Prato[173] ■ The Italian National Agency for New Technologies, Energy and Sustainable Economic Development(ENEA)

Italy has established execution strategies[174] for sustainable development and national plans for energy efficiency[175] and renewable energy[176] and water resources[177]. An eco-innovation basis has also been established through execution plans[178] of green public acquirement.

Especially city planning fields have implemented an environment friendly building certification policy (LEED)[179] allowing the documentation of repair history and operated a building energy independence program[180]. Italy has supported the fulfilment of system eco-innovation[181] through creating an industrial complex and Italy's new technology energy and sustainable development organization(ENEA)[182] supports the industry symbiosis network and established local industrial symbiosis platforms through the ENEA initiative[183].

[173] Greenovate, (2011), Eco-innovation in cluster organizations in the chemical and textile-clothing-leather sectors
Confartigianato Prato is a public organisation set up to promote regional industry through support services to SMEs. Though the Confartigianato Prato does not identify environmental challenges or eco-innovative practices within its objectives or targets, the organisation is aware of its Growing significance. At this point, no fundamental plans to tackle these issues have been developed but the organisation hopes to implement more solid plans in the future.

[174] Environmental Action Strategy for Sustainable Development(EASSD) (2002)

[175] Italian National Energy Efficiency Action Plan (2007) – approximately 9.6% energy savings target by 2016

[176] Italian National Renewable Energy Action Plan (2010)

[177] The National Plan for the Integrated Management of Water Resources(2012)

[178] Italian National Action Plan on Green Public Procurement (2008)

[179] Leadership in Energy and Environmental Design scheme(LEED); See: http://www.gbcitalia.org/risorse/169; Many cases of successful application of the LEED protocol in Italy can be found on the GBC website: http://www.gbcitalia.org/risorse/170

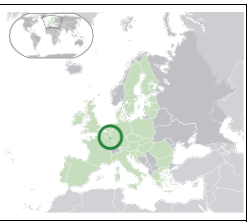
[180] The Zero Energy House in Friuli Venezia-Giulia Region

[181] The national network of scientific and technological parks (PSTs);

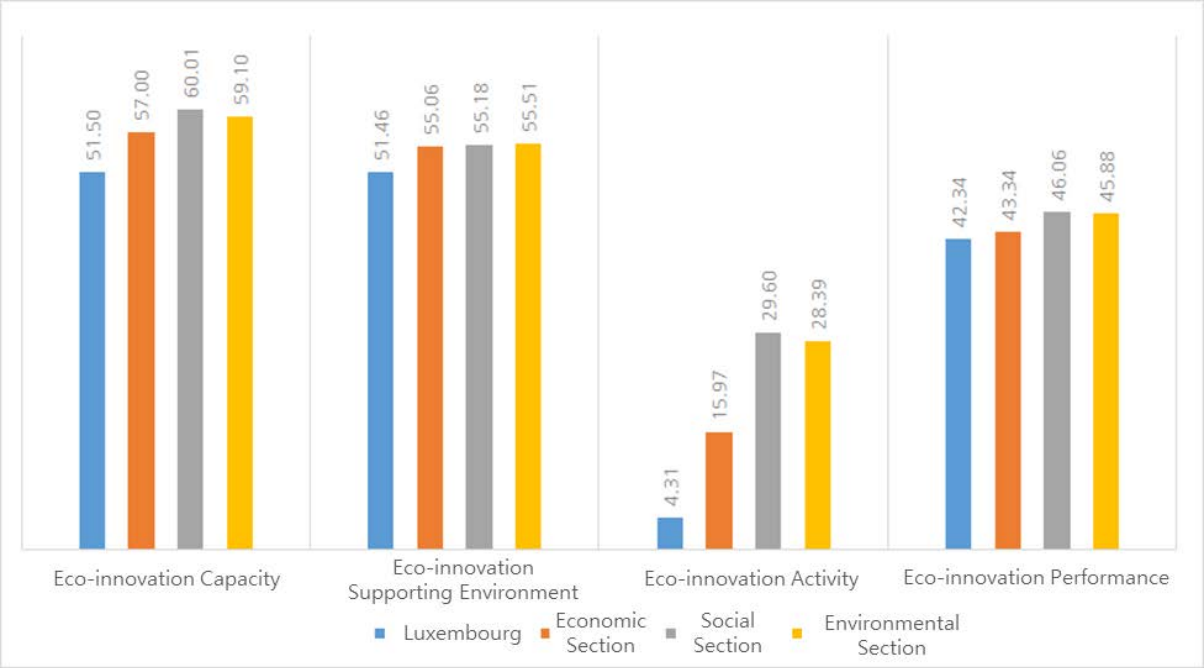
[182] The Italian National Agency for New Technologies, Energy and Sustainable Economic Development(ENEA)

[183] http://www.enea.it/it

Luxembourg

	111,162	0.5 million	0:13:87	0.881 Very high	-	-	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.33〉 ASEI quantitative analysis of Luxembourg



- Eco-innovation capacity, activity, performance and supporting environment of the Luxembourg is higher than the average sores of the first country group in the economic sector quartile.
- Eco-innovation capacity, activity, performance and supporting environment of the Luxembourg are lower than the average scores of the first country group in the social sector quartile.
- Eco-innovation capacity, activity, performance and supporting environment of the Luxembourg are lower than the average scores of the first country group in the environmental sector quartile.

〈Table 5.65〉 Comparative analysis of TBL quartile for Luxembourg

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Luxembourg	51.50	51.46	4.31	42.34	
Economic	57.00	55.06	15.97	43.34	1
Social	60.01	55.18	29.60	46.06	1
Environmental	59.10	55.51	28.39	45.88	1

- Luxembourg in comparison with same division countries shows that the overall scores of all fields were lower than the average score. The activity field especially showed low scores. Firms' Participation on Environmental Management System increase is part of the solution in maximizing the eco-innovation activity effect. The national overall capacity, private field execution and sustainable development enthusiasm and the support environment seem to have to form an organic balance.

〈Table 5.66〉 Eco-innovation Policy instruments of Luxembourg

National plan and strategy	Sustainability	■ circular economy model 2013 ■ National Plan for Sustainable Development 2010 ■ National Sustainability Strategy Luxembourg 2009
	Eco-innovation	■ eco-technologies Action Plan 2012
Programme and actions	National	■ highest political priority: energy efficiency ■ The Hollerich Village 2013 ■ Learning Factory 2013 ■ Tarkett - innovative and sustainable flooring and sports surface solutions ■ The Luxembourg Law on Promotion of Research, Development and Innovation (2009) ■ "Innovation loan provided by the "Société Nationale de Crédit et d'investissement" (SNCI) ■ R&D incentive scheme of the Ministry of Economy and Foreign Trade (RDI Law of 5th June 2009) ■ FNRCORE Thematic Programme. ■ ERA_Net ECO Innovera ■ Business Portail ■ Institut national pour le développement de la formation professionnelle continue

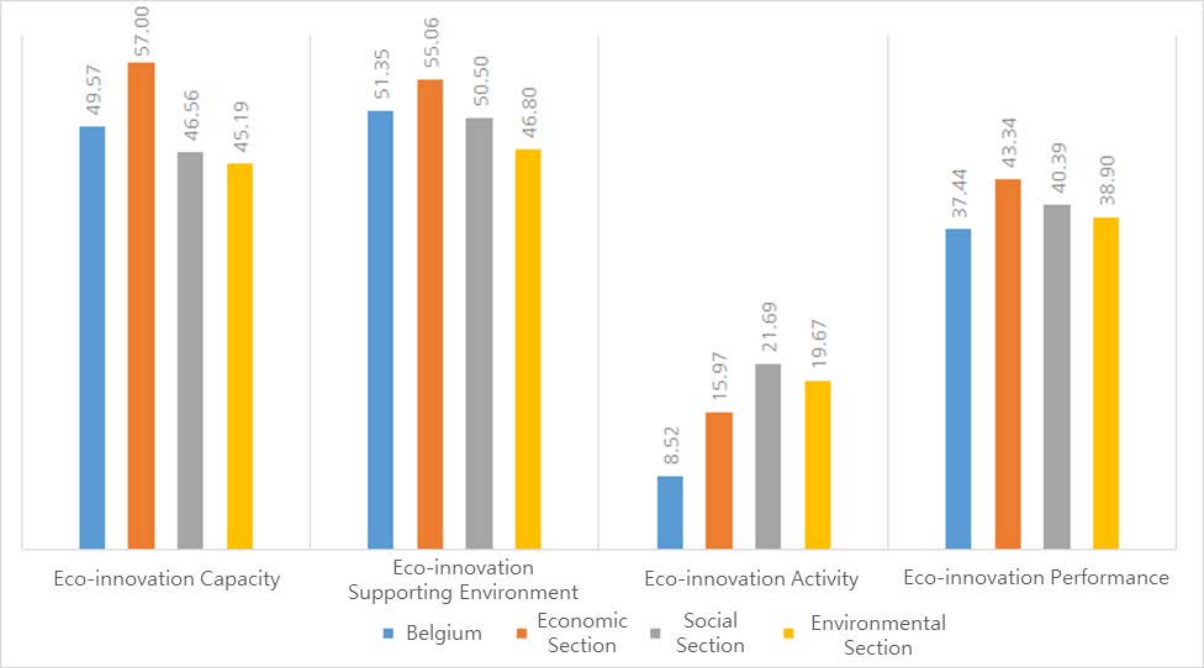
		■ ATTRACT Programme ■ National Research Training Grant Scheme ■ The Luxembourg Foresight Exercise ■ “Observatoire de la Compétitivité” ■ PRIMe CAR-e ■ The Air Quality Plan for Luxembourg City ■ National Spatial Planning Programme 2013
	International	
Legislation		
Finance		■ Luxembourg Future Fund” initiative, jointly with the European Investment Fund (FEI) 2013
Information		■ Luxembourg Green Party 2013 ■ Luxembourg EcoInnovation Cluster 2002 ■ Legal framework for venture capital and private equity companies (SICAR) ■ The National Agency for Innovation “Luxinnovation” ■ Luxembourg Private Equity & Venture Capital Association

The new government established in December 2013 have worked towards change in various fields such as energy and climate change policies and have a policy focus on energy efficiency. The most meaningful eco-innovation trend is the circulative economic model program of diversifying national economic activities and improving competitiveness. The eco-innovation field includes logical usage of natural resources, material science, sustainable transport and cities and smart technology. Luxembourg’s eco-innovation motivation is the necessity of strong policy will for sustainable eco-innovation development, economic diversification for economic growth and production. The new president has been elected as Luxembourg’s ecology innovation cluster and has worked towards new strategies for a cluster centered around mobility, circulative economy, sustainable cities and smart technology. This strategy includes specific goals for the period of 2014-2020 (EIO, 2013l).

Belgium

	45,387	11.1 million	1:22:77	0.881 Very high	5.81	5.54	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.34〉 ASEI quantitative analysis of Belgium



- Eco-innovation activity, capacity, supporting environment and performance of the Belgium are lower than the average sores of the first country group in the economic sector quartile.
- Eco-innovation capacity, performance and supporting environment of the Belgium are similar with the average scores of the second country group in the social sector quartile. However, eco-innovation activity score is low.
- Eco-innovation capacity and performance and supporting environment of the Belgium are higher than the average scores of the second country group in the environmental sector quartile. However, eco-innovation activity score is low.

<Table 5.67> Comparative analysis of TBL quartile for Belgium

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Belgium	49.57	51.35	8.52	37.44	
Economic	57.00	55.06	15.97	43.34	1
Social	46.56	50.50	21.69	40.39	2
Environmental	45.19	46.80	19.67	38.90	2

■ Belgium shows similar scores with the average scores of all fields in comparison with similarly developed countries. However the activity field showed low scores and this points out the necessity to strengthen private eco-innovation fulfillment enthusiasm. Thus it is important to strengthen private eco-innovation fulfillment enthusiasm and create an atmosphere for eco-innovation manifestation through actual market activity.

〈Table 5.68〉 Eco-innovation Policy instruments of Belgium

National plan and strategy	Sustainability	■ National Climate Plan 2009-2012 ■ Flemish Climate Policy Plan 2013-20
	Eco-innovation	■ National Energy Efficiency Action Plan 2008-2016 (NEEAP) ■ Eco Management and Audit Scheme (EMAS) (2005) ■ Strategic Policy Plan 2010. 2015 on Waste, Materials and Soil Management (2009) ■ The Federal Products Plan (2009-2012) ■ Walloon Waste Plan 2020 ■ Flanders In Action pact 2020 ■ Sustainable Materials Management Strategy ■ Energy Efficiency Action Plan 2011-16 ■ 4th Environmental Policy Plan (MINA- 4) (2011-2015) ■ Waste-water treatment plan ■ Walloon's Marshall Plan2.Green
Programme and actions	National	■ PRODEM[184] ■ Ecocheque ■ Eco-dynamic enterprise label ■ Decree on waste & materials management ■ Energy Renovation Programme 2020

[184] EIO, (2011), Eco-innovation in Belgium
Promotion and Demonstration of Environmental Technologies The project encourages SMEs to introduce environmentally friendly process technologies, by setting up demonstration tests and pilots to investigate the feasibility of selected technologies since this was found crucial for SMEs to guide them to do the right investments in cleaner technologies.

		■ Cluster policy, a sixth pole 'GreenWin'(green chemistry and ecoindustries) (2011) ■ Flanders's Sustainable Materials Management Programme (2011) ■ Walloon's Voluntary Agreements on Energy Efficiency ■ Flemish Reform Programme (2010) ■ Federal research programme - Science for a Sustainable Development ■ The National Strategy for Sustainable Public Procurement (2004-2008) ■ Regional policy statement (2009-2014)
	International	
Legislation		
Finance		
Information		■ Grants by Flanders: MIP, Environmental and Energy Technology Innovation Platform for universitycompany collaborative projects ■ Clusters Walloon (2011) ■ Ghent Bio-Energy Valley ■ TWEED ■ Public Waste Agency of Flanders(OVAM) (2010) ■ IMIEU (Institute for Infrastructure, Environment and Innovation) ■ The 9th European forum on ecoinnovation- Finance the eco-innovation (Nov 2010) ■ Sustainable Technology Development (STD) facility (in Flanders) ■ DuWoBo (a Flemish Transition Network for Sustainable Construction)

Belgium has traditionally established solid environment policies and is the main driving force behind Belgium's eco-innovation execution. Environment taxes Environment burden charge, Eco—labeling, Eco-product brochures were all part of implemented economic policy measures. The national energy efficiency action plan[185] has been established in relation to climate change policies[186]. Environment friendly management and surveillance policies[187], environment taxes and eco labelling are part of establishing a great eco-innovation promotion policy.

Also incentive mechanisms and support fund policies to support R&D was established. Belgium's eco-innovation driving force were considered to be the increase sustainability goal awareness and technology capacity improvement, and increased demands of green

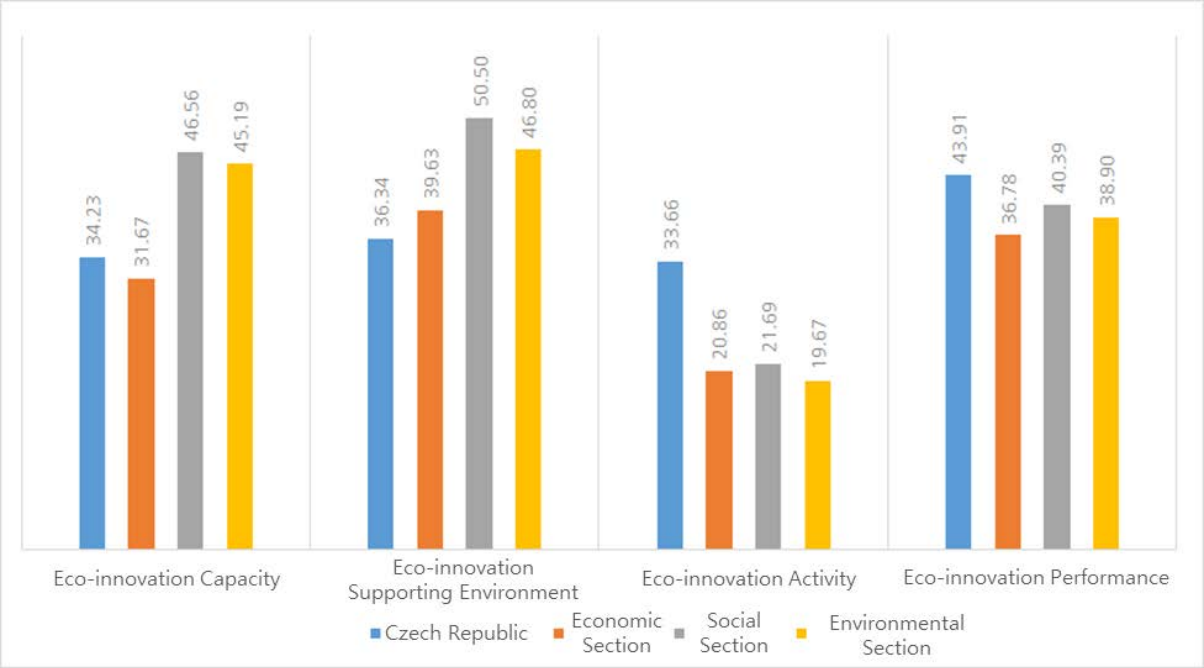
[185] National Energy Efficiency Action Plan 2008-2016 (NEEAP)
[186] National Climate Plan 2009-2012, Flemish Climate Policy Plan 2013-20
[187] Eco Management and Audit Scheme (EMAS) (2005)

products. A lack of unified policy and decision making and low economic feasibility of some local areas and industries are considered to be the obstacles. The government organizations divided by local areas are performing local eco-innovation policies and establishing incentives to establish a local are level of eco-innovation policies (EIO, 2013a).

Czech Republic

	18,869	10.7 million	3:37:60	0.869 Very high	4.84	4.69	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.35〉 ASEI quantitative analysis of Czech



- Eco-innovation activity, capacity and performance of the Czech are higher than the average sores of the third country group in the economic sector quartile. However, eco-innovation supporting environment score is low.
- Eco-innovation performance and activity of the Czech are higher than the average scores of the second country group in the social sector quartile. However, eco-innovation capacity and supporting environment score are low.
- Eco-innovation performance and activity of the Czech are higher than the average scores of the second country group in the environmental sector quartile. However, eco-innovation capacity and supporting environment score are low.

〈Table 5.69〉 Comparative analysis of TBL quartile for Czech

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Czech	34.23	36.34	33.66	43.91	
Economic	31.67	39.63	20.86	36.78	3
Social	46.56	50.50	21.69	40.39	2
Environmental	45.19	46.80	19.67	38.90	2

■ The Czech Republic in comparison with similarly developed countries has scored relatively low scores in the capacity and support environment fields. The capacity field's low score indicates the weak basic stage for eco-innovation vitalization and requires strengthening eco-innovation potential and the support environment is in need of increasing national awareness and various environment arrangements in order to achieve eco-innovation. Relatively low scores of government's R&D expenditure in green industry and firms' awareness of sustainability management indicate the need of effort to increase them.

〈Table 5.70〉 Eco-innovation Policy instruments of Czech Republic

National plan and strategy	Sustainability	■ Sustainable Spatial Development ■ the Framework of Programmes on Sustainable Consumption and Production (SCP Framework) (2005) ■ National Cluster Strategy (2005) ■ Strategic Framework for Sustainable Development (2010) ■ Local Agenda 21
	Eco-innovation	■ Czech National Biomass Action Plan for the period (2009.2011) ■ Waste Management Plan of the Czech Republic (2003-2013) ■ National Action Plan for Renewable Energy Sources ■ The National Energy Efficiency Action Plan
Programme and actions	National	■ Operational Program for Environment ■ Program on Environmental Technology Support (2006) ■ Updated Programme of Support of Environmental Technologies (2009) ■ Raw Material Policy in the Field of Mineral Materials and Their Resources (1999) ■ State Energy Policy of the Czech Republic (2004) ■ State environmental policy (2004- 2010)

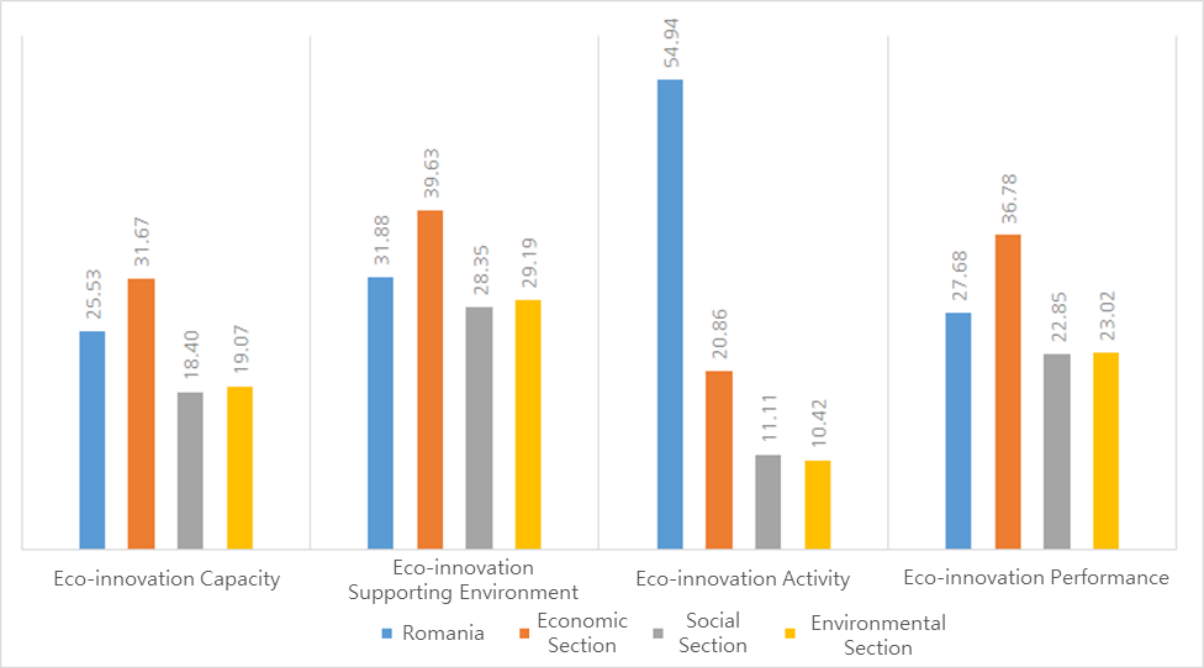
		■ National Program of Labelling Environment-friendly Products ■ National programme for the energy management and the use of renewable sources of energy for (2006.2009)
	International	
Legislation		■ Act no. 185/2001 on waste prevention and waste management
Finance		■ Subsidy programmes of the State Environment Fund ■ The Green Investment Scheme (2009) - New programme supporting renewable energy sources and energy savings in residential buildings
Information		■ Czech Environmental Information Agency (CENIA) ■ 14th European forum on ecoinnovation- Delivering innovative solutions for mobility, energy and ICT in cities (May 2013) ■ The Government Council for Sustainable Development (GCSD) ■ National Network of Science and Technology Parks

Czech's eco-innovation policy approach is focused on eco-innovation demand field activity and is composed of policy measures such as regulations and guidelines (WIFO, 2009). Czech's eco-innovation driving factor was considered to be international demand increase for green technologies and the investment from EU and public funds. However obstacles are considered to be the lack of structural policy support for SMEs' eco-innovation, lack of research facility cooperation, and lack of mutual interest clusters. In order to promote eco-innovation and overcome the obstacles, the ETAP roadmap's eco-innovation fulfilment emphasizes the supply side's network and partnership establishment in the overall environment assessment. Especially green technology cluster formation and technology platforms and R&D activity support is needed (EIO, 2013t.) Afterwards the networking policy for clean technology clusters and technology platform, R&D activity support were contained in the networking and partnership establishment policy.

Romania

	9,499	21.7 million	6:34:59	0.785 High	3.97	3.98	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.36〉 ASEI quantitative analysis of Romania



- Eco-innovation activity, supporting environment, capacity and performance of the Romania are lower than the average sores of the third country group in the economic sector quartile.
- Eco-innovation activity, supporting environment, capacity and performance of the Romania are lower than the average scores of the fourth country group in the social sector quartile.
- Eco-innovation activity, supporting environment, capacity and performance of the Romania are lower than the average scores of the fourth country group in the environmental sector quartile.

〈Table 5.71〉 Comparative analysis of TBL quartile for Romania

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Romania	25.53	31.88	54.94	27.68	
Economic	31.67	39.63	20.86	36.78	3
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

- Romania has low scores across all fields in comparison with similarly developed countries. The capacity field's score especially low and this country is showing a typical lack of basic level for eco-innovation vitalization. Eco-innovation driving force capacity is marginal and the national awareness and various environments for eco-innovation achievement is lacking. Eco-innovation vitalization requires the fixing of all these issues and eco-innovation achieving market voluntarily movement independent of government activity must be encouraged and the enthusiasm for sustainable development must be in organic balance across all fields.

〈Table 5.72〉 Eco-innovation Policy instruments of Romania

National plan and strategy	Sustainability	■ National Strategy for Sustainable Development - Horizons 2012 - 2020 - 2030 ■ s National Strategy for Energy Efficiency 2004 ■ Strategy for Forest Sector Development in Romania (2001 - 2010)
	Eco-innovation	■ the National Strategy of Research & Development and Innovation (RDI) for the period 2014-2020 ■ Green Public Procurement Action Plan 2009-2013 ■ Biomass Master Plan (2010) ■ National Action Plan for Energy from Renewable Sources(2010) ■ National Plan to Combat Illegal Logging ■ National Action Plan for environmental public procurement (2008 - 2013) i ■ Action Plan for water protection against nitrates pollution from agriculture sources 2000
Programme and actions	National	■ The Green Laboratory of Recycling 2012 ■ Recicleta ■ 'Green House' Programme

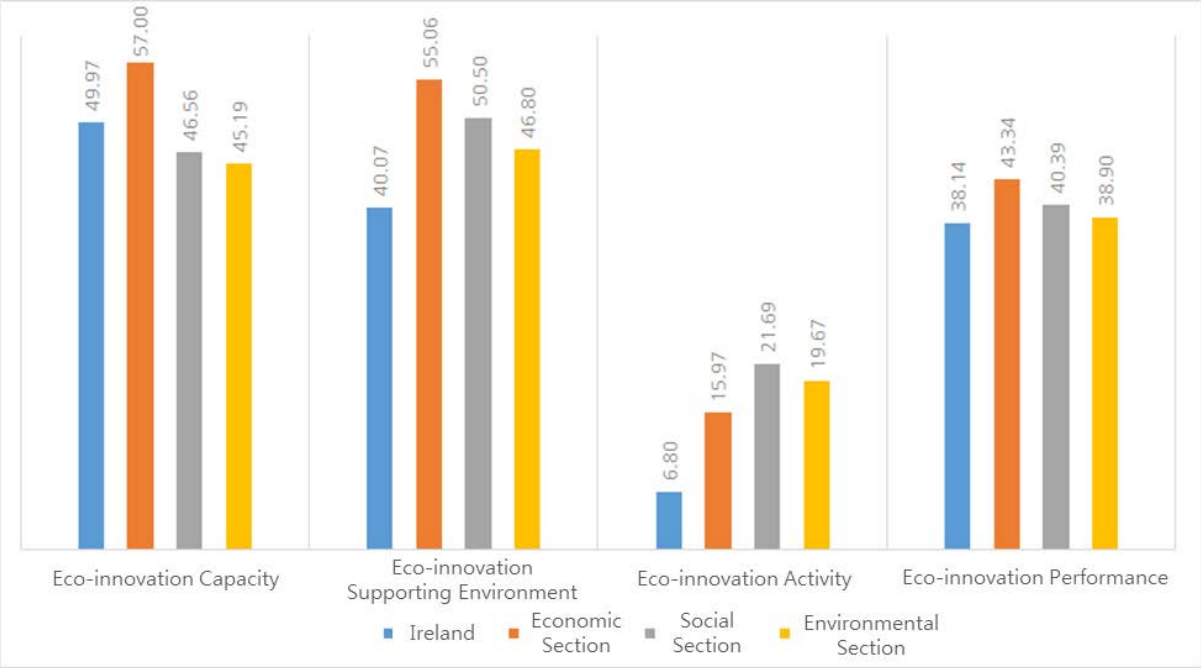
		■ Good agricultural and environmental conditions (GAEC) 2010
	International	
Legislation		■ National Law for Waste Management 2014
Finance		■ Romanian-American Foundation(RAF) 1994 ■ The Structural Funds Operational Programme 2013
Information		■ Common Strategy for Sustainable Territorial Development of the cross-border area Romania-Bulgaria - CBC 2007-2013 ■ Regional center for integrated risk and territory management of the region of Lower Danube (2013)

Rumania's eco-innovation plan has evolved steadily in the past few years. Although it has been operated in accordance to EU standard's regulations, Romania has been continuously adopting policies for improved sustainable development. However Romania's policy direction is lacking a long term view point. The government policies centered on ecology innovation and sustainable development require the committee's unified approach. As pointed out in the UNECE 2013 Environmental Performance Review on Romania more attention must be given to the issue of disposable water resource management. This field's sustainable policy execution requires the EU financial support and investment by local and national organizations setting specific solutions and executing them. In 013, energy efficiency and renewable energy field received the highest incentives and financial support. Romania has received from the FIT and is investing in renewable energy. Also as the EU and EBRE gave more financial and technology support and came up with energy efficiency increasing plan, and formed public-private partnerships like ESCOs. Due to Romania's SMEs' and large corporations' awareness of the environmental influence and resource efficiency economic opportunity awareness is low but in the recent few years the plan for the private sector's recycling and reuse plans have been solidified. However Romania did not touch the import of waste for the private sector's production activities resulting in a loss of many opportunities of waste recycling (EIO, 2013o).

Ireland

	47,400	4.6 million	2:28:70	0.899 Very High	5.33	5.31	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.37〉 ASEI quantitative analysis of Ireland



- Eco-innovation activity, capacity, supporting environment and performance of the Ireland are lower than the average score of the first country group in the economic sector quartile. In particular, eco-innovation supporting environment score is low.
- Eco-innovation capacity and performance of the Ireland are similar with the average score of the second country group in the social sector quartile. However, eco-innovation supporting environment and activity scores are low.
- Eco-innovation capacity and performance of the Ireland are similar with the average score of the second country group in the environmental sector quartile. However, eco-innovation supporting environment and activity scores are low.

〈Table 5.73〉 Comparative analysis of TBL quartile for Ireland

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Ireland	49.97	40.07	6.80	38.14	
Economic	57.00	55.06	15.97	43.34	1
Social	46.56	50.50	21.69	40.39	2
Environmental	45.19	46.80	19.67	38.90	2

■ Ireland shares similar scores in the eco-innovation capacity and performance fields with similar countries but showed low scores in the support environment and activity fields. Eco-innovation leading potential and the social atmosphere for achieving sustainable development is existent but the government awareness of the importance of eco-innovation and market action is lacking. Actions to improve the government's awareness of the importance of eco-innovation and applying the existing potential to the market is needed.

〈Table 5.74〉 Eco-innovation Policy instruments of Ireland

National plan and strategy	Sustainability	■ Sustainable Development - a Strategy for Ireland (DoECLG, 1997) ■ Local Agenda 21 - Community based SD policy area ■ National Development Plan ■ Irish Spatial Strategy ■ National Climate Change Strategy 2007-2012 ■ Delivering a Sustainable Energy Future for Ireland - the Energy Policy Framework for 2007-2020
	Eco-innovation	■ 2012 Green Economy Policy Statement on "Delivering Our Green Potential" ■ Sustainable Energy Authorigy Ireland (SEAI) ■ the Strategy for Renewable Energy 2012-2020 ■ 'Strategy for Science Technology and Innovation' 2006-2013 ■ Green Public Procurement Action Plan ■ National Energy Efficiency Action Plan 2013-2020
Programme and actions	National	■ The Greening of Dublin's International Financial Services Centre project ■ Pay As You Save (PAYS) ■ National Energy Services Framework for 2013-2014 ■ ESB Novusmodus LP ■ Pilot Clustering Programme

		■ Innovation Vouchers: ■ Irish Wateroffers“ plugand play” test bedding ■ Skillnets programme ■ National Waste Prevention Programme (NWPP), 2004 ■ Water Services Investment Programme ■ Government's Green Public Procurement Programme ■ Green Business Initiative ■ Green Hospitality Award ■ Packaging Waste Prevention Programme ■ Cleaner Greener Production Programme (CGPP) ■ SMILE Resource Exchange
	International	
Legislation		■ Water Services Act
Finance		■ National Energy Efficiency Fund (NEEF) ■ R&D Tax Credit Scheme ■ Science Foundation Ireland (SFI)
Information		■ SEAI's Large Industry Energy Network (LIEN) ■ Innovation Partnership Programme: This programme offers financial support to companies who engage in collaborative research projects with Irish universities and Institutes of Technology ■ Enterprise Ireland ■ Applied Research Enhancement Centres ■ Local Authority Prevention Network (NAPN) ■ StopFoodWaste programme 2009

Ireland's “green economy” is the driving force of jobs and future growth and is receiving the spotlight as the opportunity to reestablish the economy as Ireland's political will. The Ireland government has figured out some fields with opportunities for economic growth and job creation: renewable energy, energy efficiency and resource efficiency, green products and service, green financial services, agriculture·maritime·forest, tourism, water management, waste water management, low carbon transportation, R&D, innovation. Major activities are the 2013-2020[189] national energy efficiency execution plan and the sustainable energy department's incentive plan[190]. Recently a national water resource company Irish Water (previously managed by local organizations and state parliament) was established for water management. Renewable energy is also receiving the spotlight

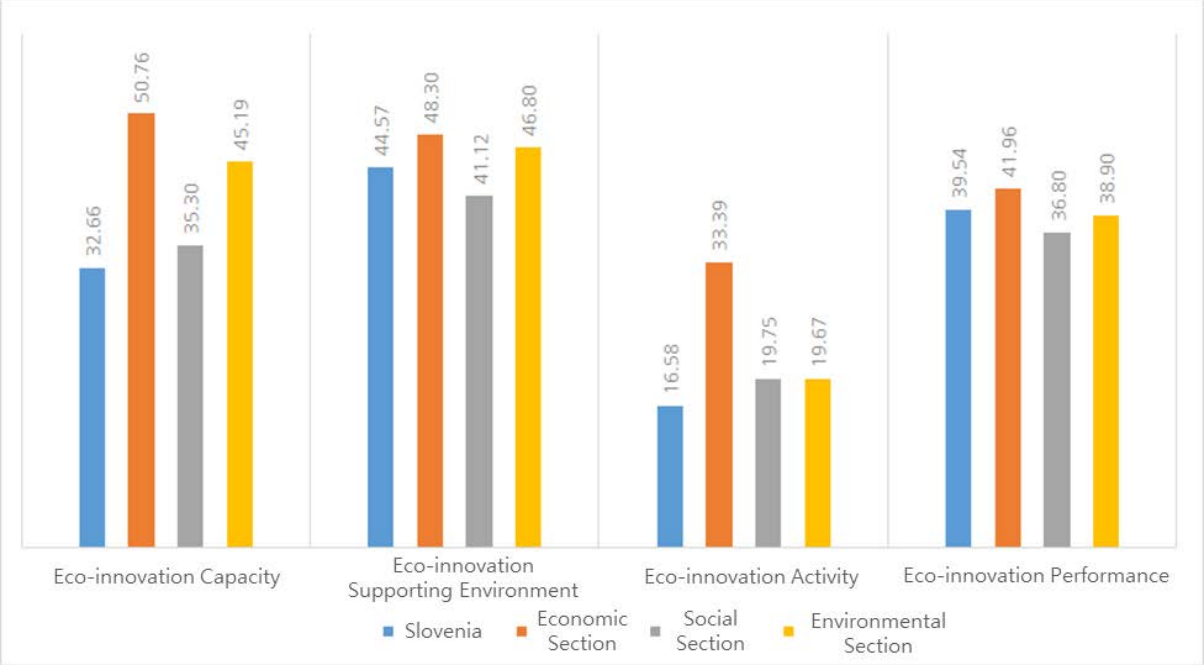
[189] National Energy Efficiency Action Plan 2013-2020
[190] Sustainable Energy Authority Ireland(SEAI)

light as Ireland is working towards becoming a world leader in maritime energy technology and wind generation energy (EIO, 2013i).

Slovenia

	22,059	2.1 million	3:29:68	0.874 Very High	4.68	4.60	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.38〉 ASEI quantitative analysis of Slovenia



- Eco-innovation performance and supporting environment and the Slovenia are similar with the average sores of the second country group in the economic sector quartile. However, eco-innovation capacity and activity scores are low.
- Eco-innovation capacity, supporting environment, activity and performance of the Slovenia are similar with the average scores of the third country group in the social sector quartile.
- Eco-innovation performance, supporting environment and activity of the Slovenia are similar with the average scores of the second country group in the environmental sector quartile. However, eco-innovation capacity scores is low.

〈Table 5.75〉 Comparative analysis of TBL quartile for Slovenia

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Slovenia	32.66	44.57	16.58	39.54	
Economic	50.76	48.30	33.39	41.96	2
Social	35.30	41.12	19.75	36.80	3
Environmental	45.19	46.80	19.67	38.90	2

- Slovenia shows similar scores with similar countries in the eco-innovation performance and support environment field but shows low scores in the capacity and activity field. Considering 2,3rd division countries' eco-innovation potential or government activity is lacking but private eco-innovation pursuit activities being active, Slovenia's fulfilment will is significantly lower is also lower than similar countries'. Especially in the economic field, the reason why capacity and performance scores show a significant difference in comparison with same division countries is due to Slovenia's lack of awareness of eco-innovation's importance in comparison to economic growth. Eco-innovation basis arrangements and private application increase solutions are needed.

〈Table 5.76〉 Eco-innovation Policy instruments of Slovenia

National plan and strategy	Sustainability	■ Slovenia's Development Strategy 2014-2020 ■ Strategy of Regional Development in Slovenia (SRDS), 2001 ■ Biodiversity Conservation Strategy of Slovenia (2001)
	Eco-innovation	■ Action plan on renewable energy resources for period 2010-2020, 2010 ■ National Energy Efficiency Action Plan 2008-2016, 2008 ■ National Strategic Reference Framework (NSRF), 2007 ■ Spatial Devel opment Strategy of Slovenia (SDSS), 2004 ■ National Mineral Resource Management Programme - General Plan 2009
Programme and actions	National	■ Water Management Plan (2009-2015) ■ National Strategic Plan on the Development of Fisheries in the Republic of Slovenia 2007-2013 ■ Programme of Development Priorities and Investments 2014-2017

		■ Resolution on the Research and Innovation Strategy of Slovenia 2011-2020 (RISS), ■ The Programme of Development Priorities and Investments (PDPI) ■ The National Environmental Action Programme (NEAP) 2005-2012 ■ National Forest Programme (2007) ■ Rural Development Programme of the Republic of Slovenia 2007-2013 ■ Resolution on the National Energy Programme (ReNEP), 2004 ■ Resolution on the Transport Policy of the Republic of Slovenia (RePPRS), 2006
	International	
Legislation		■ Decree on Green Public Procurement (GPP) 2011
Finance		
Information		■ Slovenian Innovation Forum

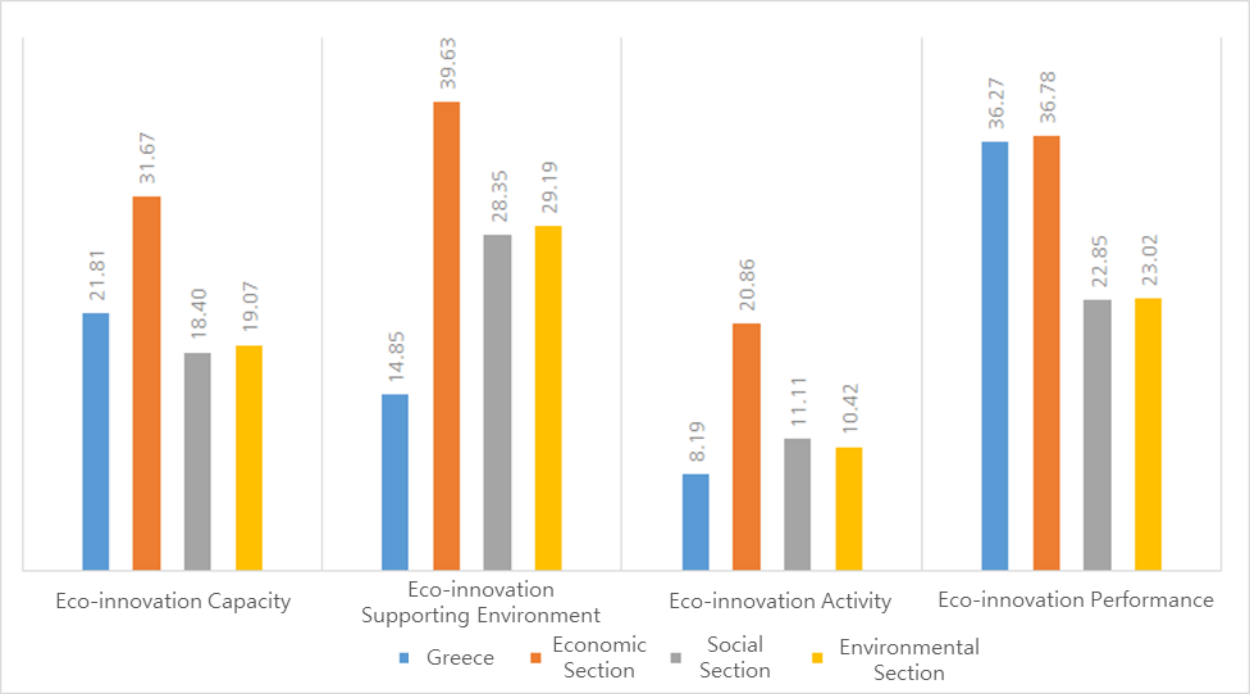
Slovenia simultaneously holds several opportunities and problems with its eco-innovation. However it is also directly facing environment problems and hold economic and policy problems of either blocking or banning the advancement of eco-innovation. Slovenia's circular economy is currently showing a sharp decline in ecology industry exports, turnover and employment. The country has even failed to host basic stage green industry investments. However, material production has gone up by two times between 2011 and 2013 and the overall R&D workforce has increased through eco-innovation related publishing and patents. This effect shows the buildup of eco-innovation knowledge and increase in the public's awareness. Slovenia's eco-innovation field has leading and innovative global corporations with car technology, efficient electric equipment and mobility, building energy efficiency and sustainable architecture. This field’s corporation R&D expenditure has increased and made up for the R&D expenditure decrease for the government between 2012 and 2013. One of the promising eco innovation fields is the bio mass based industry. Eco-innovation's obstacles are currently limited funds due to the existing social and economic crisis. And after the political change in 2011, new law enactments and economic reform attempts of the R&D field (especially eco-innovation) faces opposition (EIO, 2013q). Even with those circumstances, the past two years show

progress towards a sustainable life style. Non-government organizations and a few leading companies are proposing a more ecology oriented solution following EU policies.

Greece

	21,910	11.164.3 million	4:16:80	0.853 Very high	3.79	4.08	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.39〉 ASEI quantitative analysis of Greece



- Eco-innovation performance of the Greece is similar with the average sores of the third country group in the economic sector quartile. However, eco-innovation capacity, supporting environment and activity scores are low.
- Eco-innovation capacity and performance of the Greece are higher than the average scores of the fourth country group in the social sector quartile. However, eco-innovation supporting environment and activity scores are low.
- Eco-innovation performance and capacity of the Greece are higher than the average scores of the fourth country group in the environmental sector quartile.

However, eco-innovation supporting environment and activity scores are low.

〈Table 5.77〉 Comparative analysis of TBL quartile for Greece

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Greece	21.81	14.85	8.19	36.27	
Economic	31.67	39.63	20.86	36.78	3
Social	18.40	28.35	11.11	22.85	4
Environmental	19.07	29.19	10.42	23.02	4

■ Greece's eco-innovation performance score in comparison with 3rd division counties are similar but support environment and activity fields show low scores even in comparison with 4th division countries. Considering the depressed national situation, low enthusiasm for private eco-innovation advancement, national awareness and support environment are considered to be the reasons why. As the awareness for sustainable development in the adaptation stage is high, eco-innovation can be strengthened with further efforts to increase capacity, support environment and activities.

〈Table 5.78〉 Eco-innovation Policy instruments of Greece

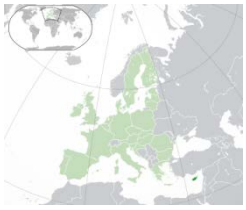
National plan and strategy	Sustainability	■ National Sustainable Development Strategies(NSDS) ■ Greek Sustainable Development Strategy ■ Green Growth Strategic Action Programme (2010-2015) ■ National Strategic Framework Programme 2007-2013 ■ Environment and Sustainable Development
	Eco-innovation	■ the Greek National Strategic Framework for Research and Innovation (NSFRI) ■ Action Plan for energy conservation in urban/commercial housing for the period 2010-2015
Programme and actions	National	■ Operational Programme Competitiveness and Enterepreneurship and all Regional Operational Programmes: 'Synergasia 2011' ■ Internship (stage) and Innovation & Entrepreneurship Units of Universities ■ Promotion of the purchase of new "resource efficient" vehicles ■ 'Building the Future' (2012-2020) ■ Green agricultural and island communities - New development model

		■ Energy Efficiency of Household Buildings (2011) ■ MoEECC
	International	
Legislation		■ Investment Incentives Law 2013 ■ The new Investment Incentives Law(April2013)
Finance		■ The National Fund for Entrepreneurship and Development (ETEAN) ■ the Green Fund 2010 ■ Green Fund 2010
Information		■ JEREMIE(Joint European Resources for Micro to Medium Enterprises) initiative ■ Coralla (Cluster Initiative targeting at enhancing competitiveness, entrepreneurship and innovation, by providing cluster-development support activities) ■ Enterprise Europe Network ■ PRAXI/HELP-FORWARD Network(=HELlenic Project FOR Wider Application of R&D) ■ The National Fund for Entrepreneurship and Development (ETEAN) ■ Enterprise Europe Network ■ National Organization for the Alternative Management of Packaging and Other Products ■ Mediterranean Component of the EU Water Initiative (MED EUWI) ■ Union for the Mediterranean: Mediterranean Strategy for Water

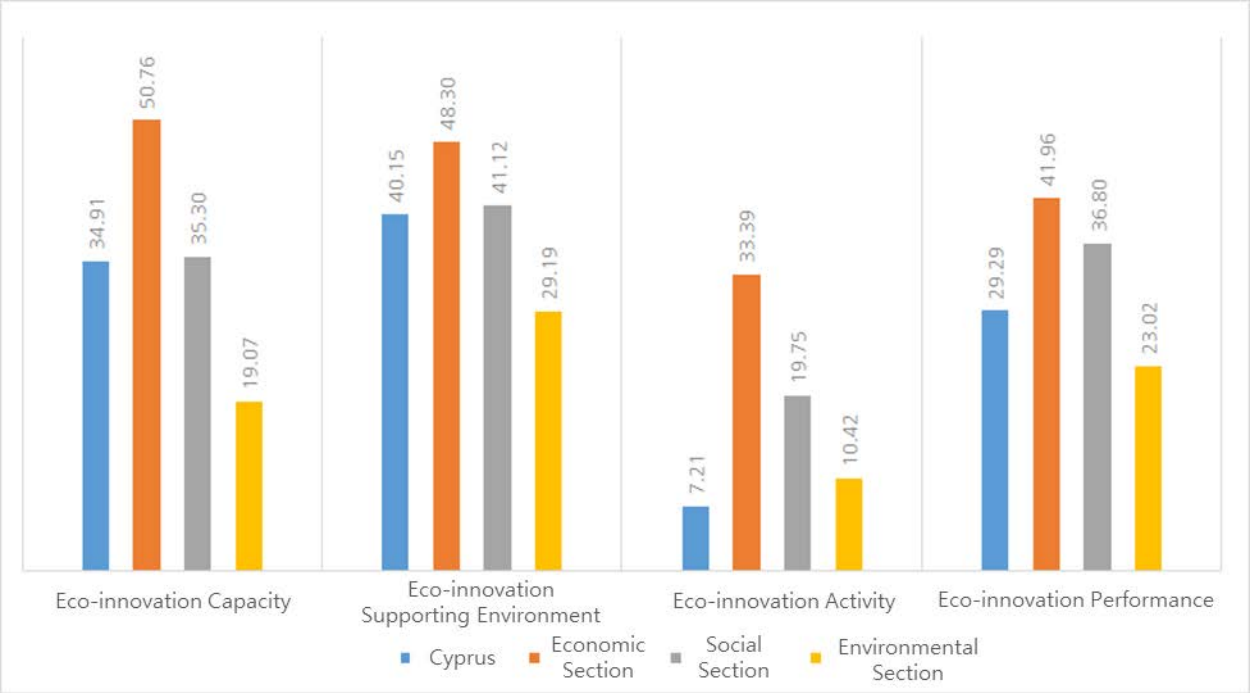
Greece's policies promote eco-innovation centering on renewable energy and energy efficiency. Greece still depends heavily on fossil fuel imports to produce power. However, the Greece government has set a goal to move over 20% of final energy consumption to renewable energy by 2020. Greece shows eco-innovation possibilities in specific fields that are not at a mature stage yet. Architecture fields have tried to implement eco-innovation and the solar power industry, primary sector and food industries also showed development. Green/alternative tourism has also showed relatively significant growth. According to Eurostat, renewable energy covers 11.6% of Greece's total energy consumption. Greece's eco-innovation hindrances are the lack of overall framework for eco-innovation and ecology industry support. Most importantly, systematic fund support for eco-innovation is currently impossible in the country's economic crisis. A firm's small size is what support eco-innovation's industrialization. From an administrative point of view, Greece's complicated and bureaucratic administration processes are what hinder

businessmen's and investors' eco-innovation progress. On the other hand, the driving force for eco-innovation can be considered to be abundant natural resources (sunlight, wind, tide) for renewable energy development, green/alternative tourism growth, agriculture/food industry's innovation and improvement in quality of scientific communication (EIO, 2013g).

Cyprus

	26,352	1.1 million	2:16:82	0.845 Very high	4.66	4.19	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.40〉 ASEI quantitative analysis of Cyprus



- Eco-innovation capacity and supporting environment of the Cyprus are similar with the average sores of the second country group in the economic sector quartile. However, eco-innovation activity and performance scores are low.
- Eco-innovation capacity and performance of the Cyprus are higher than the average scores of the third country group in the social sector quartile. However, eco-innovation supporting environment and activity scores are low.
- Eco-innovation performance, supporting environment and capacity of the Cyprus are higher than the average scores of the fourth country group in the environmental sector quartile. However, eco-innovation activity score is low.

〈Table 5.79〉 Comparative analysis of TBL quartile for Cyprus

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Cyprus	34.91	40.15	7.21	29.29	
Economic	50.76	48.30	33.39	41.96	2
Social	35.30	41.12	19.75	36.80	3
Environmental	19.07	29.19	10.42	23.02	4

- Cyprus's economic standard is part of the 2nd division but it's social and environment fields are part of the 3rd and 4th division having not so high development in relation to its economic growth rate. In comparison with 3rd division counties, Cyprus has a relatively high eco innovation basic stage but its activity scores do not even reach the 4th division average score. The need for voluntary fulfilment attitudes toward private sector eco innovation is a must need as it affects capacity and supply environment.

〈Table 5.80〉 Eco-innovation Policy instruments of Cyprus

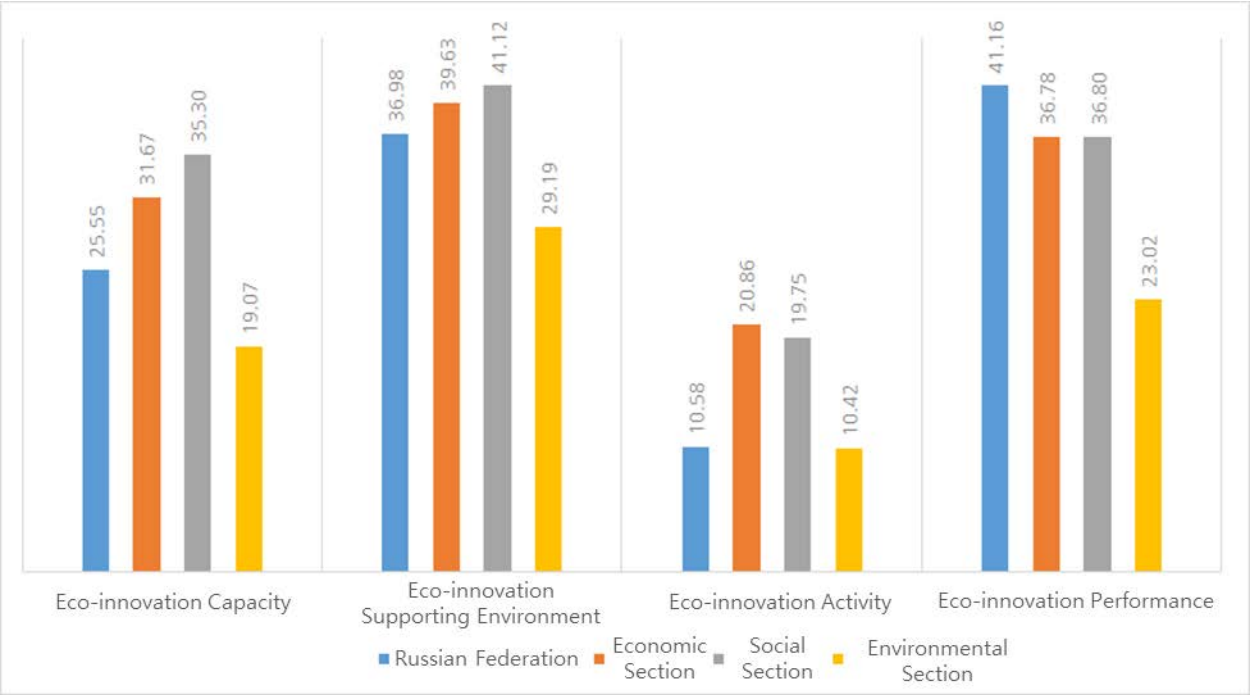
National plan and strategy	Sustainability	■ National Sustainable Development Strategy (NSDS) 2007 ■ Reviewed National Sustainable Development Strategy (NDS 2010) ■ Strategic Development Plan 2007-2013
	Eco-innovation	■ 2nd National Energy efficiency Action Plan (NEEAP) 2011 ■ Action Plan for Green Public Procurement 2012 ■ ≪EUROSTARS Cyprus≫ Specific Action
Programme and actions	National	■ Energy Audit System 2012 ■ new framework of vehicle excise duty (2012) ■ the Cypriot Energy Regulatory Authority (CERA)'s net-metering installations ■ Support Scheme for the Utilisation of RES and Evergy Conservation ■ Support Scheme for Electricity Generation from Wind Energy, Solar Energy and Biomass ■ National Reform Programfor EU 2020
	International	
Legislation		
Finance		■ The Spetial Fund for RES and Energy Efficiency
Information		■ LIFE+Program, 2012 ■ The ERMIS Research and Incubator Centre (2003) ■ Mediterranean Commission for SD (MCSD)

According to 2013's Eco-IS, Cyprus has the lowest rank of eco-innovation results. Cyprus's organizations or firms are pursuing eco-innovation separately (EIO, 2013) with no outstanding fields. Renewable energy using abundant natural resources are highlighted and the agriculture and food industries are becoming the main players. EU supported projects are underway and these projects cover water management, industrial waste, basin size water management, atmosphere quality, bio-fuel and industry productions. Cyprus's eco-innovation promotion driving force is the EU's broad financial support and the government's environment regulations for solving water and energy shortages along with waste and atmosphere pollution problems. On the other hand hindrances are low economic scales for eco-innovation investments and weak investment from firms and the government for traditional R&D. Cyprus's economy is decided by SMEs and lacks specific fields' focused investment and corporate innovations. Occasional banning of SME participation in research projects are also considered to be hindrance factors (EIO, 2013b).

Russian Federation

	14,612	142.8 million	10:28:62	0.778 High	4.30	4.10	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.41〉 ASEI quantitative analysis of Russian Federation



- Eco-innovation supporting environment and performance of the Russian are similar with the average sores of the second country group in the economic sector quartile. However, eco-innovation capacity and activity scores are low.
- Eco-innovation supporting environment and performance of the Russian are similar with the average scores of the third country group in the social sector quartile. However, eco-innovation capacity and activity scores are low.

■ Eco-innovation activity, performance, supporting environment and capacity of the Russian are higher than the average scores of the fourth country group in the environmental sector quartile.

〈Table 5.81〉 Comparative analysis of TBL quartile for Russian Federation

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Russian Federation	25.55	36.98	10.58	41.16	
Economic	31.67	39.63	20.86	36.78	3
Social	35.30	41.12	19.75	36.80	3
Environmental	19.07	29.19	10.42	23.02	4

■ Russian in comparison with 3rd division countries has a low score in the capacity and activity field. Capacity and activity scores are low but sustainable development awareness itself is increasing. If national capacity was combined with a high quality supporting environment and encouragement of private sector's voluntary eco-innovation activities and advancement, huge results can be achieved.

〈Table 5.82〉 Eco-innovation Policy instruments of Russian Federation

National plan and strategy	Sustainability	■ the Concept of transition of the Russian Federation towards sustainable development1996 ■ the Concept of the Long-Term Socio-Economic Development of the Russian Federation for the period up to 2020,2008
	Eco-innovation	■ "Energy of Russia"(1998-2005) ■ The Energy Strategy of Russia for the period up to 2030 ■ the Transport Strategy of the Russian Federation for the period up to 2030, 2008 ■ the Water Strategy of the Russian Federation for the period up to 2020, 2009 ■ "the Strategy in the field of Hydrometeorology and Related Areas for the period to 2030 (including aspects of climate change)", 2010 ■ Ecological Doctrine 2002
Programme and actions	National	■ "Energy efficiency in the energy sector" ■ national programme "Energy Conservation an d Improving Energy Efficiency for the period up to2020, 2010 ■ "High-speed environmentally clean vehicles" (until 2005) ■ the Federal Targeted Program "Development of Water Industry of the Russian Federation in 2012-2020", 2011

	International	
Legislation		■ Air Polluting Waste Centers and the List of Hazardous Materials 2010 ■ Federal Act on Protection of Environment 2002
Finance		
Information		

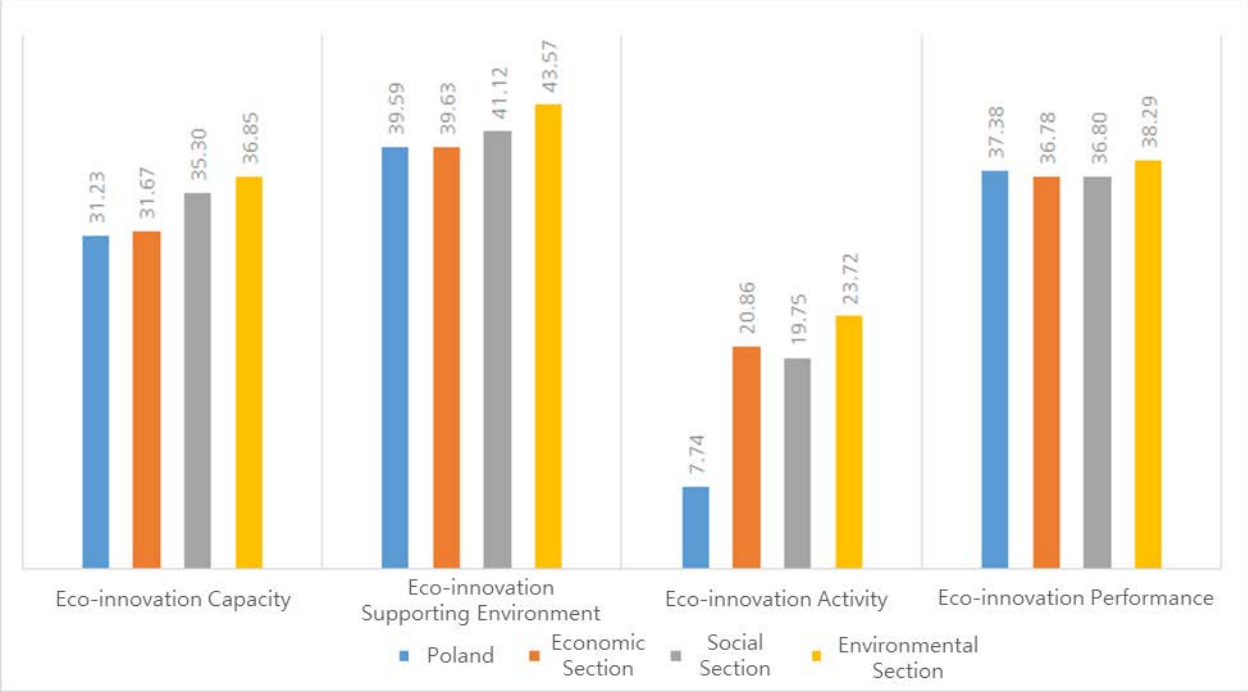
Russia does not have a clear eco-innovation policy but strategies for sustainable development including long term social economy[191], energy[192], transportation[193] and water resources[194] are established. Approaching sustainable development through green industry growth with environment friendly production and energy efficiency as well as alternative resources were part of what allowed Russia's economy to expand[195]. However, Russia does not show any signs on expediting these developments through any unified measures. However major sectors with eco-innovation advancement have established plans and programs that allow an environmental friendly approach. Especially energy[196], transportation[197] and water resource[198] field programs were operated.

[191] the Concept of transition of the Russian Federation towards sustainable development1996, the Concept of the Long-Term Socio-Economic Development of the Russian Federation for the period up to 2020,2008
[192] Energy of Russia(1998-2005), The Energy Strategy of Russia for the period up to 2030
[193] the Transport Strategy of the Russian Federation for the period up to 2030, 2008
[194] the Water Strategy of the Russian Federation for the period up to 2020, 2009, the Strategy in the field of Hydrometeorology and Related Areas for the period to 2030 (including aspects of climate change) 2010
[195] http://english.pravda.ru/russia/economics/23-07-2012/121702-green_technologies-0/
[196] Energy efficiency in the energy sector, national programme "Energy Conservation an d Improving Energy Efficiency for the period up to2020, 2010
[197] High-speed environmentally clean vehicles (until 2005)
[198] the Federal Targeted Program "Development of Water Industry of the Russian Federation in 2012-2020", 2011

Poland

	13,432	38.2 million	4:33:63	0.834 Very high	4.45	4.54	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.42〉 ASEI quantitative analysis of Poland



- Eco-innovation capacity, supporting environment and performance of the Poland are similar with the average sores of the third country group in the economic sector quartile. However, eco-innovation activity score is low.
- Eco-innovation supporting environment and performance of the Poland are similar with the average scores of the third country group in the social sector quartile. However, eco-innovation capacity and activity scores are low.
- Eco-innovation performance of the Poland is similar with the average scores of the third country group in the environmental sector quartile. However, eco-

innovation capacity, supporting environment and activity scores are low.

〈Table 5.83〉 Comparative analysis of TBL quartile for Poland

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Poland	31.23	39.59	7.74	37.38	
Economic	31.67	39.63	20.86	36.78	3
Social	35.30	41.12	19.75	36.80	3
Environmental	36.85	43.57	23.72	38.29	3

- Poland's activity field has a relatively significant low score. The support environment show similar standards to same division countries but the activities are lacking. And considering performance is high, the amount of performance maximization that can be achieved through an increase in activity is quite high. By increasing the relatively lower scored fields of firm sustainable development awareness, major eco-friendly firms' economic influence and expansion of the green market will allow the promotion of eco-innovation activity.

〈Table 5.84〉 Eco-innovation Policy instruments of Poland

National plan and strategy	Sustainability	■ Poland 2020 ■ Sustainable Development of Rural Areas, Agriculture and Fishery Strategy ■ The National Development Strategy (2007-2015) [199]
	Eco-innovation	■ Strategy for Changing Production and Consumption Patterns to Support Durable and Sustainable Development ■ The Strategy-Energy Security and Environment 2020 outlook ■ Transport Development Strategy[200] ■ National Renewable Energy Action Plan ■ Second National Energy Efficiency Action Plan for Poland

[199] National Development Strategy Ministry of regional development
The National Development Strategy, which draft was prepared by the Ministry of Regional Development, was adopted by the Council of Ministers on 29 November 2006. It is a principal strategic document which provides guidelines for other Government and local government strategies and programmes. The NDS determines the goals and identifies major areas that will be the focus of the state's activities. It also sets out priorities of Poland's social and economic development and the conditions that should sustain this development.

[200] European Environmental Agency, (2011), Poland resource efficiency policies
The Transport Development Strategy, which is nearing completion, includes the development of the road, rail, air, marine and inland-water transport in order to modernize it, make it more efficient and more environment-friendly. The strategy includes provisions for economic effectiveness and infrastructure organization improvement through novel technical solutions, ICT, intermodal transport and training professional staff.

		■ A new three-year National Action Plan on sustainable public procurement for 2010-2012 (2010) ■ National Strategy for Management of Water Resources 2030 (2010) ■ Innovativeness and Efficiency of the Economy Strategy (2012-2020)
Programme and actions	National	■ Renewable Energy Source(RES) development ■ Operational Programme Infrastructure and Environment ■ Bank Gospodarstwa Krajowego Energy Efficiency Programme ■ 16 Regional Operational Programmes ■ Energy Policy of Poland until 2030 ■ Long-term program for the promotion of biofuels in 2008-2014 (2007) ■ GEKON programme - To gather various initiatives that support Polish research institutions and companies in developing environmentally-friendly technologies ■ Sustainable Production through Innovation in Small and Mediumsized Enterprises in the Baltic Sea Region,SPIN. ■ National Environmental Policy (2009-2012) and its 2016 Outlook ■ The 2014 National Waste Management Plan ■ Assumptions to the National Development Programme for Lowcarbon Economy ■ National Programme for the Development of Low-Emission Economy ■ National Progr amme for Municipal Waste Water Treatment (2009) ■ Poland 2030: Development Challenges (2009) ■ The Enterprise Development Programme (PRP) (2011-2020)
	International	
Legislation		
Finance		■ National Fund for Environmental Protection and Water Management ■ Green Investments Scheme
Information		■ 15 clusters 8 technology platforms functioning in Poland strongly involved in developing environmentally-friendly solutions, including eco-innovations ■ Swiss-Polish Cooperation Programme

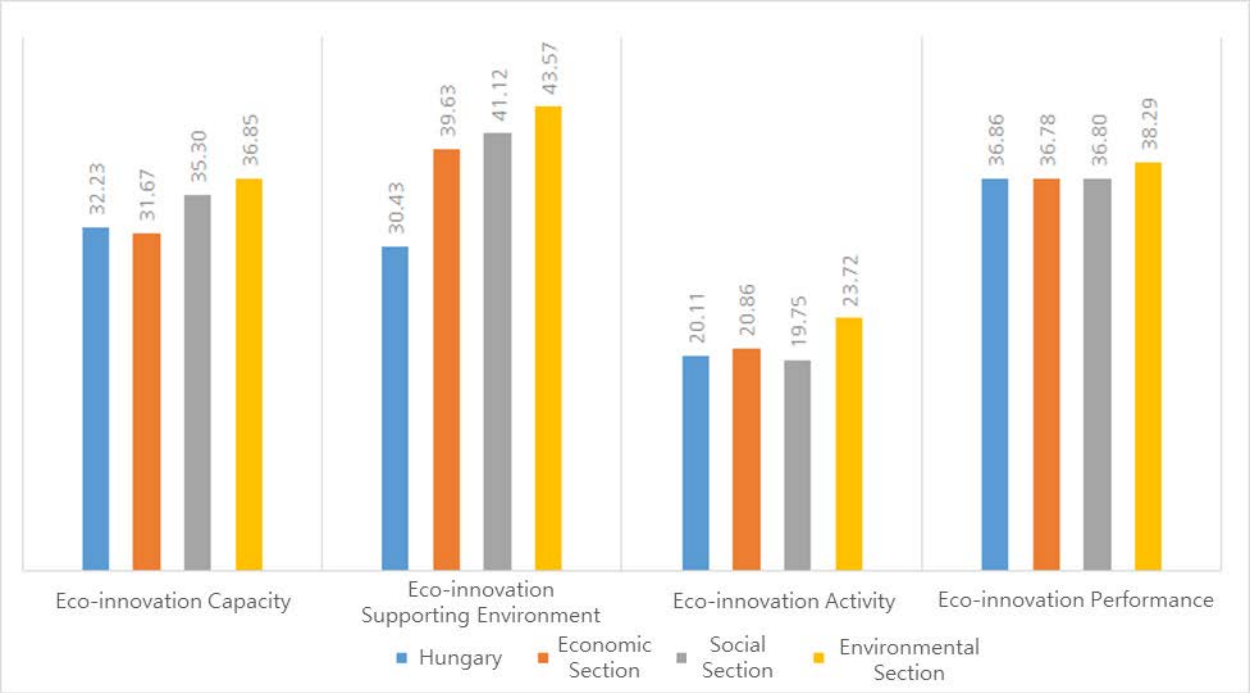
Poland's major national strategies and local development strategies include eco-innovation policies. Poland's eco-innovation driving force is considered to be the high prices of energy. The low price of alternative energy and reduction of material prices can motivate eco-innovation advancement. Also increasing prestige and pride through local eco-innovation improvements and corporation modernization are also considered to be Poland's eco-innovation driving factor. On the other hand, Poland's economy's overall low innovation is hindering eco-innovation. Poland corporations also directly face issues

of its natural economic qualities (EIO, 2013n). Poland 2030: Development Challenges mentions energy efficiency, renewable energy and clean energy fields as important subjects of eco-innovation.

Hungary

	12,560	10 million	3:28:69	0.818 Very high	4.34	4.40	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.43〉 ASEI quantitative analysis of Hungary



- Eco-innovation capacity, activity and performance of the Hungary are similar with the average sores of the third country group in the economic sector quartile. However, eco-innovation supporting environment score is low.
- Eco-innovation activity and performance of the Hungary are similar with the average scores of the third country group in the social sector quartile. However, eco-innovation capacity and supporting environment scores are low.
- Eco-innovation performance of the Hungary is similar with the average scores of the third country group in the environmental sector quartile. However, eco-

innovation capacity, supporting environment and activity scores are low.

〈Table 5.85〉 Comparative analysis of TBL quartile for Hungary

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Hungary	32.23	30.43	20.11	36.86	
Economic	31.67	39.63	20.86	36.78	3
Social	35.30	41.12	19.75	36.80	3
Environmental	36.85	43.57	23.72	38.29	3

- Hungary has low scores in eco-innovation capacity and support environment, the basic stage of eco-innovation. East Europe countries share the pattern of lacking basic stages and rela-tively high activity and result fields show that the globalizing international market environ-ment allows private fields to voluntarily adapt to market trends and independently overcome the lacking basic stage. With a stronger basic stage, activities and performance can be maxim-ized to allow further big developments.

〈Table 5.86〉 Eco-innovation Policy instruments of Hungary

National plan and strategy	Sustainability	■ Economy Development Operational Programme (New Hungary Development Plan) ■ Nationa Biodiversity Strategy and Action Plan ■ National Rural Development Strategy ■ National Sustainable Development Strategy (NSDS) (2007-2025/2050) ■ New Hungary Development Plan (NSRK, 2007-2013) ■ Energy Strategy until 2030 ■ River Basin Management Plan (RBMP) of Hungary ■ National Spatial Sturcture Plan ■ National Basic Plan for Nature Protection ■ National Spatial Development Concept, National Spatial Structure Plan
	Eco-innovation	■ National Environmental Technology Innovation Strategy (NETIS) 2011-2020 ■ National Energy Strategy 2030 ■ Third National Environmental Action Programme 2009-14 ■ Energy Efficiency Action Plan (EEAP) for Hungary until 20167

Programme and actions	National	■ SME Voucher 2012 ■ Hungarian National Ecolabel ■ National Environment Programme (NEP) 2009-2014 ■ National Reform Programme
	International	
Legislation		■ The Hungarian Climate Change Act (Act LV 2007)
Finance		■ Research and Technology Innovation Fund
Information		■ Joint European Resources for Micro to Medium Enterprises, JEREMIE ■ National Innovation Agency ■ "Innovation Cluster" accreditation

Hungary's 2012 R&D field expenditure was over 301 million Euros. Hungary expended 120 Euros per person yearly for R&D and while this is a quarter of the EU's average it exceeds the average for newly joined EU countries. In 2013 the EU and national funding organizations had a big year of change. Hungary, like other member countries, established plans and tried to find opportunities to increase eco-innovation performance. Out of the Middle Eastern Europe countries, Hungary ranked 3rd place in R&D expenditure. In comparison to 2012, Hungary's overall eco-innovation performance decreased and ranked 23 out of 28 Europe countries. This shows the decrease in funds for eco-innovation as government environment and energy R&D budget and expenditure was decreased. The Hungarian government has established the NETIS 2011-2020 plan[201] in order to make the green economy concept main stream and fulfil the scenario mentioned in the government's national energy strategy 2030[202]. However, it has agreed to Russia's financial package of building 2 new nuclear reactors at the Parks nuclear plant without social agreement procedures. After 2011, no wind energy investments were done making the 2011 wind energy production standard to 239MW (Hungary plans to reach 7-800MW of wind energy production by 2020). Even with green industry activity and policies and strategies, environmental problems are increasing. 133 million Euro was drawn to support the Hungarian economic growth by the Norwegian Grand and EEA from 2009-2014. 79

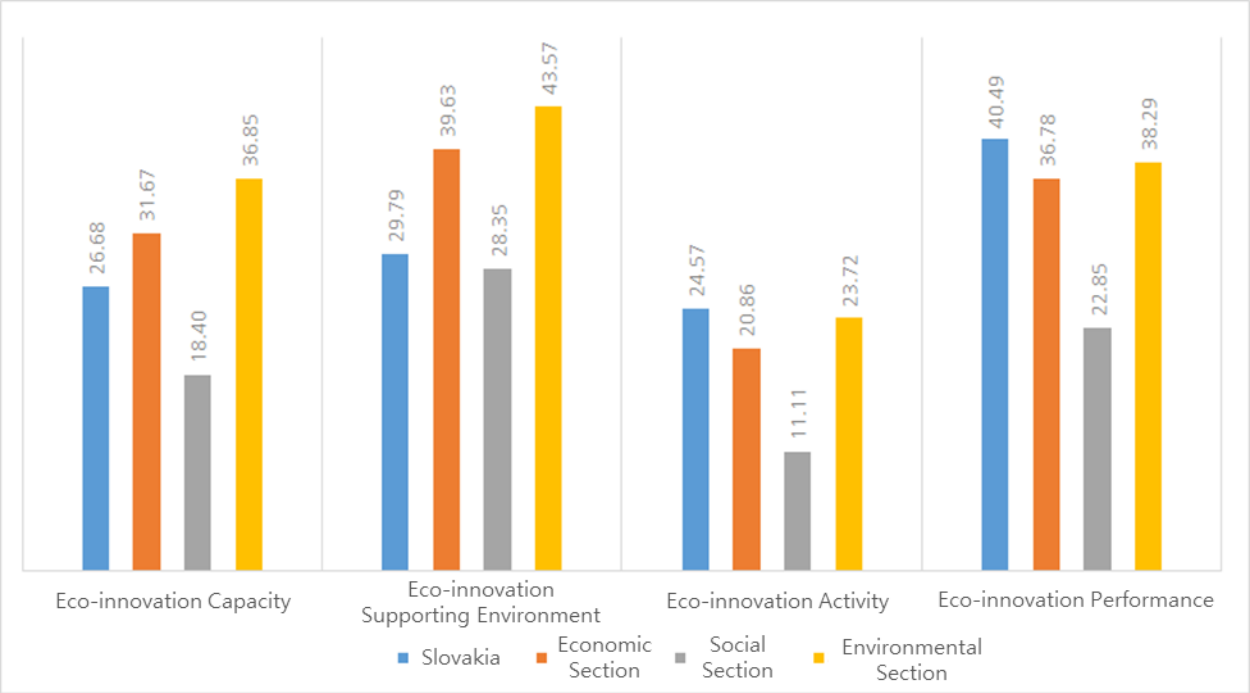
[201] National Environmental Technology Innovation Strategy 2011-2020
[202] National Energy Strategy 2030

million Euros were assigned to environment programs (green industry innovation, dual direction research development, energy efficiency, renewable energy utilization, climate change adaptation). Hungary is behind in renewable energy utilization out of the Western Europe countries and has low building energy efficiency. Geothermal power shows great potential for Hungary's energy production but its utilization is weak so far (EIO, 2013h).

Slovakia

	16,893	5.5 million	3:30:47	0.830 Very high	4.21	4.45	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.44〉 ASEI quantitative analysis of Slovakia



- Eco-innovation activity and performance of the Slovakia are similar with the average score of the third country group in the economic sector quartile. However, eco-innovation capacity and supporting environment scores are low.
- Eco-innovation capacity, supporting environment, activity and performance of the Slovakia are higher than the average score of the fourth country group in the social sector quartile.
- Eco-innovation capacity, supporting environment, activity and performance of the Slovakia are similar with the average score of the third country group in the

environmental sector quartile.

<Table 5.87> Comparative analysis of TBL quartile for Slovakia

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Slovakia	26.68	29.79	24.57	40.49	
Economic	31.67	39.63	20.86	36.78	3
Social	18.40	28.35	11.11	22.85	4
Environmental	36.85	43.57	23.72	38.29	3

■ Slovakia in comparison with 3rd division countries shows low scores in the capacity, support environment. Even with relatively lower standards of capacity and supporting environment pri-vate field oriented eco-innovation activities showed superiority and performances were also high showing the effect of the market's independent movement towards achieving eco-innovation without government interference. The inspection of the basic stage is necessary in order to back up voluntary private fields' eco-innovation activities and maximize performance.

〈Table 5.88〉 Eco-innovation Policy instruments of Slovakia

National plan and strategy	Sustainability	■ The Slovak Republic Strategy for Sustainable Development 2001 ■ Development Strategy of the Slovak Society 2030 ■ The Energy Policy (2006) ■ The Slovak Republic Action Plan for Sustainable Development for the years 2005-2010
	Eco-innovation	■ Research and Innovation Strategy for Smart Specialisation of the Slovak Republic (RIS3) 2013 ■ The Concept of Using Renewable Energy Sources (RES) 2003 ■ Strategy for a Higher Utilization of Renewable Energy Sources in the Slovak Republic 2007 ■ Energy Efficiency Action Plan for 2011 - 2013 ■ National Renewable Energy Action Plan 2020 ■ The Action Plan for Renewable Energy Sources 2002-2012, 2002 ■ The Biomass Action Plan for 2008 - 2013 (2008) ■ Strategy of the energy efficiency in buildings until 2010 without look up to 2020 ■ Strategy of the state housing policy until 2015 ■ Roadmap for implementation of the Environmental Technologies

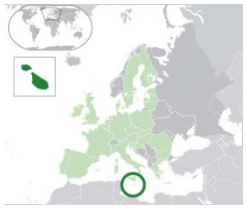
		Action Plan (ETAPII)inSlovakrepublic(2008) ■ National action plan for green public procurement for the years 2007 - 2010
Programme and actions	National	■ National Reform Programme for 2011-2014 ■ National Business Award for the Environment ■ The Ministry of Economy Award "Innovative Action of the Year" ■ Slovak organization for R&D activities (SOVVA)'s help ■ National Program for development of biofuels (2005) ■ Operational Programme Transport 2007-2013(2007) ■ Waste management Programme for 2006-2010 ■ National Forest Programme of the Slovak Republic ■ Slovak Investment and Trade Development Agency (SARIO)'s support
	International	-
Legislation		-
Finance		-
Information		■ River Basin Management Plan of the Slovak Republic (Danube River Basin District and Vistula River Basin District) ■ National action plan for green public procurement for the years 2007 - 2010

Slovakia has relatively high scores in numbers of ISO 14001 registration agencies and material productivity. However, it doesn't have a focusable eco-innovation sector or market. A brighter field seems to be in new renewable energy division and energy efficiency in constructions. Slovakia's natural conditions are fit for water power generation and bio mass development. Appropriate resources for bio mass are found within forests. National eco-innovation has been facing difficult tasks such as waste management, traffic infrastructure reconstruction/modernization, and energy frugality in construction. Slovakia has been pressing national policies that are in line with eco-innovation. The parliament has passed new policies related to waste management, and the government has passed it; thus strengthening their environmental laws. In 2013, the government has announced a research innovation strategy[203] and has set a basic strategy for research and innovation support. However, eco-innovation has leaned towards energy saving and new renewable energy. Execution of programs in financial support has been spread out

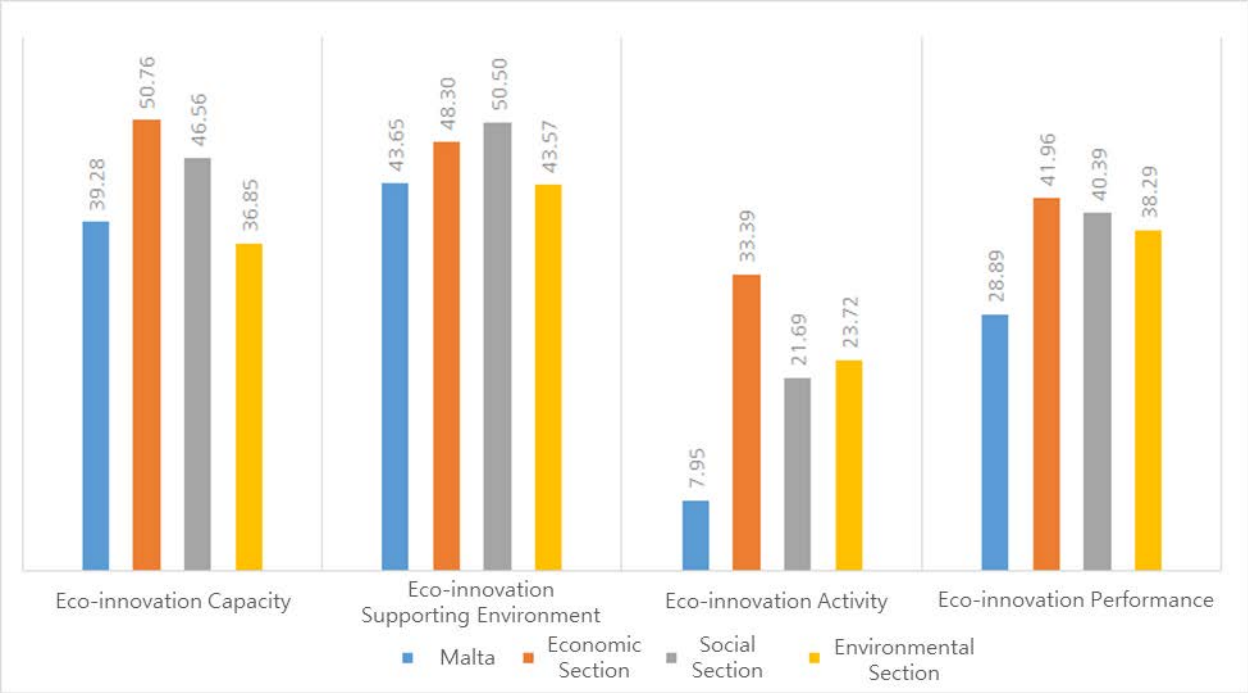
[203] Research and Innovation Strategy for Smart Specialisation (RIS3 SK)

through the help and reliance in the EU Structural Fund. Due to high turnover rates in civil servants, the administrator is not easy with handling work related to EU's funds (EIO,2013p).

Malta

	20,839	0.4 million	1:25:74	0.829 Very high	-	-	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.45〉 ASEI quantitative analysis of Malta



- Eco-innovation capacity, activity, supporting environment and performance of the Malta are lower than the average sores of the second country group in the economic sector quartile.
- Eco-innovation capacity, activity, supporting environment and performance of the Malta are lower than the average scores of the second country group in the social sector quartile.
- Eco-innovation capacity and supporting environment of the Malta are higher than the average scores of the third country group in the environmental sector quartile.

However, eco-innovation activity and performance scores are low.

<Table 5.89> Comparative analysis of TBL quartile for Malta

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Malta	39.28	43.65	7.95	28.89	
Economic	50.76	48.30	33.39	41.96	2
Social	46.56	50.50	21.69	40.39	2
Environmental	36.85	43.57	23.72	38.29	3

■ Malta in comparison with the 2nd division countries shows comparatively low scores in support environment field, but since it has the least difference out of all the fields, it shows comparative advantage in support environment. However, unlike the score difference for support environments, the other feilds show that it falls very short of other countries. Although they are progressing eco-innovation support compared to its competence levels, the fact that its activities and outcomes are not high proves that eco-innovation cannot be strengthened just with supporting environments. It seems that the overall competence of the nation, action in the private sec-tor, and the will for sustainable development alongside with the supporting environment must show harmony.

〈Table 5.90〉 Eco-innovation Policy instruments of Malta

National plan and strategy	Sustainability	■ A Sustainable Development Strategy 2006 ■ A SUSTAINABLE DEVELOPMENT STRATEGY FOR THE MALTESE ISLANDS 2007-2016
	Eco-innovation	■ draft National Strategic Plan for Research & Innovation (2011-2020) ■ The first integrated National Environmental Policy (2012)
Programme and actions	National	■ ERDF Environment Actions ■ The Green Public Procurement (GPP) Action Plan ■ The ERDF Innovation Actions Grant Scheme for the Environment the roof thermal insulation scheme (2012) ■ photovoltaic panels scheme (2013) ■ 'Plug-in Vehicles' scheme (2012) ■ DemoEV: Demonstrating the feasibility of electric vehicles towards climate change mitigation project FERTILANDIA ■ Deep-offshore wind (DOW)

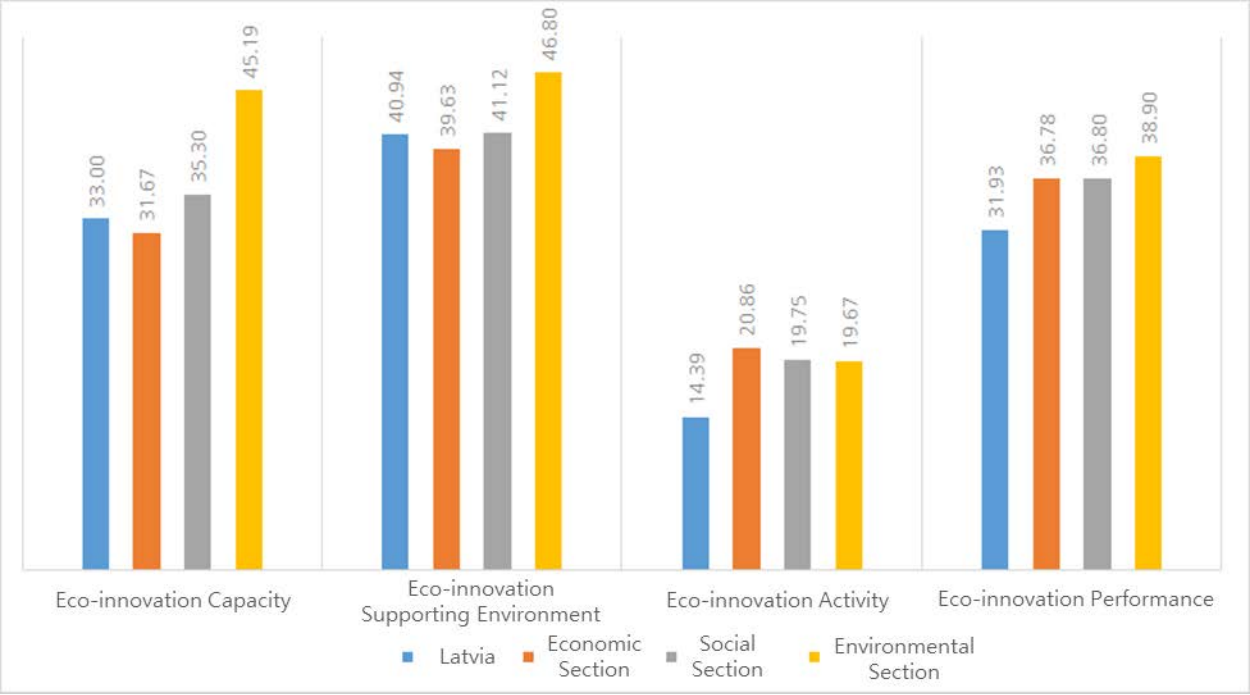
		■ The collaborative R&D Grant Scheme ■ ERDF Research and Development Grant Scheme ■ Training Aid Framework financial assistance ■ The Technician Apprenticeship Scheme (TAS) ■ An Environment Protection Act (2001)
	International	
Legislation		-
Finance		-
Information		■ EuroMedITI (The Euro-Mediterranean Initiative for Technology and Innovation)

Although Malta didn't create a market, it created the Smart-grid nation formation plan for the first time in the nation. The green tourism business especially has been developing fast. Malta has been proceeding with ECO-Certification that certifies the cultural sustainable development, environment, and the competitive society, in the hotels within Malta. Gozo, the second biggest island within the Malta islands, will become an eco-island by 2020. Malta's benevolence for eco-innovation is rich in natural resources in the field of new renewable energy and biological diversity. Especially within the field of solar energy. Related to innovation capability, Malta has been raising its investment in R&D, and has been proceeding with policies that creates researchers and raises employment rates of researchers. Each parts of the governments has been providing financial incentives and accounting support in order to support innovation that includes eco-innovation. On the other hand, a barrier might include SMCs that is overrunning the economic structure which limits the possibilities for innovation. The intimate structure of Malta's market size is very small, and it is very difficult to grow a corporation by focusing on simply local personal consumers/corporations. Malta is one of the slowest growing country in the financial market within Europe eco-innovation.

Latvia

	13,947	2.1 million	5:26:69	0.810 Very high	4.67	4.92	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.46〉 ASEI quantitative analysis of Latvia



- Eco-innovation capacity and supporting environment of the Latvia are similar with the average sores of the third country group in the economic sector quartile. However, eco-innovation activity and performance scores are low.
- Eco-innovation capacity and supporting environment of the Latvia are similar with the average scores of the third country group in the social sector quartile. However, eco-innovation activity and performance scores are low.
- Eco-innovation capacity, activity, performance and supporting environment of the Latvia are lower than the average scores of the second country group in the

environmental sector quartile.

〈Table 5.91〉 Comparative analysis of TBL quartile for Latvia

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Latvia	33.00	40.94	14.39	31.93	
Economic	31.67	39.63	20.86	36.78	3
Social	35.30	41.12	19.75	36.80	3
Environmental	45.19	46.80	19.67	38.90	2

- Latvia showed its weaknesses in the activity and performance sector in comparison with 3rd division countries in the economic and social sectors. The capacity and support environment is a similar standard with same division countries but the lack of activity and performance indicates that the private sector's advancement activities and the actual driving force to lead to sustainable development is not that high. With capacity and support environment as the basis, actual activity towards encouraging related personnel advancement and adaptation is needed.

〈Table 5.92〉 Eco-innovation Policy instruments of Latvia

National plan and strategy	Sustainability	■ the National Development Plan 2014-2020 ■ Latvian Sustainable Development Strategy of Latvia until 2030 ■ Environmental Policy Strategy 2009-2015 (MEPRD) ■ Strategic development plan for Latvia 2010 -2013
	Eco-innovation	■ Transport Development Strategy (Ministry of Transport) 2007 - 2013 ■ Strategy for Energy Development 2007-2016 (Ministry of Economy) ■ Strategy for Renewable Energy Consumption 2006-2013 ■ Electromobility Development Plan 2014-2016 ■ Draft Action Plan for Government Declaration Implementation ■ Latvian First Energy Efficiency Action Plan 2008-2010 ■ National Waste Management Plan 2006-2012 (MEPRD) ■ Development plan for Forests and forest based industries development (Ministry of Agriculture)
Programme and actions	National	■ Programme support for green technology development (2014-2017) ■ Export Guarantees and Credit Guarantee Scheme

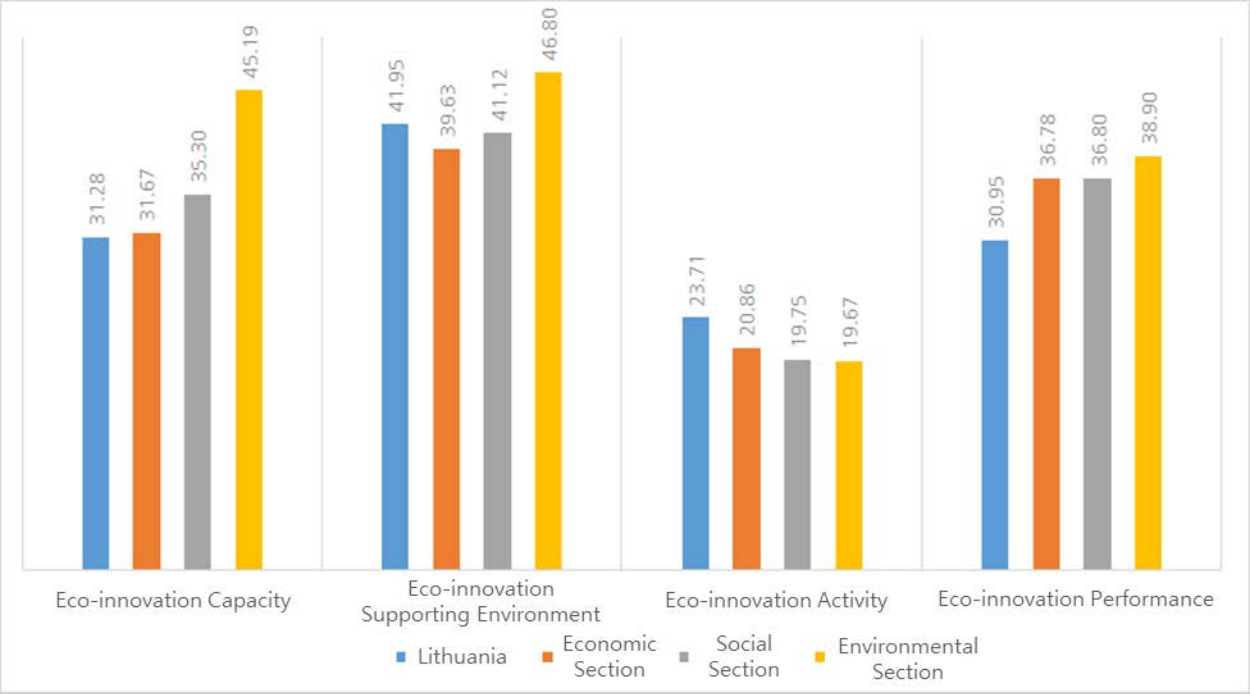
		■ State Research Programmes 2010-2013 (renewed 2014-2020) ■ Practical Application Research Projects (2011-2013) ■ Programme Innovation in the area of Green Technologies fundedby Norwegian Financial Mechanism (2009-2014) ■ Market Oriented Research Projects (2012-2013) ■ Development of Research Base Infrastructure and Commercial Research Infrastructure (2011-2013) ■ Motivation Programme for entrepreneurship and innovation (2009-2014) ■ Competence Centre Programme (2011-2015) ■ Cluster Programme (2012-2015) ■ Green Technology Transfer Contact Points (2008-2013) ■ Green Holidays - certificate for vacation properties for eco-travel development ■ Green Spoon - label for food quality and its ecological origin ■ Green Public Procurement (since 2004) ■ Campaigns on energy efficiency of housing stock and the use of renewable energy sources ■ Climate Change Mitigation Program 2005-2010 (MEPRD) ■ programme of promotion of commercial environment of entrepreneurship 2007 - 2013 ■ Programme for promotion of implementation of Innovative technologies
	International	-
Legislation		-
Finance		■ Green Investment scheme(GIS)
Information		-

Latvia lacks the effort towards eco-innovation research and innovation. There are no specific goals set for eco-innovation and environment technology firms are rare with social awareness of green growth potential being low. However Latvia has set a 2020 goal of renewable energy development and energy efficiency and is trying to support eco-innovation through national funding programs. Especially with over half of Latvia's land being composed of natural eco-environments Latvia has high appeal as an eco-tourist area (EIO, 2013j).

Lithuania

	14,172	3 million	4:28:68	0.834 Very high	4.68	4.85	
Flag	per capita GDP	Population	Industry structure (1:2:3)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.47〉 ASEI quantitative analysis of Lithuania



- Eco-innovation capacity, activity and supporting environment of the Lithuania are similar with the average sores of the third country group in the economic sector quartile. However, eco-innovation performance score is low.
- Eco-innovation supporting environment and activity of the Lithuania are similar with the average scores of the third country group in the social sector quartile. However, eco-innovation capacity and performance scores are low.
- Eco-innovation activity of the Lithuania are higher than the average scores of the second country group in the environmental sector quartile. However, eco-innovation

capacity, supporting environment and performance scores are low.

〈Table 5.93〉 Comparative analysis of TBL quartile for Lithuania

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Lithuania	31.28	41.95	23.71	30.95	
Economic	31.67	39.63	20.86	36.78	3
Social	35.30	41.12	19.75	36.80	3
Environmental	45.19	46.80	19.67	38.90	2

- Lithuania has a relatively weak capacity sector, the driving force behind eco-innovation, but the private sector oriented eco-innovation activity sector had slightly high scores with its high environmental management participation rate. However eco-innovation performance showed weak scores in comparison to the activity rate making it necessary to find a solution in order to maximize the effects of eco-innovation activities.

〈Table 5.94〉 Eco-innovation Policy instruments of Lithuania

National plan and strategy	Sustainability	-
	Eco-innovation	■ Lithuanian innovation development programme 2014-2020 (in the beginning of 2014) ■ National strategy for the development of renewable energy sources (2010) ■ Baltic sea environmental protection strategy(2010) ■ National strategy for the implementation of the United Nations Framework Convention on Climate Change(UNFCCC) (2009) ■ Drinking water supply and wastewater management development strategy for 2008-2015 (2008, 2009) ■ National energy strategy (2007) ■ Lithuanian national strategy for sustainable development (2003, 2009r) ■ National environmental protectional strategy (1996). ■ Long-term development strategy of the state (2002) ■ National strategy for the development of renewable energy sources (2010) ■ National housing strategy ■ Lithuanian forestry policy and its implementation strategy (2002) ■ Lithuania 2030

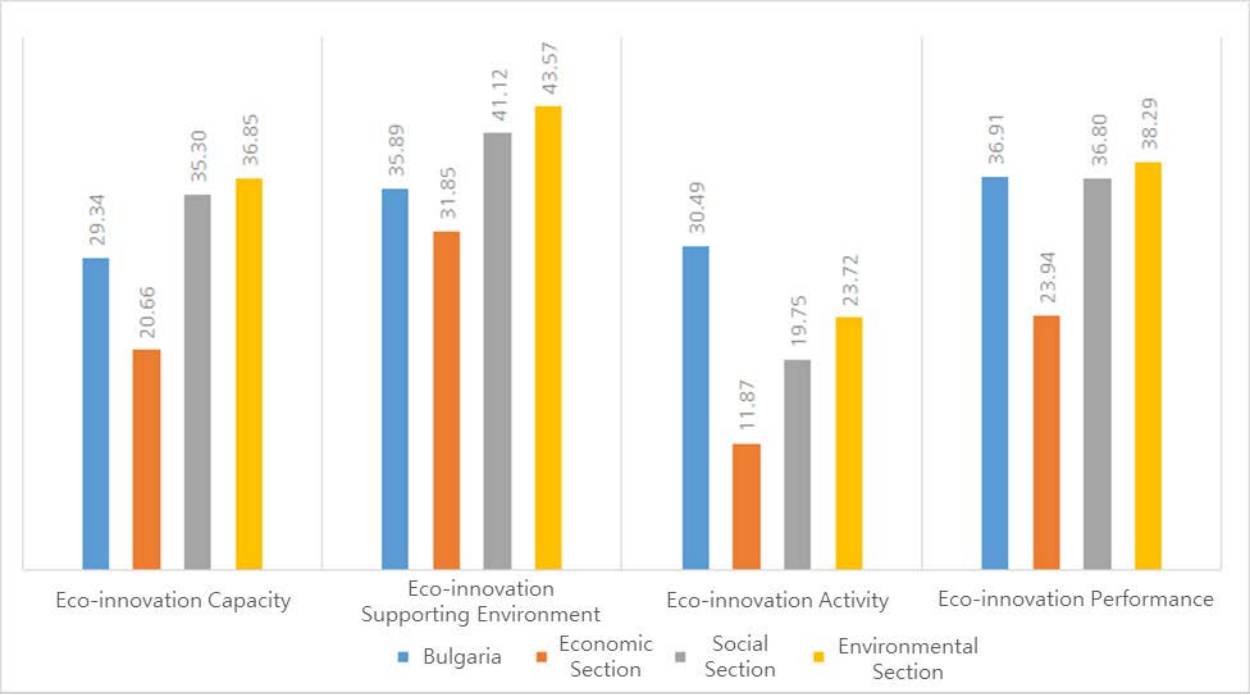
		■ Energy efficiency action plan (2007) - ■ Action plan 2010-2015 for the strategy for the baltic marine environment protection (2010) ■ National strategic waste management plan 2007-2013(2007)
Programme and actions	National	■ Green industry innovation programme (2012) ■ Industrial Biotechnology Development Programme (2011) ■ Affirmation of the Priority Trends of R&D(2007) ■ National Programme for Implementation of Green Public Procurement (2010) ■ Natural Resources Protection and Sustainability Program (2007) ■ National reform programme ■ The programme for modernization of multi-apartment buildings (2004, a2009) ■ National strategic waste management plan 2007-2013 (2007), ■ Biological diversity preservation and protected ares planning and management program for 2007-2013(2007,a2010) ■ Programme of the Lithuanian fisheries sector 2007-2013 (2007, a2008) ■ Plant genetic resources preservation programme (2007) ■ National Green Procurement Implementation 2007
	International	-
Legislation		■ Law on Energy from Renewable Sources (2011, a2013) - ■ Law on Biofuel, Biofuelsfor Transport and Bio-Oils(2009)
Finance		-
Information		-

Lithuania has increased R&D funding in the fields of landfill pollution materials, resource energy efficiency, renewable energy promotion, water resource protection and bio technology. Activities of electric transportation and parts, waste management and renewable energy resource utilization are in progress. Lithuania lacks the policy measures for promoting eco-innovation and lack general understanding of eco-innovation and cooperation between corporations and academics. However, the financial support is satisfactory, and human resources and infrastructures are well established. Various innovation policy programs are in progress and multiple organizations are partaking in them. Various plans, strategies, and regulations in order to promote innovation such as renewable energy utilization increase, pollution control and water resource management are enacted. However, no new policies in order to promote innovation since 2011 have been developed (EIO 2013k).

Bulgaria

	7,296	7.2 million	7:30:63	0.777 High	4.32	4.18	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.48〉 ASEI quantitative analysis of Bulgaria



- Eco-innovation supporting environment of the Bulgaria is similar with the average sores of the fourth country group in the economic sector quartile. However, eco-innovation capacity, activity and performance scores are low.
- Eco-innovation activity and performance of the Bulgaria are similar or higher than the average score of the third country group in the social sector quartile. However, eco-innovation capacity and supporting environment scores are low.
- Eco-innovation activity and performance of the Bulgaria are similar with the average score of the third country group in the environmental sector quartile.

However, eco-innovation capacity and supporting environment scores are low.

〈Table 5.95〉 Comparative analysis of TBL quartile for Bulgaria

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Bulgaria	29.34	35.89	30.49	36.91	
Economic	20.66	31.85	11.87	23.94	4
Social	35.30	41.12	19.75	36.80	3
Environmental	36.85	43.57	23.72	38.29	3

- Bulgaria has low scores in the firm sustainable development related fields of capacity and support environment in comparison to third division economic, social, and environment sector countries' average scores. Bulgaria can be seen as a typical country lacking basic stages for eco innovation vitalization. Normally, the private sector maintains a standard of eco innovation activities separate from the national atmosphere in order to follow international market trends. Stronger eco innovation activities and performance in order to maximize their effect through the Bulgarian government's capacity increase and support policies are quite necessary.

〈Table 5.96〉 Eco-innovation Policy instruments of Bulgaria

National plan and strategy	Sustainability	■ National strategy for development of research 2020 ■ National Environmental Strategy 2009-2018 ■ Bulgarian National Energy Plan ■ National Strategy for Biodiversity Protection ■ National Strategic Reference Framework, 2007-2013 ■ The Energy Strategy of the Republic of Bulgaria till 2020 ■ 2007 Project on Sustainable Development Strategy of the Republic of Bulgaria
	Eco-innovation	■ Innovative Strategy for Smart Specialization of the Republic of Bulgaria 2014-2020 ■ Second National Action Plan for Energy Efficiency (SNAPEE) (2011-2016) ■ National Plan for Biodiversity Protection 2005-2010 ■ National Action Plan for the Promotion of Green Public Procurement for the Period until 2014

Programme and actions	National	■ Ordinance for Mandatory Use of Recycled Materials in Public Construction Projects 2014 ■ Operational Program "Innovations and Competitiveness 2014 - 2020" ■ BG 10 “Green Industry Innovation" ■ National Long-term Program to Encourage the Use of Bio fuels in the Transport Sector 2008-2020 ■ National Long-term Program to Encourage the Use of Biomass 2008-2020 ■ “Career Start” Program ■ National Program for Action on Environment and Health, 2008-2013 ■ National action program for sustainable land management and combat against desertification in Bulgaria 2007-2013 ■ National program for waste management activities 2009-2013 ■ National Reform Program2010-2013
	International	-
Legislation		■ Law on Employment Promotion (National Action Plan for Employment 2014)
Finance		■ The National Innovation Fund's (NIF) ■ National Green Investment Scheme of the National Trust Eco Fund
Information		■ ISPA Programme/CF ■ Bulgarian-Swiss Research Programme ■ Bulgarian-Swiss Cooperation Programme ■ Norwegian Cooperatino Programme ■ European Territorial Cooperation Programs ■ Project"Bulgarian-SerbianInnovativeTeachingNetwork" ■ BiodivERsA21
Sector		-

Bulgaria’s biggest difficulties in ecology innovation is energy security assurance and going against climate change. High energy efficiency achievement, energy conservation increase, renewable energy source development is needed. Also Bulgaria is facing social, economic, and environmental problems due to a financial and economic crisis, poverty, high unemployment rates and a less than suitable environment. Bulgaria has put in effort to improve national organizations’ legislation structures in the past few years for eco-innovation but they are still behind. In 2013, Bulgaria recorded the lowest eco-innovation rank out of the EU member countries. Looking at Bulgaria’s eco-innovation performance, the national innovation system is imbalanced and while there are numerous scientists and engineers, government and investor support is low. The firms, public organizations and

educational organizations production implementation and investment incentives for green products and services have been increasing in demand. To further greenification and increase energy efficiency, local related personnel provided below market rate credit and credit guarantees from the energy efficiency and renewable energy funds[204]. While Bulgaria has economic, technological, environmental, bureaucratic, and socio-cultural hindrances in achieving eco-innovation, the past few years of regulation policies and political support structure and procurement of skilled works and knowledge and new market demand contributed towards eco-innovation vitalization. Bulgaria has established various eco-innovation policies and funding plans in 2013.[205]

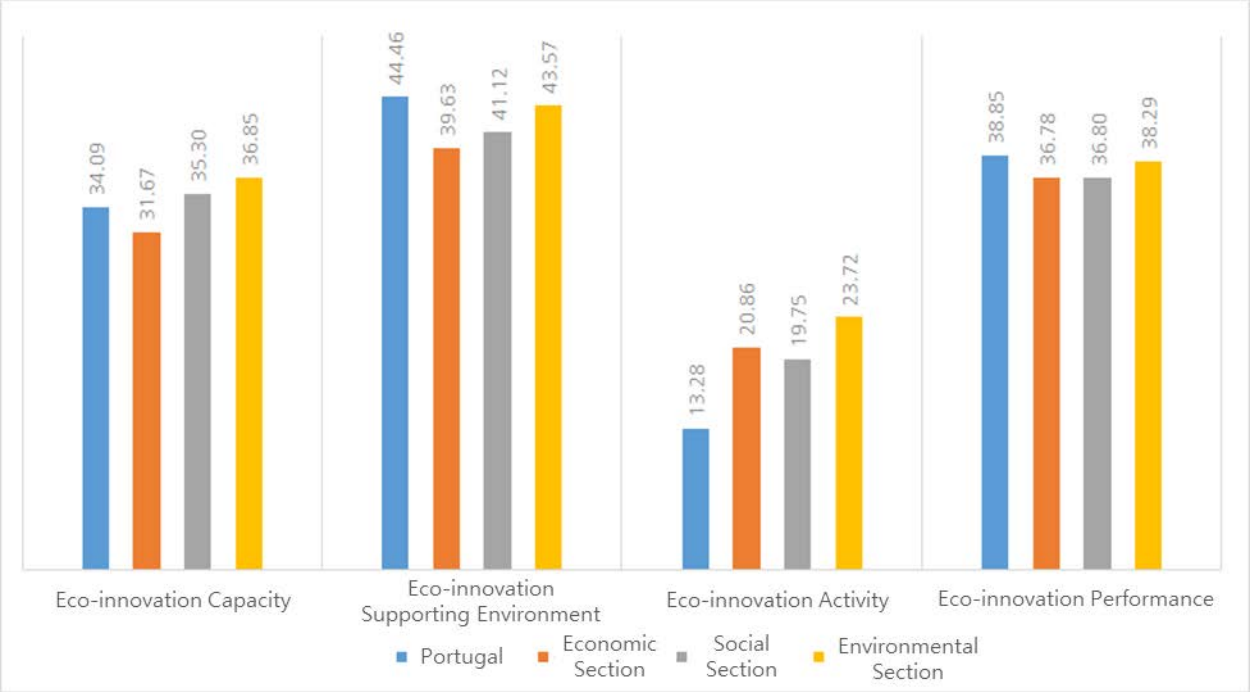
[204] Energy Efficiency and Renewable Sources Fund

[205] Innovation Strategy for Smart Specialization of Republic of Bulgaria 2014-2020, National Action Plan for the Promotion of Green Public Procurement until 2014, Law on Employment Promotion, Ordinance for Mandatory use of Recycled Materials in Public Construction projects from 2014, Operational Programme "Innovations and competitiveness 2014-2020", the Energy Efficiency and Green Economy Programme.

Portugal

	21,029	10.6 million	3:22:75	0.822 Very high	4.65	4.41	
Flag	per capita GDP	Population	Industry structure (1st:2nd:3rd)	HDI	Sustainable social index	Sustainable env. index	Geographic location

〈Figure 5.49〉 ASEI quantitative analysis of Portugal



- Eco-innovation capacity, supporting environment and performance of the Portugal are similar with the average score of the third country group in the economic sector quartile. However, eco-innovation activity score is low.
- Eco-innovation capacity, supporting environment and performance of the Portugal are similar with the average score of the third country group in the social sector quartile. However, eco-innovation activity score is low.
- Eco-innovation capacity, supporting environment and performance of the Portugal are similar with the average score of the third country group in the

environmental sector quartile. However, eco-innovation activity score is low.

〈Table 5.97〉 Comparative analysis of TBL quartile for Portugal

Country	Eco-innovation Capacity	Eco-innovation Supporting Environment	Eco-innovation Activity	Eco-innovation Performance	Quartile
Portugal	34.09	44.46	13.28	38.85	
Economic	31.67	39.63	20.86	36.78	3
Social	35.30	41.12	19.75	36.80	3
Environmental	36.85	43.57	23.72	38.29	3

- Portugal in comparison to 3rd division countries has earned similar scores in the field of capacity, support environment and performance but activity scores followed the low scores of economic influence of environmental firms. The national awareness and various environment to-wards achieving eco-innovation are established but the private sector's advancement enthusiasm is slightly lacking. Actual market activity to create an atmosphere of eco-innovation manifestation is essential.

〈Table 5.98〉 Eco-innovation Policy instruments of Portugal

National plan and strategy	Sustainability	■ General framework on environment ■ National Sustainable Development Strategy (ends 2015)
	Eco-innovation	■ National Energy Strategy(ENE 2020) ■ New National Energy Efficiency Action Plan (2008) ■ National renewable energy action plan (PNAER) ■ Strategic Plan for Municipal Waste (PERSU II) ■ The Waste Management National Plan ■ The Strategic Plan for water supply and Wastewater Treatment (PEAASAR 2007-2013) ■ National Plan for Industrial Waste Prevention (PNAPRI) ■ Strategic Plan for Industrial Waste Management (PESGRI) ■ The Environmental Technologies Action Plan ■ The national Green public procurement action plan (NAP)
Programme and actions	National	■ The National Climate Change Programme (2006) ■ Ecodesign for energy related products (Decree-Law No.12/2011) ■ Thematic operational programme for territory valuing (2007-2013) ■ The MIT Portugal Programme - to aim to enhance the sustainability of social activity as well as the

		natural and built environments ■ The Portuguese National Programme for the Efficient Use of Water - Set the targets to be achieved in ten years' time (until 2015)
	International	-
Legislation		■ Integrated pollution prevention and control (IPPC) (2008)
Finance		■ COMPETE[206](2014~2020) ■ The Energy Efficiency Fund ■ The Portuguese Carbon Fund ■ The Innovation Support Fund
Information		■ Partnership agreement for the Eco- Innovation - signed between APA, Portuguese Environment Agency and the AdI, Agency for Innovation, in order to promote initiatives integrating innovation and the environment. ■ Info-day eco-innovation ■ The Call on 2011 Projects Eco- Innovation ■ Ecopolis Project ■ MOR(the Organized Waste Market) [207] ■ Brigantia EcoPark - A partnership. Renewable energy and the environment science and technology park ■ Relvao Eco Park[208] ■ The 13th European Forum on Eco- Innovation- Developing new markets for eco-innovation (Nov 2012) ■ LNEG(National Laboratory for Energy and Geology, Portugal)

Portugal has established a sustainable strategy[209] and energy plan[210]. Specific strategies for city waste, waste management, water and sewage supply and treatment, industrial waste prevention and industrial waste management have been established as part of national plans[211]. Also national plans for green technology and green technology public

[206] COMPETE – Programa Operacional de Factores de Competitividade (Operational Program for Competivity Factors), 2014, Press release: Avaliação Intercalar do COMPETE, Resultados e Recomendações (Interim Evaluation of COMPETE, Conclusions and Recommendations). COMPETE, Lisbon. Available at:
http://www.pofc.qren.pt/media/noticias/entity/avaliacaointercalar-do-compete--resultados-e-recomendacoes?fromlist=1

[207] MOR [2011] Portugal_EIO_Eco-innovation in Portugal
An important step in promoting reuse of waste or recovered material as a secondary raw material within the Portuguese economy was taken in 2006 with the creation of the organised waste market (MOR). The MOR is a voluntary system, which promotes exchange of information about waste materials available on the market and facilitates trading of these materials between economic entities. It is envisaged that all categories of waste can be traded on the MOR after being sent for recovery operations

[208] Relvão Eco Park [2011] Portugal_EIO_Eco-innovation in Portugal
Relvão Eco Park (in Chamusca, Santarém): with an area of 1800 hectares, hosts several treatment and reuse of waste facilities, as well as companies that use waste as raw material.

[209] National Sustainable Development Strategy (ends 2015)

[210] National Energy Strategy(ENE 2020), New National Energy Efficiency Action Plan (2008), National renewable energy action plan (PNAER)

[211] Strategic Plan for Municipal Waste (PERSU II), The Waste Management National Plan, The Strategic Plan for water supply and Wastewater Treatment (PEAASAR 2007-2013), National Plan for Industrial Waste Prevention (PNAPRI), Strategic Plan for Industrial Waste Management (PESGRI)

acquirement through eco-innovation have been established[212]. Portugal has financially supported R&D from 2007 to 2013 in order to strongly promote SMEs' eco-innovation. After COMPETE's success, a new financial program from 2014 to 2020 was created (COMPETE, 2014). Conditions for eco-innovation advancement through financial support such as venture capitals[213], R&D funds[214] and tax support[215] are being created and the venture capitals focus on supporting the agriculture and energy, and forest sectors. The SIFIDE program supports corporations hiring R&D firms for' innovative product and service development (ADI, 2013a). If corporations incorporate SIFDE, R&D and development funds are deducted from taxes. This project is planned to be pursued until 2015. Portugal has created an energy policy[216] supporting energy efficiency fund[217] based off of related legislature[218]. The CO_2 fund[219] supports climate change adaptation projects and the innovation support fund has been created through the result of operation licenses[220]. This fund is supporting R&D and innovation (Simões and Godinho, 2011). Portugal is sharing eco-innovation information through means of eco-innovation related personnel partnerships[221], industrial ecological complex[222] and information sharing events[223].

212 The Environmental Technologies Action Plan, The national Green public procurement action plan (NAP)

213 Portugal venture capital (http://www.portugalventures.com): Portugal Ventures was founded in June 2012, as a result of the merger of the three State-backed Venture Capital & Private Equity firms - AICEP Capital Global, InovCapital and Turismo Capital. The firm currently manages circa €600 million in assets.

214 COMPETE

215 SIFIDE

216 National Energy Efficiency Action Plan (NEEAP)

217 The Energy Efficiency Fund

218 Decree-Law no. 50/2010

219 The Portuguese Carbon Fund

220 UNFCCC at: http://www.cdmbazaar.net/repo/buyers/buyer-643470496

221 Partnership agreement for the Eco- Innovation

222 Brigantia EcoPark, Relvao Eco Park

223 The 13th European Forum on Eco- Innovation- Developing new markets for eco-innovation (Nov 2012)

Overall Analysis

After analysis of each country's eco-innovation related policies, each country mostly chose policies with emphasis on the following important innovation fields: energy, waste, transportation, buildings and water management. Most countries chose policy goals of energy efficiency increase and renewable energy development and established related national plans and legislature along with fund establishment and operations.

Japan, UK, Denmark, Finland and Belgium have established national plans and programs, legislature and funds related to eco-innovation and are pro-actively pulling forward with eco-innovation policies. Especially Germany established an eco-innovation market and France attempted a systematic approach to eco-innovation through industrial complex creations and proper usage of economic and regulative measures. Netherlands has provided economic incentives over regulations and are utilizing policies that promote green investment and consumption. On the other hand, New Zealand has executed a waste management policy centered on various regulations and standards. Norway has not established an eco-innovation related national plan but has put forth innovation programs for the green industry. Varying industrial structures and circumstances made each country focusing on different eco-innovation fields. Singapore focused on maritime related green technology, Thailand/Greece/Malta focused on the tourism industry, Mongol on the CO2 gas reducing CDM project, Australia and Bangladesh on climate change responses, Italy on architecture, and eco-innovation focus on waste management for Austria and Czech.

Indonesia, Vietnam, Pakistan, Laos, India and Cambodia are trying to develop green technology through an international cooperation program. Cyprus, Romania, Laos, Russia, Poland, Hungary, Lithuania, and Bulgaria required strengthened eco-innovation policies and Myanmar and Brunei required policy approaches for eco-innovation as they have yet to establish policy goals and measures.

Chapter 6

Business Perspective towards Eco-Innovation

Role of business in Eco-innovation

SMEs can implement eco-innovation and create green jobs. SMEs are an important factor for achieving an emerging green business (OECD, 2010). Eco-innovation can develop a firm's competitiveness. This chapter aims to emphasize the importance of business in promoting and implementing eco-innovation. As mentioned frequently throughout the report, businesses are the key drivers and enablers of eco-innovation. Firms have the capacity to innovate, change and diffuse new concepts, products, processes and technologies bringing far greater impact and opportunities in the future than today. They can manage and enhance resource and material efficiency, important transitional improvement needed for eco-innovative economy and accelerating sustainable development. It can be extrapolated that their impact will be far superior and larger in the future as their innovation activities today is more radical and complex affecting larger parts of the global community. Innovative firms today are accelerating as solution providers of environmental and social challenges and they will determine the success of eco-innovation at the country level in the future. As emphasized in the previous chapter, various national and regional governmental support elevate and ensure businesses to successfully create, diffuse and deliver eco-innovation solutions. Governmental support towards eco-innovation is indispensable and is a major impetus to the domestic firms. Businesses in diverse national contexts may choose different eco-innovation approaches to utilize and maximize a range of beneficial support and opportunities provided by the governments and business environment. The more exploited to government supported policies businesses are, the most likely businesses will find local strengths and understand local dimensions and make most use of local supporting environments. However, regardless of

a government's willingness to promote eco-innovation to firms, it will be subject to the firm's appropriate awareness and resources to implement eco-innovation at a practical level. Early runners of eco-innovation like Sweden and United Kingdom have continuously made efforts to encourage firms to proactively participate in their respective nation's eco-innovation activity. Denmark and France, they have provided comprehensive eco-innovation support friendly policy in the areas of R&D and international trade. Belgium and Finland is known to establish clusters and partnerships to provide a ground to facilitate synergy between various stakeholders in order to create eco-innovation activities. The Progress program in Germany provides financial support and advisory services to SMEs with eco-innovative technology solutions. 'Thousand Enterprises Programme in China and GHG & Energy Target Management Programme' in Korea request firms to participate in national set environmental goals. Denmark, France and Sweden support oversees exports of eco-innovative products and solutions by facilitating partnership with developing countries. Policy direction and strategy focuses vary by country and region, yet there is a general movement that developing countries follow, usually in the footsteps of more developed countries to urge firms to participate in eco-innovation (ASEIC, 2013).

Importance of Small and Medium sized Enterprises (SMEs)

"New and young firms are prone to exploiting technological or commercial opportunities which have been neglected by more established companies often because radical innovations challenge the business models of existing firms... Policy may need to create the room for such new firms by enabling their entry, exit and growth, ensuring fair

competition and improving access to finance which remains a major constraint for the entry and growth of young firms[224]." (OECD, 2012)

The OECD explains there are different levels of innovation. Technological and non-technological innovation leads to incremental, disruptive and radical innovation 94) and then to systemic and transformative eco-innovation. Technological approaches and its applications are known to present more positive and forceful breakthroughs from existing systems and patterns than non-technological approaches. This is why incremental innovation generally refers to non-technological eco-innovation approaches while transformative innovation refers to technological eco-innovation approaches. Synergetic integration of both non-technological and technological approaches to eco-innovation will allow a specific industry to break away from resource intensive growth and towards sustainable development. The OECD states that radical transformative eco-innovations tend to be pioneered by SMEs and, systemic eco-innovation are performed by larger firms. The changing definition of innovation today also implies that small and medium business have equal or more potential to implement eco-innovation compared to large corporations with sufficient resources, sector professionals and strong infrastructure. SMEs are often more flexible to integrate eco-innovation concept into their operation, product development and strategy, thus can be more creative overtime than larger corporations with rigid eco-systems. Many businesses in green technology are small and medium enterprises (SMEs) which can bring radical influence to society and environment. It is expected that more SMEs will challenge many existing eco-innovation related technologies, processes, products and solutions of bigger companies. More recently, there has been an increase in number of SMEs that develop and trade green technology solutions and products which comes under the paradigm of eco-innovation. Many

[224] OECD Green Growth Studies Fostering Innovation for Green Growth Report

national governments are building networking stages for SMEs to stimulate eco-innovation activities as eco-innovations become more developed and commercialized as a result of interactions between innovative firms. More than 99 percent of European Union companies are SMEs and are responsible for over 60 percent of the EU's GDP. 95) In Asia, SMEs account for about 90 percent of businesses and employ about 60 percent of the workforce[225]. Yet, the definition of SMEs varies from country to country which make it hard to define. In both Asia and Europe, SMEs are extensively recognized as key drivers of eco-innovation growth and a key instrument for environmental and social development efforts. SMEs around the world are growing at a faster pace than ever before and are bringing greater impact to domestic markets, affecting wider global society. As a result, SMEs in Europe have been the main target of eco-innovation initiatives and programmes at the national and regional level[226]. SMEs unlike large corporate or MNEs, lack the effort and activities towards developing eco-innovation. Organizations like the OECD, the EU and the ASEIC are working towards promoting opportunities of eco-innovation which can bring global, national and industry levels of participation in developing countries and SMEs. In a recent report by the CIP showed that SMEs implementing eco-innovation create twenty times more profit than normal SMEs and those eco-innovation SMEs are more likely to receive investment, and contribute to job creation and higher profit. More analytical research on the benefits of eco-innovation for developing countries and SMEs is expected to be available in the near future. Belgium's Business Angel Network (BAN), China's Technical Innovation Fund for SMEs and China SME Global Development Forum, France's OSEO and CDC Enterprises, Germany's BMU and the Mikrokreditfonds Deutschland, the Netherland's Dutch SBIR and Doe Mee are representative examples of

[225] Small and Medium Enterprises, Asia-Pacific Economic Cooperation

[226] EIO (2012), Emerging Markets

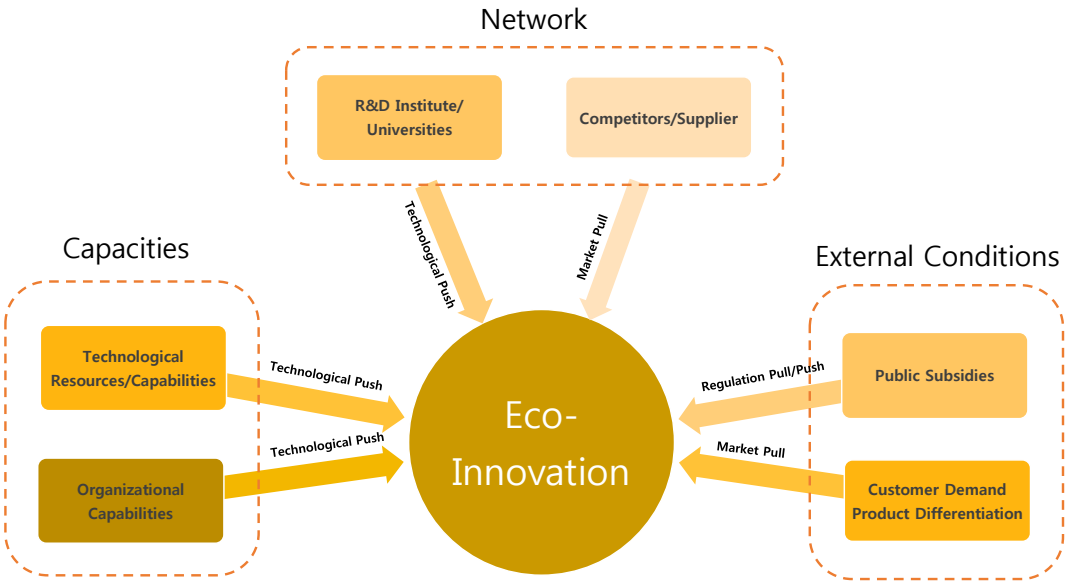
governmental support given to SMEs to facilitate eco-innovation. Networking stages vary by region. In Europe, which has the high level of eco-innovation, R&D activities and innovative trials are strong when centered on clusters and parks. For example, Italy has a tradition of industrial clusters and regional cooperation unions and countries such as Belgium, Czech and Finland each has its own numerous R&D cluster and technology parks where SMEs' innovation and R&D capacity are expanding. Additionally, a variety of networks such as each European country's Cleantech Cluster, France's Club ADEME International and Britain's Carbon Trust are going on to transfer Europe's aggregated eco-innovation capacity to other regions. In case of Asia, many countries are now moving towards promoting technology transfer and financial support from developed countries. Vietnam, Bangladesh, Cambodia, Malaysia, and Philippines are increasingly hosting various kinds of forums and events to increase cooperation with European countries in the area of eco-innovations.

This report introduces the best business case studies that can be categorized more towards radical or transformative eco-innovation. This report does not underestimate the role of large corporations. Rather, this report aims to emphasize the increasing role and potential of SMEs so that this report provides information to SMEs on ways to develop eco-innovation within their scope of business. SMEs face various barriers such as lack of financial support, training and information on eco-innovation or environmental regulation, co-operational groups and human resource to implement eco-innovation. This report calls for governmental support to help SMEs overcome such barriers. The next sub-chapter presents a set of detailed case studies of SMEs that have successfully introduced eco-innovative products, systems and services. We have tried to select cases that can offer a diverse view of different methods SMEs have taken to adopt eco-innovation practice, hoping that it would ultimately validate our view of the importance of SMEs. The next second sub-chapter presents eco-innovation practices that have been implemented by

other stakeholders than firms. This should give a brief introduction on how various stakeholders can participate in eco-innovation at local contexts (ASEIC, 2013).

Several scholars have studies on the determinants of eco-innovation in line with the international effort to implement and diffuse eco-innovation toward sustainable development. Horbach (2008) has classified the determinants; supply side, demand side and environmental policies. It can be presented as technology push, market pull and regulation push/pull. Scope of the eco-innovation policies covers all of the determinants which was classified by (Horbach, 2008).

〈Figure 6.1〉 Eco-innovation Determinants of SMEs



(Source: Horbach(2008);Marina(2014) and own elaborations)

Technological capabilities including knowledge capacities are main determinant of eco-innovation in supply side (Table 3). Oslo manual [6] regards a knowledge as one of a factor for eco-innovation. A firm which cooperate with research institute and university shows active performance in all types of eco-innovation [7]. [8,9] refers monopolistic market structures may help to overcome the appropriation problem, especially for large firms

because they ". . . must fear less imitation from competitors and gain more from scale economies associated with innovations". Today there is a consensus that technology push is particularly important during the initial phase in the life cycle of an innovation such as developing a new product, whereas demand factors such as market pull is more important during the diffusion phase (Rehfeld, 2007; Pavitt, 1984). In the diffusion phase of new (environmental) products the demand from consumers, public procurement, other firms and exports is relevant (Pavitt, 1984). Horbach (2008) argues that positive demand expectations can be a trigger of present innovations. Environmental regulation, which encourage the new technologies to respond, and financial system are identified as external determinants of eco-innovation (Porter and vander Linder, 1995; Kemp, 2007; Kammerer, 2009; Doran and Ryan, 2012). Negative external effects characterizing most environmental problems, environmental innovations are at least less market-driven than other innovations, therefore making environmental policy one of the main drives of environmental innovation. The famous Porter-hypothesis (Porter and van der Linde, 1995) postulates that environmental regulation may lead to a win-win situation so that pollution is reduced and profits are increased. Therefore, environmental regulation may "force" firms to realize economically benign environmental innovation. Furthermore, the encouragement of "soft" environmental measures like environmental accounting systems or eco-audits may improve the information basis for eco-innovation. A second component of the Porter-hypothesis states the assumption that environmental policy may induce early mover advantages for regulated firms, which may lead to higher profits in the future.

〈Table 6.1〉 Determinants of Eco-innovation

Elements	Contents
Supply side	· Technological capabilities (knowledge capacities) · Appropriation problem and market characteristics

Demand side	· (Expected) market demand (demand pull hypothesis) · Social awareness of the need for clean production; environmental consciousness and preference for environmentally friendly products
Institutional and political influences	· Environmental policy (incentive based instruments or regulatory approaches) · Institutional structure: e.g. political opportunities of environmentally oriented groups, organization of information flow, existence of innovation networks

(Source: Horbach (2008) and own elaborations)

Several empirical researches show that implementing the regulation make an opportunities to introduce the new technologies [11]. Eco-friendly life style and quality of life would be enhanced by implementing eco-innovation [12]. In an effort to reduce environmental burden, Dangelico & Pujari (2010) highlighted the environmental effect of eco-innovation. SMEs without R&D face a cost disadvantage in obtaining or developing innovation (difficult to imitate). Therefore, R&D enhances technological capabilities. Many studies fine that R&D improves technological capabilities in environmental technology-oriented firms (Maria, 2014; Horbach, 2008; Rehfeld et al., 2007; Bernauer et al., 2006).

〈Table 6.2〉 SME policies of ASEM member countries

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Australia		■ Renewable Energy Equity Fund (REEF) (1997)	
Austria		■ Mountain Cleantech Fund II ■ ERP SME Program ■ Austrian Research Promotion Agency (FFG	■ Austria Wirtschaftsservice GmbH
Belgium		■ Brussels - Funding for precompetitive development ■ Eco-efficiency Scan programme ■ Brussels Enterprise Agency (BEA)	■ Business Angels Network (BAN) ■ Wallonia/Brussels-Capital ■ Brussels-Capital - BRUSTART ■ Wallonia - FIRST Enterprise spin-out

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Brunei		■ Youth Skills Dev. Program (YSDP) Micro Grant Scheme ■ Village Enterprise Grant Scheme ■ Enterprise Technical Assitance Scheme (ETAS) Grant Scheme ■ Local Enterprise Application Program (LEAP) Grant Scheme (For Innovation) ■ Brunei Research Incentive Scheme (BRIsc) ■ AITI Grant for Development of Local ICT&Digital Media Industries ■ MIPR Standards and Quality Certification Program ■ MIPR Promotion and Marketing Service ■ AITI ICT Competency Program ■ Enterprise Expansion Program (EEP) Loan Scheme ■ MIPR Enterprise Facilitation Scheme (EFS) ■ MIPR Micro-credit Financing Schme (MFS) ■ MIPR Export Refinancing Scheme (ERS) ■ PLEDS CO-Investment Fund ■ Accel-X Venture Capital Fund (ICT-related only) ■ The Future Fund (ICT-related only) ■ iCentre Incubation Program ■ Creative Arts Facilities ■ JPKE Traning and Employment Scheme	
Bulgaria		■ Energy Efficiency and Green Economy Programme 2013 ■ Acceleration & Seed Fund (2012) ■ 'Supporting SMEs in Rural Areas' initiative (2013) ■ 'BRANDIKO' contest ■ The Action Plan to reduce the administrative burden (2012-14) ■ Amendments to the Corporate Income Tax and to the Personal Income Tax Law ■ a grant for the construction of the Bulgaria-Serbia gas interconnection ■ the National Innovation Fund initiative	■ The Joint European Resources for Micro to Medium Enterprises (JEREMIE) initiative ■ Amendments to the Corporate Income Tax and to the Personal Income Tax Law

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Cambodia			■ Sustainable Product Innovation in Vietnam, Cambodia and Laos - Strengthens the innovative power of industry to improve environmental and societal quality of products made in Vietnam, Laos and Cambodia - Activities include among others capacity building on project branding and marketing skill trainings for SMEs ■ Green Eco-preneurship Accelerated Program 2013 in Cambodia - Developed by ASEIC in cooperation with Global Green Growth Institute(GGGI) to provide appropriate entrepreneurship training program including application of ecoinnovation concept and a holistic range of services to encourage trainees to build a practical start-up business model
China		■ Technical Innovation Fund for Small and Medium-sized S & T Firms	■ China SME Global Development Forum ■ The 30th Meeting of APEC SMEWG (Small and Medium Enterprises Working Group) (June 2010)
Cyprus		■ the scheme Erasmus for Young Entrepreneurs (2012) ■ The Special Prevention and Action Plan (2012) ■ Government Data Warehouse initiative (2013) ■ Government Secure Gateway (ARIADNI) (2012) ■ Joined-Up Government' manifesto 2012 ■ education reform in 2012 ■ 'Enterprise liaison offices in universities' ■ The Entrepreneurial Innovation Scheme 2012 ■ transpose into national law the Late Payments Directive	■ Cyprus Entrepreneurship Fund (CYPEF)
Czech Republic			■ Operational programme enterprise and innovation (2007-2013)
Denmark		■ Research voucher for SMEs	■ Regional Innovation Agents
Estonia	■ Enterprise Estonia 2010	■ Organisation of Research and Development Act (1997, revised in 2006) ■ Enterprise Estonia (EAS) with its subprograms ■ The Credit and Export Guarantee Fund KredEx ■ Local entrepreneurship centres and consultancy centres ■ Estonian Development Fund (EDF) ■ CompanyRegistrationPortal(CReP)	
Finland		■ Finnvera - Environmental loan	

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
France		■ DEMETER Common Fund for Risk Placement	■ OSEO ■ CDC Enterprises ■ Tenerrdis
Germany		■ The KfW bank programme "Energy efficiency advice for SMEs" ■ BMU-Umweltinnovationsprogramm supports primarily SME investing in processes for the abatement of any environmental damage ■ DEMEA - Consultative programmes on material efficiency - Material Efficiency Award Scheme ■ The Mikrokreditfonds Deutschland -a guarantee fund and sponsors mainly SME (2009)	■ PROINNO(innovation partnerships for small and medium enterprises) ■ ZUTECH(future technologies for SMEs) ■ Innonet(support of innovative networks) (2008)
Greece	■ the National Plan for Supporting Small and Medium-Sized Enterprises (2010-13)	■ 'Business-friendly Greece' Action Plan (2012) ■ SME Guarantee Fund (2012) ■ the Special Management Service of the Regional Operational Programme (2013) ■ The National Fund for Entrepreneurship and Development (ETEAN SA) 2011 ■ ICT4GROWTH - Business Aid for Implementing Investment projects in the Development and Provision of Innovative Products and Value-Added Services	
Hungary	■ New Széchenyi Plan (2011)	■ New Széchenyi Plan enterprise-development programme ■ Job Protection Action Plan ■ 'Cutting Red Tape' Programme (2012) ■ 'Act CXL of 2004 General rules of administrative proceedings and services ■ Consumer Protection Act	
India		■ Techno-entrepreneurs promotion programme ■ Home grown technology programme	■ Technology Business Incubators(TBIs) ■ Public-Private Partnership
Indonesia		■ Environmental Soft Loans	■ Workshop on Development of APEC Green Technology Network to Support SME Development (2013)

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Ireland	■ Irish Government's 2013 Action Plan for Jobs	■ 2007 - 2012 'Seed and Venture Capital Scheme' ■ The Leader Programme ■ Small Businesses and a High Group on Business Regulations ■ National Entrepreneurship Policy Statement ■ Business Regulation Website ■ Reform of the National Micro and Small Business Support Infrastructure ■ 2012 Companies Bill ■ Single Portal for SME Retailer Licences ■ Public Service Reform Agenda ■ New Directive on Late Payments in Commercial Transactions ■ Tax Reform Plan for Small Business 2012 ■ the Credit Guarantee Scheme ■ Microenterprise Loan Fund ■ NSAI SME Portal: povide information on the benefits of standards to SMEs ■ Action Plan and ICT Skills Programme ■ Management 4 Growth Programme ■ Origin Green ■ Strategy for Renewable Energy ■ Green Tenders: An Action Plan on Green Public Procurement ■ Get Export Ready' programme ■ 2012 Personal Insolvency Act	■ Reform of the National Micro and Small Business Support Infrastructure ■ NSAI SME Portal: povide information on the benefits of standards to SMEs
Italy		■ Toscana Innovazione	■ eLCA project(EcoSMEs) - a European project that has involved 45 experts from the United Kingdom, Germany, Italy, Spain and Greece who have combined their knowledge of IPP, Information & Communication Technologies, Management & Marketing and Training ■ The Pratese Industrial Union ■ Network contracts (NET) (2009)
Japan		■ The New Competitive Cluster Project (2010)	
Korea	■ Foster 1000 green SMEs by the year 2013 ■ SMEs green growth support project by Small and medium Business Corporation	■ Environmental venture funds ■ Eco-Technopia 21	■ Environmental Technology Business Incubator (ETBI) ■ Green partnership among big companies and SMEs (2012) ■ Korea-China Green Cooperation Forum for Green Industry and Conference for Green Business (2012)

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Lao PDR	■ Decree on the Promotion of Small and Medium Sized Enterprises 2004 ■ Environmental and Social Management Framework (ESMF)	■ SME Access to Finance Project for Lao PDR	
Latvia	■ Latvia 2030	■ annual Action Plan to Improve the Business Environment ■ programme to support job creation in SMEs (announced by the Invest Agency of Latvia) 2012 ■ The Latvian Guarantee Agency (LGA) ■ The Trade Markets International Marketing Programme	■ Tautsaimniecibas padome (the National Economic Council) ■ Baltic neighbours Finland and Sweden
Lithuania	■ Long-term Strategy for Development of Lithuanian Economy to 2015 ■ National Strategy for Long-term Development, 2002 ■ National Strategy for Development of Small and Medium Sized Business 2002 ■ Lithuanian Strategy for Innovations 2010-2020 ■ Strategy for Use of EU Structural Support 2007-2013 ■ 'Enterprise Lithuania' initiatives (2011)	■ Special Programme for Economy Development and Increase of Competitiveness 2008 ■ National Programme for Improvement of Business Environment "Dawn" ■ Economic Growth Action Programme ■ Human Resource Development Action Programme ■ Special Programme for Economic Growth and Increase of Competitiveness 2008 ■ "For raising national economy competitiveness by development of research and technologies" ■ Action Plan for National Youth Policy Development Programme Implementation for 2011-2013 ■ Business Envrionment Improvement Action Plan for 2011 ■ 'Business ABC', 2012	■ World Lithuanian Economic Forum , 2012 ■ 'BSR(Baltic Sea Region) Stars SME networking day on smart/wooden houses' 2012

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Luxembourg	■ National Action Plan in favour of SMEs 2008 ■ National Lifelong Learning Strategy	■ business mentoring by the Chamber of Commerce ■ 'Our Community' by Jonk Entrepreneuren (Young entrepreneurs) ■ 'Young enterprise' project ■ ex-ante impact evaluation sheet for every item of draft legislation ■ ex-ante impact evaluation of changes related to business procedures Fit4Commerce programme 2013 Newonlineportalongovernmentprocurement	■ Luxembourg Business Angel Network (LBAN) ■ the Office Ducroireand the COPEL (Comitépourla Promotion des Exportations Luxembourgeoises)
Malaysia			■ Cleaner Technology (1996) ■ The EU-ASEAN SME Forum 2012: ASEAN Economic Community 2015 on "Challenges and Opportunities for EUROPEAN and ASEAN SMEs in the Services Sectors" (Nov 2012) ■ South East Asian SME Forum (2011)
Mongolia		■ e-Procurement system 2013 ■ SME Development Program 2013	■ SUPPORT TO SME DEVELOPMENT IN MONGOLIA (EU and EBRD) ■ Business Professional Network (BPN) project 2013
Myanmar		■ One Village One Product (OVOP) movement ■ Foundry and Forging technology Training 2013 ■ CEFE TOT Training 2013 ■ SMEs Entrepreneurship Training Program 2013	■ The 27-member Central Committee ■ ASEAN SME WG Meeting and Related Meetings 2013 ■ OVOP Study Visit Team
Netherlands		■ Dutch SBIR (Small Business Innovation Programme) ■ Syntens: training and awareness centre for improving entrepreneurship ■ Doe Mee: raising awareness and competences in a group of 200 SMEs which are interested in sustainability	
New Zealand		■ Regulatory Review Work Programme	■ Regional Business Partners Network (RBPN)
Norway	■ the strategy "Small Enterprise - Large Value" 2012	■ the Altinn portal 2003 ■ Opportunity of using companies 'Bank ID as a unique login point for the electronic services of fered by the Public Administration. ■ possibility of starting up a firm with a share capital of 30,000 NOK (€4,000 approx) reducing it from 100,000NOK (€13,500 approx) 2012 ■ Export Credit Norway ■ Waiving Audit: bureaucratic simplification for SMEs	
Pakistan		■ Public Sector Development Programme (PSDP) 2006-07 ■ SME Cluster Development ■ PM's Youth Business Loan ■ SME Sector Development Program	■ The Multi Donor Trust Fund (MDTF) project 'Economic Revitalization of Khyber Pakhtunkhwa and Federally Administered Tribal Areas (FATA)'

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Philippines			■ The Philippine SME Business EXPO 2013 - Philippines's biggest business expo dedicated to empowering the Small and Medium Enterprises (SMEs) and Entrepreneurs ■ The 2013 APEC Green Business Forum - To take a look at expanding global green supply chains in various ways and discuss how SMEs may adapt to the global phenomenon
Poland		■ Polish Sustainable Energy Financing Facility - provides SMEs with loans for energy efficiency improvement and RES utilisation ■ Greenevo programme - to support Polish eco-innovators, mostly SMEs	■ Eight networks of Business Angels in Poland - More than 86% focus in the activities on ecology, environmental protection and biotechnologies
Portugal		■ The Institute for Small and Medium- Sized Firms and Investment (IAPMEI)	
Romania	■ Governmental Strategy for SME development 2009-2013 ■ Governmental Strategy for development of SMEs and business development 2014-20	■ a programme for encouraging young entrepreneurs to start up and develop businesses 2012-13 ■ The 'START' initiative 2012 ■ new insolvency code 2013 ■ reducing the tax burden of SMEs byraising the exemption threshold for VAT from € 35000 to € 65000, 2012 ■ revised Law on SMEs 2013 ■ The One-Stop Shop 2011 ■ monitoring the debate on public procurement legislation by the National Authority for Regulating and Monitoring Public Procurement (NARMPP) ■ 'Mihail Kogalniceanu Programme for SMEs' ■ the national multiannual programme supporting SMEs ■ 'Support for innovative start-ups and spin-offs' programme, 2008 ■ Environmental Fund Administration gives access to a tax-deductible fund to exploit renewable energy sources, and to improve and protect the environment.	■ The SME Export Development Programme
Russian Federation	■ "Developing Small and Medium Scale Entrepreneurship in the Russian Federation", 2008 ■ The Road Map ≪Support for international markets access and support for export≫	■ Export Insurance Agency of Russia (EXIAR)	■ Russian Technology Transfer Network 2001 ■ Union of innovative and technology centres of Russia 2002 ■ Russian Agency for Support of Small and Medium Business 1992 ■ Gate to Russian Business and Innovation Networks s (Gate2RuBIN)

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Singapore		■ Business Angel Scheme (BAS) ■ Sector Specific Accelerator (SSA) Programme ■ SPRING Start-up Enterprise Development Scheme (SPRING SEEDS) ■ Technology Enterprise Commercialisation Scheme (TECS) ■ Angel Investors Tax Deduction Scheme (AITD) ■ Incubator Development Programme (IDP) ■ Young Entrepreneurs Scheme for Schools (YES! Schools) ■ Action Community for Entrepreneurship (ACE) ■ ACE Startup Grant ■ Innovation & Capability Voucher (ICV) ■ Productivity & Innovation Credit(PIC) ■ Capability Development Grant (CDG) ■ Local Enterprise Finance Scheme (LEFS) ■ Loan Insurance Scheme (LIS) ■ Micro Loan Programme (MLP) ■ Local Enterprise & Association Development (LEAD) programme ■ Part-time Pool Programme (PTP) ■ Customer-Centric Initiative (CCI) ■ Collaborative Industry Projects (CIP) ■ Partnerships for Capability Transformation (PACT) ■ Executive Development Scholarship (EDS) ■ The Business Excellence (BE) initiative	
Slovakia		■ 'Young Innovative Entrepreneur 2012' ■ 'Female Entrepreneur of the Year 2012' Award ■ Governmental Act on Vocational Education and Training ■ a State aid scheme ■ programme to support clusters ■ innovation vouchers scheme ■ The Risk Capital programme of NADSME ■ annual programme Businesswoman of Slovakia	
Slovenia		■ Point of Single Contact (PSC) based on the e-government e-VEM portal ■ new Slovenian Industrial Policy (SIP) ■ tax incentives for environmentally friendly vehicles (2012) ■ a new regulation on Green Public Procurement 2012 ■ Slovenian Public Agency for Entrepreneurship, Innovation, Development, Investment and Tourism (SPIRIT Slovenia)	

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Spain	■ Strategic Plan for Internationalisation of Spanish Economy	■ draft Law on Market Unity (Ley de Unidad de Mercado) 2013 ■ Programme of quality and administrative simplification (Programa de calided y simplification normativa) ■ Entrepreneurs Plan (Royal Decree-Law 4/2013 Support Measures for Entrepreneurs and Encouraging Growth and Job Creation) 2013 ■ Emprendemos Juntos Programme 2012 ■ Contract to Support Entrepreneurship (Contrato de Apoyo a Emprendedores) ■ Draft Project of Law to Support Entrepreneurs ■ the Plan to Pay Suppliers (Plan de Pago a Provedores) ■ Royal Decree-Law 4/2013 ■ budget increase for Financing Lines of the Institute of Official Credit (ICO) ■ ENISA Growth Lines (Lineas de Financiacion de la Empresa Nacional de Innovacion (ENISA)) ■ EAF-Fondo Isabel La Católica ■ ICEX-next' programme ■ Law supporting Entrepreneurs and their Internationalisation 2013	■ Centres for entrepreneurship support ■ Support to Business Angel Networks (Impulso a las Redes de Business Angels) ■ Centre for SMEs of Intellectual Property Rights protection 2012 ■ Agencia de Internacionalización (SECEX) 2013
Sweden		■ The Environment- Driven Business Development program(2003) ■ MISTRA(The foundation for strategic environmental research) Innovation - to give small and medium-sized enterprises (SMEs) a chance to develop innovative ideas ■ Almi(Almi ForetagspartnerAB) is owned by the state with the task to promote the development of competitive small and medium-sized businesses as well as to stimulate new enterprises with the aim of creating growth and innovation in Swedish business life	■ Cleantech Inn Sweden - A nation-wide business support organization that coaches new and established companies in the promotion and adoption of cleantech innovations
Switzerland		■ e-Government ■ SAFFA ■ The Swiss Society for Hotel Credit (SGH) ■ CTI Invest ■ Swiss Export risk insurance SERV ■ Switzerland global Enterprise ■ The State Secretariat for Education, Research and Innovation SERI ■ vocational and professional education and training (VPET) programmes	■ The SME Forum
Thailand		■ Good innovation projects ■ Green Labor program and Green leaf program (2008) - Standard Offer Program (SOP) - Energy Efficiency Resource Standards	
United Kingdom		■ National Contact Point for ecoinnovation (2011) - provide advice and individual assistance to support UK SMEs	■ Local Enterprise Partnerships (LEPs) - The DEFRA Network

Country	National Vision & Strategy	National Policy & Programs	Network, Partnership & Organizations
Vietnam		■ Promoting Energy Conservation in Small and Medium Enterprises (PECSME) (2006)	■ European Green Business Solutions for Vietnam (Sep 2013) ■ Sustainable Product Innovation in Vietnam, Cambodia and Laos - Strengthens the innovative power of industry to improve environmental and societal quality of products made in Vietnam, Laos and Cambodia - Activities include among others capacity building on project branding and marketing skill trainings for SMEs

Eco-innovative SMEs Best Practices

Eco-innovations have been implemented in various sectors such as building, clothing, transportation, electronics, chemicals, agricultural products, wood products etc. We investigated a wide range of eco-innovation practices summarized as follows.

KG Chemical

Nation	Republic of Korea	Sector	Chemical
Background	KG is a company that produces chemical fertilizer in Ulsan city in Korea. There was a problem of the high energy cost and a large amount of emitting greenhouse gases in the reaction of the BC oil and in the combustion of KILN for fertilizer.		
Innovation case	The heat source of the plant was substituted to environmentally friendly energy sources. The energy costs and greenhouse gas emissions have been reduced by substituting B-C oil to LNG.		
Performance	Greenhouse gases were reduced by amount 2,260 tCO_2 and economic savings are more than USD 700 million.		
Funding	Central and local government: 50%, own spending: 50%		
Source	http://www.kncpc.or.kr/green/echo_case_view.asp?id=102&page=1		

LG Hausys

Nation	Republic of Korea	Sector	Chemical
Background	Approximately 90% of the products are affected the domestic market and a regulation from Korean government. Therefore, they influenced by the Korean government policy such as the energy efficiency labeling scheme.		
Innovation case	Development of eco-friendly items: They launched a new sub-brand from Z:IN in order to provides eco-collection products. This eco-collection includes traditional energy saving products, environmental products in response to sunlight wallpaper and decompose the harmful substances, excellent insulation performance glass, flooring made by natural raw materials such as corn as the main ingredient. Recent progress that vacuum insulating glass products is ongoing project based on the excellent technical competence.		
Performance	The vacuum insulating glass product was patented in both domestic and overseas. More than 40% of energy efficiency compared to conventional products is achieved.		
Funding	Own R&D sources		
Pictures	 		
Source	KAIST, 2011, Drivers and performance of eco-innovation		

Tianjin Cosmo Polyurethane Co. Ltd. (TCPC)

Nation	China	Sector	Climate Change
Background	The TCPC was established by joint investment of three companies (Mitsui Chemicals Inc., Tianjin Petrochemical Corporation and Chori Co. Ltd) in 1993 and moved to the TEDA ecological complexes. The TCPC mainly produces polyurethane polyester, paint curing materials, composite packaging, polyurethane resins. They take a lot of influence of Mitsui Chemicals Inc. and is used for environmentally-friendly production technique.		
Innovation case	The TCPC has produced a polyurethane products by applying the non-fossil fuel technology developed by Mitsui Chemicals Inc. Instead of no use of fossil fuel, vegetable resin is used and sold to the company producing the car seat. This material can be recycled and emit lower greenhouse gas.		
Performance	Production of environmentally friendly materials and reduction of greenhouse gas		
Funding	Funding from Sinopec Tianjin Company, Japan's Mitsui Chemicals Inc., Chori Co. Ltd and sales revenue		
Pictures	 The TEDA ecological complexes		
Source	http://www.tcpc-mci.com/en/about_1.aspx http://www.mitsuichem.com/techno/strategy_01.htm#syokubutsu http://www.pancathay.com/pdf/teda_news_apr08.pdf http://www.mitsuichem.com/release/2005/pdf/050817e.pdf		

National and regional eco-innovation practices

Eco-innovation policies were established and carried out in ASEM member countries. We investigated national programs and projects related to eco-innovation as follows.

Japan

Name of the program or project	Environment Research and Technology Development Fund (ERTDF)
Managing department	MOE (Ministry of environment) and NEDO (New Energy and Industrial Technology Development Organization
Starting year	Since 2010
Investment	USD 5.2 billion (until 2013)
Participating firms	188 projects
Sectors	R&D on renewable energy
Introduction	ERTDF is the most important R&D programs of Eco-innovation in Japan. ERTDF, which is promoted as part of Japan's new growth strategy, supported a low-carbon energy supply, energy efficiency and smart technologies and green social infrastructure.
Sources	http://www.env.go.jp/policy/kenkyu/suishin/english/gaiyou/index.html http://www.env.go.jp/policy/kenkyu/suishin/english/gaiyou/pdf/2013color_pamphlet_eng.pdf ASEM Eco-Innovation Index (ASEI), ASEIC, 2012.

Singapore

Name of the program or project	Maritime Singapore Green Initiative
Managing department	MPA(Maritime and Port Authority of Singapore)
Starting year	Since 2011
Investment	USD 100 million(for five years)
Participating firms	60 firms and organizations (until 2014)
Sectors	Transportation (수송(선박)
Introduction	The Maritime Singapore Green Initiative seeks to reduce the environmental impact of shipping and related activities and to promote clean and green shipping in Singapore. It is a comprehensive initiative comprising 3 programmes - the Green Ship Programme, Green Port Programme and Green Technology Programme. These are voluntary programmes designed to recognise and provide incentives to companies that adopt clean and green shipping practices over and above the minimum required by International Maritime Organization (IMO) Conventions.
Sources	http://www.news.gov.sg/public/sgpc/en/media_releases/agencies/mpa/press_release/P-20131203-1 http://www.mpa.gov.sg/sites/maritime_singapore/msgi/maritime-singapore-green-initiative.page

Vietnam

Name of the program or project	Cleaner Production in Industry Component
Managing department	Ministry of Industry and Trade (MoIT)
Starting year	2010 ~ 2011
Investment	National environmental fund: The Vietnam Environmental Protection Fund(VEPF)- 50% of interest rates Green Credit Trust Fund (GCTF)-Adjustment of interest rates until one million dollors.
Participating firms	1,031 firms
Sectors	Manufacturing
Introduction	In 2002, the MOIT strongly promoted the application of the approach at five target provinces of Phu Tho, Thai Nguyen, Nghe An, Quang Nam and Ben Tre. The MOIT has a CP (Cleaner Production) strategy in industry to 2020. The MOIT is now deploying and allocating budgets for implementing 5 projects under the framework of the Strategy, specifically: 1.Raising awareness and capability to apply CP in Industry methods, 2.Building and putting into place a database and a website related to CP in Industry, 3.Providing technical assistance to industrial production facilities that apply CP in Industry methods, 4.Building a network of CPI support organizations, 5.Putting in place appropriate financing mechanisms and policies to promote the application of CPI methods.
Sources	http://www.sxsh.vn/en-US/Home/default.aspx http://www.globalwindow.org/gw/overmarket/GWOMAL020M.html?BBS_ID=10&MENU_CD=M10103&UPPER_MENU_CD=M10102&MENU_STEP=3&ARTICLE_ID=2136412&ARTICLE_SE=20302

Malaysia

Name of the program or project	The Energy Efficient Vehicle(EEV) under the National Automotive Policy(NAP)
Managing department	Center government (Prime minister's office)
Starting year	Since 2006
Investment	5 billion ringgit (until 2012)
Participating firms	2 companies
Sectors	Transportation
Introduction	The EEC include the vehicles with an internal combustion engine to meet the carbon dioxide emission standards and energy efficiency such as hybrid, electric and alternative fuel vehicles. EEV has a purpose to enhance the car industry competitiveness in ASEAN region. To raise the car industry competitiveness Malaysian government has carried out the permission cancelation on car import including used cars. At the same time they encouraged investment on hybrid and electric vehicles by establishing the programs. The goal of establishing a hub to foster energy efficiency vehicle (EEV) and strategy to aggregate car production resources to the EEV are established through the 3rd NAP. It support new manufacturing permission, investment,
Sources	http://www.miti.gov.my/cms/content.jsp?id=com.tms.cms.article.Article_9971dce0-c0a81573-3edb3edb-686eb8ad

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