



# ASEM Eco-Innovation Index (ASEI) 2013

*Measuring Sustainable Future for Asia and Europe*

## Executive Summary

November 2013

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### **About Sustinvest**

Sustinvest is the first and leading SRI research and consulting institution established in Korea in 2006. Sustinvest is a think tank that provides actionable information and critical insight on extra-financial risks and opportunities of companies to enhance the decision-making process of the investor community. Sustinvest evaluates the ESG performance of companies and provides ESG analysis and advisory services to approximately 3.3 billion USD worth of SRI funds based on this evaluation system, as of June 2013.

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## **ASEIC**

Ordering Organization

### **About ASEIC (ASEM SMEs Eco-Innovation Centre)**

**The ASEM SMEs Eco-Innovation Center (ASEIC)** aims to promote eco-innovation for Small and Medium-sized Enterprises (SMEs) in Asia and Europe. Its establishment was endorsed by the leaders of ASEM member countries at the 8<sup>th</sup> ASEM Summit in Brussels, Belgium. ASEIC seeks to serve as an international platform where eco-innovation practices are shared and new green growth opportunities are created. ASEIC is currently funded by the Small and Medium Business Administration, the Republic of Korea. Its office is located in Seoul.

[www.aseic.org](http://www.aseic.org)

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The views expressed in this report are purely those of the authors and may not in any circumstances be regarded as stating an official position of the organisations involved.

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## Highlights of ASEM Eco-Innovation Index 2013

This second ASEM Eco-Innovation Index (ASEI) report is in its second edition on the eco-innovation of ASEM member countries. The report recognizes the **key role of eco-innovation as an accelerating driver of sustainable development of a country**. It calls for the need to **increase awareness on eco-innovation** and for a **multidimensional approach to understand eco-innovation** in both developed and developing countries. This report looks at various aspects triggering eco-innovation, putting effort to keep track of the most current perceptive of the concept. Each government is aiming to gain sustainable competitiveness today and we see eco-innovation as a way to achieve this.

The ASEI 2013 examines 25 countries on 20 individual indicators. These individual indicators are aggregated into composite index to provide measurement with currently best available country data sources, to capture national status of eco-innovation. There is hope that quantitative study of eco-innovation would offer a snapshot of where we are: global and regional trends that policy makers can use as a foundation for making their decision that shape the future.

However, broad and not yet internationally agreed concepts of eco-innovation make it difficult to convert into simple measures. No consensus has been made on what eco-innovation is or how it can be measured, whether it is even measurable. In the midst of such continuous debate, ASEI hopes to be part of the broader imperative and practical studies in the field of eco-innovation.

With reference to quantitative metrics, qualitative research and analysis had been implemented in order to better capture the complex full eco-system of eco-innovation. This report tracks policy measures and national plan, involved national organizations and business best practices related.

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### Structure and Content of the ASEI Report

This report is presented in seven chapters. **Chapter One** summarizes the scope of the second ASEI project and clarifies its objectives. This chapter refines the concept understood and shows a snapshot of how the concept is evolving. **Chapter Two** presents how indicators had been selected and key literature reviews on eco-innovation and eco-innovation indicators, which we have referred

to. In **Chapter Three**, a set of selected indicators for ASEI framework is introduced. It includes explanation on what is measured in each four criteria, underpinning theoretical background to support the grounds of the ASEI measuring framework. **Chapter Four** shows the overall result of all twenty five countries assessed and how missing data had been input. **Chapter Five** presents key analytical findings based on the ASEI result. **Chapter Six** analyzes ASEI result by country. For each countries measured, key national policies, programmes, strategies, networks and organizations on eco-innovation are illustrated. Overall analysis of each country is presented by integrating both qualitative and quantitative research considering each local context and condition. The last chapter, **Chapter Seven** aims to underline the imperative interconnection between eco-innovation and business actors. Role of business in eco-innovation is being increasingly emphasized. In particularly, the role of Small and Medium Enterprises (SMEs) is highlighted in this report. Finally, the report concludes with lessons learned and a way forward.

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### Chapter 1

#### Purpose of the ASEM Eco-innovation Index

The ASEI project was launched in 2012, as an integral part of a wider objective:

- 1) To increase awareness of eco-innovation paradigms and communicate the importance at the global stage;
- 2) To enhance quantitative data based eco-innovation analysis

The definition of eco-innovation used in this report is as follows;

“Eco-innovation is any form of innovation aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment or achieving a more efficient and responsible use of resources including both intended and unintended environmental effects from innovation as well as not only environmental technology but processes, systems and services.”

European Commission, 2012

The ASEI is not meant to show the definitive ranking of countries with respect to eco-innovation. In other words it is not ASEI's purpose to define the laggards and frontrunners of eco-innovation by comparing ASEM member countries, or suggest a blueprint for successful eco-innovation policy measures and market instrument that can be replicable. Each country is at a different starting point for eco-innovation, and each country's capacity relies on its institutional settings, level of development, natural resource, human capacity, environmental conditions and other economic, social and environmental aspects.

Today, a variety of concepts has emerged such as green economy, green growth, and inclusive growth, to describe a way to combat current environmental challenges we face via changing from conventional economic pattern. Such similar and grand terminologies undervalue the eco-innovation concept. This report emphasizes the critical role of business and governments. Active development and wide diffusion of eco-innovation will bring a change in paradigm at national, regional and global levels.

The significant work done since the mid-1990s around eco-innovation has contributed to a broader understanding of the concept. Eco-innovation has evolved through five flows since it was first introduced in 1996. Each country can be at different stages of the following waves.

- *First Wave*: Understanding eco-innovation as environmental technology advancement
- *Second Wave*: Establishment of regional initiatives and programmes on eco-innovation
- *Third Wave*: Acknowledging eco-innovation as an engine for national sustainable development
- *Fourth Wave*: The role of business and understanding the non-technological side of eco-innovation
- *Fifth Wave*: Diffusion of eco-innovation in both developed and developing countries & Importance of SMEs

## Chapter 2

### ASEM Eco-Innovation Index Development Process

No agreement hitherto exists on a set of indicators that accurately measure eco-innovation. Thus, ASEI is an evolving project focusing on a handful of proposed indicators for eco-innovation which always carries room for improvement.

There have been few cases where a preliminary set of eco-innovation indicators was proposed but actual measuring

procedure had been neglected. Much of these studies merely introduced important indicators for examining eco-innovation status at a company, industry or national level. Each of these sets is different depending on where the focus lies.

This chapter presents the development process of ASEI and how we have appropriately selected eco-innovation indicators considering conceptual coherence. We chose the indicators through a careful selection process that included the following: a review of eco-innovation literature, AHP process, consultation with experts and checking of available data sets.

#### Indicator Selection Process:

- 1) Research key indicators introduced via literatures and related indexes;
- 2) Engage expert group via Analytic Hierarchy Process (AHP) to find relevant indicators;
- 3) Check availability data sources for each indicators;
- 4) Consultation and confirmation by renowned global professionals

## Chapter 3

### ASEM Eco-Innovation Index Framework & Indicators

The ASEI model has evolved over for only two years and it only examines a partial picture of the complex "eco-innovation eco-system". This report provides a measurement framework storyline for greater analytical rigor of the index.

The ASEI measures eco-innovation using the following four criteria.

- 1) *Eco-innovation Capacity*: aims to capture the country's mental attitude towards eco-innovation by examining the potential each country carry to implement eco-innovation at the practical level.
- 2) *Eco-innovation Supporting Environment*: gears "eco-innovation capacity" to transform into practical tools that actually facilitate the implementation of eco-innovation activities as the market itself cannot trigger the diffusion or activation of eco-innovation.
- 3) *Eco-innovation Activities*: focuses on the firms' contribution towards eco-innovation such as green patents, level of environmental management and commercialization of green technology that can affect eco-innovation at industry and national economy levels.
- 4) *Eco-innovation Performance*: measures the overall

national economic, social and environmental competitiveness that eco-innovation can bring in the long term.

Each of the four criteria is composed of individual indicators (20 in total).

### Storyline of ASEI Framework

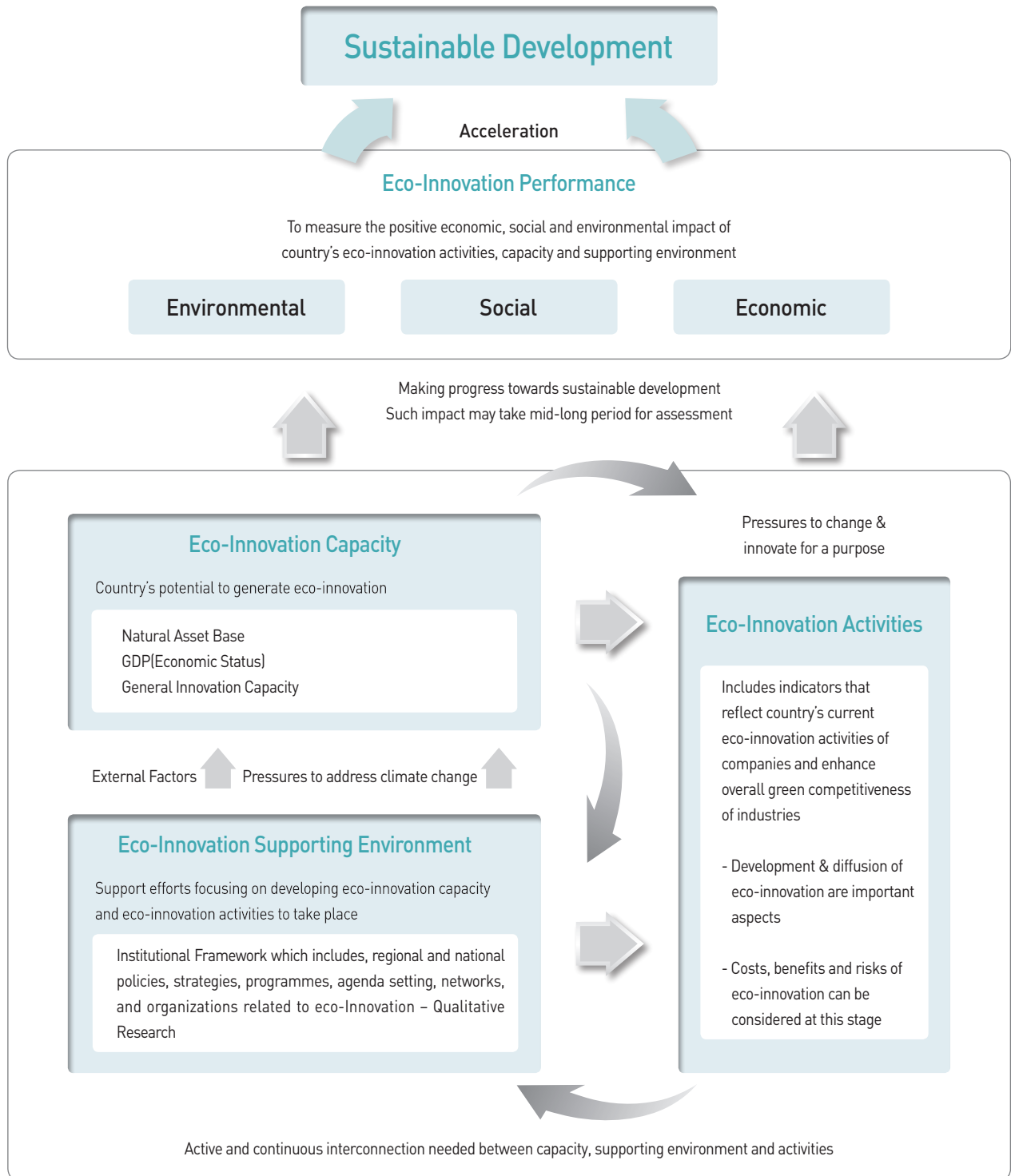


Fig 6. Storyline of ASEI framework

[Source: Own Elaboration]

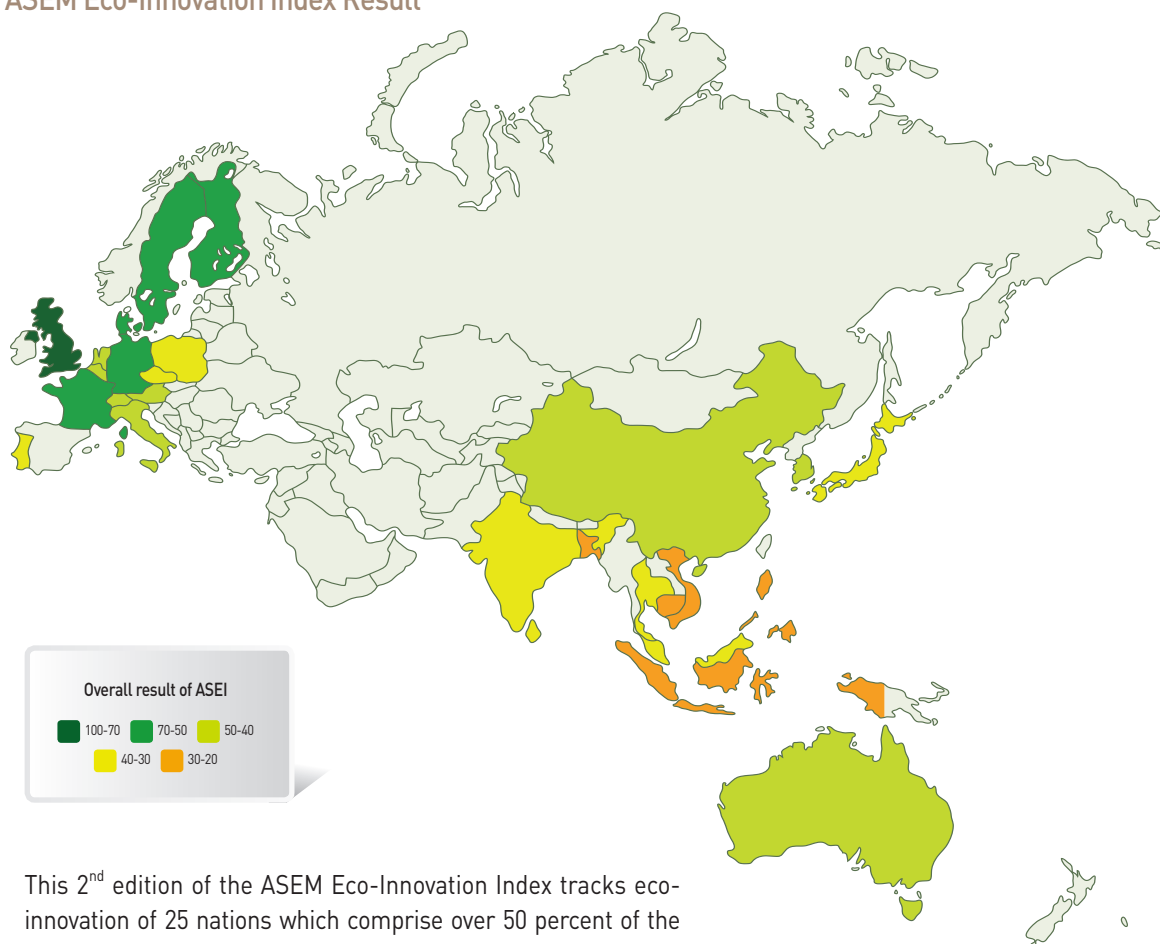
While there is no widely accepted answer to appropriate set of an eco-innovation index, we believe that ASEI indicators cover a comprehensive yet manageable body of information on core eco-innovation issues. The ASEI framework incorporates all high priority issues including green technology, environmental R&D, green patents, green market and others. It aims to spell out some of the critical drivers of successful eco-innovation performance. The ASEI 2013 tried to go beyond the traditional measures of eco-innovation merely focusing on level of green

technology in a country.

This year, ASEI framework had been updated and revised. Depending on the decision to use 'stock' and 'flow' measure for each indicator, the time series of data sources differ. In accordance to each individual indicators used, measuring factor, reference year and data source used have been shown clearly in the appendix of this report.

## Chapter 4

### ASEM Eco-Innovation Index Result



This 2<sup>nd</sup> edition of the ASEM Eco-Innovation Index tracks eco-innovation of 25 nations which comprise over 50 percent of the total ASEM member countries. Newly assessed countries are shown in bold below.

<b>Australia</b>	<b>Czech Republic</b>	Germany	Korea	<b>Portugal</b>
Austria	<b>Cambodia</b>	India	Malaysia	Sweden
<b>Bangladesh</b>	Denmark	Indonesia	<b>Netherlands</b>	Thailand
Belgium	France	Italy	<b>Philippines</b>	United Kingdom
China	<b>Finland</b>	Japan	<b>Poland</b>	<b>Vietnam</b>

ASEI Result Mapping



## Chapter 5

### Result Analysis

By extending the number of countries in the ASEI 2013, from fifteen to twenty-five countries, more in-depth regional comparative analysis between European and Asian countries had been possible compared to the 1<sup>st</sup> ASEI. Going beyond the traditional evaluation of regional analysis, this time, the ASEI data has been flexibly utilized in order to look the result through different perspective.

#### Criteria level Analysis

- The “eco-innovation capacity” criterion result of each country shows the strongest correlation with the each country’s overall result. From our analyses, the capacity gap between European and Asian nations is relatively large.
- In “eco-innovation supporting environment” criteria, United Kingdom is placed as the top performer leading with a wide gap with other countries. It is noticeable that China and India’s eco-innovation supporting environment reaches the level of the European countries. Qualitative analysis on China and India’s institutional framework proves that they are preparing to form a firm foundation to support eco-innovation activities. Meanwhile, the rest of Asian nations fall behind.
- “Eco-innovation activity” and “eco-innovation performance” showed the narrowest disparity between top and bottom tier performers among the four criteria of ASEI. Top tier group of countries performing well in “eco-innovation performance” are likewise reflecting high score in overall score of ASEI.

#### Income Group Peer Analysis

To compare the results of similar peer groups by national income level, 25 member assessed countries were grouped into three income categories: 1) high income (16 countries), 2) middle income (7 countries) and 3) low income countries (2 countries). All countries’ ASEI result were compared against the average of the group each country belongs to.

- In case of the high income group, United Kingdom, Sweden, France, Denmark and Germany showed above average scores in each four criteria.
- For the middle income group, China was the only country that showed an above average score.
- With regards to the low income group, there was a limitation in the comparison and analysis as there were

only two countries that belonged to this group.

Income level correlates highly with ASEI scores: higher the income, higher the ASEI score. In particular, large gap difference between peer groups was shown in “eco-innovation capacity”, “eco-innovation supporting environment”, and “eco-innovation performance”. The gap is wider in other three criteria, wider respectively: eco-innovation supporting environment, eco-innovation performance and eco-innovation capacity. “Eco-innovation activities” shows the lowest gap between the three peer groups. Disparity within eco-innovation capacity and performance was found to be larger because these two criteria reflect a nation’s fundamentals which include economic infrastructure, education, scale of investment, R&D capacity, natural resource and environmental condition, which takes a long period to shape and organize. Meanwhile, eco-innovation supporting environment and activities showed the lowest gap between the peer groups. It is viewed that these two criteria includes indicators that shows short-term impact or force of eco-innovation.

The eco-innovation gap between the peer groups is difficult to reduce in a short period of time. However, there is potential for quicker growth by accelerating the development in eco-innovation activities and supporting environments where the gap between different income peer groups is small and impact period is shorter. It is expected that better policy and national strategies of low-income countries would demonstrate more direct impact to their economy, society and environment. International collaboration between peer groups can also narrow the gap.

#### Regional Analysis: Europe & Asia

##### Eco-Innovation in Asia

- Most of the Asian countries’ ASEI results fall behind the European Countries
- Within the region, China, Japan and Korea score high while less developed emerging countries are catching up fast
- Eco-innovation activities criteria score varied the most between Asian countries
- Although European countries mark the top tier of the list, Asian countries have been identified to have high Eco-innovation Capacity scores. It is significant to note Malaysia and India’s score high in this criteria
- Regional initiatives or policy schemes have not developed yet; however, bilateral or multilateral

national networks are being created.

- Additionally, more international events are taking place in Asia such as Sustainable Product Innovation in Vietnam, Korea-China Cooperation Forum for Green Industry and Conference for Green Business Malaysia-Europe Forum Roundtable Series on Sustainability.

### Eco-Innovation in Europe

- Most of the European countries show high scores in ASEI, dominating the top tier of the list
- United Kingdom and Sweden rank top while Eastern European countries fall behind when compared within the region.
- European countries' Eco-Innovation Capacity and the Eco-Innovation Performance criteria scores show the strongest correlation with the overall ASEI results
- The European Commission understood that eco-innovation is a crucial aspect to improve economic, social and environmental competitiveness of Europe since the early days.
- The first regional initiative for eco-innovation was launched in 2004: the European Commission's the Environmental Technologies Action Plan (ETAP). In 2010, the ETAP was revised to the Eco-innovation Action Plan (EcoAP) and, together with the Europe Strategy 2020; eco-innovation became the European Commission's major development strategy.
- In Europe, which has the high level of Eco-innovation, R&D activities and innovative trials are strong that ■ In Europe, SMEs have been the main target of eco-innovation initiatives and programmes at the national and regional level.

### Green Technology Analysis

ASEI used five indicators, using the Cleantech Database to capture green technology sector contribution to national eco-innovation.

Although, there are increasing discussions on stressing non-technological eco-innovation and of its impact, we acknowledge that green technology related indicators are a good source to capture partial pictures of current eco-innovation status. It is also true that the contribution of green technology towards eco-innovation is still dominant today.

United Kingdom scored high for all of the green technology related indicators. The indicators have shown France has vibrant investment environment for green technology while Finland, Sweden and Denmark show competitiveness in green technology firms. European countries are showing to be proactive in stimulating the green technology industry by via actively financing SMEs and networking between firms.

As Asian countries, China and India have scored high in green technology indicators in comparison to other Asian countries. China and India are known to invest heavily in R&D and commercialization of green technology, not falling too far behind the frontrunners of European countries. China and India's huge investment in green technology and related R&D, is prospected to trigger a strong eco-innovation drive within the next ten years. Other Asian countries including Korea and Japan, where green technology has been the key word in the national sustainable growth agenda, still fall behind in the scale of investment and infrastructure on green technology.

### Prospective Analysis: Global Eco-innovation Capacity Trend

Each country has different eco-innovation capacity and resources to trigger eco-innovation. Capacity is a significant factor affecting mid to long term eco-innovation performance. In order to do so, capacity needs to be converted and processed to impact the overall eco-innovation status of a nation. "Capacity" is viewed as the fundamental in this report as well as in the ASEI measuring framework. It represents "absorptive capacity"<sup>11</sup> needed for wider diffusion of technology and knowledge as well as ability to integrate sustainable growth agenda into traditional development approach. From this perspective, we can attentively predict the potential growth of nations that score high in eco-innovation capacity, although this criterion only depicts partial picture of the wider and complex eco-system of eco-innovation capacity.

Most of the assessed twenty five countries received high scores in eco-innovation capacity criteria compared to other three criteria. Each four countries from Europe and Asia with high eco-innovation capacity compared to other three criteria had been selected from our prospective analysis. In Europe, the countries selected were Denmark, Netherlands, Austria and Poland and in case of Asia, Australia, India, Malaysia and Vietnam. These eight countries have not scored high overall eco-innovation national scores yet they are predicted to have great growth potential.

1) OECD (2012), *Inclusive Green Growth for the Future We Want*  
OECD (2012), *Greening Development Enhancing Capacity*



For Denmark, Netherland, Poland and Austria, they are creating eco-innovative industries through new business opportunities. In particular, Denmark, Netherlands and Austria with already achieving high score in eco-innovation performance have developed its eco-innovation capacity by strengthening partnership and networks. Though Australia reveals low eco-innovation performance score compared to eco-innovation capacity, the government's current active role in promoting eco-innovation is worthy of attention from a mid to long term perspective. Economic development is an important issue for Poland and India and as part of their economic growth strategies, are seeking appropriate ways to develop sustainable economic growth. To do this, both countries are seeing eco-innovation as a way to achieve this; they are investing heavily on eco-innovation related R&D and infrastructure. Malaysia has put productivity innovation and environmental values as their long term development strategy and Vietnam is activating eco-innovation industries by attracting foreign investment. We attentively introduce these countries as countries with high potential to enhance their eco-innovation level in the future.

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## Chapter 6 Country Level Analysis

With acknowledgement of the importance of understanding each country's cultural, social, economic, environmental and political contexts in order to comprehend various driving force of eco-innovation in different local contexts, this report has integrated the quantitative results of ASEI 2013 and qualitative research on national measures and activities that promote eco-innovation.

ASEI's result analysis demonstrates that rate and patterns of development and diffusion of eco-innovation tend to vary from country to country. Yet it tends to be that the more determined a country's sustainable development targets and envisions, the higher that the country scores high in ASEI. Each country's level of eco-innovation capacity tends to differ nationally.

This chapter goes beyond the quantitative findings of ASEI and sees the local context, institutional framework and conditions that is promoting eco-innovation.

This chapter specifically:

- Analyzes relationship between quantitative and qualitative research and integrate both research to provide key feature analysis of a country's eco-innovation status.

- Identifies national policies, programmes, vision, strategy, network and partnerships promoting eco-innovation at local level.
- Highlights high priority issues in the field of eco-innovation.
- Identify whether each national government has particular industries they push and focus their efforts to generate eco-innovation of firms.
- Examine key instruments that trigger eco-innovation, sustainable development and eco-innovation of firms.
- Distinguish distinctiveness and similarities between the countries.

Research has shown that rarely does a country offer direct eco-innovation policy frameworks and programmes. Rather, eco-innovation is promoted under multifaceted concepts and combination of policy instruments.

Eco-innovation advanced countries are aiming to gain sustainable competitiveness today and are seeing eco-innovation as a way of achieving this. In such point in time, it is necessary to see where each country stands in terms of eco-innovation in comparison to other countries and regions. ASEI hopes to provide related stakeholders and key decision-makers extensive analytical information on different national approaches to eco-innovation.

This report hopes to push each government to create specific action plans and broader strategies on the basis of our analysis and evidence. This would be beneficial specifically to those countries that have not yet formed eco-innovation policy objectives or actions, which would be mostly developing countries.

ASEI projects hopes to stimulate flexible policy learning and positively influence regional and national policy making processes rather than generating a search for a set blueprint for successful eco-innovation. There is no blueprint or enough evidence on exactly what types of eco-innovation can trigger sustainable growth. No correct answer exists, but this report provides room for flexible and creative thinking at different local contexts.

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## Chapter 7 Business Perspective Towards Eco-innovation

This report emphasizes the critical role of business and governments, and looks at the linkage and impact between macro level (country) and micro-level (company) eco-innovations. The logic behind such emphasis comes from

the understanding of nature and practice of innovation today: the positive and grand impact business can bring to our environment and society in the future. This chapter aims to capture the degree of interconnectivity between business and national eco-innovation competitiveness, triggering acceleration in reaching sustainable development.

Eco-innovation can make firms more competitive in the near future. As mentioned frequently throughout this report, businesses are the key drivers and enablers of eco-innovation. Innovative firms today are quickly becoming as solution providers concerning environmental and social challenges and they will determine the success of eco-innovation at the country level. Corporations, SMEs and start-ups have the capacity to innovate, change and diffuse new concepts, products, processes and technologies and their activities can bring far greater impact and opportunities in the future than the present. The integration of both non-technical and technical approaches to eco-innovation will allow a specific industry to break away from resource intensive growth and towards sustainable development. It is vital that businesses find their unique strengths and understand local dimensions and efficiently use of local supporting environment.

Innovation today allows SMEs to be more flexible in integrating eco-innovation concepts into their operation, product and strategy, and thus can be more inventive than larger corporations with rigid eco-system in the long run. More SMEs are expected to challenge many existing eco-innovation related technologies, processes, products and solutions of bigger companies. In contrast to a few literature that underestimate the role of SMEs in implementing eco-innovation in practice due to limited resource capacity, capital and advanced technology, this report emphasizes the radical potential and greater opportunities SMEs possess in triggering eco-innovation. More recently, there has been an increase in the number of SMEs that develop and trade green technology solutions and products which comes under the paradigm of eco-innovation. Many national governments are building networking stages for SMEs to gear eco-innovation activities as eco-innovations can be developed and commercialized as a result of the interactions of firms themselves.

This report aims to emphasize the increasing role and potential of SMEs so that this chapter provides information to SMEs of what can be done within such size of business by offering business case studies.

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## Conclusion

International organizations have extended their research on eco-innovation. However, academic studies and statistical data sources on eco-innovation are still limited today. In line with the growing interests towards eco-innovation, advanced data and studies will be required in the future. Thus, ASEI calls for the need for further development of data sources, in-depth study and discussion on eco-innovation.

Yet, the 2<sup>nd</sup> edition of ASEI hopes to mark a forward stride in the development of the latest research on eco-innovation and its measurement, steering individual countries and deliver greater impact to the targeted users. The ASEI analysis can assist in monitoring the determinants of eco-innovation progress overtime and provide a snapshot of the evolving global trend of eco-innovation.

While the ASEI 2013 still faces barriers, we are stepping forward to overcome them one at a time. The biggest barrier that we currently face is the lack of available data for Asian ASEM member countries. Yet, ASEI has been more focused on improving the framework and extend deeper understanding of eco-innovation. As a way to make up for such limitations, we have applied qualitative research into our analysis. Overall the ASEI 2013 represents a work-in-progress.

Each country has a different level of understanding of eco-innovation and thus, different short, medium and long term approaches that should be taken to promote different dimensions of eco-innovation at the national level. Eco-innovation can provide a window of opportunities for both developing and developed countries in a variety of ways. Nations need to optimize the interplay of institutions and the interactive processes, application and diffusion of eco-innovation. Success in eco-innovation requires a holistic approach to progress.

The ASEI framework will be revised every year as new data sources become available, and as the concept evolve. The 3<sup>rd</sup> ASEI 2014 will expand the coverage of countries measured. We endeavor to constantly offer the most advanced research in the field of eco-innovation. We hope that this report has laid another foundation to this process.

# ASEM Eco-Innovation Index (ASEI) 2013

*Measuring Sustainable Future for Asia and Europe*



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