# 2015 ASEM Eco-Innovation Index (ASEI)

**Final Report**

**2015.12**

ESC
EcoServices Consulting

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# 1. Research Outline

○ Background and Necessities of Study

This study was implemented as a follow-up project of the development and evaluation of ASEM Eco-Innovation Index (ASEI), which has been in process since 2012. ASEM SMEs Eco-Innovation Center (ASEIC) developed the ASEI after 3 years since 2012. Starting in the current year, it measured the innovation index of its member countries and promote advancement of the index. During the development period of the ASEI, the index of ASEM member countries were measured, and the results were used to enhance the level of awareness and status of the index in those countries. Specifically, its information network and information sharing system, both of which help ASEM member countries in Asia to actively seek for the new concept of eco-innovation, are expected to function as positive stimulants for further studies on ASEI.

The technical aspect of ASEI bases on the theoretical model, which includes input-output model and key drivers of eco-innovation. The index is composed so as to enable assessment of all member countries of ASEM with the same index. However, application of the same index to ASEM countries, which are in different stages of development, as well as social and economic environment, was found to have limitation in terms of data availability. In addition, it was suggested that cross-correlation method should be used with caution when comparing the measured values of the ASEM member countries. These restrictions will be important in developing ASEI in a long run and the result of this study will have significance as it presents the direction for development.

Hence the current study deviates from the theoretical approach but attempts to collect actual data from developing countries and examine possibility of finding missing values. Moreover, the study aims to draw meaningful conclusion for the member countries by improving the assessment frame as to enable examination of index values in terms of regions and developmental stages. Lastly, possibility of collaboration between ASEM countries and related research institutions was considered in the evaluation and analysis of ASEI for the long-term development of ASEI (Figure 1)

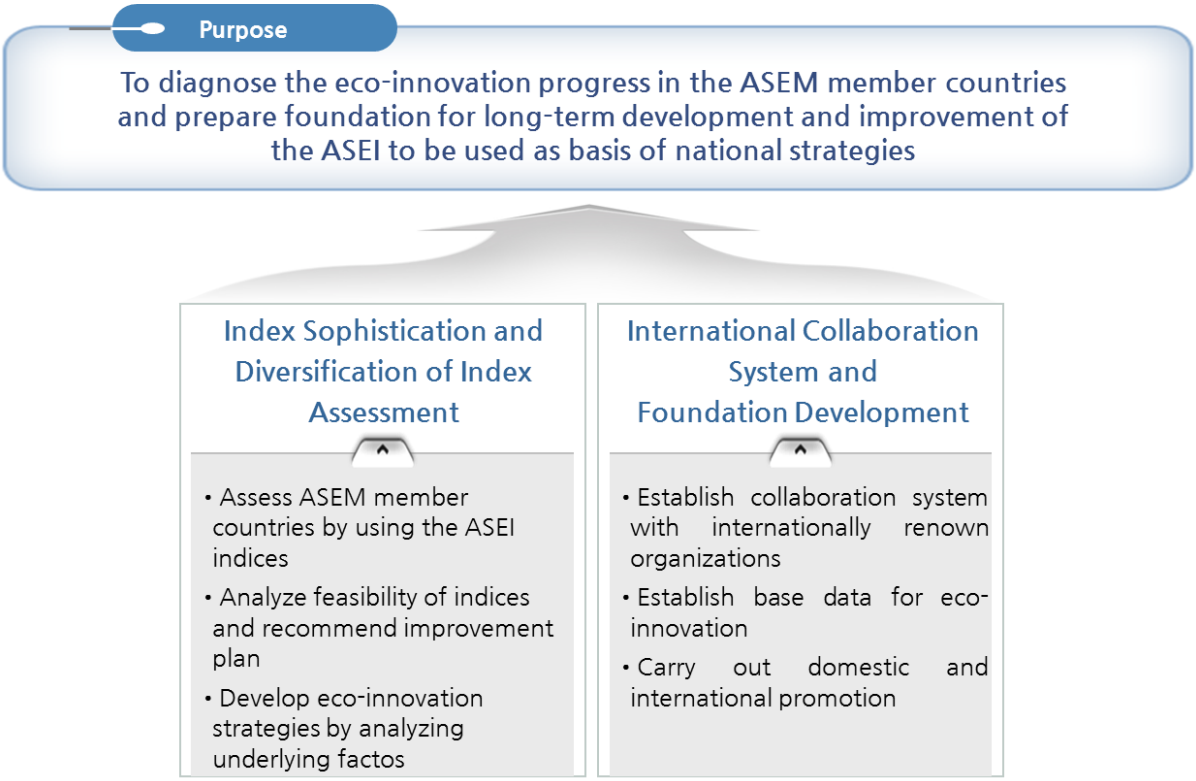



Figure 1 Project Objective

○ Contents of Study

Major tasks of 2015 ASEI Project can be largely divided into ASEI evaluation and analysis and establishment of collaboration system with international organizations (Figure 2). For sophistication of ASEI index and diversification of index assessment, eco-innovation status in each ASEM member country is investigated and the related index is updated. As base material for analysis, qualitative data related to barriers to eco-innovation of the countries are collected. Based on the collected data, eco-innovations status of each ASEM country is analyzed. Lastly, limitations revealed during the process of data collection and analysis are included to propose improvements to ASEI. Being directly related to ASEI assessment and analysis, establishment of collaboration system with international organizations and base material are evaluated in terms of the possibility of collaboration with reliable organization through operation of domestic and international advisory panel. In addition, the research made efforts on searching for and collaborate with experts who can help collect data and analyze underlying factors for the case study report.

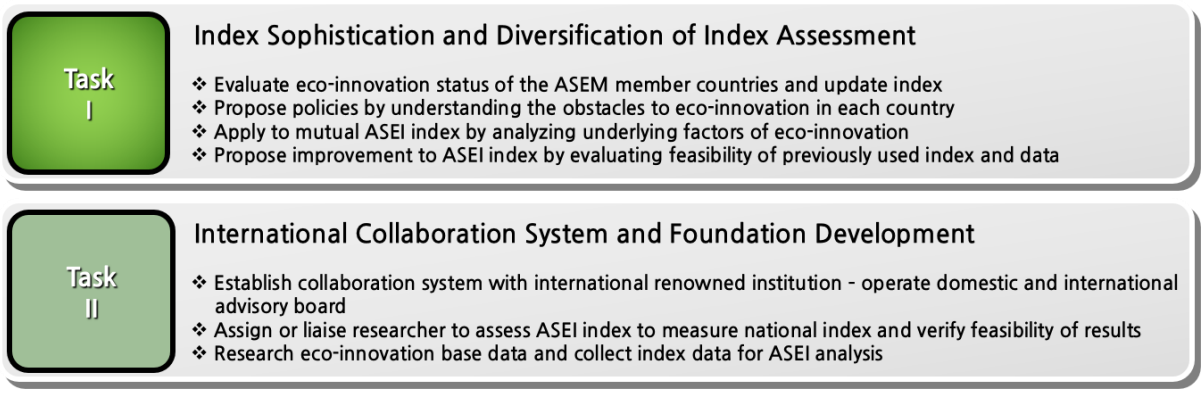



Figure 2 Study areas and details

○ Study Strategy

In order to meet the study goal effectively, the researchers categorized into index assessment part and base model derivation based on the case study of nations to come up with the research development plan. To assess and analyze index, data examination for ASEI assessment was minimized during the beginning of project so as to ensure time for new data collection and result analysis. Base model derivation was done by establishing standardized process for case study of nations so that it will be applicable to countries being studied additionally in the future.

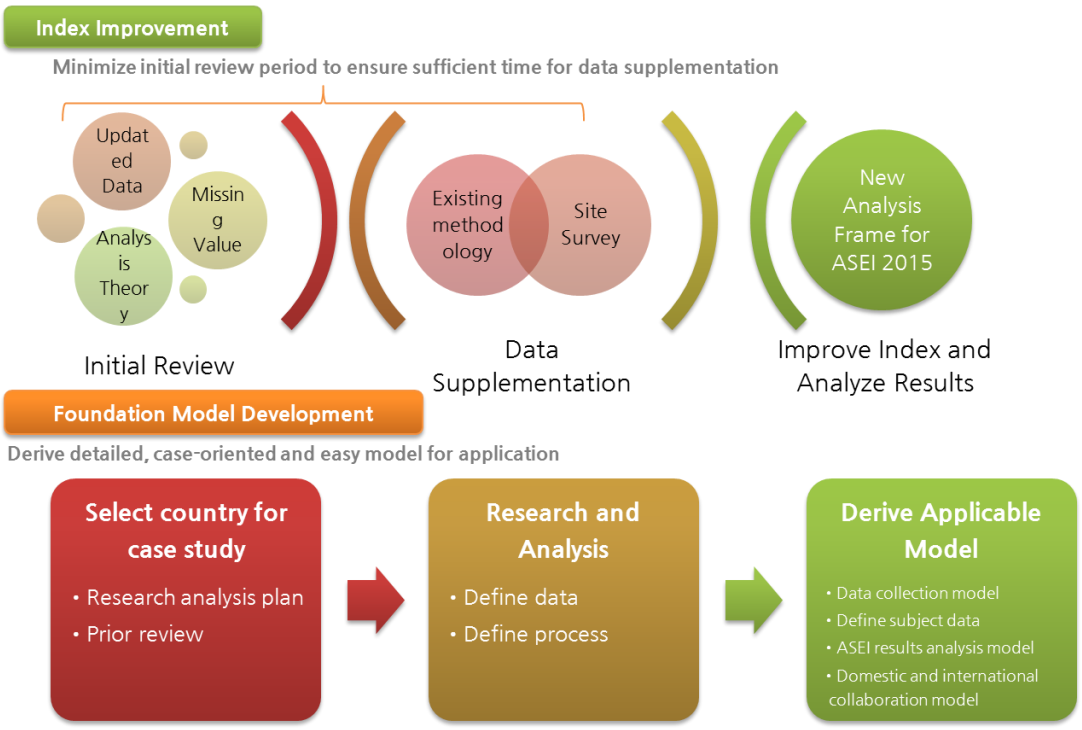



Figure 3 Study plan strategies

# 2. 2015 ASEI Index Assessment

○ Stages of Index Assessment

For sophistication of index assessment and improvement of specific index and analysis system, the measurement of 2015 ASEI was done by dividing into index assessment stages (data collection, statistical processing of data, indexing work) and index analysis stage. The assessment was done for 51 countries, including 2 new countries (Kazakhstan and Croatia) and 49 countries previously assessed in 2014 ASEI assessment. In the ASEI data collection stage, index data was collected for 51 ASEM member countries and the missing data was analyzed in terms of the substitutability, acquisition plan and data collection for the nation being case-studied. After data collection, data variable was statistically processed and amendment was performed for the missing values. Then the composite index data was produced and 2015 ASEI was derived through standardization and applying weight factor. In the index analysis stage, improved index analysis frame for region and income level were used to conduct multilateral analysis of 2015 ASEI. The country case study helped analyze drivers and barriers of eco-innovation in each country.

## A. Data Collection

Data was collected in 4 areas with 20 indices, among which 14 were used, excluding 6 from Clean Tech.

Table 1 Sources of ASEI Index

| Index Name | | Source | Year Collected | Collected |
|---|---|---|---|---|
| 1. Eco-Innovation Capacity | 1.1. Potential to improve national competitiveness | GCI (WEF) | 2014- 2015 | Yes |
| | 1.2. General innovation Capacity of nation | GII (INSEAD) | 2014 | Yes |
| | 1.3. Green R&D Capacity of research institutes | Cleantech | - | No |
| | 1.4. Number of companies with green innovative technology | Cleantech | - | No |
| | 1.5. Awareness level of company's sustainable management | United Nations Global Compact | 2015.03 | Yes |
| 2. Eco-Innovation Support | 2.1. Government expenditure on green R&D | OECD | 2013 | Yes |
| | 2.2. Implementation of environmental regulations | WEF | 2014- 2015 | Yes |

| Index Name | | Source | Year Collected | Collected |
|---|---|---|---|---|
| Environment | 2.3. Green technology industry investment environment | Cleantech | - | No |
| | 2.4. Green innovative technology investment level for SMEs | Cleantech | - | No |
| 3. Eco-Innovation Activities | 3.1. Number of companies with commercialized green technology | Cleantech | - | NO |
| | 3.2. Participation level in environmental management | ISO | 2013 | Yes |
| | 3.3. Economic influence of major eco-friendly corporates | Trucost & Sustainalytics | 2014 | Yes |
| | 3.4. Green patent | OECD(WIPO) | 2011 | Yes |
| | 3.5. Distribution of renewable energy | IEA | 2014 | Yes |
| 4. Eco-Innovation Performances | 4.1. Quality of life related to environmental factors | EPI | 2014 | Yes |
| | 4.2. Greenhouse gas emission intensity | IEA | 2014 | Yes |
| | 4.3. Energy sustainability level | ESI (WEC) | 2014 | Yes |
| | 4.4. Water resource consumption intensity | IMD | 2014 | Yes |
| | 4.5. Employment rate in green technology industry | Cleantech | - | No |
| | 4.6. Green market size | UK BIS | 2012 | Yes |

# B. Statistical Processing of Data

○ Data verification and statistical processing

For the index that needed data verification, data verification was conducted for statistical processing. '1.5 Awareness level of company's sustainable management,' which is included in the eco-innovation capacity index, was borrowed from the UNGC (UN Global Compact)'s number of participating companies. Data were the accumulated values of the participating companies until the data collection period. As a result of data verification, large deviation was found as shown in the following table. Skewness and kurtosis were also not in the normal range. Data statistics of the mentioned index showed an average value of 143.88, minimum value of 1, maximum value of 1693, skewness of 4.349 and standard deviation of 273.84. The greater value of skewness corresponds to the greater degree of asymmetry in the data, resulting in the bias to one side. The positive values show right-

tailed distribution, because the data values are so large. In normal distribution, skewness will be close to 0 while index 1.5 shows right distribution of skewness value and large standard deviation. Hence the data for index 1.5 in is nonlinear.

Table 2 Data Technical Statistics (Index No. 1.5)

| Category | | Value | Standard Error |
|---|---|---|---|
| Mean | | 143.88 | 39.046 |
| 95% Confidence Interval | L1 | 65.46 | |
| | L2 | 222.31 | |
| 5% Trimmed Mean | | 94.99 | |
| Median | | 65.00 | |
| Distribution | | 77753.106 | |
| Standard Deviation | | 278.842 | |
| Minimum | | 1 | |
| Maximum | | 1693 | |
| Range | | 1692 | |
| Quartile | | 114 | |
| Skewness | | 4.349 | .333 |
| Kurtosis | | 21.250 | .656 |

The following table shows test results of normality for index 1.5, 'Awareness level of company's sustainable management,' in which the significance level was below 0.05. Hence the data did not show normal distribution. Table 3 shows results of Kolmogorov-Smirnov test and Shapiro-Wilk test, and the results appear as non-normal.

Table 3 Normal Test of Data (Index No. 1.5)

| Kolmogorov-Smirnov | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|
| Statistics | Degree of freedom | Significance Level | Statistics | Degree of freedom | Significance Level |
| .304 | 51 | .000 | .475 | 51 | .000 |

If the Q-Q graph shows normal distribution, then it will have positive correlation between the observed values in the x-axis and expected normal distribution in the y-axis, or in other words, data is distributed in linear form. However, the below graph shows that two indices have higher values compared to other data, which results in non-normal or non-linear distribution. Statistical processing

of taking log of the original data values was performed so that the data can be normally distributed.

○ Processing Missing Values

Some of the ways of processing missing values include list-wise deletion, single imputation and multiple imputation (Little and Rubin, 2002). List-wise deletion, first of all, uses the index with all needed data and is most commonly used for not causing any serious problem when the missing rate is low. Single imputation is a method that replaces missing values with one value that has been obtained in certain way. Imputation methods include average imputation, deductive imputation, exact match imputation, hot deck imputation (Little and Rubin, 1987; Min Ah Kang et. al, 2006) and EM imputation (Little and Rubin, 2002; OECD, 2005), among which, EM imputation is the latest and can be found by getting the expected value (E) and maximum likelihood estimation (M). The core idea in this method is the maximization of estimated value, which results in the most suitable value to substitute any missing value, in comparison to other methods. Index values represent the matrix of data and data in the estimation method based on probability is estimated from a model or can be explained with probability, density or function. If omega of a parameter vector with an unknown theta is known (i.e. the actual line of the mean or the actual line of the middle value with probability interval of 0.1), then the probability value can be found. The EM algorithm is found when the maximum likelihood value is applied to the parameter vector theta for missing values, which is called the M stage. Then the expected value of the missing value is repeated until the concurrence with the theta found in the M stage and this continues in the estimation process of series of variance-covariance until no changes occur. While this method maximizes expected log-likelihood value in each conditional cycle of parameter vector and observed value and requires the estimated value of the missing value in the beginning, it can be obtained by using the estimated theta to estimate the variable of missing value and then proceed with the M stage without any missing value. Some of the advantages of the EM method include that it can be used in a broad range of problems; the EM algorithm is applicable both in concept and practice; and the derive value is reliable. Though derivation of concurrence takes a while when there are many missing values, this study applied the EM method to amend the omitted data. Missing values were amended in the range of normal distribution and missing values were derived by estimating the maximum values of more than 5000 expected values.

## C. Calculation of Index

Index was calculated by using the rescaled range method mentioned in the OECD (2005) 「Handbook on Constructing Composite Indicators: Methodology and Use Guide. Many literatures suggest taking standardization before combining the data of the index because each index in the data set has different unit (Freudenberg, 2003; Jacobs et al., 2004). To apply to the index, the following ranking estimation, standardization and rescaling method was considered.

Table 4 Method of Indexing

| Method of Indexing | Formula |
|---|---|
| Ranking | $I_{cc}^{t} = Rank(x_{cc}^{t})$ |
| Standardization (Z-scores) | $I_{cc}^{t} = \frac{x_{cc}^{t} - x_{cc=\bar{c}}^{t}}{\sigma_{cc=\bar{c}}^{t}}$ |
| Re-scaling (Min-Max) | $I_{cc}^{t} = \frac{x_{cc}^{t} - \min_{c}(x_{c}^{t_b})}{\max_{c}(x_{c}^{t_b}) - \min_{c}(x_{c}^{t_b})}$ |
| Distance to reference country | $I_{cc}^{t} = \frac{x_{cc}^{t}}{x_{cc=\bar{c}}^{t_b}}$ or $\frac{x_{cc}^{t} - x_{cc=\bar{c}}^{t_b}}{x_{cc=\bar{c}}^{t_b}}$ |
| Categorical scales | $I_{cc}^{t} = \begin{cases} 0 & x_{cc}^{t} < p^{15} \\ 20 & p^{15} \le x_{cc}^{t} < p^{25} \\ 40 & p^{25} \le x_{cc}^{t} < p^{65} \\ 60 & p^{65} \le x_{cc}^{t} < p^{85} \\ 80 & p^{85} \le x_{cc}^{t} < p^{95} \\ 100 & p^{95} \le x_{cc}^{t} \end{cases}$ |

Source: Freudenberg, 2003; Jacobs et al., 2004 OECD, 2005 reconstituted

Regardless of external influences, a simple standardization method can show changes in ranking over time from a relative position. Because the Z-scores method converts mean and standard deviation into the index in same scale, index of the extreme values affects composite index. Hence, using non-extreme values will result in derivation of more accurate results than the mean value. This can be modified by excluding the index score of the extreme value or weighting the lower index values based on the desirability, which is often referred to as the Re-scaling of Min-Max. This method changes skewed index values or extreme values by standardizing the index in the same range (0;1).

Re-scaling method influences composite index in smaller interval than the Z-scores, making it more suitable for expanding the scope of index. Distance to the reference country is a method that enables setting a common goal within a limited period of time between the interested parties. For example, the goal of 8% reduction of CO2 emission by 2010 set by the members of the EU in Kyoto Protocol can be used as the standard of composite index as it can become a benchmark to other countries.

A country that has set the index receives 1 as an index and the countries that benchmark receive an approximate value of 1. This can be used to set the index based on extreme value. The Categorical Scale method can be used to measure by applying the standard scale or reference value for each index. Along with the qualitative evaluation, the quantitative evaluation is possible and the quantitative score can base on the distribution ratio of the index within the nation. In this study, Re-scaling method (Min-Max) was applied and the following formulas were used to estimate ASEI 2015.

- Formula 1 is used for the overall index evaluation of ASEI
- Formula 2 was used for eco-innovation capacity, support environment, activities and performance.
- Re-scaling (Min-Max) method in formula 3 was used for the specific index.

Each evaluation area and specific indices of evaluation area were weighted as shown in the following table.

Table 5 ASEI Index Evaluation Estimation Formula

| ASEI Index Evaluation Estimation Formula | |
|---|---|
| $2015ASEI = (\sum_{i=1}^{k} wi * Gi) / \sum_{i=1}^{k} wi$<br>w: weighted value G: evaluation area score | Formula 1. 2015 ASEI formula |
| $Gi = (\sum_{i=1}^{k} wi * I_{cc}^{t}) / \sum_{i=1}^{k} wi$ | Formula 2. ASEI evaluation area score formula |
| $I_{cc}^{t} = \frac{x_{cc}^{t} - \min_c(x_c^{t_b})}{\max_c(x_c^{t_b}) - \min_c(x_c^{t_b})}$ | Formula 3. ASEI specific index formula |
| $\sum_{i=1}^{k} wi = 1$ | Formula 4. Weighted value formula |

## D. Index Results

Eco-innovation index results of ASEM member countries in 2015 are as shown in the following table. It appears that eco-innovation of ASEM countries in higher ranking had higher capacity, support environment and performance, whereas the eco-innovation activities were low. Compared to 2014 ASEI, Korea and China showed lower eco-innovation results. In 2015 ASEI, green patent index estimation was changed from a total number to ratio, and renewable energy ratio index was added. Korea and China show low scores in eco-innovation activities area because they both have low ratio of green patent and renewable energy ratio.

Table 6 ASEI Results and Ranking

| Country | 1.1 | 1.2 | 1.5 | 2.2 | 3.2 | 3.4 | 3.5 | 4.1 | 4.2 | 4.3 | 4.4 | 4.6 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New Zealand | 79.67 | 77.27 | 21.65 | 87.17 | 6.47 | 41.03 | 51.06 | 83.31 | 73.85 | 79.11 | 93.38 | 1.12 | 61.43 |
| Laos | 27.24 | 15.99 | 0.00 | 10.16 | 8.30 | 22.42 | 48.69 | 5.90 | 64.62 | 8.69 | 16.46 | 0.18 | 17.55 |
| Malaysia | 78.05 | 57.51 | 53.15 | 69.52 | 13.75 | 36.32 | 6.98 | 83.00 | 64.62 | 62.11 | 98.00 | 3.17 | 53.41 |
| Mongolia | 23.98 | 39.61 | 24.10 | 0.00 | 0.39 | 18.83 | 5.00 | 35.79 | 10.77 | 11.83 | 40.35 | 0.00 | 14.26 |
| Myanmar | 0.00 | 0.00 | 72.12 | 3.21 | 0.00 | 22.42 | 100.00 | 15.89 | 98.46 | 22.18 | 0.52 | 0.88 | 23.91 |
| Bangladesh | 19.51 | 10.43 | 53.41 | 12.83 | 0.39 | 13.45 | 36.18 | 0.00 | 89.23 | 0.00 | 11.84 | 4.03 | 19.58 |
| Vietnam | 40.24 | 33.78 | 56.36 | 14.71 | 8.00 | 22.42 | 40.54 | 31.89 | 60.00 | 23.84 | 18.82 | 3.93 | 27.38 |
| Brunei | 25.20 | 26.65 | 0.00 | 20.59 | 4.18 | 26.91 | 0.00 | 85.61 | 67.69 | 21.07 | 36.65 | 0.01 | 22.61 |
| Singapore | 97.97 | 87.73 | 56.15 | 93.85 | 17.28 | 19.73 | 3.22 | 100.00 | 93.85 | 34.75 | 95.52 | 1.80 | 63.26 |
| India | 39.43 | 31.15 | 77.46 | 35.03 | 3.59 | 15.70 | 33.89 | 4.01 | 63.08 | 0.37 | 11.93 | 47.41 | 31.86 |
| Indonesia | 54.07 | 26.96 | 77.46 | 36.90 | 3.76 | 23.32 | 44.79 | 36.66 | 83.08 | 42.51 | 51.72 | 12.10 | 39.72 |
| Japan | 90.65 | 72.60 | 72.79 | 94.12 | 16.30 | 42.15 | 6.03 | 93.07 | 69.23 | 65.62 | 97.15 | 47.97 | 67.23 |
| China | 67.07 | 59.66 | 75.60 | 32.89 | 25.35 | 59.42 | 14.63 | 17.84 | 21.54 | 27.73 | 82.88 | 100.00 | 45.87 |
| Kazakhstan | 47.97 | 29.04 | 41.58 | 36.90 | 1.80 | 65.02 | 1.30 | 65.17 | 9.23 | 56.75 | 73.72 | 1.59 | 35.11 |
| Cambodia | 26.42 | 19.98 | 9.32 | 14.97 | 0.46 | 0.00 | 96.19 | 17.84 | 100.00 | 4.62 | 0.00 | 0.31 | 22.58 |
| Thailand | 57.72 | 43.51 | 47.03 | 25.94 | 15.09 | 11.21 | 25.62 | 59.04 | 67.69 | 9.43 | 57.30 | 7.41 | 33.21 |
| Pakistan | 7.32 | 9.66 | 63.83 | 11.23 | 1.37 | 26.91 | 50.74 | 12.11 | 86.15 | 15.90 | 11.24 | 4.78 | 22.63 |
| Philippines | 47.15 | 22.66 | 53.90 | 39.04 | 4.18 | 27.58 | 52.63 | 43.74 | 93.85 | 45.84 | 2.57 | 6.06 | 36.70 |
| Korea | 69.92 | 78.93 | 75.79 | 44.12 | 9.05 | 53.81 | 2.55 | 74.30 | 52.31 | 34.94 | 95.84 | 13.81 | 48.76 |
| Australia | 74.80 | 78.36 | 63.59 | 79.14 | 10.72 | 57.62 | 7.50 | 100.00 | 49.23 | 70.06 | 98.40 | 7.54 | 60.43 |
| Greece | 32.52 | 42.78 | 57.71 | 32.35 | 12.41 | 41.48 | 12.46 | 88.08 | 66.15 | 50.83 | 95.01 | 2.91 | 39.85 |
| Netherlands | 89.84 | 90.72 | 62.73 | 86.36 | 11.07 | 54.26 | 7.10 | 89.02 | 73.85 | 67.10 | 97.60 | 6.25 | 64.59 |
| Norway | 85.77 | 79.64 | 61.95 | 87.97 | 12.02 | 65.70 | 64.46 | 100.00 | 93.85 | 86.69 | 98.72 | 2.31 | 71.86 |
| Denmark | 83.33 | 83.92 | 76.99 | 100.00 | 12.32 | 56.95 | 35.92 | 97.35 | 84.62 | 87.62 | 99.60 | 1.98 | 72.68 |
| Germany | 91.46 | 80.59 | 79.18 | 95.19 | 7.87 | 54.26 | 15.95 | 90.42 | 76.92 | 75.42 | 98.29 | 32.64 | 69.92 |
| Latvia | 51.22 | 55.76 | 29.56 | 60.43 | 24.67 | 47.09 | 51.80 | 72.59 | 83.08 | 48.98 | 97.26 | 0.30 | 51.89 |

| Country | 1.1 | 1.2 | 1.5 | 2.2 | 3.2 | 3.4 | 3.5 | 4.1 | 4.2 | 4.3 | 4.4 | 4.6 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Russia | 45.93 | 43.20 | 58.08 | 24.06 | 1.44 | 74.44 | 3.91 | 63.46 | 0.00 | 56.01 | 91.67 | 19.59 | 36.47 |
| Romania | 43.09 | 40.85 | 42.18 | 31.02 | 100.00 | 47.98 | 20.02 | 45.54 | 66.15 | 46.21 | 93.48 | 2.62 | 44.96 |
| Luxemburg | 78.46 | 82.45 | 40.30 | 90.11 | 6.63 | 64.80 | 5.49 | 89.60 | 72.31 | 61.00 | 100.00 | 0.27 | 61.86 |
| Lithuania | 51.63 | 47.32 | 57.53 | 60.70 | 31.17 | 92.83 | 21.08 | 62.95 | 80.00 | 54.16 | 97.43 | 0.59 | 55.06 |
| Malta | 49.19 | 68.23 | 21.65 | 56.42 | 9.67 | 20.85 | 1.80 | 93.13 | 76.92 | 22.00 | 91.18 | 0.02 | 42.55 |
| Belgium | 78.86 | 71.00 | 57.15 | 87.17 | 8.72 | 37.44 | 13.94 | 86.06 | 72.31 | 64.70 | 97.73 | 4.17 | 60.30 |
| Bulgaria | 45.93 | 46.74 | 55.07 | 21.93 | 42.54 | 71.75 | 11.93 | 81.35 | 40.00 | 33.27 | 78.10 | 0.81 | 39.99 |
| Sweden | 88.21 | 94.48 | 70.65 | 87.43 | 30.19 | 58.30 | 50.92 | 99.42 | 98.46 | 93.90 | 99.06 | 3.23 | 74.29 |
| Switzerland | 100.00 | 100.00 | 65.47 | 98.93 | 26.10 | 44.39 | 31.89 | 89.50 | 96.92 | 100.00 | 99.02 | 3.11 | 74.82 |
| Spain | 53.25 | 65.64 | 100.00 | 50.00 | 37.50 | 55.83 | 17.29 | 97.38 | 83.08 | 71.53 | 95.66 | 20.68 | 58.38 |
| Slovakia | 36.99 | 49.29 | 32.25 | 51.60 | 35.28 | 69.06 | 11.26 | 83.27 | 73.85 | 79.11 | 99.00 | 1.06 | 49.23 |
| Slovenia | 39.84 | 61.12 | 35.50 | 65.24 | 26.43 | 77.35 | 20.50 | 88.31 | 72.31 | 60.26 | 97.01 | 0.48 | 53.96 |
| Ireland | 70.73 | 82.03 | 36.43 | 71.12 | 11.89 | 38.12 | 8.71 | 95.41 | 84.62 | 66.36 | 99.52 | 1.51 | 55.81 |
| Estonia | 59.76 | 70.67 | 21.65 | 73.80 | 48.06 | 36.32 | 20.91 | 85.05 | 18.46 | 18.48 | 84.78 | 0.21 | 50.25 |
| UK | 88.21 | 94.66 | 77.51 | 75.94 | 22.87 | 45.29 | 6.43 | 98.80 | 83.08 | 92.42 | 99.56 | 28.79 | 67.03 |
| Austria | 78.05 | 74.81 | 55.94 | 94.65 | 9.47 | 67.04 | 43.69 | 89.44 | 84.62 | 87.80 | 98.34 | 3.14 | 69.25 |
| Italy | 47.97 | 57.62 | 72.30 | 40.64 | 44.36 | 35.20 | 18.49 | 73.99 | 81.54 | 59.89 | 95.83 | 20.08 | 49.72 |
| Czech Republic | 52.44 | 67.74 | 37.29 | 63.37 | 54.56 | 100.00 | 10.72 | 87.24 | 50.77 | 60.63 | 98.52 | 2.50 | 57.72 |
| Croatia | 36.18 | 46.77 | 52.89 | 46.26 | 34.53 | 81.61 | 16.81 | 76.75 | 78.46 | 62.85 | 98.57 | 1.13 | 49.85 |
| Cyprus | 43.50 | 58.00 | 35.50 | 54.55 | 8.17 | 44.84 | 0.08 | 93.90 | 67.69 | 32.53 | 98.42 | 0.14 | 44.11 |
| Portugal | 52.85 | 57.58 | 56.95 | 69.79 | 17.51 | 43.50 | 28.95 | 98.26 | 84.62 | 59.52 | 92.76 | 2.20 | 55.76 |
| Poland | 50.41 | 46.52 | 58.77 | 48.13 | 8.69 | 72.42 | 12.60 | 66.40 | 52.31 | 52.68 | 95.87 | 6.58 | 46.51 |
| France | 74.80 | 72.09 | 94.00 | 66.58 | 11.21 | 52.69 | 11.93 | 95.71 | 90.77 | 87.62 | 98.25 | 23.39 | 62.82 |
| Finland | 91.87 | 90.89 | 53.66 | 98.93 | 23.72 | 55.83 | 40.74 | 100.00 | 72.31 | 81.52 | 99.03 | 1.98 | 72.20 |
| Hungary | 42.28 | 55.32 | 40.30 | 45.72 | 32.02 | 82.29 | 10.72 | 84.84 | 76.92 | 62.85 | 93.12 | 2.20 | 49.34 |

○ Results of Specific Areas

〈Eco-Innovation Capacity〉

The Index measured for eco-innovation capacity were 1.1. Potential to improve national competitiveness, 1.2. General innovation capacity of nation, and 1.5. Awareness level of company's sustainable management. The maximum and minimum values and standard deviation of 1.1 index were 3.24(Myanmar), 5.70(Switzerland), and 0.60, respectively. Standard deviation of the indexed value was 24.39. The maximum and minimum values and standard deviation of 1.2 index were 19.64(Myanmar), 64.78(Switzerland), and 11.27, respectively. Standard deviation of the indexed value was 24.96. The maximum and minimum values and standard deviation of 1.5 were 1.00(Laos), 1693(Spain), and 278.84, respectively, and the standard deviation of indexed value was 16.48. Missing data for 1.1 and1.2 were Brunei and Laos, respectively, and 1.5 index did not have missing country. Values of missing country were amended by using the EM method.

〈Eco-Innovation Support Environment〉

Eco-Innovation Support Environment was assessed by looking at the specific index of 2.2. Implementation of environmental regulations. The minimum and maximum value of this index were 2.55(Mongolia) and 6.29(Demark), respectively, and standard deviation was 1.07. Standard deviation of the indexed value was 0.33, which is rather large. This index, in particular, became the single indicator of eco-innovation support environment, affecting 25% of the total eco-innovation value. Due to the high standard deviation value, it was considered to require improvement in the future. In addition, index 2.2 was missing values from Laos, Myanmar, Brunei, Singapore and Malta. EM method was used to amend for the missing data as done for the previous index.

〈Eco-Innovation Activities〉

The index included in eco-innovation activities are 3.2. Participation level in environmental management, 3.3 Economic influence of major eco-friendly corporates, 3.4. Green patent, and 3.5. Distribution of renewable energy. The minimum and maximum value of the original data of 3.2. Participation level in environmental management was found to be 0.06(Myanmar) and 30.67(Romania), respectively, with standard deviation of 5.52. Standard deviation of the indexed value was 18.03. The minimum and maximum value of 3.4. Green patent was 0.04(Mongolia) and 3.66(Czech Republic), respectively, with standard deviation of 0.85. Standard deviation of the indexed value was 23.48. For 3.5. Distribution of renewable energy, minimum, maximum, and standardized deviation values were 0(Brunei), 74.62(Myanmar), and 17.08, respectively, and the standard deviation of indexed value was 22.89. The value of 3.2. Participation level in environmental management was missing from Laos, which was substituted with a valid data value found by using EM method. The index 3.5. Distribution of renewable

energy was missing data from Laos and Brunei, which were replaced in a similar manner by using the EM method. On the other hand, 3.4. Green patent was measured by a ratio of the green patents to the entire patents.

Data were missing from 10 countries including Laos, Myanmar, Bangladesh, Vietnam, Brunei, Kazakhstan, Cambodia, Thailand, Pakistan, and Cyprus. It was used when the number of green patents or the entire patents was not known.

〈Eco-Innovation Performance〉

The index included in eco-innovation performance are 4.1. Quality of life related to environmental factors, 4.2. Greenhouse gas emission intensity, 4.3. Energy sustainability level, 4.4. Water resource consumption intensity, and 4.6. Green market size. The minimum, maximum and standard deviation values of index 4.1 were 30.42(Bangladesh), 99.44(Singapore), and 20.80, respectively, and standard deviation of the indexed value came out to be 30.13. For index 4.2, minimum, maximum and standard deviation values were 0.11(Cambodia), 0.76(Russia), and 0.15, respectively, and standard deviation of the indexed value came out to be 23.56. Unlike other indices, lower value of index 4.2 means lower emission of greenhouse gas per unit production.

The minimum, maximum and standard deviation values of index 4.3 were 1.60(Bangladesh), 7.01(Switzerland), and 1.47, respectively, and standard deviation of the indexed value came out to be 27.12. For index 4.4, the minimum, maximum and standard deviation values were 0.74(Luxemburg), 542.15(Cambodia), and 180.20, respectively, and standard deviation of the indexed value was 33.28. The lower value of index 4.4 represents more efficiency in the water resource consumption. Lastly, the minimum, maximum and standard deviation values of index 4.6 were 328.29(Mongolia), 444,324.31(China), and 76326.51, respectively, and standard deviation of the indexed value was 17.19. Index 4.1 and 4.6 had no missing values but index 4.2 was missing from Laos. Laos, Myanmar and Brunei were missing from index 4.3 and Laos, Mongolia, Myanmar, Bangladesh, Vietnam, Brunei, Singapore, Cambodia, Pakistan, and Malta were missing from index 4.4.

# 3. Index Result Analysis

## A. Result Analysis by Region

○ ASEI Result Analysis by Region

Comparing the results of eco-innovation evaluation areas of countries in Asia and Europe, countries in Europe showed higher level of capabilities, activities and performances and especially high level in the eco-innovation support environment. Through eco-innovation initiatives like ETAP, Europe has established foundation to support national policies, high social awareness for eco-innovation and has advanced eco-friendly technologies and industries. In Europe, eco-innovation for corporates was facilitated through means of environmental regulations and high awareness in society and market resulted in the activities and performances of eco-innovation. As leaders of eco-innovation, European countries initiated international issues to create eco-friendly market and actively supported by implementing official assistance activities to expand the related markets.

On the other hand, Asian countries showed relatively low level of national interest and political support, despite high eco-innovation capabilities, as compared to the European countries. In Asia, Korea and Japan are actively involved in implementing and expanding eco-innovation and are attempting eco-innovation in various ways in relation to sustainable development regime so that Asian countries can apply eco-innovation according to their own industrial structure and national status. With regards to renewable energy industry, related to the traditional eco-innovation, rising nations like China are dominating the international market with full support from their governments and are showing rapid growth. In both region groups, eco-innovation activities were lower than other areas, suggesting that more efforts are needed to bring practical activities.

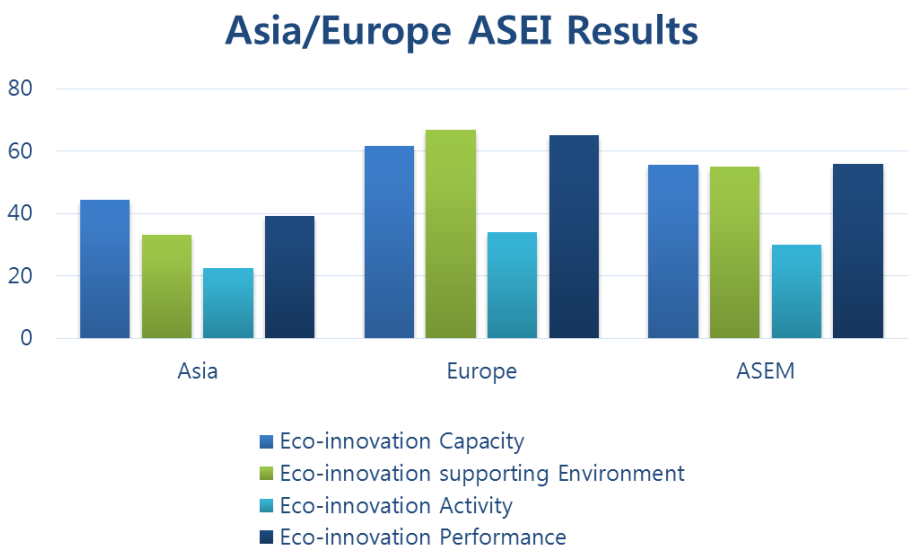



Figure 4 ASEI results by region

# B. ASEI Result Analysis by National Development Stage

○ ASEI Result Analysis by National Development Stage

The categorization of national development stage followed that of WEF (2015), which divided countries into 5 groups according to the development stage based on GDP and exportation of raw material. Countries in stage 1 have low GDP and raw material sales-based economy structure and their national competence depends largely on the production elements. Countries in stage 2 and 3 are improving their national competence level through efficiency enhancement and innovation, respectively. ASEM member countries can be categorized according to the development stage as shown in following Table.

Table 7 National Development Stages

| Stage | Europe | Asia |
|---|---|---|
| 1 | - | Vietnam, Lao PDR, India, Pakistan, Cambodia, Bangladesh, Myanmar |
| 1-2 | - | Mongolia, Philippines, Brunei Darussalam |
| 2 | Romania, Bulgaria | China, Thailand, Indonesia |
| 2-3 | Estonia, Slovakia, Russian Federation, Lithuania Latvia, Poland, Hungary, Croatia | Malaysia, Kazakhstan |

| Stage | Europe | Asia |
|---|---|---|
| 3 | Luxembourg, Norway, Switzerland, Denmark, Sweden, Austria, Netherlands, Ireland, Finland, Belgium, Germany, France, United Kingdom, Italy, Spain, Cyprus, Slovenia, Greece, Portugal, Malta, Czech Republic | Australia, Singapore, New Zealand, Japan, Republic of Korea |

Support environment and performance of eco-innovation show increase according to the national development stage because countries in higher stages already have strategies that improve national competence and have great interest in eco-innovation and are already operating political measures. Low eco-innovation activities were a similar feature in all countries, indicating that transition to green economy is in the beginning stage yet. Distribution level of renewable energy included biomass energy, which gave higher scores to countries in stage 1 and 2 and lower score to those in stage 3. Eco-innovation capabilities showed step-wise increase according to the development stage, but countries located in the transitional stage (1→2, 2→3) showed no difference, whereas ASEI results showed increase according to the national development stage.

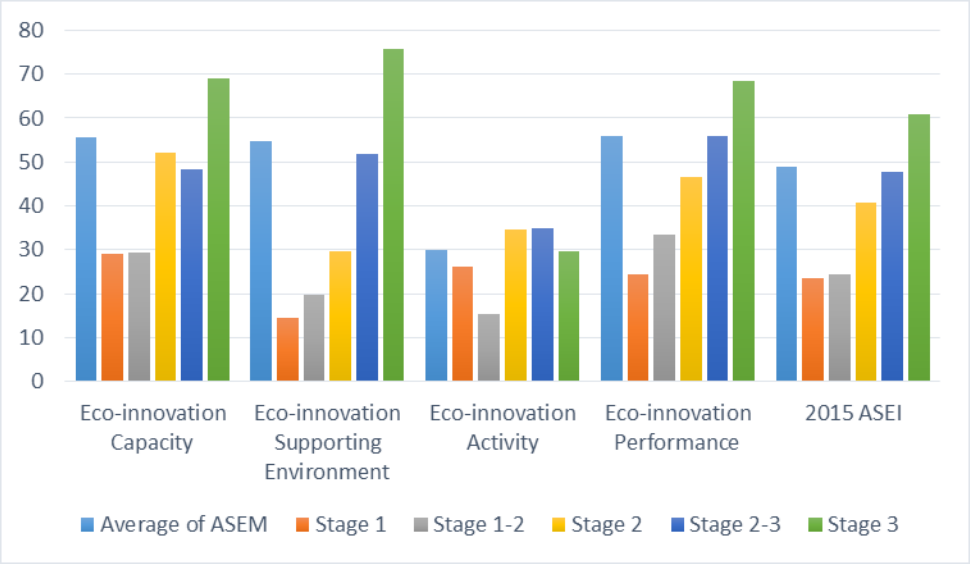



Figure 5 ASEI results by stages

# C. Country Level Analysis

This chapter provides country level analysis for 51 ASEM member countries. Country level analysis includes country profile, ASEI quantitative analysis and qualitative analysis for each 51 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 GDP per capita data are collected from World Economic Database (Oct 2015) that provided IMF (International Monetary Fund). The Flag of the country, population, industry structure ($1^{st}$:$2^{nd}$:$3^{rd}$) and geographic location information are collected from the date of Central Intelligence Agency (CIA)[1]. Human Development Index (HDI) is collected from the UN Development programme (UNDP)'s 2015 report[2]. Sustainable social and environmental index are collected from the national competitiveness index of the WEF[3].

The quantitative analysis consisted of ASEI quantitative analysis of country and a comparative analysis for country state of development level and ASEI results. ASEI qualitative analysis includes eco-innovation policy and present condition.

Table 8 Eco-Innovation country level analysis

| Division | Contents |
|---|---|
| Country Profile | - Flag of the country<br>- per capita GDP<br>- Population / Industry structure (1st:2nd:3rd)<br>- Human Development Index; HDI<br>- Social and environmental sustainable index<br>- Geographical location information |
| ASEI Quantitative Analysis | - ASEI quantitative analysis of country<br>- Comparative analysis by state of development level<br>- Detailed indicator results of ASEI |
| ASEI Qualitative Analysis; Eco-innovation Policy Analysis | - Eco-innovation policy investigation<br>- Eco-innovation present condition analysis |

1 https://www.cia.gov

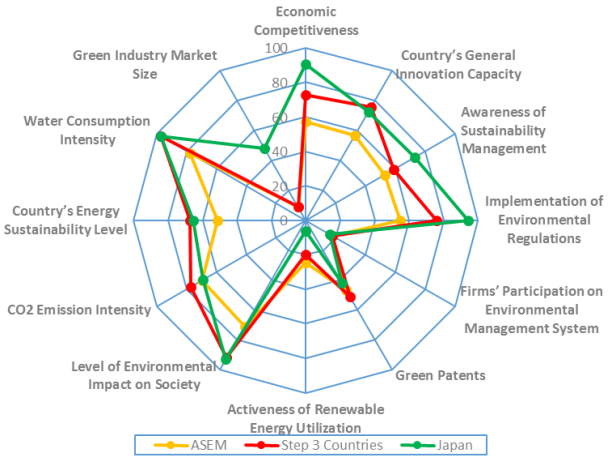
2 http://hdr.undp.org/en/content/human-development-index-hdi

3 http://www.weforum.org/

# Japan

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 32,480 | 126.9 million | 1:27:72 | 0.891 Very High | 6.29 | 5.83 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **67.23** |
| **Eco-Innovation Capacity** | 78.68 |
| Economic Competitiveness | 90.65 |
| Country's General Innovation Capacity | 72.60 |
| Awareness of Sustainability Management | 72.79 |
| **Eco-Innovation Supporting Environment** | 94.12 |
| Implementation of Environmental Regulations | 94.12 |
| **Eco-Innovation Activities** | 21.49 |
| Firms' Participation on Environmental Management System | 16.30 |
| Green Patents | 42.15 |
| Activeness of Renewable Energy Utilization | 6.03 |
| **Eco-Innovation Performance** | 74.61 |
| Level of Environmental Impact on Society | 93.07 |
| $CO_2$ Emission Intensity | 69.23 |
| Country's Energy Sustainability Level | 65.62 |
| Water Consumption Intensity | 97.15 |
| Green Industry Market Size | 47.97 |




- Japan's eco-innovation capacity, supporting environment and performance are higher than the average score of the same development state countries. However, eco-innovation activity is low.
- Ecomomic Competitiveness (indicator no. 1.1) and Green Industry Market Size (4.6) of Japan are higher than the average score of the same development state countries.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) is lower than the average score of the same development state countries.

Table 9 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)<br>■ Green Innovation Strategy (2010)<br>■ Strategic Energy Plan (2010)<br>■ Third Science and Technology Basic Plan (2006-2010) |
| Programmes and actions | National | ■ Top runner program<br>■ The Japan Environmental Technology Verification Programme (J-ETV) (2003)<br>■ Eco Leaf Program<br>■ Eco-Action 21<br>■ Eco-Town project<br>■ Carbon Footprint Program<br>■ The Cool Earth Innovative Energy Technology Programme (2008)<br>■ 3Rs (Reduce, Reuse, Recycle) Programme |
| | International | - |
| Legislation | | ■ Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services (Green Purchasing Law)<br>■ 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)<br>■ Asia-Pacific Regional Inception Workshop on Environmentally Sound Management of Electronic and Electrical Wastes (2005)<br>■ Eco Mark Program & Global Eco-labeling Network<br>■ Green purchasing network<br>■ Regional Innovation Cluster Programme<br>■ 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.

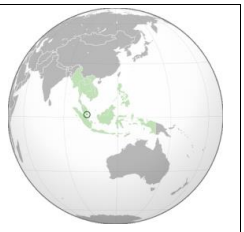
Specific plans and programs to promote eco-innovation have been developed for sustainable development by establishing the "New growth strategy", "Green Innovation Strategy" and "Strategic Energy Plan". In order to foster high technology in the medium-long term, "Third Science and Technology Basic Plan" 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 achieved 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"[4] for environmental management and "Carbon Footprint Program" and "The Eco-Point Program" for environment-friendly society and green market activation.

METI[5] 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)".

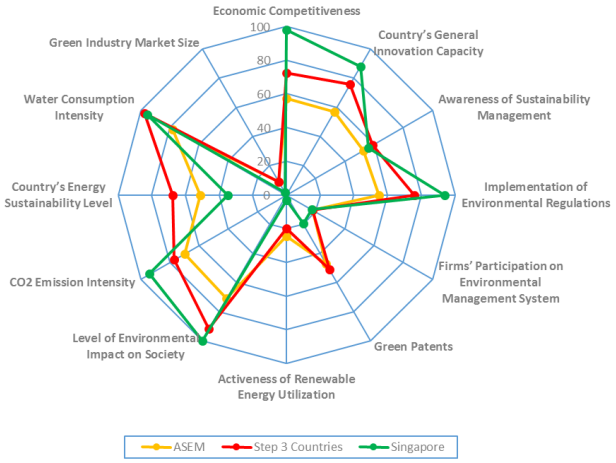
[4] 3Rs (Reduce, Reuse, Recycle) Programme

[5] Ministry of Economy, Technology, and Industry(METI)

# Singapore

|  | 53,224 | 5,7 million | 1:15:84 | 0.912 Very High | - | - |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **63.26** |
| **Eco-Innovation Capacity** | 80.62 |
| Economic Competitiveness | 97.97 |
| Country's General Innovation Capacity | 87.73 |
| Awareness of Sustainability Management | 56.15 |
| **Eco-Innovation Supporting Environment** | 93.85 |
| Implementation of Environmental Regulations | 93.85 |
| **Eco-Innovation Activities** | 13.41 |
| Firms' Participation on Environmental Management System | 17.28 |
| Green Patents | 19.73 |
| Activeness of Renewable Energy Utilization | 3.22 |
| **Eco-Innovation Performance** | 65.18 |
| Level of Environmental Impact on Society | 100.00 |
| $CO_2$ Emission Intensity | 93.85 |
| Country's Energy Sustainability Level | 34.75 |
| Water Consumption Intensity | 95.52 |
| Green Industry Market Size | 1.80 |




- Singapore's eco-innovation capacity, supporting environment and performance are higher than the average score of the same development state countries. However, eco-innovation activity is low.
- Ecomomic Competitiveness (indicator no. 1.1) and $CO_2$ Emission Intensity (indicator no. 4.2) of Singapore are higher than the average score of the same development state countries.
- Country's Energy Sustainability Level (indicator no. 4.3) is lower than the average score of the same development state countries.

Table 10 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<br>■ Green Port Programme<br>■ Green Technology Programme |
| | International | - |
| Legislation | | ■ Environmental Protection and Management Act<br>■ Hazardous Waste Act (1998) |
| Finance | | ■ Innovation for Environmental Sustainability Fund<br>■ 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[6]. GDP of Singapore has increased 3.9 times from 1990 to 2009 and R&D spending accounted for 2.3% of GDP[7]. 20.7% and 68.5% of GDP accounted from secondary and tertiary industry respectively[8]. 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”[9]. “Green Ship[10]” and “Green Port[11]” are working to reduce the environmental pollution caused by the use of the harbor.

6 A*STAR, 2011, STEP 2015 (8p)

7 A*STAR, 2011, STEP 2015 (2p)

8 MTI, 2012, Economic Survey of Singapore (iiip)

9 http://www.mpa.gov.sg/sites/maritime_singapore/msgi/maritime-singapore-green-initiative.page

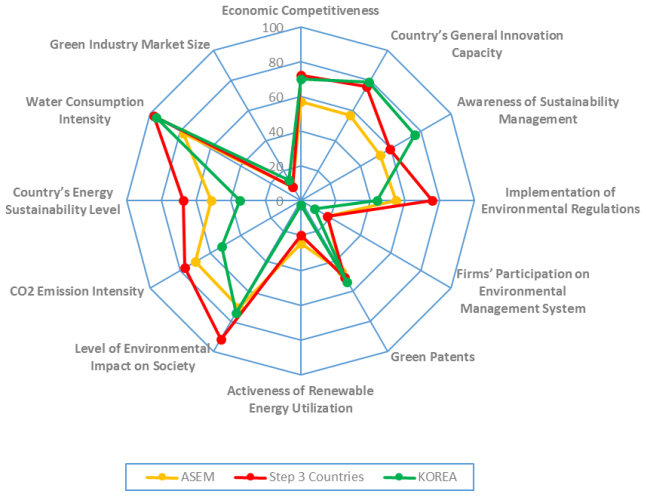
10 http://www.mpa.gov.sg/sites/maritime_singapore/msgi/green-shipping-programme.page

11 http://www.mpa.gov.sg/sites/maritime_singapore/msgi/green-port-programme.page

# Republic of Korea

|  | 27,513 | 49 million | 2:38:60 | 0.898 Very high | 5.25 | 4.85 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **48.76** |
| **Eco-Innovation Capacity** | 74.88 |
| Economic Competitiveness | 69.92 |
| Country's General Innovation Capacity | 78.93 |
| Awareness of Sustainability Management | 75.79 |
| **Eco-Innovation Supporting Environment** | 44.12 |
| Implementation of Environmental Regulations | 44.12 |
| **Eco-Innovation Activities** | 21.80 |
| Firms' Participation on Environmental Management System | 9.05 |
| Green Patents | 53.81 |
| Activeness of Renewable Energy Utilization | 2.55 |
| **Eco-Innovation Performance** | 54.24 |
| Level of Environmental Impact on Society | 74.30 |
| $CO_2$ Emission Intensity | 52.31 |
| Country's Energy Sustainability Level | 34.94 |
| Water Consumption Intensity | 95.84 |
| Green Industry Market Size | 13.81 |




- Korea's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Awareness of Sustainability Management (indicator no. 1.5) of Korea is higher than the average score of the same development state countries.
- $CO_2$ Emission Intensity (indicator no. 4.2) and Country's Energy Sustainability Level (4.3) are lower than the average score of the same development state countries.

Table 11 Eco-innovation Policy instruments of Republic of Korea

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Green Vision 21 (1996-2005)<br>■ National Action Plan for the Implementation of Agenda 21 (1996)<br>■ State Environmental Mission for a New Millennium (2001) |
| | Eco-innovation | ■ Green growth strategy (2009-2050)<br>■ The Green New Deal (2009-2012)<br>■ National Energy Master Plan (2008)<br>■ The Five-Year Plan for Green Growth (2009-2013)<br>■ 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)<br>■ The high-efficiency appliance certification (1996)<br>■ Standby electricity reduction programme (1999)<br>■ GHG & Energy target management system (2010)<br>■ Carbon point scheme<br>■ The Greening Cities project<br>■ Climate Change Adaptation Model City project<br>■ The Eco-city project and the low carbon, green village project |
| | International | |
| Legislation | | ■ Act on Promotion of Purchase of Green Products (2005)<br>■ Framework Act and Low Carbon and Green Growth (2010)<br>■ Act on the Allocation and Trading of Greenhouse-Gas Emission Permits (2012) |
| Finance | | ■ Environmental Improvement Fund<br>■ Recycling Industry Promoting Fund |
| Information | | ■ Seoul Initiative Network on Green Growth (2005)<br>■ Local Green Networks<br>■ Green Technology Network(GTNET) (2009)<br>■ East Asia Climate Partnership (2008) |

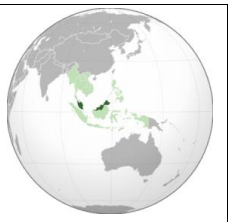
Republic of Korea has announced a five-year plan (2009-2013) and aims to grow green power to enter the top five in the world by 2050. It is composite of three strategies and major ten policy sectors. Three strategies are adaptation to climate change, energy independence and new growth engines. Policy 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 supports were conducted to realize those policy goals. 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[12]" and "Mandatory energy-efficiency standards and labeling[13]" 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 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.

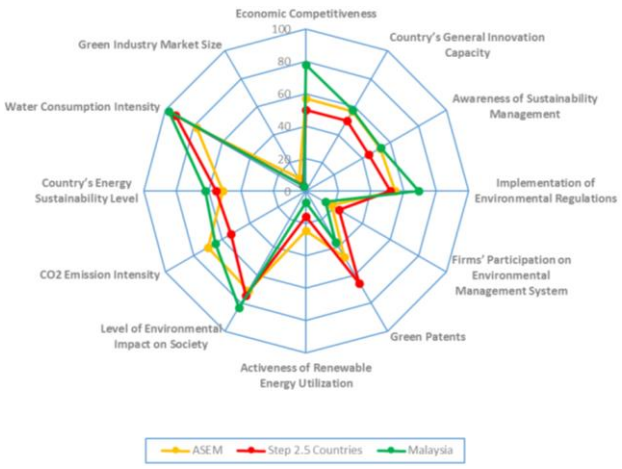
[12] Ten-year Basic Plan for the Development and Dissemination of New and Renewable Technologies (released in 2003)

[13] Mandatory energy-efficiency standards and labeling (1992)

# Malaysia

|  | 10,073 | 30.5 million | 9:35:56 | 0.779 High | 5.59 | 4.86 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **53.41** |
| **Eco-Innovation Capacity** | 62.90 |
| Economic Competitiveness | 78.05 |
| Country's General Innovation Capacity | 57.51 |
| Awareness of Sustainability Management | 53.15 |
| **Eco-Innovation Supporting Environment** | 69.52 |
| Implementation of Environmental Regulations | 69.52 |
| **Eco-Innovation Activities** | 19.02 |
| Firms' Participation on Environmental Management System | 13.75 |
| Green Patents | 36.32 |
| Activeness of Renewable Energy Utilization | 6.98 |
| **Eco-Innovation Performance** | 62.18 |
| Level of Environmental Impact on Society | 83.00 |
| $CO_2$ Emission Intensity | 64.62 |
| Country's Energy Sustainability Level | 62.11 |
| Water Consumption Intensity | 98.00 |
| Green Industry Market Size | 3.17 |




- Malaysia's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Economic Competitiveness (indicator no. 1.1) and Implementation of Environment Regulation (indicator no. 2.2) of Malaysia are higher than the average score of the same development state countries.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) of Malaysia is lower than the average score of the same development state countries.

Table 12 Eco-innovation Policy instruments of Malaysia

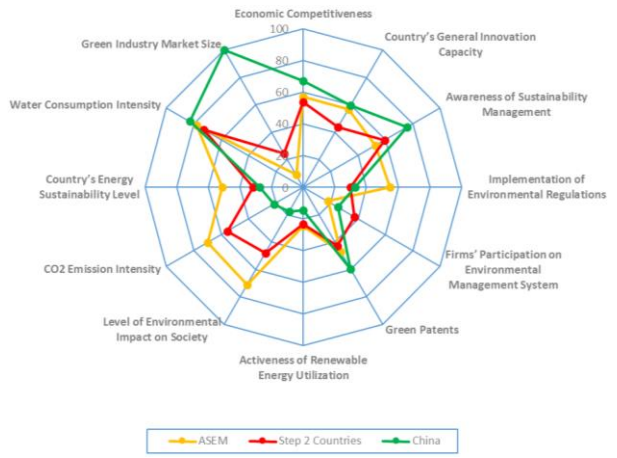
| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ The 10th Malaysia Plan |
| | Eco-innovation | ■ Green Technology Master Plan 2030 |
| Programmes and actions | National | ■ Government Green Procurement program<br>■ Green TAG Endorse program<br>■ Small Renewable Energy Programme (SREP) |
| | International | ■ Malaysia-New Zealand Environmental Cooperation Agreement |
| Legislation | | ■ Environmental Quality Act 1974<br>■ Renewable Energy Act 2011 |
| Finance | | ■ Green technology financing scheme<br>■ 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. 8$^{th}$ national plan (2001-2005) included development instrument focusing on renewable energy and energy efficient and 10$^{th}$ 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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 8,280 | 1367 million | 9:43:48 | 0.727 High | 4.96 | 4.28 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **45.87** |
| **Eco-Innovation Capacity** | 67.44 |
| Economic Competitiveness | 67.07 |
| Country's General Innovation Capacity | 59.66 |
| Awareness of Sustainability Management | 75.60 |
| **Eco-Innovation Supporting Environment** | 32.89 |
| Implementation of Environmental Regulations | 32.89 |
| **Eco-Innovation Activities** | 33.13 |
| Firms' Participation on Environmental Management System | 25.35 |
| Green Patents | 59.42 |
| Activeness of Renewable Energy Utilization | 14.63 |
| **Eco-Innovation Performance** | 50.00 |
| Level of Environmental Impact on Society | 17.84 |
| $CO_2$ Emission Intensity | 21.54 |
| Country's Energy Sustainability Level | 27.73 |
| Water Consumption Intensity | 82.88 |
| Green Industry Market Size | 100.00 |




- China's eco-innovation capacity and performance are high. However, eco-innovation supporting environment and activity are low.
- Green Patents (indicator no. 1.1) and Green Industry Market Size (indicator no. 4.6) of China are higher than the average score of the same development state countries.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) and Level of Environmental Impact on Society (indicator no. 4.1) of China are lower than the average score of the same development state countries.

Table 13 Eco-innovation Policy instruments of China

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ The 12th five-year plan (2011-2016)<br>■ 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)<br>■ Government energy efficiency programs (2006)<br>■ China Greentech Partner Program |
| | International | |
| Legislation | | ■ Renewable Energy Law (2005)<br>■ Energy Conservation Law (2008)<br>■ China Circular Economy Promotion Law (2009) |
| Finance | | ■ China CDM Fund<br>■ Mobilizing financing from national new products program & national key technologies R&D program<br>■ National Key Laboratories Programmes-Public investment in environmental R&D |
| Information | | ■ The Regional Inclusive Innovation Policy Forum (2012)<br>■ China-Japan-US Forum on Sustainable Built Environment (CJUFSBE)<br>■ The 30th Meeting of APECSMEWG (Small and Medium Enterprises Working Group) (2010)<br>■ 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[14]. In line with the national plan, 'Energy Saving and New Energy Vehicle Development Plan'[15] 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'[16]. It has a purpose to enhance energy efficiency for top 1,000 companies and start their

[14] National Plan for Science and Technology Development (2006-2020): prioritized field of research includes energy, water, environment etc.

[15] Energy Saving and New Energy Vehicle Development Plan (2011-2020)

[16] Thousand Enterprises program (2006)

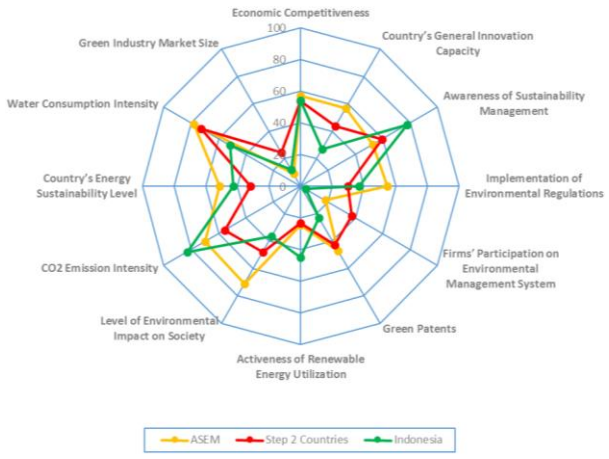
program in 2006. It expands the target companies from 1,000 to 10,000 by criteria of energy consumption. China has implemented a strong government-led policy to improve energy efficiency and switch to renewable energy. In 2009, a national plan was established to build a 'Smart Grid' by 2010 and carried out plan whit the local government energy company[17]. 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 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.

[17] State Grid Corporation of China(SGCC)

# Indonesia

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 3,416 | 256 million | 14:43:43 | 0.684 Medium | 4.31 | 4.26 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **39.72** |
| **Eco-Innovation Capacity** | 52.83 |
| Economic Competitiveness | 54.07 |
| Country's General Innovation Capacity | 26.96 |
| Awareness of Sustainability Management | 77.46 |
| **Eco-Innovation Supporting Environment** | 36.90 |
| Implementation of Environmental Regulations | 36.90 |
| **Eco-Innovation Activities** | 23.95 |
| Firms' Participation on Environmental Management System | 3.76 |
| Green Patents | 23.32 |
| Activeness of Renewable Energy Utilization | 44.79 |
| **Eco-Innovation Performance** | 45.21 |
| Level of Environmental Impact on Society | 36.66 |
| $CO_2$ Emission Intensity | 83.08 |
| Country's Energy Sustainability Level | 42.51 |
| Water Consumption Intensity | 51.72 |
| Green Industry Market Size | 12.10 |




- Indonesia's eco-innovation capacity and performance are high. However, eco-innovation supporting environment and activity are low.
- Awareness of Sustainability Management (indicator no. 1.5) and $CO_2$ Emission Intensity (indicator no. 4.2) of Indonesia are higher than the average score of the same development state countries.
- Country's General Innovation Capacity (indicator no. 1.2) and Firm's Participation on Environmental Management System (indicator no. 3.2) of Indonesia are lower than the average score of the same development state countries.

Table 14 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)<br>■ Eco-industry program<br>■ Green Investment Program<br>■ Low Cost Green Car (LCGC) program |
| | International | ■ The APEC Policy Partnership on Science, Technology and Innovation (PPSTI)<br>■ Indonesia-Singapore Environmental Partnership (ISEP) (2002) |
| Legislation | | ■ Law No. 32/2009 on Environmental Protection and Management |
| Finance | | ■ Green Investment Program<br>■ Environmental Soft Loans(for SMEs)<br>■ The Indonesia Climate Change Trust Fund |
| Information | | ■ BAPEDAL Regional Network Project (1996~2005)<br>■ 7th Regional Environmentally Sustainable Transport(EST) Forum |

With its abundant resources, Indonesia is strongly founded in agriculture, but recent industrial development brought expansion in the manufacturing and service businesses. Indonesia is also one of the biggest exporters of palm oil, cocoa, tin, steel, copper, rubber, and fish. De-spite its rapid economic growth, Indonesia is in need of innovation for sustainable development since Indonesia is currently relying on agriculture and other industry forms that are sustained by gathering and collecting natural resources. The infrastructure of Indonesia especially plays as an important role in improving the country's competitiveness as a distribution center of the East Asia. Indonesia is already aware of the need for technical advancement in order to improve their data communication technology. In order to do so, country calls for high-quality manpower, however 50% of their population still remains at an elementary level of education and only 8% of the whole population has received a higher education.

Under these conditions, the Eco-Innovation policy has been promoted along with the Nation-al Action Plan on climate change and the focus of its operation has been mainly on the renewable energies. Wind and water power energy development businesses are being developed intensively as a part of the policy to diversify electricity energy source and raise effectiveness of electric power supply. The related programs and initiatives are implemented cooperatively with international organizations such as the GEF, the UNDP, and the World Bank. They provide economic incentives such as tax reduction for the developing renewable energy related businesses. The Indonesian government selects and promotes measures that

provide economic incentives rather than restrictions for environmental improvement. The Indonesian Environmental Agency operates a clean technology investment support policy in alliance with financial institutions for small and medium sized enterprises. This is mainly done by the Development Planning Institute of Indonesia. The Development Planning Institute, in cooperation with the UNDP, established and operates the Indonesia Climate Change Trust Fund.

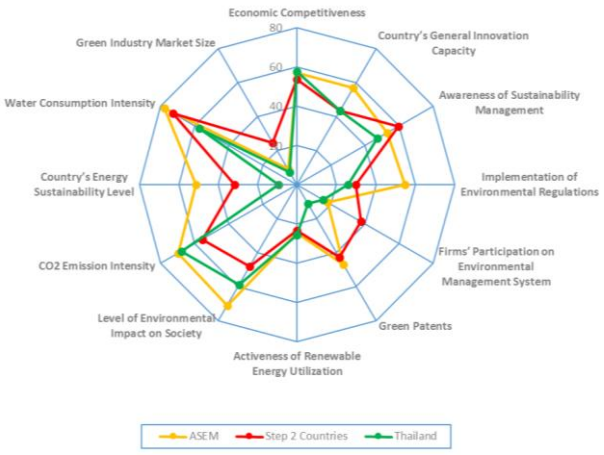
The BAPEDAL[18] categorizes factories into five different levels, ac-cording to its pollution level, based on the Public Disclosure Pollution Control Program (PROPER), in which incentives are given if a factory advances a level. Many different East Asian countries have started to benchmark this approach after it has proven to produce positive outcomes. These kinds of environmental programs are based on the previous project experiences of the ADB and the World Bank that were designed to strengthen their capacities. The ADB has been supporting the network project of the local environmental offices to strengthen capacity of Indonesian environmental agencies for the past 10 years (1996~2005), while the World Bank has been supporting the Development Technical Assistance project of the Environmental Office to enhance the technological capacity of the Environmental Office (1992-1999). In addition, they also supported a network of construction businesses to create innovative green technology of the Southeast Asian countries, including Indonesia. Along with many other international cooperative programs, the Global Green Growth Institute (GGGI) supports the green growth program of Indonesia. Multiple international cooperation programs contribute to improve Indonesia's eco-innovation capacity. INAGREENTHEC contributes to the expansion of eco-Innovation awareness through networks in the green building related fields, eco-friendly products and technology, green energy, green transportation, green ICT, green policies, and water resources and waste management. Indonesia's eco-Innovation appears to be necessary effort undertaken in order to enhance Indonesia's technical competitiveness to lead a self-sufficient economy. They will need a long-term plan to improve manpower quality by providing supports to train high-quality human resources for Eco-Innovation. In addition, they will need to support a short-term techno-logical development in order to develop eco-Innovation technologies for a self-sufficient economy, which is the direction the country is headed toward.

[18] Badan Pengendalian Dampak Lingkungan (Environmental Impact Management Agency)

# Thailand

|  | 5,426 | 67.9 million | 10:38:52 | 0.726 High | 4.63 | 4.38 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **33.21** |
| **Eco-Innovation Capacity** | 49.42 |
| Economic Competitiveness | 57.72 |
| Country's General Innovation Capacity | 43.51 |
| Awareness of Sustainability Management | 47.03 |
| **Eco-Innovation Supporting Environment** | 25.94 |
| Implementation of Environmental Regulations | 25.94 |
| **Eco-Innovation Activities** | 17.31 |
| Firms' Participation on Environmental Management System | 15.09 |
| Green Patents | 11.21 |
| Activeness of Renewable Energy Utilization | 25.62 |
| **Eco-Innovation Performance** | 40.17 |
| Level of Environmental Impact on Society | 59.04 |
| $CO_2$ Emission Intensity | 67.69 |
| Country's Energy Sustainability Level | 9.43 |
| Water Consumption Intensity | 57.30 |
| Green Industry Market Size | 7.41 |




- Thailand's eco-innovation capacity and performance are high. However, eco-innovation supporting environment and activity are low.
- $CO_2$ Emission Intensity (indicator no. 4.2) and Level of Environmental Impact on Society (indicator no. 4.1) of Thailand are higher than the average score of the same development state countries.
- Green Patents (indicator no. 3.4) and Country's Energy Sustainability (indicator no. 4.3) of Thailand are lower than the average score of the same development state countries.

Table 15 Eco-innovation Policy instruments of Thailand

| | | |
|---|---|---|
| National plan and strategy | Sustainability | - |
| | Eco-innovation | ■ Thailand's green and inclusive innovation policy<br>■ Thailand 20-Year Energy Efficiency<br>■ Development Plan (2011 - 2030)<br>■ Environmental Quality Management Plan (1999- 2006) |
| Programmes and actions | National | ■ Carbon Reduction Labeling<br>■ 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<br>■ The 9th Sustainable Energy and Environment Forum (SEE Forum) 2012<br>■ Thailand country development partnership-environment (2004)<br>■ Science and Innovation for Sustainable Development Forum<br>■ A Quest for Sustainable Development: Goals for Asia and Europe (Asia-Pacific Ministerial Dialogue) (2013)<br>■ The Fifth Regional Environmentally Sustainable Transport (EST) Forum in Asia (2010)<br>■ Pilot project on waste exchange programs |

The annual average economic growth rate of Thailand is 3.9% and the GDP ratio of key industries, agriculture, manufacture and service is, 1:4:5. Since the tourism is well developed, the added value of the service industry is high. Although the leading export, manufacture and agricultural goods, are mainly exported, the imported goods outnumber that of the exports by 4 times, and the influence of foreign investment is tremendous in the vitalization of Thailand economy. Especially in the manufacturing business where most of its shares belong to the Japanese or other foreign corporations, they acknowledge that their weakness is in the field of science. Hence the scientific technologies are considered as one of the core elements that enable improvement in not only the eco-innovation fields, but also in general competitiveness of the country. Although agriculture takes up one of the most important parts in their economy, most products are exported as primary manufactured products. Most Eco-Innovation policies are focused on the energy-related field. With the development of tourism business for the environmental goods, the carbon footprint program has been progressing alongside with the environmental policies. The country's development plans include those for improving science and technology fields and the recent national policy for 2012-2021 specifies innovation in the building

capacity. Many pilot programs about long-term plans and eco-innovation for each category are in action. These pilot programs include waste management, recycling, and eco-labeling. Thailand is not only concerned about the green-production of manufacturers, but also about the improvement in green-communication with the consumers. This shows that the development of the tourism industry increased the level of awareness in their citizens as well as that of the tourists.

Most funding support has been made by energy preservation funds, research funds, and the small and medium industry bank. Funds from the small and medium industry bank have been invested by the Ministry of Finance. The Small and Medium Business Corporation is an organization that manages and controls the general affairs of universities, organizations, corporations, and small and medium enterprises that seek to support a small and medium enterprise. It proposes visions for the small and medium enterprises, but does not provide any supporting policies[19] for eco-innovation. Most eco-innovation is focused on the energy field, and the current national development plan is working to improve the under-developed technologies. Although the current progress of technological development is not complete, technology transfer activities like eco-labeling and environment improvement businesses in pilot project form will act as catalysts for the eco-innovation of Thailand.

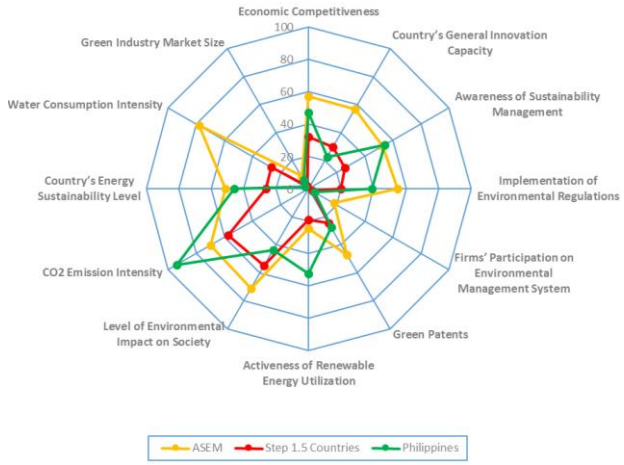
International cooperation is taking place in network actions, as done in other countries. Since many separate organizations have been established for the conservation of environment and sustainable development, the promotion of eco-innovation is anticipated, for which science and technical fields and infrastructures are being supported as part of the long-term strategy. The environment research institute is a NGO that provides consultation about the responsive strategy to the environmental problems for the country, local government, corporations, and civic groups. This institution has been awarded as the world's 70th environmental sink tank for two consecutive years in 2013 and 2014, and received positive feedback from the Ministry of Science and Technology in 2012 about their systemic approach to innovation. Although it is in an introductory stage of the innovation policy, they will be able to aim for a more rapid development on eco-innovation by building capacity to implement eco-innovation through short-term manufacturing and agricultural technology transfer projects.

[19] SME Promotion Plan

# Philippines

|  | 2,951 | 100.9 million | 11:32:57 | 0.668 Medium | 4.26 | 4.25 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **36.70** |
| **Eco-Innovation Capacity** | 41.24 |
| Economic Competitiveness | 47.15 |
| Country's General Innovation Capacity | 22.66 |
| Awareness of Sustainability Management | 53.90 |
| **Eco-Innovation Supporting Environment** | 39.04 |
| Implementation of Environmental Regulations | 39.04 |
| **Eco-Innovation Activities** | 28.13 |
| Firms' Participation on Environmental Management System | 4.18 |
| Green Patents | 27.58 |
| Activeness of Renewable Energy Utilization | 52.63 |
| **Eco-Innovation Performance** | 38.41 |
| Level of Environmental Impact on Society | 43.74 |
| $CO_2$ Emission Intensity | 93.85 |
| Country's Energy Sustainability Level | 45.84 |
| Water Consumption Intensity | 2.57 |
| Green Industry Market Size | 6.06 |




- The Philippines's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) and $CO_2$ Emission Intensity (indicator no. 4.2) of the Philippines are higher than the average score of the same development state countries.
- Economic Competitiveness (indicator no. 1.1) and Firm's Participation on Environmental Management System (indicator no. 3.2) of the Philippines are lower than the average score of the same development state countries.

Table 16 Eco-innovation Policy instruments of the Philippines

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Philippines Agenda 21 (1996) |
| | Eco-innovation | |
| Programme and actions | National | ■ National Energy Efficiency and Conservation Program |
| | International | |
| Legislation | | ■ Biofuels Act (2006)<br>■ Renewable Energy Act (2008) |
| Finance | | ■ Philippines Sustainable Energy Finance Program<br>■ Sustainable Entrepreneurship Enhancement and Development Program(SEED)<br>■ Clean Technology Fund Investment Plan for the Philippines |
| Information | | ■ Sub-regional Conference on Waste water Management: Promoting Innovations and Sustainable Investments (2013)<br>■ The Asia Low Emission Development Strategies (LEDS) Forum (2013)<br>■ Philippines sustainable development network (PSDN) |

The vision and strategies of the Philippines' eco-innovation are centered on energy related fields. The Philippines has established national plans to improve energy efficiency [20] and has enacted specific laws regarding biofuel and new renewable energies. In order to meet these plans, the Philippine government has cooperated with various international organizations such as GEF, ADB, SWITCH-Asia, and UNIDO to pursue programs to improve energy efficiency. In particular, the Philippians Development Bank[21] is operating a financial support program for continuous development, providing support specifically in the social infrastructures, public services and community development, small and medium enterprise (SME) promotion, and environmental initiatives.

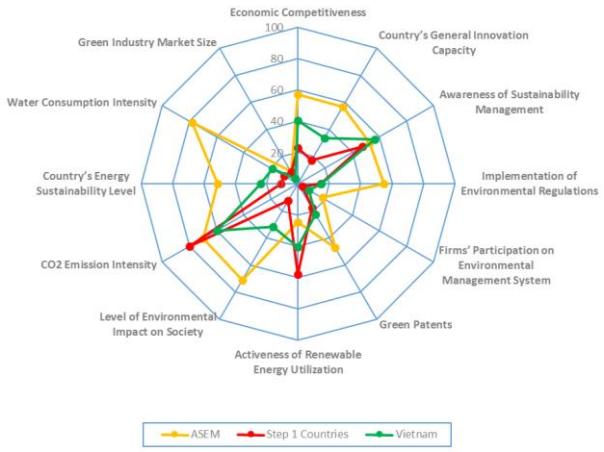
[20] Energy Efficiency and Conservation Plan of Action

[21] DBP (Development Bank of Philippines)

# Vietnam

|  | 2,171 | 94.3 million | 17:39:44 | 0.666 Medium | 4.11 | 3.67 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **27.38** |
| **Eco-Innovation Capacity** | 43.46 |
| Economic Competitiveness | 40.24 |
| Country's General Innovation Capacity | 33.78 |
| Awareness of Sustainability Management | 56.36 |
| **Eco-Innovation Supporting Environment** | 14.71 |
| Implementation of Environmental Regulations | 14.71 |
| **Eco-Innovation Activities** | 23.65 |
| Firms' Participation on Environmental Management System | 8.00 |
| Green Patents | 22.42 |
| Activeness of Renewable Energy Utilization | 40.54 |
| **Eco-Innovation Performance** | 27.70 |
| Level of Environmental Impact on Society | 31.89 |
| $CO_2$ Emission Intensity | 60.00 |
| Country's Energy Sustainability Level | 23.84 |
| Water Consumption Intensity | 18.82 |
| Green Industry Market Size | 3.93 |




- Vietnam's eco-innovation capacity is high. However, eco-innovation supporting environment, activity and performance are low.
- Economic Competitiveness (indicator no. 1.1) and Level of Environmental Impact on Society (indicator no. 4.1) of Vietnam are higher than the average score of the same development state countries.
- Green Industry Market Size (indicator no. 4.6) of Vietnam is lower than the average score of the same development state countries.

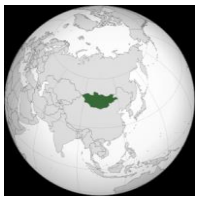
Table 17 Eco-innovation Policy instruments of Vietnam

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Socio-economic development strategy for 1991-2000<br>■ 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)<br>■ National Energy Master Plan |
| Programme and actions | National | ■ A Guideline for Energy Efficiency Standard and Labeling (2006)<br>■ Vietnam Clean Production and Energy Efficiency Project<br>■ 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<br>■ Roundtable on Eco-innovation (2013)<br>■ Green Innovation Forum-Energy Efficiency and Renewable Energy (2011) |

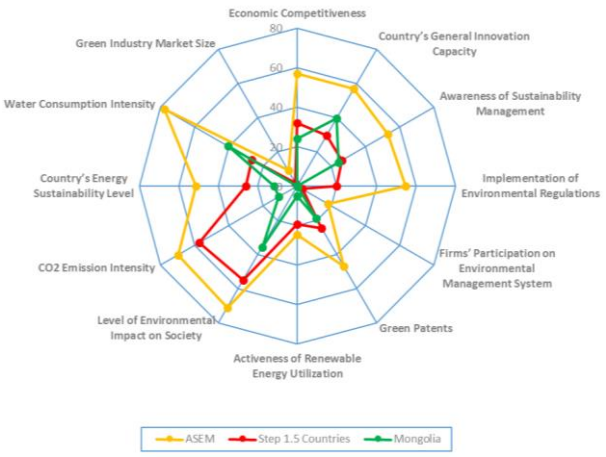
Vietnam's national vision and strategy for eco-innovation includes technological development and energy procurement strategies. In 2013, the Vietnam government established the National Green Growth Strategy, which proposed the increase in the use of new renewable energies, minimization of greenhouse gas emissions, and the increase in the Green Production and Green Consumption. It provides a guideline for energy efficiency to achieve Green Growth and operates an eco-labeling system in cooperation with the Australian government, providing information about environmentally-friendly consumption to the consumers. Vietnam cooperates with various countries and organizations to achieve eco-innovation. A demonstration project for the wind power generation is underway as a part of the new renewable energies development. Several other pilot projects are being promoted in cooperation with international organizations, such as the WB, the SNV, the BMU, the GIZ, the IIEC, and the IFC. In addition, the World Bank and Hanoi organization are pushing for the eco-innovation of Hanoi's transportation sector as a part of their urban planning. Vietnam also has established eco-innovation partnerships with countries in the South East Asia, such as Laos and Cambodia that share close borders and are in the vicinity of the Mekong River. It also operates a forum[22] on eco-innovation, energy efficiency and new renewable energies.

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

# Mongolia

|  | 4,179 | 2.9 million | 16:33:51 | 0.727 Medium | 3.6 | 3.3 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **14.26** |
| **Eco-Innovation Capacity** | 29.23 |
| Economic Competitiveness | 23.98 |
| Country's General Innovation Capacity | 39.61 |
| Awareness of Sustainability Management | 24.10 |
| **Eco-Innovation Supporting Environment** | 0.00 |
| Implementation of Environmental Regulations | 0.00 |
| **Eco-Innovation Activities** | 8.07 |
| Firms' Participation on Environmental Management System | 0.39 |
| Green Patents | 18.83 |
| Activeness of Renewable Energy Utilization | 5.00 |
| **Eco-Innovation Performance** | 19.75 |
| Level of Environmental Impact on Society | 35.79 |
| $CO_2$ Emission Intensity | 10.77 |
| Country's Energy Sustainability Level | 11.83 |
| Water Consumption Intensity | 40.35 |
| Green Industry Market Size | 0.00 |




- Mongolia's eco-innovation capacity is high. However, eco-innovation supporting environment, activity and performance are low.
- Country's General Innovation Capacity (indicator no. 1.2) and Water Consumption (indicator no. 4.4) of Mongolia are higher than the average score of the same development state countries.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) and Country's Energy Sustainability Level (indicator no. 4.3) of Mongolia are lower than the average score of the same development state countries.

Table 18 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<br>■ "National Program for Renewable Energy (NPRE)" 2005, 2007<br>■ "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)<br>■ National Forum on Green Development<br>■ "World Clean Coal 2014 〃 conference<br>■ National Committee for reducing air pollution<br>■ Consultation "Implementation Status of Agenda 21 for sustainable education (MNET and UNDP)" 2012 |

Mongolia has continued to develop a legislative system for sustainable development in the past 20 years[23]. A series of national strategies have been chosen and 304 official policies, in combination with overall national development plans, have been created in the past 15 years. Despite such developments, there needs to be improvements to allow these policies to be carried out. Also, there is a strong need for continuous work on strengthening capacity to advance to the next stage[24]. Mongolia's policy goals for eco-innovation have not been specifically planned, but they can be found in the national vision and strategies for sustainable development[25]. They proposed five types of tasks - traffic, chemical substances, waste, mining, and continuous consumption for the sustainable development[26]. As part of the agenda for sustainable development to establish a sustainable energy system, the government also proposed to

[23] 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.

[24] UNDP, 2012, MONGOLIA'S SUSTAINABLE DEVELOPMENT AGENDA: PROGRESSES, BOTTLENECKS AND VISION FOR THE FUTURE, UNDP, ULAANBAATAR (11~15pp)

[25] Mongolia National Report On Sustainable Development for The 18th Session of the Commission on Sustainable Development

[26] Mongolian National Sustainable Development Agenda (2005), 76pp

increase energy efficiency and the importance of the new renewable energies, 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 as it is faced with environmental problems like pollution, water shortage due to the mining, and desertification. The Department of Industry has been in charge of promoting small and medium enterprises and has internationally cooperated with organizations such as the 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 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[27] in 2005 and improved its energy system standards by 2007. The goal of the original plan was to produce 3~5% of all energy by 2010 but it has currently changed to 20~25% by 2020. After pushing forward programs across all Mongolian provinces, over 90% of the cotton has been connected to the central electricity grid and 70~90% of the stock farmers are able to use solar and wind generated electricity. The country's "One Hundred Thousand Solar Lights" program has allowed the stock farmer families to use solar energy; the programs have been successful based on the appropriate regulations from each district along with the public and private partnership[28]. 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.

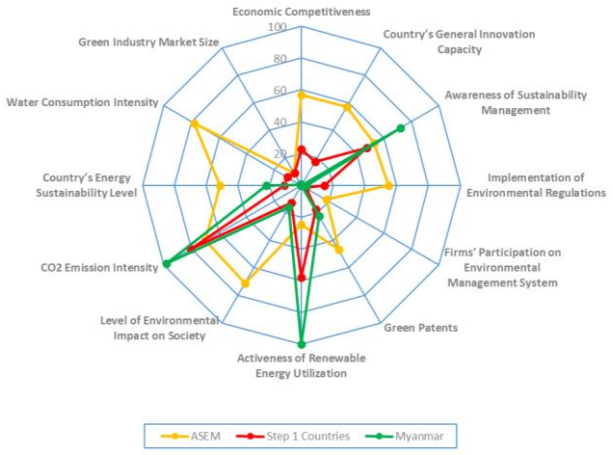
[27] "National Program for Renewable Energy (NPRE)" 2005, 2007

[28] UNDP, 2012, MONGOLIA'S SUSTAINABLE DEVELOPMENT AGENDA: PROGRESSES, BOTTLENECKS AND VISION FOR THE FUTURE, UNDP, ULAANBAATAR (11~15pp)

# Myanmar

|  | 1,269 | 53.3 million | 38:20:42 | 0.536 Low | - | - |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **23.91** |
| **Eco-Innovation Capacity** | 24.04 |
| Economic Competitiveness | 0.00 |
| Country's General Innovation Capacity | 0.00 |
| Awareness of Sustainability Management | 72.12 |
| **Eco-Innovation Supporting Environment** | 3.21 |
| Implementation of Environmental Regulations | 3.21 |
| **Eco-Innovation Activities** | 40.81 |
| Firms' Participation on Environmental Management System | 0.00 |
| Green Patents | 22.42 |
| Activeness of Renewable Energy Utilization | 100.00 |
| **Eco-Innovation Performance** | 27.59 |
| Level of Environmental Impact on Society | 15.89 |
| $CO_2$ Emission Intensity | 98.46 |
| Country's Energy Sustainability Level | 22.18 |
| Water Consumption Intensity | 0.52 |
| Green Industry Market Size | 0.88 |




- Myanmar's eco-innovation activity is high. However, eco-innovation capacity, supporting environment and performance are low.
- Awareness of Sustainability Management (indicator no. 1.5) and Activeness of Renewable Energy Utilization (indicator no. 3.5) of Myanmar are higher than the average score of the same development state countries.
- Economic Competitiveness (indicator no. 1.1) and Green Industry Market Size (indicator no. 4.6) of Myanmar are lower than the average score of the same development state countries.

Table 19 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<br>■ Sustainable Business Myanmar<br>■ Myanmar Green Economy Green Growth Forum (2011~annually)<br>■ A pilot Resource Efficient and Cleaner Production (RECP) programme in Myanmar<br>■ Myanmar Green Energy Summit 2014<br>■ Renewable Energy Association Myanmar (REAM) (1993) |

In 1997, as the Myanmar's National Commission for Environmental Affairs (NCEA) announced Myanmar Agenda 21, Myanmar's eco-innovation, as a threefold goal for sustainable development, became Myanmar's national vision and strategy. Afterwards, in cooperation with UNEP in 2009, the Forestation Department proposed a national road map for sustainable development. Myanmar currently focuses on the technological developments to support small and medium enterprises, but does not show a clear eco-innovation policy goal or the measures. At the "Myanmar's Legislative Reform for Sustainable Development" seminar hosted by the UNDP, the Japanese government the Japan International Cooperation Agency (JICA), 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 political transition[29]. Myanmar has prepared a sustainable development strategy to establish a sustainable national roadmap for the environmental, economic, and social sectors.

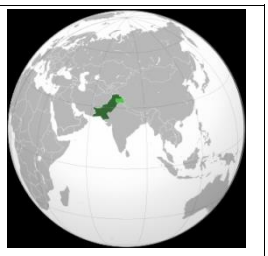
Ministry of Agriculture and Irrigation[30] and The UNESCAP have partnered to provide local support for the complete and sustainable development of their agricultural sector and are looking for ways to facilitate eco-innovation with organizations such as the UNIDO and the SECO. After Myanmar's recent change of government, the UMFCCI[31] held the Myanmar Green Energy Summit (2014), indicating increased interest in the technology and information exchange of the new renewable energies, as well as the financing and facilities.

[29] http://www.mm.undp.org/content/myanmar/en/home/presscenter/speeches/2014/04/opening-remarks--towards-sustainable-development-of-myanmar/

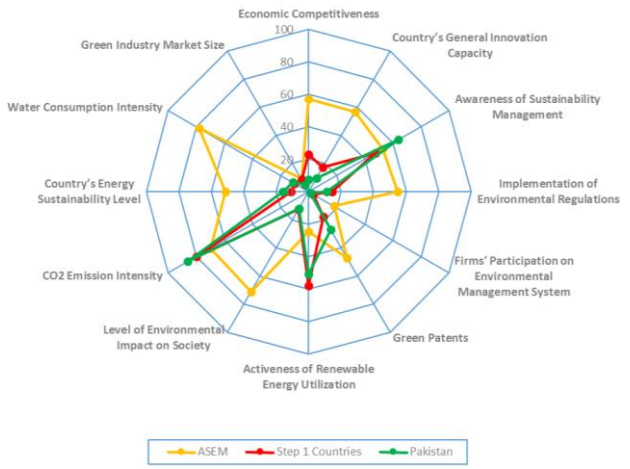
[30] Ministry of Agriculture and Irrigation

[31] UMFCCI (The Republic of the Union of Myanmar Federation of Chambers of Commerce & Industry)

# Pakistan

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 4,900 | 199.0 million | 26:19:55 | 0.538 Low | 3.16 | 2.99 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **22.63** |
| **Eco-Innovation Capacity** | 26.93 |
| Economic Competitiveness | 7.32 |
| Country's General Innovation Capacity | 9.66 |
| Awareness of Sustainability Management | 63.83 |
| **Eco-Innovation Supporting Environment** | 11.23 |
| Implementation of Environmental Regulations | 11.23 |
| **Eco-Innovation Activities** | 26.34 |
| Firms' Participation on Environmental Management System | 1.37 |
| Green Patents | 26.91 |
| Activeness of Renewable Energy Utilization | 50.74 |
| **Eco-Innovation Performance** | 26.04 |
| Level of Environmental Impact on Society | 12.11 |
| $CO_2$ Emission Intensity | 86.15 |
| Country's Energy Sustainability Level | 15.90 |
| Water Consumption Intensity | 11.24 |
| Green Industry Market Size | 4.78 |




- Pakistan's eco-innovation capacity, activity and performance are high. However, eco-innovation supporting environment is low.
- Awareness of Sustainability Management (indicator no. 1.5) and $CO_2$ Emission Intensity (indicator no. 4.2) of Pakistan are higher than the average score of the same development state countries.
- Country's General Innovation Capacity (indicator no. 1.2) of Pakistan is lower than the average score of the same development state countries.

Table 20 Eco-innovation Policy instruments of Pakistan

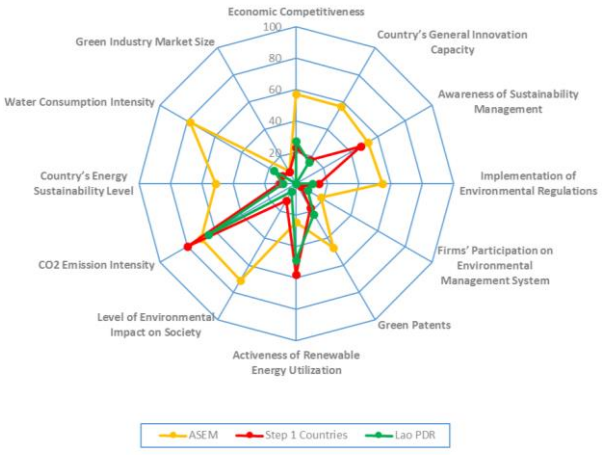
| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ National Sustainable Development Strategy (2012) |
| | Eco-innovation | ■ Alternative and Renewable Energy Policy 2011<br>■ Pakistan Energy Vision 2035<br>■ National Climate Change Policy 2012<br>■ Clean Development Mechanism - National Operational Strategy (2006) |
| Programmes and actions | National | ■ Pakistan Sustainable Transport Project (2011-2016) |
| | International | |
| Legislation | | ■ The Pakistan Environmental Protection Act 1997<br>■ National Environmental Quality Standards (self-monitoring and reporting by industries) Rules (2001) |
| Finance | | ■ Provincial Sustainable Development Funds (PSDFs) 2011 |
| Information | | ■ Sustainable Development Conferences (SDCs)<br>■ Pakistan Sustainability Network<br>■ Pathways to Resilience in Semi-Arid Economies (PRISE) 2014-2018<br>■ Sustainable Ship-breaking Initiative (SSI) for Trade and Sustainability in Ship-breaking Industry of Pakistan 2011-2016<br>■ Secure Livelihoods Research Consortium (SLRC) 2011-2017<br>The Centre for Capacity Building [CCB] |

Pakistan established Plan for Alternative Energy and New Renewable Energy in 2011 under its national vision and strategy for the sustainable development and response to the climate change. Instead of the R&D policies for developing new renewable energies. Pakistan is receiving 2,300MW worth of solar and wind electricity support from China's Wind Electric. Pakistan is participating in the project, in cooperation with the IUCN, to reduce the energy consumption and greenhouse emissions in the Pakistan Sustainable Transportation Project. Recently, Pakistan established National Sustainable Development Strategy in 2012 for sustainable development while strengthening its sustainable development policies. The Pakistan Environmental Protection Agency improved the Pakistan environment protection Act enacted in 1997 and established regulations regarding environment management standards, as an effort to promote sustainable development policies.

# Lao PDR

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 1,785 | 6.9 million | 23:33:44 | 0.575 Medium | - | - |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **17.55** |
| **Eco-Innovation Capacity** | 14.41 |
| Economic Competitiveness | 27.24 |
| Country's General Innovation Capacity | 15.99 |
| Awareness of Sustainability Management | 0.00 |
| **Eco-Innovation Supporting Environment** | 10.16 |
| Implementation of Environmental Regulations | 10.16 |
| **Eco-Innovation Activities** | 26.47 |
| Firms' Participation on Environmental Management System | 8.30 |
| Green Patents | 22.42 |
| Activeness of Renewable Energy Utilization | 48.69 |
| **Eco-Innovation Performance** | 19.17 |
| Level of Environmental Impact on Society | 5.90 |
| $CO_2$ Emission Intensity | 64.62 |
| Country's Energy Sustainability Level | 8.69 |
| Water Consumption Intensity | 16.46 |
| Green Industry Market Size | 0.18 |




- Lao PDR's eco-innovation activity is high. However, eco-innovation capacity supporting environment and performance are low.
- Economic Competitiveness (indicator no. 1.1) and Water Consumption Intensity (indicator no. 4.4) of Lao PDR are higher than the average score of the same development state countries.
- Green Industry Market Size (indicator no. 4.6) of Lao PDR is lower than the average score of the same development state countries.

Table 21 Eco-innovation Policy instruments of Lao PDR

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

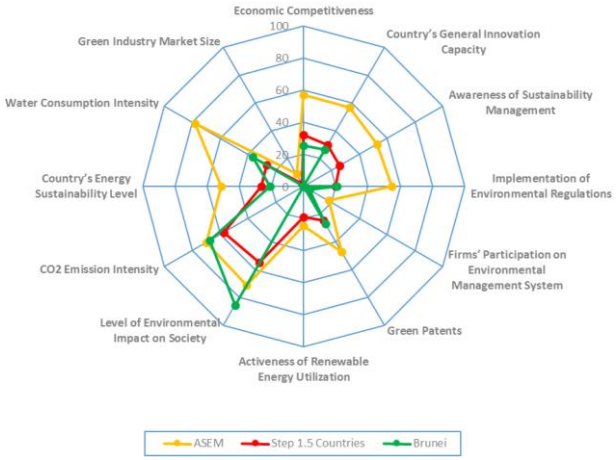
Laos's national strategy for the transportation and energy sector for sustainable development includes eco-innovation national strategies and vision. Laos is being supported by the international cooperation program of eco-innovation, SWITCH Asia[32]. The clean production center Lao PDR (CPC-L) was constructed in cooperation with the UNIDO and is being managed by the Laos Ministry of Industry and Commerce while receiving financial support from the Swiss government. SPIN, a project of EU's SWITCH-Asia program for sustainable product innovation in Laos, Cambodia, and Vietnam, aims to enhance the environmental and social quality of the products and services of its respective countries and includes marketing and branding skill trainings for the SMEs.

[32] http://www.switch-asia.eu/projects/

# Brunei Darussalam

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 27,759 | 0.4 million | 1:67:32 | 0.856 Very high | - | - |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **22.61** |
| **Eco-Innovation Capacity** | 17.28 |
| Economic Competitiveness | 25.20 |
| Country's General Innovation Capacity | 26.65 |
| Awareness of Sustainability Management | 0.00 |
| **Eco-Innovation Supporting Environment** | 20.59 |
| Implementation of Environmental Regulations | 20.59 |
| **Eco-Innovation Activities** | 10.36 |
| Firms' Participation on Environmental Management System | 4.18 |
| Green Patents | 26.91 |
| Activeness of Renewable Energy Utilization | 0.00 |
| **Eco-Innovation Performance** | 42.21 |
| Level of Environmental Impact on Society | 85.61 |
| $CO_2$ Emission Intensity | 67.69 |
| Country's Energy Sustainability Level | 21.07 |
| Water Consumption Intensity | 36.65 |
| Green Industry Market Size | 0.01 |




- Brunei Darussalam's eco-innovation performance is high. However, eco-innovation capacity supporting environment and performance are low.
- Level of Environmental Impact on Society (indicator no. 4.1) of Brunei Darussalam is higher than the average score of the same development state countries.
- Awareness of Sustainability Management (indicator no. 1.5) of Brunei Darussalam is lower than the average score of the same development state countries.

Table 22 Eco-innovation Policy instruments of Brunei Darussalam

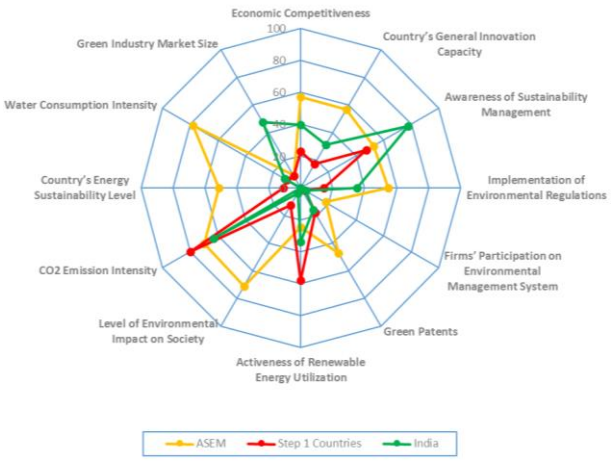
| | | |
|---|---|---|
| **National plan and strategy** | **Sustainability** | ■ Wawasan Brunei 2035 (Vision Brunei 2035) |
| | **Eco-innovation** | - |
| **Programmes and actions** | **National** | - |
| | **International** | - |
| **Legislation** | | - |
| **Finance** | | - |
| **Information** | | -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

Although Brunei emphasized the sustainable economy at the WAWASAN BRUNEI 2035, it has been focusing more on the economic development rather than the preservation and management of environment. As Brunei does not have a Ministry of Environment, the Ministry of Development or Ministry of Industry and Primary Resources are responsible for developing the sustainable development related polices. The innovation and technology transfer of the SMEs are emphasized but eco-innovation related strategies and investment need more attention.

# India

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 1,688 | 1251.6 million | 16:30:54 | 0.609 Medium | 3.98 | 3.72 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **31.86** |
| **Eco-Innovation Capacity** | 49.35 |
| Economic Competitiveness | 39.43 |
| Country's General Innovation Capacity | 31.15 |
| Awareness of Sustainability Management | 77.46 |
| **Eco-Innovation Supporting Environment** | 35.03 |
| Implementation of Environmental Regulations | 35.03 |
| **Eco-Innovation Activities** | 17.73 |
| Firms' Participation on Environmental Management System | 3.59 |
| Green Patents | 15.70 |
| Activeness of Renewable Energy Utilization | 33.89 |
| **Eco-Innovation Performance** | 25.36 |
| Level of Environmental Impact on Society | 4.01 |
| $CO_2$ Emission Intensity | 63.08 |
| Country's Energy Sustainability Level | 0.37 |
| Water Consumption Intensity | 11.93 |
| Green Industry Market Size | 47.41 |




- India's eco-innovation capacity and supporting environment are high. However, eco-innovation activity and performance are low.
- Awareness of Sustainability Management (indicator no. 1.5) and Green Industry Market Size (indicator no. 4.6) of India are higher than the average score of the same development state countries.
- Level of Environmental Impact on Society (indicator no. 4.1) of India is lower than the average score of the same development state countries.

Table 23 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<br>■ National biofuel policy (2008)<br>■ 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)<br>■Environmental compliance program - |
| Finance | | - |
| Information | | ■ Environmental Information System |

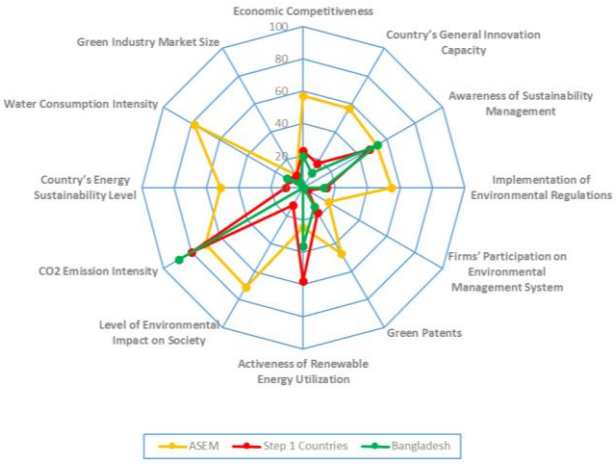
India's eco-innovation related national strategy is to advance in the technological development and acquire renewable energies. The strategy of acquiring renewable energies is included in the National Action Plan for Climate Change (NAPCC) (2008). The National Energy Map for India proposed an energy 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 Strategy Plan for New and Renewable Energy (2011-2017) to support the eco-innovation in energy sector. The Indian government has enacted the National Green Tribunal Act for environment regulation and operates Environmental Compliance Program in energy, waste, transportation and agriculture. India cooperates with international organizations for eco-innovation. The World Wildlife Fund (WWF) has supported the Climate Solver Program [33] in order to endorse SMEs' clean technology. Grassroots Innovation Augmentation Network, a private network, also provides support for any companies that are not receiving support from the government or international organizations.

[33] http://west.gian.org/

# Bangladesh

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 1,266 | 168.9 million | 16:30:54 | 0.570 Medium | 3.65 | 3.35 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **19.58** |
| **Eco-Innovation Capacity** | 27.78 |
| Economic Competitiveness | 19.51 |
| Country's General Innovation Capacity | 10.43 |
| Awareness of Sustainability Management | 53.41 |
| **Eco-Innovation Supporting Environment** | 12.83 |
| Implementation of Environmental Regulations | 12.83 |
| **Eco-Innovation Activities** | 16.68 |
| Firms' Participation on Environmental Management System | 0.39 |
| Green Patents | 13.45 |
| Activeness of Renewable Energy Utilization | 36.18 |
| **Eco-Innovation Performance** | 21.02 |
| Level of Environmental Impact on Society | 0.00 |
| $CO_2$ Emission Intensity | 89.23 |
| Country's Energy Sustainability Level | 0.00 |
| Water Consumption Intensity | 11.84 |
| Green Industry Market Size | 4.03 |




- Bangladesh's eco-innovation capacity is high. However, eco-innovation and supporting environment, activity and performance are low.
- Awareness of Sustainability Management (indicator no. 1.5) and CO2 Emission Intensity (indicator no. 4.2) of Bangladesh are higher than the average score of the same development state countries.
- Country's General Innovation Capacity (indicator no. 1.2) of Bangladesh is lower than the average score of the same development state countries.

Table 24 Eco-innovation Policy instruments of Bangladesh

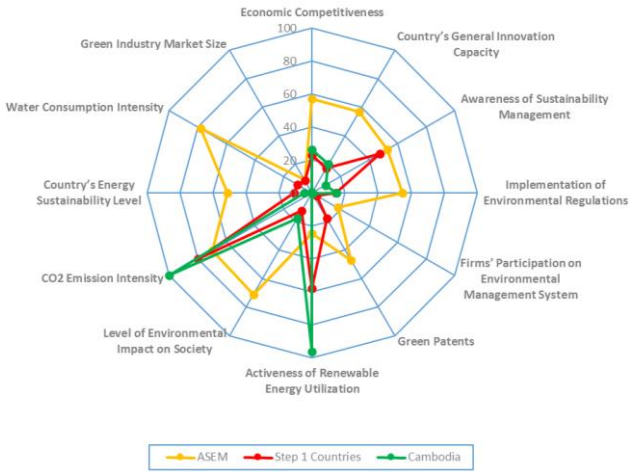
| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ National Sustainable Development Strategy (2009) |
| | Eco-innovation | ■ National Environment Management Action Plan (NEMAP) (1995) |
| Programmes and actions | National | |
| | International | |
| Legislation | | ■ Bangladesh Climate Change Trust Fund Act (2010) |
| Finance | | ■ The Clean Technology Fund<br>■ Bangladesh Climate Change Resilience Fund (2010) |
| Information | | ■ A seminar entitled "Opportunities for UK-Bangladesh<br>■ Business Collaborations for Environmental Sustainability and Resource Efficiency"<br>■ Sustainable agri business supply chain workshop (2013)<br>■ 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 Sustainable Development Strategy, which was established in 2009. The National Sustainable Development Strategy focuses on the sustainable economic growth, agriculture and local development, social security and management of environment and national resources. The eco-innovation policies, including the green technology, are unclear and programs for CO2 reduction and endorsing environmental friendly products have not been arranged yet.

# Cambodia

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 1,140 | 15.7 million | 29:28:43 | 0.555 Medium | 3.58 | 3.85 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **22.58** |
| **Eco-Innovation Capacity** | 18.58 |
| Economic Competitiveness | 26.42 |
| Country's General Innovation Capacity | 19.98 |
| Awareness of Sustainability Management | 9.32 |
| **Eco-Innovation Supporting Environment** | 14.97 |
| Implementation of Environmental Regulations | 14.97 |
| **Eco-Innovation Activities** | 32.22 |
| Firms' Participation on Environmental Management System | 0.46 |
| Green Patents | 0.00 |
| Activeness of Renewable Energy Utilization | 96.19 |
| **Eco-Innovation Performance** | 24.55 |
| Level of Environmental Impact on Society | 17.84 |
| $CO_2$ Emission Intensity | 100.00 |
| Country's Energy Sustainability Level | 4.62 |
| Water Consumption Intensity | 0.00 |
| Green Industry Market Size | 0.31 |




- Cambodia's eco-innovation activity is high. However, eco-innovation capacity, supporting environment and performance are low.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) and $CO_2$ Emission Intensity (indicator no. 4.2) of Cambodia are higher than the average score of the same development state countries.
- Awareness of Sustainability Management (indicator no. 1.5) of Cambodia is lower than the average score of the same development state countries.

Table 25 Eco-innovation Policy instruments of Cambodia

| | | |
|---|---|---|
| National plan and strategy | Sustainability | National Strategic Development<br>■ Plan (NDSP 2009 to 2013 update) 29) |
| | Eco-innovation | ■ The National Green Growth Roadmap<br>(2009) |
| Programmes and actions | National | - |
| | International | ■ Sustainable Product Innovation Project (SPIN) |
| Legislation | | ■ Law on Environmental Protection and Natural Resource Management (1996) |
| Information | | ■ Community Based Natural Resource Management (CBNRM) ■ Emerging Trends, Challenges and Innovations (2009)<br>■ 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<br>■ Fostering policies and capacity building in science, technology and innovation for sustainable development<br>■ TT-Pilot (GEF-4): Climate Change Related Technology Transfer for Cambodia: Using Agricultural Residue Biomass for Sustainable Energy<br>Solutions |

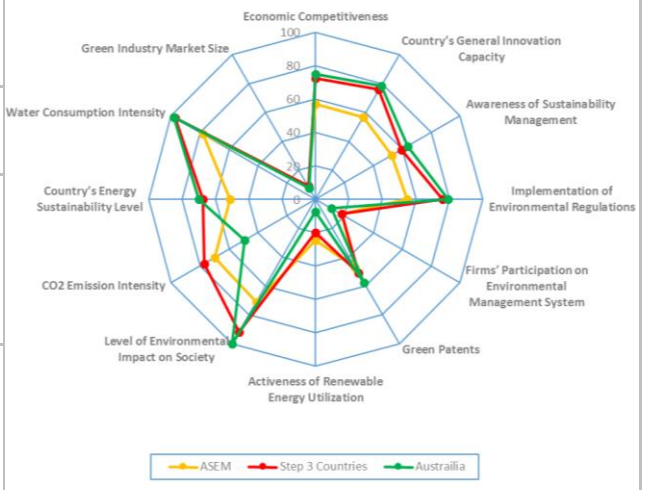
Cambodia emphasizes on the energy development in its national development plan and focuses on establishing stable power sources and electricity supply chains. Specifically, the sustainable production, supply, and management of electricity (energy) are being emphasized. 90% of Cambodia's population lives in farming villages and practices agriculture. Although the economic growth is staggered by the 2008 global financial crisis, the growth of green industry and reduction in the CO2 emission are being pursued with the support from international 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; with the increase in cutting volumes, its forest conversion rate is the 9th in the world (Maplecroft, 2011). Cambodia's government is pursing policies to increase energy efficiency and sustainable forest management but has not arranged any eco-innovation related programs or regulations.

# Australia

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 51,642 | 22.7 million | 4:29:67 | 0.935 Very high | 5.8 | 5.54 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **60.43** |
| **Eco-Innovation Capacity** | 72.25 |
| Economic Competitiveness | 74.80 |
| Country's General Innovation Capacity | 78.36 |
| Awareness of Sustainability Management | 63.59 |
| **Eco-Innovation Supporting Environment** | 79.14 |
| Implementation of Environmental Regulations | 79.14 |
| **Eco-Innovation Activities** | 25.28 |
| Firms' Participation on Environmental Management System | 10.72 |
| Green Patents | 57.62 |
| Activeness of Renewable Energy Utilization | 7.50 |
| **Eco-Innovation Performance** | 65.05 |
| Level of Environmental Impact on Society | 100.00 |
| $CO_2$ Emission Intensity | 49.23 |
| Country's Energy Sustainability Level | 70.06 |
| Water Consumption Intensity | 98.40 |
| Green Industry Market Size | 7.54 |




- Australia's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) and $CO_2$ Emission Intensity (indicator no. 4.2) of Australia are higher than the average score of the same development state countries.
- Green Patents (indicator no. 3.4) and Level of Environmental Impact on Society (indicator no. 4.1) of Australia are lower than the average score of the same development state countries.

Table 26 Eco-innovation Policy instruments of Australia

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ National Climate Change Adaptation Framework (2006) |
| | Eco-innovation | ■ Backing Australia's Ability (2004)<br>■ Renewable Energy Target (MRET)<br>■ National Average Fuel Consumption (NAFC) target<br>■ The Australian National Research Priorities (2002)<br>■ Building Code Australia |
| Programme and actions | National | ■ Renewable Energy Development Initiative (REDI) (2004)<br>■ Solar Cities (2004)<br>■ Solar Hot Water Rebates Programme<br>■ Green Power Scheme (1997)<br>■ Nation-wide House Energy Rating Scheme<br>■ National Solar School Programme<br>■ National Plan for Water Security<br>■ Low Emissions Technology and Abatement (LETA) (2005)<br>■ Greenhouse Challenge Plus<br>■ Measures for a Better Environment (greenhouse gas reduction programmes) (2000)<br>■ Local Greenhouse Action<br>- Cities for Climate Protection (CCP)<br>- Travel Demand Management<br>- Cool Communities<br>■ Advanced Electricity Storage Technologies (AEST)<br>■ Australia's Climate Change Policy (2007) |
| | International | - |
| Legislation | | ■ Renewable Energy (Electricity) Act (2000) |
| Finance | | ■ Australian Government Water Fund<br>■ Biofuel Capital Grants (2003)<br>■ Low Emissions Technology Demonstration Fund |
| Information | | ■ Commonwealth Scientific and Industrial Research Organization (CSIRO)<br>■ Victorian Eco-Innovation Lab<br>■ Clean Energy Finance Corporation<br>■ Australian Renewable Energy Agency (ARENA) |

In 2006, Australia established an activity guideline as a response to the climate change, through a climate

change framework[34]. As part of its response to the climate change, the Australian's Ministry of Environment has implemented a renewable energy goal policy[35]. This policy is designed to produce 20% of Australia's electricity through renewable energies, and is being operated in large scale projects[36] provide economic incentives for the construction of renewable energy generation plants, which are aimed to produce 41,000 GWh by 2020. Small[37] scale projects provide economic support to general merchandise, businesses and community groups to be able to install renewable energy systems, such as solar heat, solar light, and small scale wind and water generation. The Solar Towns Programme also has contributed to the expansion of renewable energies at a local level. This policy is mainly conducted independently by the Australia Renewable Energy Agency (ARENA) as the main organization. In order to achieve this goal, the country has set an average fuel consumption goal and implemented program[38] related to the renewable energies focused on solar power.

[34] National Climate Change Adaptation Framework (2006); http://www.environment.gov.au/climate-change/adaptation/adaptation-framework

[35] Renewable Energy Target (MRET); http://www.environment.gov.au/climate-change/renewable-energy-target-scheme

[36] Large-scale Renewable Energy Target

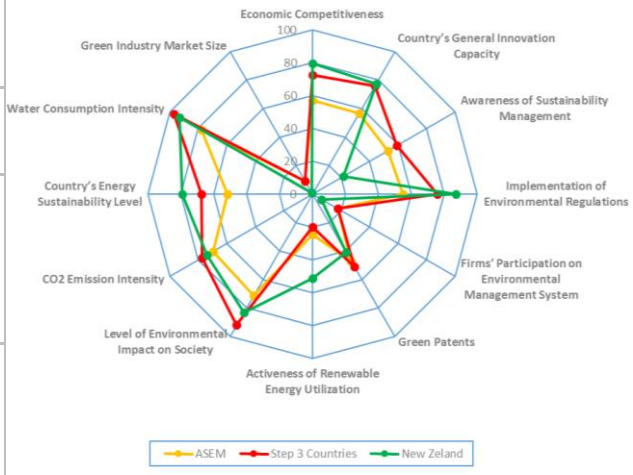
[37] Small-scale Renewable Energy Scheme

[38] 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

# New Zealand

|  | 36,963 | 4.4 million | 4:27:69 | 0.913 Very high | 5.94 | 6.04 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **61.43** |
| **Eco-Innovation Capacity** | 59.53 |
| Economic Competitiveness | 79.67 |
| Country's General Innovation Capacity | 77.27 |
| Awareness of Sustainability Management | 21.65 |
| **Eco-Innovation Supporting Environment** | 87.17 |
| Implementation of Environmental Regulations | 87.17 |
| **Eco-Innovation Activities** | 32.85 |
| Firms' Participation on Environmental Management System | 6.47 |
| Green Patents | 41.03 |
| Activeness of Renewable Energy Utilization | 51.06 |
| **Eco-Innovation Performance** | 66.15 |
| Level of Environmental Impact on Society | 83.31 |
| $CO_2$ Emission Intensity | 73.85 |
| Country's Energy Sustainability Level | 79.11 |
| Water Consumption Intensity | 93.38 |
| Green Industry Market Size | 1.12 |




- New Zealand's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) and Country's Energy Sustainability Level (indicator no. 4.3) of New Zealand are higher than the average score of the same development state countries.
- Awareness of Sustainability Management (indicator no. 1.5) of New Zealand is lower than the average score of the same development state countries.

Table 27 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<br>■ The New Zealand Waste Strategy<br>■ The New Zealand Energy Efficiency and Conservation Strategy 2007<br>■ The New Zealand Transport Strategy<br>■ The Growth and Innovation Framework (GIF) |
| Programme and actions | National | ■ Sustainable Business Initiatives<br>■ the Emission Trading Scheme 2007<br>■ Selected local initiatives on green R&D<br>■ the Framework for a New Zealand Emissions Trading Scheme 2007<br>■ Cleaner Production<br>■ Auckland Regional Council Programmes for Cleaner Production<br>■ Green light<br>■ The Energy Intensive Business (EIB) project<br>■ The Govt3 programme<br>■ Single procurement policy<br>■ Waste management and recycling procurement<br>■ The Pastoral Greenhouse Gas Research Consortium (PGgRc) 2002 |
| | International | |
| Legislation | | ■ National Environmental Standards<br>■ Minimum Energy Performance Standards (MEPS) 2002<br>■ New Zealand Packaging Accord<br>■ the Resource Management Act (1991) (RMA)<br>■ Hazardous Substances and New Organisms Act 1996 (HSNO)<br>■ Ozone Layer Protection Act 1996<br>■ Hazardous Substances and New Organisms Act 1996<br>■ Waste Minimization Act 2008 |
| Finance | | |
| Information | | ■ Australia-New Zealand Climate Change Partnership 2003<br>■ United States-New Zealand Climate Change Partnership 2002<br>■ Trade and Environment |

New Zealand established a national plan[39] on sustainable land management and climate change, as well

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

as the framework[40]. Specifically, energy[41], waste[42] and transportation[43] were developed. Introducing initiatives for the sustainable business and the emission trading scheme[44], the foundation for corporate eco-innovation was established. Furthermore, New Zealand currently is promoting various environment regulation policies[45].

[40] The Growth and Innovation Framework (GIF)

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

[42] The New Zealand Waste Strategy

[43] The New Zealand Transport Strategy

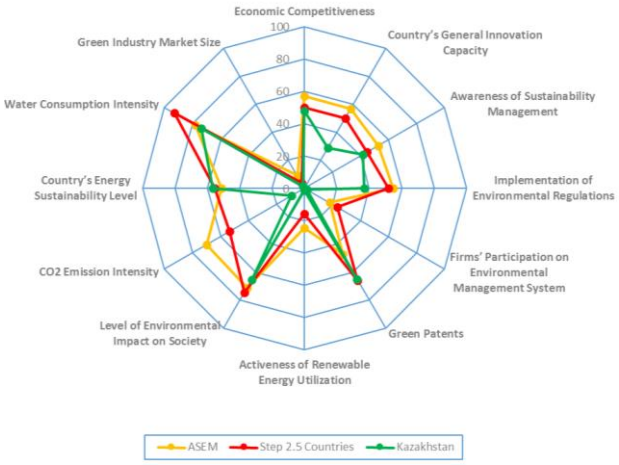
[44] the Emission Trading Scheme 2007

[45] 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 Minimization Act 2008

# Kazakhstan

|  | 11,028 | 18.1 million | 5:35:60 | 0.788 High | 4.69 | 3.91 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **35.11** |
| **Eco-Innovation Capacity** | 39.53 |
| Economic Competitiveness | 47.97 |
| Country's General Innovation Capacity | 29.04 |
| Awareness of Sustainability Management | 41.58 |
| **Eco-Innovation Supporting Environment** | 36.90 |
| Implementation of Environmental Regulations | 36.90 |
| **Eco-Innovation Activities** | 22.71 |
| Firms' Participation on Environmental Management System | 1.80 |
| Green Patents | 65.02 |
| Activeness of Renewable Energy Utilization | 1.30 |
| **Eco-Innovation Performance** | 41.29 |
| Level of Environmental Impact on Society | 65.17 |
| $CO_2$ Emission Intensity | 9.23 |
| Country's Energy Sustainability Level | 56.75 |
| Water Consumption Intensity | 73.72 |
| Green Industry Market Size | 1.59 |




- Kazakhstan's eco-innovation capacity, supporting environment, activity and performance are low.
- Country's Energy Sustainability Level (indicator no. 4.3) of Kazakhstan is higher than the average score of the same development state countries.
- Country's General Innovation Capacity (indicator no. 1.2) and $CO_2$ Emission Intensity (indicator no. 4.2) of Kazakhstan are lower than the average score of the same development state countries.

Table 28 Eco-innovation Policy instruments of Kazakhstan

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ National Sustainable Development Strategy<br>■ Concept for Transition of the Republic of Kazakhstan to Green Economy (2013) |
| | Eco-innovation | ■ The Green economy - Renewable energy (2014)[46] |
| Programmes and actions | National | ■ Sustainable consumption and production<br>■ SPAID - State Programme for Accelerated Industrial Innovative Development (2010) |
| | International | - |
| Legislation | | - |
| Finance | | - |
| Information | | ■ Green economy EXPO-2017[47] |

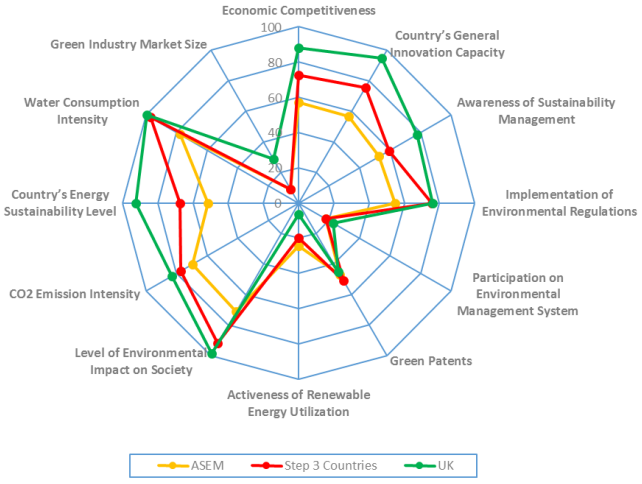
In Kazakhstan, national policies[48] for sustainable development, which become basis to eco-innovation support policy, are already incorporated into national plan and strategies. Eco-innovation plays an important role in sustaining political agenda related to green economy in national level and serves as catalyst for green economy. Concepts that become basis to the transformation into green economy in Kazakhstan have been solidified within the nation. They have established a foundation of green economy with renewable energy[49]. Along in the same line, Kazakhstan will be hosting an Expo until 2017 to enable partnership to heighten awareness to make transition to green economy[50]. National programs that support sustainable consumption and production are also in operation[51].

[46] http://energytransition.de/2014/02/kazakhstan-goes-renewable/
[47] http://www.kz.undp.org/content/kazakhstan/en/home/presscenter/articles/2015/06/19/kazakhstan-shares-experience-of-developing-green-economy-.html
[48] National Sustainable Development Strategy
[49] Concept for Transition of the Republic of Kazakhstan to Green Economy (2013)
[50] Green economy EXPO-2017
[51] Sustainable consumption and production

# United Kingdom

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 44,118 | 64.0 million | 1:20:79 | 0.907 Very high | 5.95 | 5.75 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **67.03** |
| **Eco-Innovation Capacity** | 86.79 |
| Economic Competitiveness | 88.21 |
| Country's General Innovation Capacity | 94.66 |
| Awareness of Sustainability Management | 77.51 |
| **Eco-Innovation Supporting Environment** | 75.94 |
| Implementation of Environmental Regulations | 75.94 |
| **Eco-Innovation Activities** | 24.86 |
| Firms' Participation on Environmental Management System | 22.87 |
| Green Patents | 45.29 |
| Activeness of Renewable Energy Utilization | 6.43 |
| **Eco-Innovation Performance** | 80.53 |
| Level of Environmental Impact on Society | 98.80 |
| $CO_2$ Emission Intensity | 83.08 |
| Country's Energy Sustainability Level | 92.42 |
| Water Consumption Intensity | 99.56 |
| Green Industry Market Size | 28.79 |




- The United Kingdom's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Most of the ASEI indicators of the United Kingdom are higher than the average score of the same development state countries.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) of the United Kingdom is lower than the average score of the same development state countries.

Table 29 Eco-innovation Policy instruments of the United Kingdom

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ UK Sustainable Development Strategy (2005)<br>■ Securing the future-sustainable development strategy (2006) |
| | Eco-innovation | ■ A Roadmap to a Green Economy (2011)<br>■ Waste Prevention & Waste Management - DEFRA[52]<br>■ Carbon Reduction Commitment Energy Efficiency Scheme(CRC EES) (2010)<br>■ the Microgeneration Strategy<br>■ UK Bioenergy Strategy 2011<br>■ Anaerobic Digestion Strategy in 2011<br>■ Combined Heat and Power schemes<br>■ Carbon Plan (2011)<br>■ 'The Greenest Government Ever' campaign<br>■ The 'Building a low carbon economy: unlocking innovation and skills' strategy (2008)<br>■ National Low Carbon Strategy<br>■ The Low Carbon Industrial Strategy, and the Low Carbon Transition Plan (2009)<br>■ Planning Policy Wales (PPW)<br>- Guidance on renewable and low carbon energy projects<br>■ Overarching National Policy Statement for Energy, DECC (2011)<br>■ Resource Security Action Plan |
| Programmes and actions | National | ■ WRAP (Waste & Resources Action Programme)<br>■ Renewable Transport Fuel Obligation (RTFO) (2008)<br>■ Community Energy Saving Programme (CESP) (2009)<br>■ Green Deal: The Energy Bill (2012)<br>■ National Sustainable Procurement Training Programme<br>■ Green Deal: The Energy Bill (2012)<br>■ Carbon Emission Reduction Target (CERT) (2008)<br>■ The northwest eco-innovation programme<br>■ Technical Advice Note 8 Renewable Energy (TAN8)<br>■ Ultra-Low Carbon Vehicle Demonstrator Programme<br>■ The Low Carbon Vehicle Integrated Delivery Programme<br>■ the Central Government Low Carbon Technology Programme |

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

| | | |
|---|---|---|
| | | ■ Carbon Reduction Commitment Energy Efficiency Scheme (CRC EES) - 2010 |
| | International | |
| Legislation | | ■ The Energy Act (2011)<br>■ Climate Change Act (2008) |
| Finance | | ■ Green Investment Bank (GIB) (2012) |
| Information | | ■ UK-Japan Symposium on Green Manufacturing and Eco-innovation (2010)<br>■ The 10th European Forum on Eco- Innovation 'Towards a Resource-Efficient Economy - from Policy to Action' (March 2011)<br>■ Scotland & Northern Ireland Forum for Environmental Research (SNIFFER)<br>■ 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 (Waste & Resources Action Programme) to reuse waste in order to form a new market of eco-innovation products (EIO, 2013v). 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 includes climate

[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' Strategy (2008)

[60] Resource Security Action Plan

[61] The Energy Act (2011)

[62] Community Energy Saving Programme(CESP) (2009), Ultra Low Carbon Vehicle Demonstrator 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)

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 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].

[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)

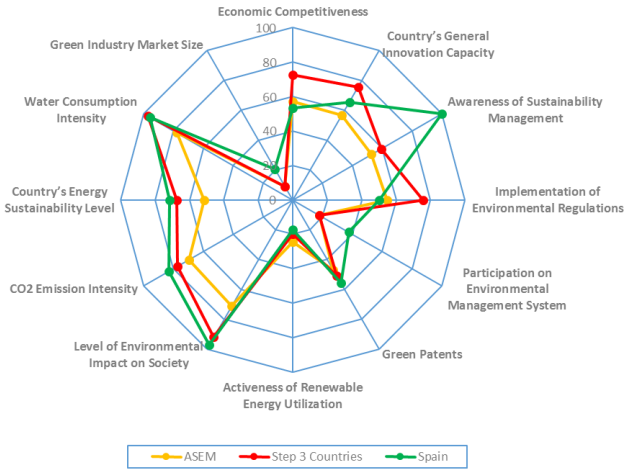
[69] The 10th European Forum on Eco-Innovation 'Towards a Resource Efficient Economy from Policy to Action' (2011.03), Scotland & Northern Ireland Forum for Environmental Research(SNIFFER)

[70] Environmental Sustainability Knowledge Transfer Network (ES KTN) (2009)

# Spain

|  | 26,327 | 48.1 million | 2:23:75 | 0.876 Very high | 4.65 | 4.73 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **58.38** |
| **Eco-Innovation Capacity** | 72.96 |
| Economic Competitiveness | 53.25 |
| Country's General Innovation Capacity | 65.64 |
| Awareness of Sustainability Management | 100.00 |
| **Eco-Innovation Supporting Environment** | 50.00 |
| Implementation of Environmental Regulations | 50.00 |
| **Eco-Innovation Activities** | 36.87 |
| Firms' Participation on Environmental Management System | 37.50 |
| Green Patents | 55.83 |
| Activeness of Renewable Energy Utilization | 17.29 |
| **Eco-Innovation Performance** | 73.67 |
| Level of Environmental Impact on Society | 97.38 |
| $CO_2$ Emission Intensity | 83.08 |
| Country's Energy Sustainability Level | 71.53 |
| Water Consumption Intensity | 95.66 |
| Green Industry Market Size | 20.68 |




- Spain's eco-innovation capacity, activity and performance are high. However, eco-innovation supporting environment is low.
- Awareness of Sustainability Management (indicator no. 1.5) of Spain is highest among the same development state countries.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) of Spain is lower than the average score of the same development state countries.

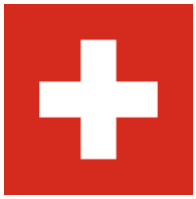
Table 30 Eco-innovation Policy instruments of Spain

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Spanish Strategy on Sustainable Development 2007<br>■ Sustainable Economy (BOE nº 55, March 5th) 2011 |
| | Eco-innovation | ■ Strategy for Entrepreneurship and Youth Employment 2013-2016<br>■ Spanish Strategy for Science, Technology and Innovation 2013-2020<br>■ National Integrated Plan on Waste (2008-2015)<br>■ Irrigated Lands Sustainable Modernization National Strategy-Horizon 2015<br>■ Spanish Strategy on Energy Efficiency and Saving 2004-2012<br>■ Renewable Energy National Action Plan (PANER) 2011-2020<br>■ Strategic Plan on Infrastructures and Transport (2005-2020) (PEIT).<br>■ Spanish Strategy on Sustainable Mobility (EEMS) 2009<br>■ Tourism Plan 2020<br>■ National Plan on Agricultural Environmental Quality 2007<br>■ National Plan on Adaptation to Climate Change<br>■ Spanish Strategy on Biodiversity Sustainable Use and Conservation |
| Programme and actions | National | ■ Green Jobs programme (Emplea Verde Programme) 2014<br>■ National Action Plan on Energy Savings and Efficiency 2011-2020<br>■ National Plan for the improvement of Air Quality 2011<br>■ The National Sub-Programme For Training<br>■ EMPLEA Programme<br>■ The INNODEMANDA programme<br>■ Technical Code on Building 2007<br>■ Green Public Procurement (GPP) 2008<br>■ A.G.U.A. Programme 2004<br>■ Green Public Contracting and Purchase<br>■ Spanish Forest Strategy (1999)<br>■ National Programme on Combating Desertification (PAND) 2008<br>■ IDAE (Energy Diversification and Saving Institute) initiatives on Energy Efficiency and renewable<br>■ Spanish Action Plan for Energy Savings and Energy Efficiency 2011-2020 |
| | International | |
| Legislation | | ■ Law 3/2001 of Sea Fisheries<br>■ State Soil Law 2008<br>■ Marine Environment Planning Law 41/2010<br>■ Sustainable Economy Act 2011 |

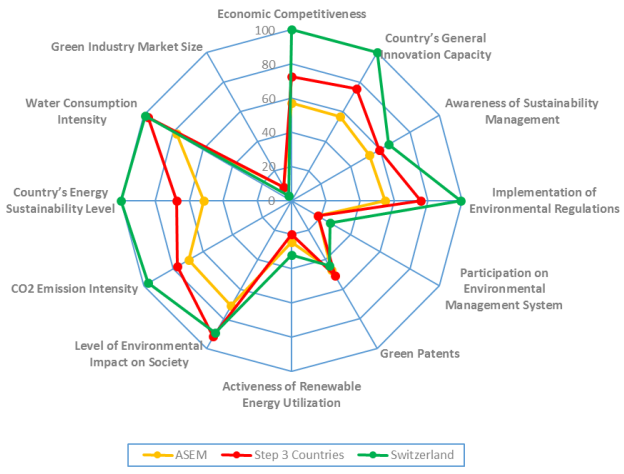
| | | |
|---|---|---|
| Finance | | ■ INNPRONTA programme<br>■ NEOTEC Venture Capital<br>■ INNVIERTE programme |
| Information | | ■ Centre for Industrial Technological Development(CDTI)<br>■ Spanish Technology Platform for Environmental Technologies<br>■ Eco-Union<br>■ Environmental Education National 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 includes 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 include 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 are 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 (EIO, 2013r).

# Switzerland

|  | 82,178 | 8.1 million | 1:27:72 | 0.930 Very high | 6.75 | 6.84 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **74.82** |
| **Eco-Innovation Capacity** | 88.49 |
| Economic Competitiveness | 100.00 |
| Country's General Innovation Capacity | 100.00 |
| Awareness of Sustainability Management | 65.47 |
| **Eco-Innovation Supporting Environment** | 98.93 |
| Implementation of Environmental Regulations | 98.93 |
| **Eco-Innovation Activities** | 34.13 |
| Firms' Participation on Environmental Management System | 26.10 |
| Green Patents | 44.39 |
| Activeness of Renewable Energy Utilization | 31.89 |
| **Eco-Innovation Performance** | 77.71 |
| Level of Environmental Impact on Society | 89.50 |
| $CO_2$ Emission Intensity | 96.92 |
| Country's Energy Sustainability Level | 100.00 |
| Water Consumption Intensity | 99.02 |
| Green Industry Market Size | 3.11 |




- Switzerland's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Most of the ASEI indicators of Switzerland are higher than the average score of the same development state countries.
- Green Patents (indicator no. 3.4) of Switzerland is lower than the average score of the same development state countries.

Table 31 Eco-innovation Policy instruments of Switzerland

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

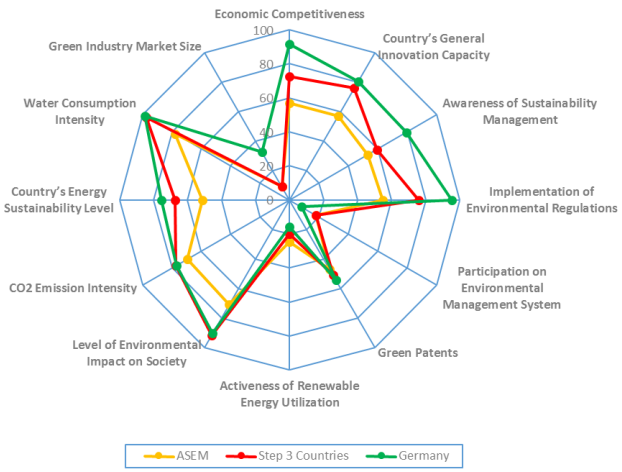
Switzerland created a green technology master plan vision in order to reduce resource consumption to the natural state and established the Green Economy Action Plan in order to create a sustainable development plan[71] and transition into a green economy. The Green Economy Protram 2010 was implemented by 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 environmentally and socially sustainable development that preserves environment while simultaneously increasing welfare. As a response to climate change and systemic elimination of nuclear reactors, the Green Economy Action Plan (2010) was established, under which resource utilization efficiency was reformed, information about resource utilization and pollution causing products (Environment Labeling) was provided, and the validity of environment tax revision was assessed. This has been revised into the 2012-2014 Switzerland Cleantech Master Plan (SCMP) from which focused on increasing resource utilization efficiency for products and consumers alike, replacement and recycling of raw material, participation of the related personnel, and the reinforcement of monitoring. The Switzerland 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, including consumption/production, waste/raw-material, tax and performance assessment (Establishment of goal – Monitoring – Information Provision – Report) and 27 strategy plans.

[71] Sustainable Development Strategy 2012-2015

# Germany

|  | 41,267 | 80.8 million | 1:30:69 | 0.916 Very high | 6.36 | 6.00 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **69.92** |
| **Eco-Innovation Capacity** | 83.74 |
| Economic Competitiveness | 91.46 |
| Country's General Innovation Capacity | 80.59 |
| Awareness of Sustainability Management | 79.18 |
| **Eco-Innovation Supporting Environment** | 95.19 |
| Implementation of Environmental Regulations | 95.19 |
| **Eco-Innovation Activities** | 26.03 |
| Firms' Participation on Environmental Management System | 7.87 |
| Green Patents | 54.26 |
| Activeness of Renewable Energy Utilization | 15.95 |
| **Eco-Innovation Performance** | 74.74 |
| Level of Environmental Impact on Society | 90.42 |
| $CO_2$ Emission Intensity | 76.92 |
| Country's Energy Sustainability Level | 75.42 |
| Water Consumption Intensity | 98.29 |
| Green Industry Market Size | 32.64 |




- Germany's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Most of the ASEI indicators of Germany are higher than the average score of the same development state countries.
- Firm's Participation on Environmental Management System (indicator no. 3.2) of Germany is lower than the average score of the same development state countries.

Table 32 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)<br>■ The Framework Research Programme for Sustainable Development<br>■ National ICT Strategy "Germany Digital 2015" and Action Plan "Germany: Green IT Pioneer"<br>■ National Research Strategy for BioEconomy 2030<br>■ The High-Tech Strategy 2020 for Germany (2010)<br>■ National Raw Material Strategy (2010) |
| Programme and actions | National | ■ Eco-Innovation Programme<br>■ The Master plan on environmental Technology (2008)<br>■ ProgRess programme promoting the understanding of resource efficiency as a competitive advantage<br>■ Research programme on Material Efficiency and Resource Conservation (MaRess)<br>■ Integration of the closed-cycle and waste management into a sustainable resource conserving substance management (2004)<br>■ Identification of Relevant Substances and Materials for a Substance Flow-Oriented, Resource-Conserving Waste Management (2006)<br>■ 5th Federal government energy research Programme<br>■ The "Saarländisches Umweltmanagement- Förderprogramm"<br>- Goal is an increase of EMAS-certified enterprises in order to tackle the sustainable resource-management issue<br>■ The project WING (Materials innovation for industry and society)<br>■ The Research for Sustainable Development Programme of the Federal Ministry of Education and Research (2010)<br>■ The national eco-label scheme "Blue Angel"<br>■ The Integrated Energy and Climate Package (2007)<br>■ The National Energy Efficiency Plan (2008)<br>■ National Biomass Action Plan (2009) and Action Plan for the Industrial use of Biomass (2009)<br>■ National Resource Efficiency Programme (2011)<br>■ 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)<br>- An energy advice program<br>- A program for remodeling federal government buildings |
| Information | | ■ NeMAT (Netzwerken zur Materialeffizienz) programme<br>■ Solar Valley-grid parity for solar power in Germany<br>■ Cool silicon-climate friendly communications<br>■ The Centre for Resource Efficiency(VDI ZRE) (2009)<br>■ International partnerships for sustainable climate protection and environmental technologies and services(CLIENT)<br>■ The national Resource Efficiency Network |

Germany has done well in composing a sustainable development policy along with its eco-innovation policy. Especially the green technology endorsement policy[72] was well developed as it was supported with the program for green technology development[73]. Germany has clearly chosen eco-innovation subjects and utilized relevant means such as technology demands, regulations, guidelines and incentives to establish an eco-innovation market (EIO, 2013f). In order to increase resource utilization efficiency, especially, a strong policy framework was established, which supported eco-innovation related to the climate changes, renewable energies, and waste[74]. In order to further encourage eco-innovation, waste disposal regulations[75] were created and economic support[76] measures related to renewable energies and remodeling of public institutions were arranged. Related networks were established and various information sharing events furthered eco-innovation awareness[77].

[72] High-Tech Strategy (2006) (renewed in 2010), The High-Tech Strategy 2020 for Germany (2010)

[73] Eco-Innovation Programme (former, Environmental Technology Programme), The Master plan on environmental Technology (2008), Material Innovation for Industry and Society(WING)

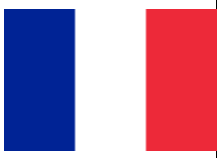
[74] ProgRess programme promoting the understanding of resource efficiency as a competitive advantage

[75] Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal (1994, latest update 2006; now under revision)

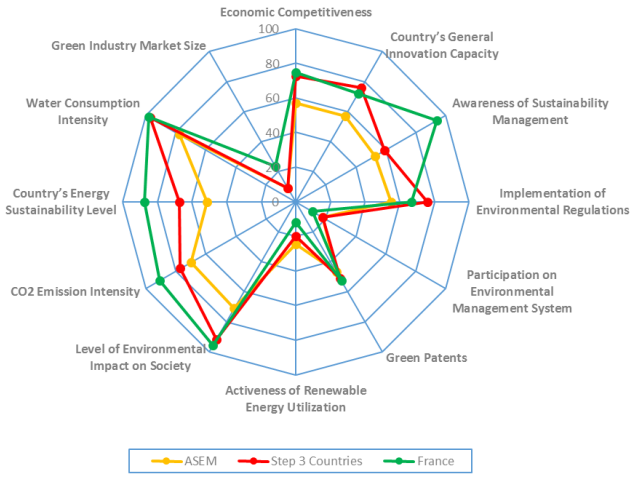
[76] The federal government runs three subsidy programs

[77] 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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 37,728 | 66.5 million | 2:19:79 | 0.888 Very high | 5.56 | 5.52 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **62.82** |
| **Eco-Innovation Capacity** | 80.30 |
| Economic Competitiveness | 74.80 |
| Country's General Innovation Capacity | 72.09 |
| Awareness of Sustainability Management | 94.00 |
| **Eco-Innovation Supporting Environment** | 66.58 |
| Implementation of Environmental Regulations | 66.58 |
| **Eco-Innovation Activities** | 25.27 |
| Firms' Participation on Environmental Management System | 11.21 |
| Green Patents | 52.69 |
| Activeness of Renewable Energy Utilization | 11.93 |
| **Eco-Innovation Performance** | 79.15 |
| Level of Environmental Impact on Society | 95.71 |
| $CO_2$ Emission Intensity | 90.77 |
| Country's Energy Sustainability Level | 87.62 |
| Water Consumption Intensity | 98.25 |
| Green Industry Market Size | 23.39 |




- France's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Most of the ASEI indicators of France are higher than the average score of the same development state countries.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and Activeness of Renewable Energy Utilization (indicator no. 3.5) of France are lower than the average score of the same development state countries.

Table 33 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<br>■ Water framework directive in 2000<br>■ A Waste Action Plan (2009-2012)<br>■ The national climate change adaption plan<br>■ Development plan for renewable energy (2008) |
| Programme and actions | National | ■ Ecotech 2012 (2012)<br>■ Eco-industry call (2009)<br>■ The Ecophyto Plan 2018 (2008 - 2018)<br>■ Fuel cell research programme H-PAC<br>■ Excellence Institutes in the field of carbon-free energies (IEED) (Instituts d'excellence sur les énergies décarbonnées)<br>■ Sustainable Energy programme |
| | International | |
| Legislation | | ■ General Tax on Polluting Activities(TGAP) |
| Finance | | ■ BPI Finance<br>■ ADEME(French Environment and Energy Management Agency)<br>■ The Strategic Investment Fund (FSI) |
| Information | | ■ The Club ADEME International<br>■ Cluster of Axelera in Rhone Alpes<br>■ Eco-technology clusters |

France has established a sustainable policy[78] along with an eco-innovation policy[79] related to the water resource management, waste management, climate change adaptation, and renewable energies. They have also established a policy to create an environment necessary to enforce those eco-innovation policies. France's eco-innovation policies mainly focus on supporting the eco-innovation industries, such as the BIP fund, which supports researches on regulation[80] of waste material and the ADEME[81], which provides financial support. France's economic policies and regulations are assessed to be playing a crucial role in expanding eco-innovation across multiple fields (EIO, 2013e). The ADEME established international partnerships along with economic support. With a newly developed industrial complex, France increases the efficiency in the resource and energy utilization and systematically approaches

[78] National Strategy for Sustainable Development(NSSD) (2010-2013)

[79] Water framework directive in 2000, A Waste Action Plan (2009-2012), The national climate change adaption plan, Development plan for renewable energy (2008)

[80] General Tax on Polluting Activities(TGAP)

[81] ADEME (French Environment and Energy Management Agency)

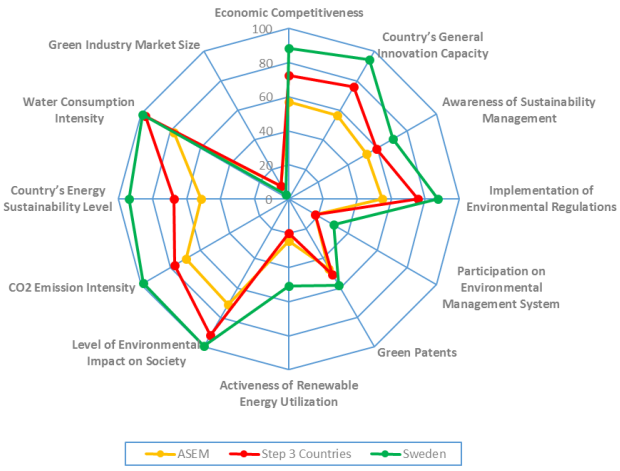
Sweden scored similar to the average scores of the countries in the 1st division, in all fields of capacity, supporting environment, activities and performance. The scores of capacity and activities were slightly higher while those of performance and supporting environment were relatively lower. Increasing the Green Technology R&D investment support and trying to connect it to the performance are expected to allow more advanced eco-innovation activities[82].

[82] Cluster of Axelera in Rhone Alpes, Eco-technology clusters

# Sweden

|  | 48,966 | 9.8 million | 2:33:65 | 0.907 Very high | 6.05 | 5.95 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **74.29** |
| **Eco-Innovation Capacity** | 84.45 |
| Economic Competitiveness | 88.21 |
| Country's General Innovation Capacity | 94.48 |
| Awareness of Sustainability Management | 70.65 |
| **Eco-Innovation Supporting Environment** | 87.43 |
| Implementation of Environmental Regulations | 87.43 |
| **Eco-Innovation Activities** | 46.47 |
| Firms' Participation on Environmental Management System | 30.19 |
| Green Patents | 58.30 |
| Activeness of Renewable Energy Utilization | 50.92 |
| **Eco-Innovation Performance** | 78.82 |
| Level of Environmental Impact on Society | 99.42 |
| $CO_2$ Emission Intensity | 98.46 |
| Country's Energy Sustainability Level | 93.90 |
| Water Consumption Intensity | 99.06 |
| Green Industry Market Size | 3.23 |




- Sweden's eco-innovation capacity, supporting environment, activity and performance are high.
- Most of the ASEI indicators of Sweden are higher than the average score of the same development state countries.
- Green Industry Market Size (indicator no. 4.6) of Sweden is lower than the average score of the same development state countries.

Table 34 Eco-innovation Policy instruments of Sweden

| | | |
|---|---|---|
| National plan and strategy | Sustainability | |
| | Eco-innovation | ■ 16 Swedish Environmental Quality Objectives (1999)<br>■ Integrated climate and energy policy (2009)<br>■ The Environmental Technology Strategy (2011)<br>■ The Strategy for Development and Export of Environmental Technology (2011-2014)<br>■ Environmental technology Action Plan<br>■ National Innovation Strategy for 2020 [83]<br>■ Action Plan for Swedish Cleantech (2009) |
| Programme and actions | National | ■ five-year energy efficiency programme for 2010-2014<br>■ Delegation for Sustainable Cities (2008)<br>■ Nordic Cleantech<br>■ National system for Green certificates in electricity production<br>■ SymbioCity<br>■ Swedish Environmental Code (1998) |
| Legislation | | ■ National Waste Plan (2005)<br>■ A National Program for Waste Prevention (2013) |
| Finance | | ■ Innovationsbron AB[84]<br>■ VINNOVA[85]<br>■ Sustainable Technologies Fund[86]<br>■ The research and innovation bill (Bill 2008/9:50) - the government's support for eco-innovation research programmes<br>■ The Swedish Environmental Protection Agency<br>■ Arbetsförmedlingen |
| Information | | ■ The International Cooperation for Eco- Innovations Programme (2012)<br>■ Swedish American Green Alliance (SAGA) |

[83] 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

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

[85] 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

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

| | | |
|---|---|---|
| | | ■ SEMCo - the Swedish government's expert body on environmental and other sustainable procurement<br>■ The Swedish Environmental Technology Council(SWENTEC)<br>■ Swedish energy agency |

Sweden chose eco-innovation as a solution to achieve the policy goals for the future generations (EIO, 2013s). Sweden established a framework[87] to enhance quality of environment and built the foundation for the eco-innovation policies, which address the climate change and energy[88]. Furthermore, Sweden established environmental technology plans and strategies were established along with strategies as well as the strategies to export them[89]. Sweden also simultaneously prepared a sustainable solution for both climate change and environment destruction and pursued activities to promote 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[90].

Sweden financially supports eco-innovation activities through venture finances[91], publicly guaranteed funds[92], R&D funds[93], joint subsidies, and tax support[94]. The Swedish government has created the INNOVA[95] in order to facilitate international cooperation in eco-innovation programs. The purpose of this organization is to promote international research and development cooperation networks (EIO, 2013s). 'SymbioCity' is a government initiative operated by Business Sweden. Business Sweden manages the trademark of 'SymbioCity' and encourages national exports behalf of the government and industries such as the SWENTEC[96]. The Swedish government is working strongly committed to exporting green technology know-hows and related technologies and services (EIO, 2013s).

[87] 16 Swedish Environmental Quality Objectives (1999) (EQOs)

[88] Integrated climate and energy policy

[89] 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)

[90] five-year 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

[91] Innovationsbron AB

[92] VINNOVA, Environment-Driven Business Development programme- for SME, Swedish energy agency

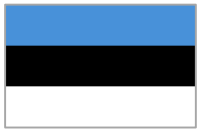
[93] The research and innovation bill, Swedish energy agency, The Swedish Environmental Protection Agency

[94] Arbetsförmedlingen

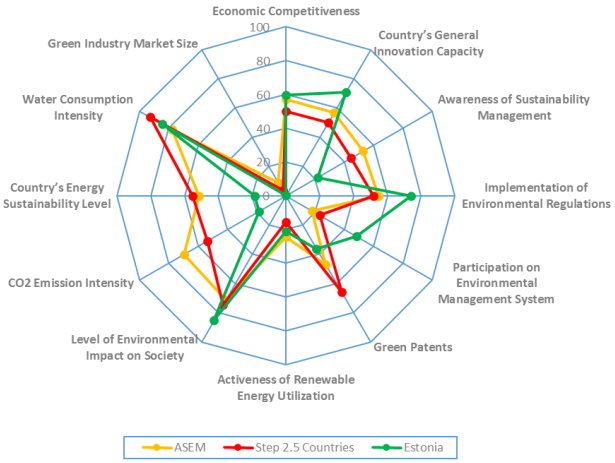
[95] Swedish Governmental Agency for Innovation Systems

[96] The Swedish Environmental Technology Council(SWENTEC)

# Estonia

|  | 17,425 | 1.2 million | 4:28:68 | 0.861 Very high | 5.13 | 4.71 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **50.25** |
| **Eco-Innovation Capacity** | 50.69 |
| Economic Competitiveness | 59.76 |
| Country's General Innovation Capacity | 70.67 |
| Awareness of Sustainability Management | 21.65 |
| **Eco-Innovation Supporting Environment** | 73.80 |
| Implementation of Environmental Regulations | 73.80 |
| **Eco-Innovation Activities** | 35.09 |
| Firms' Participation on Environmental Management System | 48.06 |
| Green Patents | 36.32 |
| Activeness of Renewable Energy Utilization | 20.91 |
| **Eco-Innovation Performance** | 41.40 |
| Level of Environmental Impact on Society | 85.05 |
| $CO_2$ Emission Intensity | 18.46 |
| Country's Energy Sustainability Level | 18.48 |
| Water Consumption Intensity | 84.78 |
| Green Industry Market Size | 0.21 |




- Estonia's eco-innovation capacity, supporting environment and activity are high. However, eco-innovation performance is low.
- Country's General Innovation Capacity (indicator no. 1.2), Implementation of Environment Regulations (indicator no. 2.2) and Firm's Participation on Environmental Management System (indicator no. 3.2) of Estonia are higher than the average score of the same development state countries.
- Awareness of Sustainability Management (indicator no. 1.5), CO2 Emission Intensity (indicator no. 4.2) and Country's Energy Sustainability Level (indicator no. 4.3) of Estonia are lower than the average score of the same development state countries.

Table 35 Eco-innovation Policy instruments of Estonia

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Sustainable Estonia 21 (2005)<br>■ National Environmental Action Plan of Estonia 2007-2013<br>■ Estonia 2020 (Competitiveness Plan) (2011) |
| | Eco-innovation | ■ the R&D and Innovation Strategy 2014-2020<br>■ the Entrepreneurship Growth Strategy 2014-2020<br>■ Estonian Environmental Strategy 2030 (2007)<br>■ 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)<br>■ National Development Plan for Energy Sector until 2020 (2009)<br>■ 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<br>■ Estonian R&D strategy Knowledge-based Estonia for the years 2007-2013 |

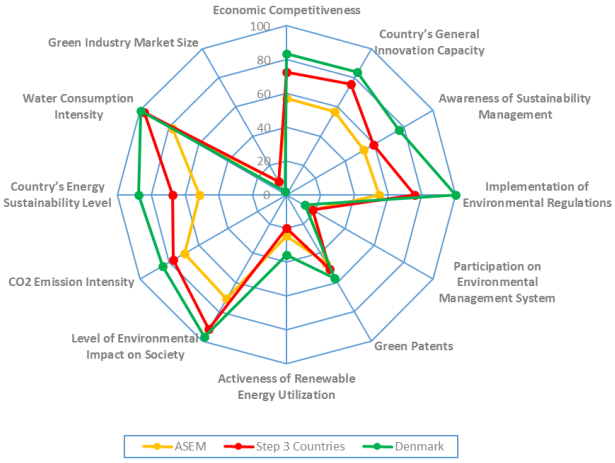
Estonia shows changes in the following three fields. Firstly, the Estonian government enacted the new Research Development Innovation Strategy 2014-2020[97]. The Ministry of Education Research was authorized as the leader of the nation's research development policies and each department's research development sector leader. These strategies are expected to produce innovation in new areas. Secondly, Estonia established a Smart Specialization Strategy in 2013. This strategy emphasizes information communication technology, health technology and resource efficiency, which are three areas with high growth potential. These three fields are also compatible with active eco-innovation fields (ICT, material technology, energy etc.). In addition, the 2014-2020 strategy emphasizes the fields that are associated with important socio-economic issues such as environment, energy, security and health management. In comparison to the average of the EU, Estonia has low resource efficiency due to its investment on those with low production level of material, water, and energy, and the usage of the outdated technology. Estonia is trying to optimize environmentally friendly technologies through development of processes and new products; however, the investment expenditures related to ecological progress and high prices of environmentally friendly products make it difficult to promote execution of innovation strategy. The supportive funds from the EU are driving factors for promoting eco-innovation in each committee (EIO, 2013c).

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

# Denmark

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 51,424 | 5.6 million | 1:22:77 | 0.923 Very high | 6.14 | 5.69 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **72.68** |
| **Eco-Innovation Capacity** | 81.41 |
| Economic Competitiveness | 83.33 |
| Country's General Innovation Capacity | 83.92 |
| Awareness of Sustainability Management | 76.99 |
| **Eco-Innovation Supporting Environment** | 100.00 |
| Implementation of Environmental Regulations | 100.00 |
| **Eco-Innovation Activities** | 35.06 |
| Firms' Participation on Environmental Management System | 12.32 |
| Green Patents | 56.95 |
| Activeness of Renewable Energy Utilization | 35.92 |
| **Eco-Innovation Performance** | 74.23 |
| Level of Environmental Impact on Society | 97.35 |
| $CO_2$ Emission Intensity | 84.62 |
| Country's Energy Sustainability Level | 87.62 |
| Water Consumption Intensity | 99.60 |
| Green Industry Market Size | 1.98 |




- Denmark's eco-innovation capacity, supporting environment, activity and performance are high.
- Most of the ASEI indicators of Denmark are higher than the average score of the same development state countries.
- Green Industry Market Size (indicator no. 4.6) of Denmark is lower than the average score of the same development state countries.

Table 36 Eco-innovation Policy instruments of Denmark

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Danish Strategy for Sustainable Development (2009) |
| | Eco-innovation | ■ Energy Strategy 2050<br>■ The National Energy Agreement (2008 - 2011)<br>■ Green Growth (2009)<br>■ Environmental technological action plan 2010-2011<br>■ The Waste Strategy (2009-2012)<br>■ Green Growth agreement (2009) & Green Growth agreement 2.0 (2010) |
| Programme and actions | National | ■ A visionary Danish Energy Policy 2025 (2008)<br>■ New Eco-innovation Programme<br>■ The Green Development and Demonstration Programme (GUDP)<br>■ Eco-label Denmark<br>■ An enhanced effort for green procurement (2008-2009) |
| | International | |
| Legislation | | ■ The Raw Materials Act |
| Finance | | ■ The growth Fund<br>■ The Energy Technology Development and Demonstration Programme<br>■ The Fund for Green Conversion and Commercial Renewal<br>■ Four largest water research programmes |
| Information | | ■ The 7th European Forum on Eco-Innovation- Adapting to Climate Change through Eco-Innovation (Nov 2009)<br>■ Business climate strategy (2009) |

Denmark established Energy Strategy 2050 based on the sustainable development policy[98], in order to become independent from fossil fuel. As a response to the climate change in the energy field, the Denmark Energy Agreement[99] used from 2008 to 2011 was revised as the Renewable Energy Agreement[100] in March, 2012. This agreement states that Denmark will supply 50% of its electricity through wind generation and produce over 35% of its final energy using renewable energies or bio gases[101]. The energy policy consists of the country's vision until 2025[102]. The Denmark Ministry of

[98] Danish Strategy for Sustainable Development (Vækst med Omtanke) (2009)

[99] The National Energy Agreement (2008 – 2011)

[100] new Energy Agreement – "Our Future Energy"

[101] Danish Energy Agency, 2014, Danish Climate and Energy policy. Available at http://www.ens.dk/en/policy/danish-climate-energy-policy

[102] A visionary Danish Energy Policy 2025 (2008)

Environment eco-innovation programs[103]. The Ministry of Agriculture-Fishing Food positively influences the environment in agriculture and operate green industry development and test programs[104] in order to promote prospective green technologies with market potential. Through the Eco-Label program and Green Procurement programs[105], policy efforts are made to create positive conditions for eco-innovation supply. Denmark is creating conditions for the execution of eco-innovation by providing economic support through venture finances[106], public guarantee funds[107], R&D funds[108], joint subsidies, and tax support[109]. A forum on climate change adoption through eco-innovation was held, in which the participants shared business strategies and other related information as to relate climate change adaptation efforts to the business[110].

[103] 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

[104] 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/

[105] Eco-label Denmark, An enhanced effort for green procurement (2008-2009)

[106] Danish Venture Capital and Private Equity Association (DVCA), The Growth Fund, Innovation Environments-DTU Symbion Innovation, Southern Technological Innovation (SDTI)

[107] The Energy Technology Development and Demonstration Programme (EUDP)

[108] 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

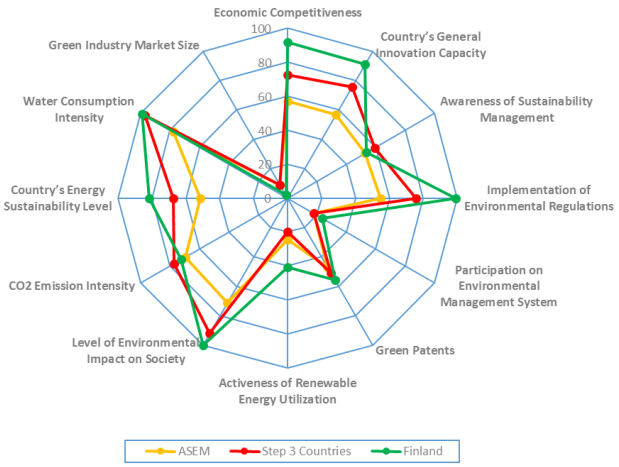
[109] 25% Tax Scheme

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

# Finland

|  | 42,159 | 5.5 million | 3:27:70 | 0.883 Very high | 6.38 | 5.98 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **72.20** |
| **Eco-Innovation Capacity** | 78.81 |
| Economic Competitiveness | 91.87 |
| Country's General Innovation Capacity | 90.89 |
| Awareness of Sustainability Management | 53.66 |
| **Eco-Innovation Supporting Environment** | 98.93 |
| Implementation of Environmental Regulations | 98.93 |
| **Eco-Innovation Activities** | 40.10 |
| Firms' Participation on Environmental Management System | 23.72 |
| Green Patents | 55.83 |
| Activeness of Renewable Energy Utilization | 40.74 |
| **Eco-Innovation Performance** | 70.97 |
| Level of Environmental Impact on Society | 100.00 |
| $CO_2$ Emission Intensity | 72.31 |
| Country's Energy Sustainability Level | 81.52 |
| Water Consumption Intensity | 99.03 |
| Green Industry Market Size | 1.98 |




- Finland's eco-innovation capacity, supporting environment, activity and performance are high.
- Most of the ASEI indicators of Finland are higher than the average score of the same development state countries.
- Green Industry Market Size (indicator no. 4.6) of Finland is lower than the average score of the same development state countries.

Table 37 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)<br>■ The Climate and Energy Strategy (2009)<br>■ National waste plan until 2016 (2008)<br>■ The National Resources Strategy (2009)<br>■ A Natural Resource Strategy for Finland: Using natural resources intelligently (2009)<br>■ The National Innovation Strategy (2009)<br>■ Bioeconomy Strategy (2010)<br>■ Finland's Mineral Strategy (2010) |
| Programme and actions | National | ■ Towards a Smart Resource Economy<br>- Government Report to Parliament on Natural Resources (2010)<br>■ The Programme for the Built Environment (2010)<br>■ Energy and eco-efficiency standards for new buildings<br>■ The ERA17 programme for an energy smart built environment 2017 (2010)<br>■ The Strategic Programme for Cleantech Business (2012)<br>■ Resolution on Sustainable public procurement (2009)<br>■ Proposals for Finland's national programme to promote sustainable consumption and production (2005)<br>■ Energy efficiency label scheme |
| 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<br>■ The Finnish Innovation Fund(Sitra) |
| Information | | ■ Cleantech Finland Business Forum<br>■ Green Net Finland<br>■ The Finnish National Environmental Innovation Panel<br>■ The Energy Efficiency committee (2008)<br>■ The 11th European Forum on Eco-Innovation working with emerging economies for green growth (Oct 2011)<br>■ The Finnish Cleantech Cluster<br>■ SHOK (Strategic Centres for Science, Technology and Innovation)<br>■ Motiva Ltd: Equipment procurements, Energy procurements and Material efficiency<br>■ Wood energy advisors network |

Finland established a green growth plan in order to identify new potential growth factors for a sustainable economy. The green growth plan is based on the economic activities that are designed to increase energy efficiency and the sustainable usage of natural resources (EIO, 2013d). A response to climate changes, a national plan and strategy was established to address energy policies[111], waste management[112], resource utilization[113], and national innovation[114]. The eco-innovation market was created Based on the public acquirement regulations[115], and the corporate participation in eco-innovation was encouraged. Finland provides economic support through venture finances[116], public guarantee funds[117], R&D funds[118], joint subsidies, and tax support for the execution of eco-innovation. Finland also partakes in various support activities such as technology platform and innovation network support[119], industrial complex group creations[120], consumer awareness increase[121] and consulting support[122]. The Finland Ministry of Environment and Ministry of Transportation and Communications provide support for the establishment of a research development infrastructure.

[111] Climate Change and Energy Strategy (2008), The Climate and Energy Strategy (2009), Bioeconomy Strategy (2010)

[112] National waste plan until 2016 (2008)

[113] The National Resources Strategy (2009), A Natural Resource Strategy for Finland: Using natural resources intelligently (2009), Finland's Mineral Strategy (2010)

[114] The National Innovation Strategy (2009)

[115] 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

[116] Finnvera (Environmental Loan): Finnvera acts according to the export guarantee act, Sitra (Finnish Innovation Fund)

[117] Finvera: Environmental guarantee

[118] Tekes: grants funding and subsidies, Academy of Finland

[119] 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

[120] 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

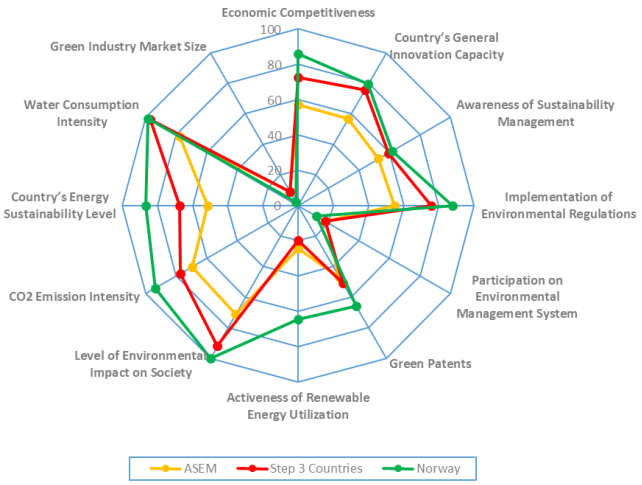
[121] Motiva Ltd: Equipment procurements, Energy procurements and Material efficiency

[122] Tekes, Wood Biomass Advisors Network

# Norway

|  | 76,266 | 5.2 million | 2:39:59 | 0.944 Very high | 6.43 | 6.14 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **71.86** |
| **Eco-Innovation Capacity** | 75.79 |
| Economic Competitiveness | 85.77 |
| Country's General Innovation Capacity | 79.64 |
| Awareness of Sustainability Management | 61.95 |
| **Eco-Innovation Supporting Environment** | 87.97 |
| Implementation of Environmental Regulations | 87.97 |
| **Eco-Innovation Activities** | 47.39 |
| Firms' Participation on Environmental Management System | 12.02 |
| Green Patents | 65.70 |
| Activeness of Renewable Energy Utilization | 64.46 |
| **Eco-Innovation Performance** | 76.31 |
| Level of Environmental Impact on Society | 100.00 |
| $CO_2$ Emission Intensity | 93.85 |
| Country's Energy Sustainability Level | 86.69 |
| Water Consumption Intensity | 98.72 |
| Green Industry Market Size | 2.31 |




- Norway's eco-innovation capacity, supporting environment, activity and performance are high.
- Most of the ASEI indicators of Norway are higher than the average score of the same development state countries.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and Green Industry Market Size (indicator no. 4.6) of Norway are lower than the average score of the same development state countries.

Table 38 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)<br>■ "Technology for reduction of greenhouse emissions" 1997 |
| | International | |
| Legislation | | ■ 2009 Nature Diversity Act |
| Finance | | ■ Green Industry Innovation programme (Norway Grants) 2009-2014<br>■ EEA and Norway Grants |
| Information | | ■ European Economic Area (EEA) 1994 |

Norway established a sustainable development strategy. Although eco-innovation related national strategies are absent, Norway provides support for eco-innovation through local development support policies and the $CO_2$ reduction technology policies[123]. Relevant laws allowed the enactment of the Varied Environment Law[124], which is related to the land usage, and the green industry innovation programs are being supported financially[125]. Norway financially supports the European SMEs' green technology development in conjunction with the EEA[126].

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

[124] 2009 Nature Diversity Act

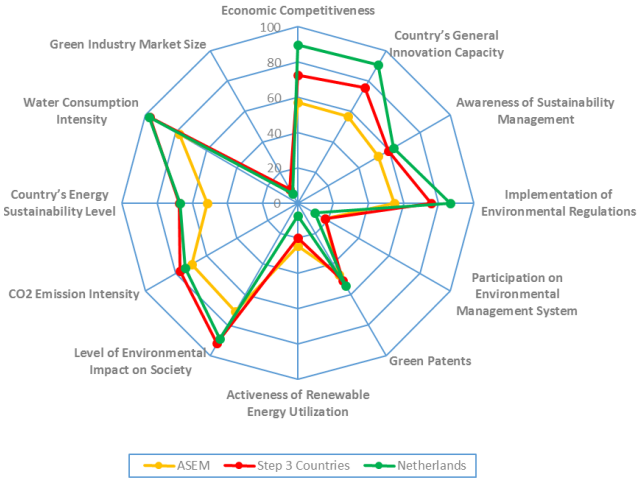
[125] Green Industry Innovation programme (Norway Grants) 2009-2014

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

# Netherlands

|  | 44,333 | 16.9 million | 2:19:79 | 0.922 Very high | 6.39 | 5.88 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **64.59** |
| **Eco-Innovation Capacity** | 81.09 |
| Economic Competitiveness | 89.84 |
| Country's General Innovation Capacity | 90.72 |
| Awareness of Sustainability Management | 62.73 |
| **Eco-Innovation Supporting Environment** | 86.36 |
| Implementation of Environmental Regulations | 86.36 |
| **Eco-Innovation Activities** | 24.15 |
| Firms' Participation on Environmental Management System | 11.07 |
| Green Patents | 54.26 |
| Activeness of Renewable Energy Utilization | 7.10 |
| **Eco-Innovation Performance** | 66.76 |
| Level of Environmental Impact on Society | 89.02 |
| $CO_2$ Emission Intensity | 73.85 |
| Country's Energy Sustainability Level | 67.10 |
| Water Consumption Intensity | 97.60 |
| Green Industry Market Size | 6.25 |




- The Netherland's eco-innovation capacity and supporting environment are high. However, eco-innovation activity and performance are low.
- Most of the ASEI indicators of the Netherlands are higher than the average score of the same development state countries.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and Activeness of Renewable Energy Utilization (indicator no. 3.5) of the Netherlands are lower than the average score of the same development state countries.

Table 39 Eco-innovation Policy instruments of the Netherlands

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Sustainability Agenda (2011) [127] |
| | Eco-innovation | ■ Dutch ETAP roadmap (2006) (EU ETAP roadmap)<br>■ Green Deal (2011) |
| Programme and actions | National | ■ Green deal programme<br>■ Programme Environment & Technology |
| | International | |
| Finance | | ■ Groen Beleggen[128]<br>■ VAMIL/MIA[129]<br>■ Tax incentive for low CO2 cars<br>■ EIA: fiscal support for purchasing innovative energy investment goods<br>■ MEP Scheme<br>■ Renewable energy incentive scheme (SDE+)<br>■ Green fund scheme |
| Information | | ■ The 12th European Forum on Eco- Innovation- Scaling up sustainable construction through value chain innovation (April 2012)<br>■ Renewable energy, sustainable mobility and healthy food<br>■ Energy valley<br>■ Netherlands Water Partnership (NWP) |

The Netherlands has adopted sustainable development as a national sustainability agenda and established an environment technology roadmap[130]. The Green Deal established in 2011 supports sustainable company activity. It provides support in active networking, regulation framework, sustainability, and innovation related knowledge sharing, rather than focusing on financial support for about 150 firms (Green Deals, 2013). The Netherlands government supports sustainable industries in areas, where it is difficult for the companies to operate[131]. The Netherlands provides tax reduction benefits[132] for the green industry investment and the green products. In particular, they adopted a policy, which provides economic incentives for low carbon green consumption[133]. Fund support policies for the environmental technologies have been promoted since the 1980s. Consumer support policies, which

[127] 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'

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

[129] Fiscal support for purchasing environmental innovative investment goods

[130] Dutch ETAP roadmap (2006) (EU ETAP roadmap)

[131] http://www.government.nl/issues/energy-policy/green-deal

[132] Groen Beleggen, VAMIL/MIA, EIA: fiscal support for purchasing innovative energy investment goods

[133] Tax incentive for low CO2 cars

were promoted not only for the eco-industry but also for the eco-market and eco-innovation support outside of the technological field have been provided after the 1990s (EIO, 2013u). Producers in the Netherlands, who provided renewable energies to the public grid, received fixed fees in the past 10 years through the MEP policy. The SDE policy[134] implemented afterwards is similar to the MEP policy (EREC, 2009). There is a green fund policy, which executes eco-innovation or makes investment on the green business with low interest. Any individual or private organization who have deposited money into these funds receive tax reductions according to their deposit amount (NL Agency, 2010). Although the Netherlands held forums[135] for increasing social awareness for eco-innovation and established local networks and partnerships for the water resource[136] and energy fields[137], they have yet to any specific eco-innovation related networks (EIO, 2013u).

[134] Renewable energy incentive scheme (SDE+)

[135] The 12th European Forum on Eco- Innovation- Scaling up sustainable construction through value chain innovation (April 2012)

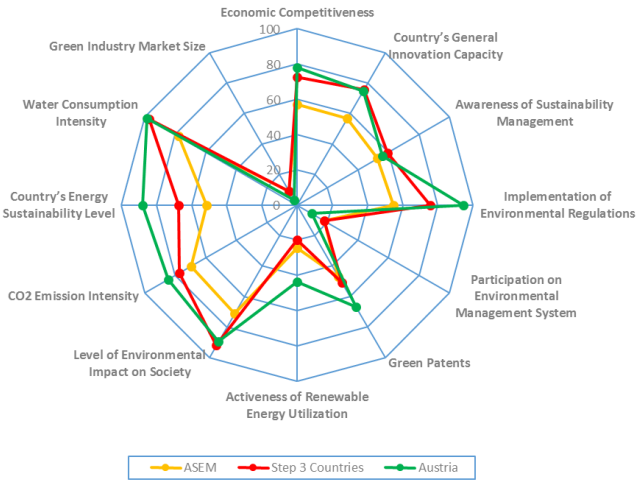
[136] Netherlands Water Partnership (NWP)

[137] Energy valley

# Austria

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 43,547 | 8.7 million | 1:28:71 | 0.885 Very high | 6.00 | 5.85 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **69.25** |
| **Eco-Innovation Capacity** | 69.60 |
| Economic Competitiveness | 78.05 |
| Country's General Innovation Capacity | 74.81 |
| Awareness of Sustainability Management | 55.94 |
| **Eco-Innovation Supporting Environment** | 94.65 |
| Implementation of Environmental Regulations | 94.65 |
| **Eco-Innovation Activities** | 40.07 |
| Firms' Participation on Environmental Management System | 9.47 |
| Green Patents | 67.04 |
| Activeness of Renewable Energy Utilization | 43.69 |
| **Eco-Innovation Performance** | 72.67 |
| Level of Environmental Impact on Society | 89.44 |
| $CO_2$ Emission Intensity | 84.62 |
| Country's Energy Sustainability Level | 87.80 |
| Water Consumption Intensity | 98.34 |
| Green Industry Market Size | 3.14 |




- Austria's eco-innovation capacity, supporting environment, activity and performance are high.
- Most of the ASEI indicators of Austria are higher than the average score of the same development state countries.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and Green Industry Market Size (indicator no. 4.6) of Austria are lower than the average score of the same development state countries.

Table 40 Eco-innovation Policy instruments of Austria

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Austrian Strategy for SD (NSTRAT) (2002)<br>■ A new Austrian Sustainable Development Strategy (SDS) (2010)<br>■ Master plan Sustainable Energy<br>■ Growth in Transition<br>■ Master plan's strategies<br>■ Austrian Climate Strategy and the Energy Efficiency Action Plan (2007) |
| | Eco-innovation | ■ The Austrian Raw Materials Plan<br>■ Resource Efficiency Action Plan (REAP) (2007)<br>■ Waste Prevention and Recycling Strategy (2006)<br>■ Master Plan Environmental Technologies(MUT)<br>■ Strategy 2020-Research, Technology and Innovation for Austria<br>■ The National Action Plan for Sustainable Public Procurement (2010)<br>■ Master Plan Green Jobs |
| Programme and actions | National | ■ Environmental technology export initiative (2005)<br>■ Green Brands seal (2011)<br>■ Smart Energy Demo (2011)[138]<br>■ Green Public Procurement (2008- 2013)<br>■ Waste Prevention Programme (2011) |
| | International | |
| Legislation | | ■ The new Green Electricity Act 2012 |
| Finance | | ■ The Climate and Energy Fund(KLIEN)<br>■ The programme on Technologies for Sustainable Development (2005)<br>- Building of Tomorrow<br>- Factory of Tomorrow<br>- Energy systems of Tomorrow |
| Information | | ■ Austrian Clean Technology (ACT) (2008)<br>■ COMET (Competence Centers for Excellent Technologies)[139] |

Austria has established national plans and strategies[140] for sustainable development, as well as the

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

[139] 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.

[140] 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

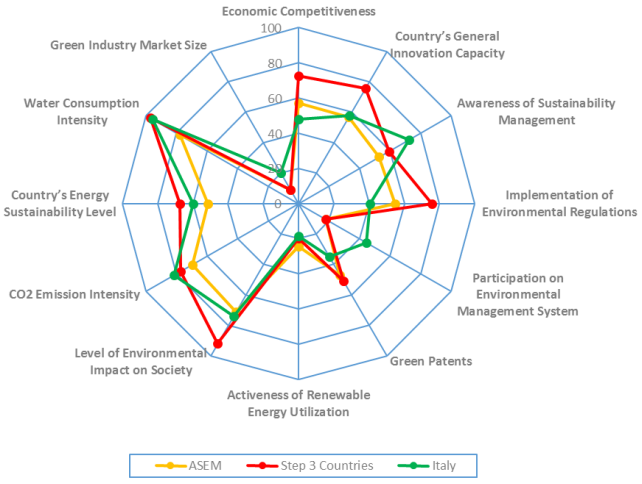
resource policies for the raw material[141] and waste recycling[142]. In addition, the national plan for green technology development[143], sustainable public acquirement policies[144] and green industry[145] jobs established political foundation that facilitates corporate driven eco-innovation. The Ministry of Science, Research, and Economy have supported the development of export strategies for environmental technologies in cooperation with the Austrian Chamber of Commerce & Industry[146]. The eco-labeling policy, which awards marks to the makers who have contributed to the environmental sustainability, has been in operation[147]. Climate change and Energy Fund (KLIEN) and sustainable technology programs[148] are focused on R&D support. KLEIN especially supports the smart energy[149] test project[150]. Austria promotes education program[151] and network establishment[152], in order to enhance corporate capacity for eco-innovation.

[141] The Austrian Raw Materials Plan, Resource Efficiency Action Plan (REAP) (2007)
[142] Waste Prevention and Recycling Strategy (2006), Green Public Procurement (2008- 2013)
[143] Master Plan Environmental Technologies(MUT), Strategy 2020-Research, Technology and Innovation for Austria
[144] The National Action Plan for Sustainable Public Procurement (2010)
[145] Master Plan Green Jobs
[146] Environmental technology export initiative (2005)/ www.go-international.at
[147] Green Brands seal (2011)/ http://www.green-brands.org/en/seal/
[148] The programme on Technologies for Sustainable Development (2005)
[149] Smart Energy Demo (2011)
[150] https://www.ffg.at/smart-energy-demo-fit4set-1-ausschreibung
[151] Austrian Clean Technology (ACT) (2008)
[152] COMET (Competence Centers for Excellent Technologies)

# Italy

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 29,847 | 61.9 million | 2:24:74 | 0.873 Very high | 4.36 | 4.44 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **49.72** |
| **Eco-Innovation Capacity** | 59.30 |
| Economic Competitiveness | 47.97 |
| Country's General Innovation Capacity | 57.62 |
| Awareness of Sustainability Management | 72.30 |
| **Eco-Innovation Supporting Environment** | 40.64 |
| Implementation of Environmental Regulations | 40.64 |
| **Eco-Innovation Activities** | 32.69 |
| Firms' Participation on Environmental Management System | 44.36 |
| Green Patents | 35.20 |
| Activeness of Renewable Energy Utilization | 18.49 |
| **Eco-Innovation Performance** | 66.27 |
| Level of Environmental Impact on Society | 73.99 |
| $CO_2$ Emission Intensity | 81.54 |
| Country's Energy Sustainability Level | 59.89 |
| Water Consumption Intensity | 95.83 |
| Green Industry Market Size | 20.08 |




- Italy's eco-innovation capacity, supporting environment, activity and performance are high.
- Awareness of Sustainability Management (indicator no. 1.5) and Firm's Participation on Environmental Management System (indicator no. 3.2) of Italy are higher than the average score of the same development state countries.
- Implementation of Environment Regulation (indicator no. 2.2) of Italy is lower than the average score of the same development state countries.

Table 41 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<br>■ Italian National Renewable Energy Action Plan (2010)<br>■ The National Plan for the Integrated Management of Water Resources (2012)<br>■ Italian National Action Plan on Green Public Procurement (2008) |
| Programme and actions | National | ■ Leadership in Energy and Environmental Design scheme(LEED)<br>■ The Zero Energy House in Friuli Venezia-Giulia Region<br>■ Programme "Industria 2015"<br>■ ROP (Regional Operational Programme) [153]<br>■ 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 |
| | International | |
| Information | | ■ The national network of scientific and technological parks (PSTs); a number of PSTs have areas that are focused on eco-innovation<br>■ Prato[154]<br>■ The Italian National Agency for New Technologies, Energy and Sustainable Economic Development(ENEA) |

Italy established execution strategies[155] and national plan for sustainable development, and energy efficiency[156], renewable energy[157], and water resources[158], respectively. In addition, the foundation for

[153] 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.

[154] Greenovate, (2011), Eco-innovation in cluster organizations in the chemical and textile-clothing-leather sectors Confartigianato Prato is a public organization 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 organization is aware of its Growing significance. At this point, no fundamental plans to tackle these issues have been developed but the organization hopes to implement more solid plans in the future.

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

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

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

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

the eco-innovation has been established through execution plans[159] of green public procurement.

Especially in the city planning area, the implementation of leadership in the energy and environmental design policy (LEED) [160] enabled the documentation of repair history and operation of independent building energy program[161]. Italy supported the execution of system eco-innovation[162] by creating an industrial complex. Supporting the industry symbiosis network, The Italian National Agency for New Technologies, Energy and Sustainable Development (ENEA) [163] established local industrial symbiosis platforms through the ENEA initiative[164].

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

[160] 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

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

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

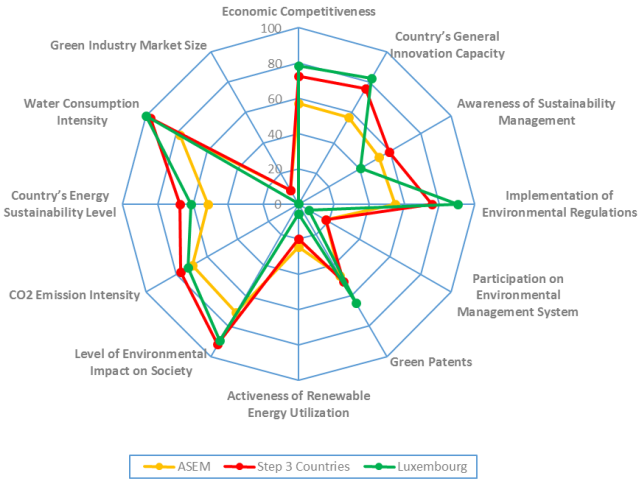
[163] The Italian National Agency for New Technologies, Energy and Sustainable Economic Development(ENEA)

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

# Luxembourg

|  | 103,187 | 0.6 million | 0:12:88 | 0.892 Very high | 5.96 | 5.73 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **61.86** |
| **Eco-Innovation Capacity** | 67.07 |
| Economic Competitiveness | 78.46 |
| Country's General Innovation Capacity | 82.45 |
| Awareness of Sustainability Management | 40.30 |
| **Eco-Innovation Supporting Environment** | 90.11 |
| Implementation of Environmental Regulations | 90.11 |
| **Eco-Innovation Activities** | 25.64 |
| Firms' Participation on Environmental Management System | 6.63 |
| Green Patents | 64.80 |
| Activeness of Renewable Energy Utilization | 5.49 |
| **Eco-Innovation Performance** | 64.63 |
| Level of Environmental Impact on Society | 89.60 |
| $CO_2$ Emission Intensity | 72.31 |
| Country's Energy Sustainability Level | 61.00 |
| Water Consumption Intensity | 100.00 |
| Green Industry Market Size | 0.27 |




- Luxembourg's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Implementation of Environment Regulation (indicator no. 2.2) and Green Patents (indicator no.3.4) of Luxembourg are higher than the average score of the same development state countries.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and Activeness of Renewable Energy Utilization (indicator no.3.5) of Luxembourg are lower than the average score of the same development state countries.

Table 42 Eco-innovation Policy instruments of Luxembourg

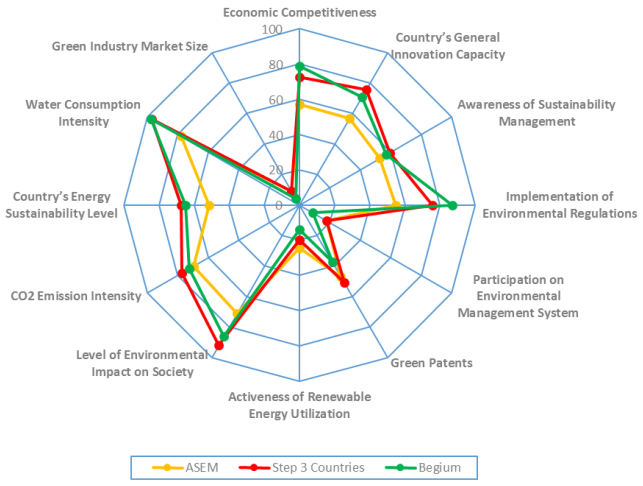
| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ circular economy model 2013<br>■ National Plan for Sustainable Development 2010<br>■ National Sustainability Strategy Luxembourg 2009 |
| | Eco-innovation | ■ eco-technologies Action Plan 2012 |
| Programme and actions | National | ■ highest political priority: energy efficiency<br>■ The Hollerich Village 2013<br>■ Learning Factory 2013<br>■ Tarkett - innovative and sustainable flooring and sports surface solutions<br>■ The Luxembourg Law on Promotion of Research, Development and Innovation (2009)<br>■ "Innovation loan provided by the "Société Nationale de Crédit et d'investissement" (SNCI)<br>■ R&D incentive scheme of the Ministry of Economy and Foreign Trade (RDI Law of 5th June 2009)<br>■ FNRCORE Thematic Programme.<br>■ ERA_Net ECO Innovera<br>■ Business Portail<br>■ Institut national pour le développement de la formation professionnelle continue<br>■ ATTRACT Programme<br>■ National Research Training Grant Scheme<br>■ The Luxembourg Foresight Exercise<br>■ "Observatoire de la Compétitivité"<br>■ PRIMe CAR-e<br>■ The Air Quality Plan for Luxembourg City<br>■ National Spatial Planning Programme 2013 |
| Finance | | ■ Luxembourg Future Fund" initiative, jointly with the European Investment Fund (FEI) 2013 |
| Information | | ■ Luxembourg Green Party 2013<br>■ Luxembourg EcoInnovation Cluster 2002<br>■ Legal framework for venture capital and private equity companies (SICAR)<br>■ The National Agency for Innovation "Luxinnovation"<br>■ Luxembourg Private Equity & Venture Capital Association |

The new government established in December 2013 has been seeking for changes in various fields, including energy and climate change policies, with emphasis on the energy. The most meaningful eco-innovation trend is the economic circulation model program, which diversifies national economic activities and improves competitiveness. The eco-innovation field includes reasonable usage of natural resources, material science, sustainable mobility and urban smart technology. The driving forces of Luxembourg's eco-innovation are strong policy will for the sustainable eco-innovation development, and the need for the economic diversification for the economic growth and productivity. The new president of Luxembourg, who has been elected as the head of the ecology innovation cluster, has been committed to develop new strategies for a cluster centered on the mobility, economic circulation, sustainable cities and smart technology. This strategy includes specific goals for the period of 2014-2020 (EIO, 2013l).

# Belgium

|  | 40,456 | 11.3 million | 1:22:77 | 0.890 Very high | 5.89 | 5.48 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **60.30** |
| **Eco-Innovation Capacity** | 69.00 |
| Economic Competitiveness | 78.86 |
| Country's General Innovation Capacity | 71.00 |
| Awareness of Sustainability Management | 57.15 |
| **Eco-Innovation Supporting Environment** | 87.17 |
| Implementation of Environmental Regulations | 87.17 |
| **Eco-Innovation Activities** | 20.03 |
| Firms' Participation on Environmental Management System | 8.72 |
| Green Patents | 37.44 |
| Activeness of Renewable Energy Utilization | 13.94 |
| **Eco-Innovation Performance** | 64.99 |
| Level of Environmental Impact on Society | 86.06 |
| $CO_2$ Emission Intensity | 72.31 |
| Country's Energy Sustainability Level | 64.70 |
| Water Consumption Intensity | 97.73 |
| Green Industry Market Size | 4.17 |




- Belgium's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Economic Competitiveness (indicator no.1.1) and Implementation of Environment Regulation (indicator no. 2.2) of Belgium are higher than the average score of the same development state countries.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and Activeness of Renewable Energy Utilization (indicator no.3.5) of Belgium are lower than the average score of the same development state countries.

Table 43 Eco-innovation Policy instruments of Belgium

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ National Climate Plan 2009-2012<br>■ Flemish Climate Policy Plan 2013-20 |
| | Eco-innovation | ■ National Energy Efficiency Action Plan 2008-2016 (NEEAP)<br>■ Eco Management and Audit Scheme (EMAS) (2005)<br>■ Strategic Policy Plan 2010. 2015 on Waste, Materials and Soil Management (2009)<br>■ The Federal Products Plan (2009-2012)<br>■ Walloon Waste Plan 2020<br>■ Flanders in Action pact 2020<br>■ Sustainable Materials Management Strategy<br>■ Energy Efficiency Action Plan 2011-16<br>■ 4th Environmental Policy Plan (MINA- 4) (2011-2015)<br>■ Waste-water treatment plan<br>■ Walloon's Marshall Plan2.Green |
| Programme and actions | National | ■ PRODEM[165]<br>■ Ecocheque<br>■ Eco-dynamic enterprise label<br>■ Decree on waste & materials management<br>■ Energy Renovation Programme 2020<br>■ Cluster policy, a sixth pole 'GreenWin' (green chemistry and ecoindustries) (2011)<br>■ Flanders's Sustainable Materials Management Programme (2011)<br>■ Walloon's Voluntary Agreements on Energy Efficiency<br>■ Flemish Reform Programme (2010)<br>■ Federal research programme - Science for a Sustainable Development<br>■ The National Strategy for Sustainable Public Procurement (2004-2008)<br>■ Regional policy statement (2009-2014) |
| | International | |
| Legislation | | |
| Finance | | |

[165] 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.

| | | |
|---|---|---|
| Information | | ■ Grants by Flanders: MIP, Environmental and Energy Technology Innovation Platform for university company collaborative projects<br>■ Clusters Walloon (2011)<br>■ Ghent Bio-Energy Valley<br>■ TWEED<br>■ Public Waste Agency of Flanders(OVAM) (2010)<br>■ IMIEU (Institute for Infrastructure, Environment and Innovation)<br>■ The 9th European forum on ecoinnovation- Finance the eco-innovation (Nov 2010)<br>■ Sustainable Technology Development (STD) facility (in Flanders)<br>■ DuWoBo (a Flemish Transition Network for Sustainable Construction) |

Belgium has solid environment policies that have been established traditionally and have been the main driving forces behind Belgium's eco-innovation execution. They have been implementing various policies including environment taxes, environment charge, eco-labeling, and eco-product brochures. The national energy efficiency action plan[166] was established in relation to the climate change policies[167]. Environmentally friendly management and monitoring scheme[168], environment taxes and eco-labeling are part of the eco-innovation promotion polies. Also, incentive mechanisms and subsidy systems were established to support the R&D. The driving forces of Belgium's eco-innovation are considered to be the increase in the awareness of sustainability, improvement in the demand of green product. On the other hand, lack of unified policy and decision making, as well as low economic feasibility in some regions and industries are considered to be the obstacles. Decentralized local governmental agencies establish and operate eco-innovation policies and initiatives (EIO, 2013a).

[166] National Energy Efficiency Action Plan 2008-2016 (NEEAP)

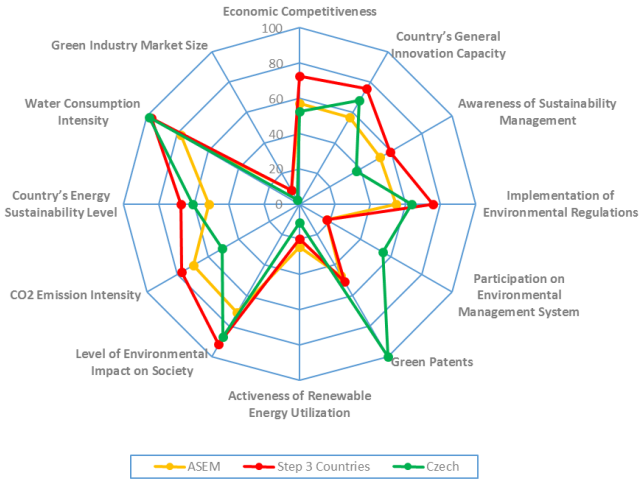
[167] National Climate Plan 2009-2012, Flemish Climate Policy Plan 2013-20

[168] Eco Management and Audit Scheme (EMAS) (2005)

# Czech Republic

|  | 17,330 | 10.6 million | 3:38:59 | 0.870 Very high | 4.97 | 4.90 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **57.72** |
| **Eco-Innovation Capacity** | 52.49 |
| Economic Competitiveness | 52.44 |
| Country's General Innovation Capacity | 67.74 |
| Awareness of Sustainability Management | 37.29 |
| **Eco-Innovation Supporting Environment** | 63.37 |
| Implementation of Environmental Regulations | 63.37 |
| **Eco-Innovation Activities** | 55.09 |
| Firms' Participation on Environmental Management System | 54.56 |
| Green Patents | 100.00 |
| Activeness of Renewable Energy Utilization | 10.72 |
| **Eco-Innovation Performance** | 59.93 |
| Level of Environmental Impact on Society | 87.24 |
| $CO_2$ Emission Intensity | 50.77 |
| Country's Energy Sustainability Level | 60.63 |
| Water Consumption Intensity | 98.52 |
| Green Industry Market Size | 2.50 |




- Czech Republic's eco-innovation capacity, supporting environment and performance are high. However, eco-innovation activity is low.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and Green Patents (indicator no.3.4) of Czech Republic are higher than the average score of the same development state countries.
- Awareness of Sustainability Management (indicator no.1.5) and Activeness of Renewable Energy Utilization (indicator no.3.5) of Czech Republic are lower than the average score of the same development state countries.

Table 44 Eco-innovation Policy instruments of Czech Republic

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Sustainable Spatial Development<br>■ the Framework of Programmes on Sustainable Consumption and Production (SCP Framework) (2005)<br>■ National Cluster Strategy (2005)<br>■ Strategic Framework for Sustainable Development (2010)<br>■ Local Agenda 21 |
| | Eco-innovation | ■ Czech National Biomass Action Plan for the period (2009.2011)<br>■ Waste Management Plan of the Czech Republic (2003-2013)<br>■ National Action Plan for Renewable Energy Sources<br>■ The National Energy Efficiency Action Plan |
| Programme and actions | National | ■ Operational Program for Environment<br>■ Program on Environmental Technology Support (2006)<br>■ Updated Programme of Support of Environmental Technologies (2009)<br>■ Raw Material Policy in the Field of Mineral Materials and Their Resources (1999)<br>■ State Energy Policy of the Czech Republic (2004)<br>■ State environmental policy (2004- 2010)<br>■ National Program of Labelling Environment-friendly Products<br>■ 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<br>■ The Green Investment Scheme (2009)<br>- New programme supporting renewable energy sources and energy savings in residential buildings |
| Information | | ■ Czech Environmental Information Agency (CENIA)<br>■ 14th European forum on ecoinnovation- Delivering innovative solutions for mobility, energy and ICT in cities (May 2013)<br>■ The Government Council for Sustainable Development (GCSD)<br>■ National Network of Science and Technology Parks |

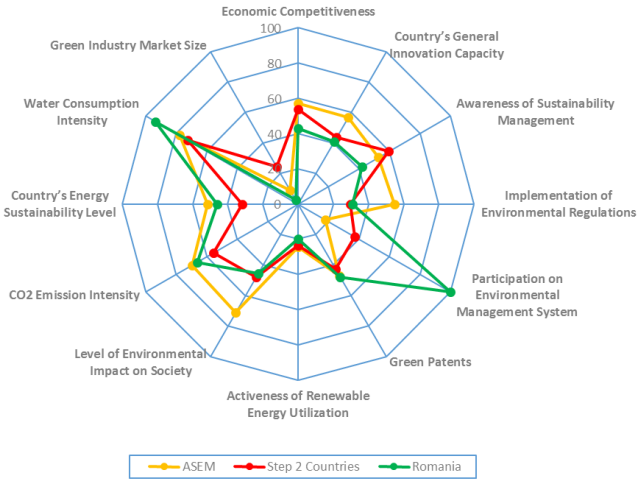
The political approach to eco-innovation by the Czech Republic is observed to be in the demand activities fields, mainly, and consists of policy measures such as regulations and guidelines (WIFO, 2009). The driving forces of eco-innovation are considered to be the increase in international demand for green

technologies and the investment from the EU and public funds. On the other hand, the obstacles are considered to be lack of structural policy support for eco-innovation of the SME, lack of research facility cooperation, and lack of mutual interest clusters. In order to promote eco-innovation and to overcome the obstacles, they need to establish the supplier network and partnership for the implementation of eco-innovation as per the ETAP roadmap. Especially support for the formation of green technology cluster and technology platforms and R&D activity are important. (EIO, 2013t.) For the subsequent support to the supply sector, the policies are established to support clean technology clusters, technology platforms, R & D activities, and networks and partnerships.

# Romania

|  | 8,807 | 21.7 million | 12:36:52 | 0.793 High | 4.13 | 4.21 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **44.96** |
| **Eco-Innovation Capacity** | 42.04 |
| Economic Competitiveness | 43.09 |
| Country's General Innovation Capacity | 40.85 |
| Awareness of Sustainability Management | 42.18 |
| **Eco-Innovation Supporting Environment** | 31.02 |
| Implementation of Environmental Regulations | 31.02 |
| **Eco-Innovation Activities** | 56.00 |
| Firms' Participation on Environmental Management System | 100.00 |
| Green Patents | 47.98 |
| Activeness of Renewable Energy Utilization | 20.02 |
| **Eco-Innovation Performance** | 50.80 |
| Level of Environmental Impact on Society | 45.54 |
| $CO_2$ Emission Intensity | 66.15 |
| Country's Energy Sustainability Level | 46.21 |
| Water Consumption Intensity | 93.48 |
| Green Industry Market Size | 2.62 |




- Romania's eco-innovation activity is high. However, eco-innovation capacity, supporting environment and performance are low.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and Water Consumption Intensity (indicator no. 4.4) of Romania are higher than the average score of the same development state countries.
- Awareness of Sustainability Management (indicator no.1.5) and Green Industry Market Size (indicator no. 4.6) of Romania are lower than the average score of the same development state countries.

Table 45 Eco-innovation Policy instruments of Romania

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ National Strategy for Sustainable Development - Horizons 2012 - 2020 - 2030<br>■ s National Strategy for Energy Efficiency 2004<br>■ 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<br>■ Green Public Procurement Action Plan 2009-2013<br>■ Biomass Master Plan (2010)<br>■ National Action Plan for Energy from Renewable Sources (2010)<br>■ National Plan to Combat Illegal Logging<br>■ National Action Plan for environmental public procurement (2008 - 2013) i<br>■ Action Plan for water protection against nitrates pollution from agriculture sources 2000 |
| Programme and actions | National | ■ The Green Laboratory of Recycling 2012<br>■ Recicleta<br>■ 'Green House' Programme<br>■ Good agricultural and environmental conditions (GAEC) 2010 |
| | International | |
| Legislation | | ■ National Law for Waste Management 2014 |
| Finance | | ■ Romanian-American Foundation(RAF) 1994<br>■ The Structural Funds Operational Programme 2013 |
| Information | | ■ Common Strategy for Sustainable Territorial Development of the cross-border area Romania-Bulgaria - CBC 2007-2013<br>■ Regional center for integrated risk and territory management of the region of Lower Danube (2013) |

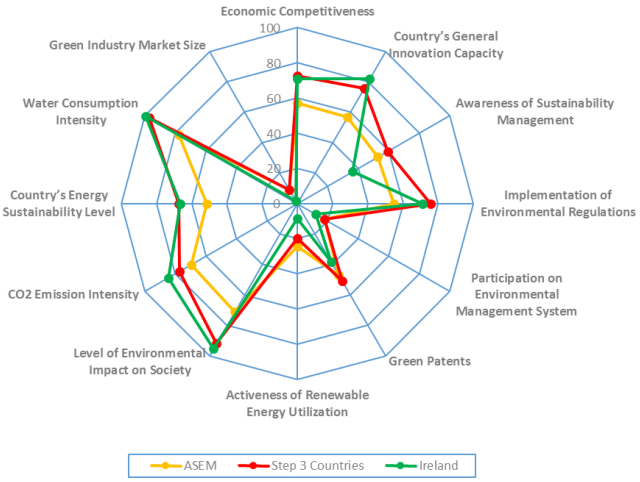
Romania's eco-innovation plan has been evolving steadily during the past few years. Although it has been following the standard regulations of the EU, Romania has been continuously adopting policies to promote sustainable development. However, the direction of Romania's policies is missing a long term perspective. The government policies centered on the ecological 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. To be able to implement sustainable policies and utilize the financial support and investment of the EU, the local and national organizations will need to come up with specific plans and

execute them. In 2013, the energy efficiency and the renewable energies fields received the highest incentives and financial support. Romania is investing in renewable energies with the help from the FIT. Also, as the EU and the EBRE provided more financial and technological support, they were able to come up with the energy efficiency increasing plan, and form more public-private partnerships like ESCOs. Although the awareness of economic opportunities related to the resource management and corporate environments are low in Romania, the plan for recycling and reusing in the private sector have been solidified in the recent years. However, Romania has lost a lot of opportunities to recycle domestic waste as it neglected the waste import for the production activities in private sectors (EIO, 2013o).

# Ireland

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 48,940 | 4.9 million | 2:25:73 | 0.916 Very High | 5.38 | 5.14 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **55.81** |
| **Eco-Innovation Capacity** | 63.06 |
| Economic Competitiveness | 70.73 |
| Country's General Innovation Capacity | 82.03 |
| Awareness of Sustainability Management | 36.43 |
| **Eco-Innovation Supporting Environment** | 71.12 |
| Implementation of Environmental Regulations | 71.12 |
| **Eco-Innovation Activities** | 19.57 |
| Firms' Participation on Environmental Management System | 11.89 |
| Green Patents | 38.12 |
| Activeness of Renewable Energy Utilization | 8.71 |
| **Eco-Innovation Performance** | 69.48 |
| Level of Environmental Impact on Society | 95.41 |
| $CO_2$ Emission Intensity | 84.62 |
| Country's Energy Sustainability Level | 66.36 |
| Water Consumption Intensity | 99.52 |
| Green Industry Market Size | 1.51 |




- Ireland's eco-innovation performance is high. However, eco-innovation supporting environment and activity are low.
- Country's General Innovation Capacity (indicator no. 1.2) and $CO_2$ Emission Intensity (indicator no. 4.2) of Ireland are higher than the average score of the same development state countries.
- Awareness of Sustainability Management (indicator no.1.5) and Green Industry Market Size (indicator no.3.5) of Ireland are lower than the average score of the same development state countries.

Table 46 Eco-innovation Policy instruments of Ireland

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Sustainable Development - a Strategy for Ireland (DoECLG, 1997)<br>■ Local Agenda 21 - Community based SD policy area<br>■ National Development Plan<br>■ Irish Spatial Strategy<br>■ National Climate Change Strategy 2007-2012<br>■ 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"<br>■ Sustainable Energy Authorigy Ireland (SEAI)<br>■ the Strategy for Renewable Energy 2012-2020<br>■ 'Strategy for Science Technology and Innovation' 2006-2013<br>■ Green Public Procurement Action Plan<br>■ National Energy Efficiency Action Plan 2013-2020 |
| Programme and actions | National | ■ The Greening of Dublin's International Financial Services Centre project<br>■ Pay As You Save (PAYS)<br>■ National Energy Services Framework for 2013-2014<br>■ ESB Novusmodus LP<br>■ Pilot Clustering Programme<br>■ Innovation Vouchers:<br>■ Irish Wateroffers" plugand play" test bedding<br>■ Skillnets programme<br>■ National Waste Prevention Programme (NWPP), 2004<br>■ Water Services Investment Programme<br>■ Government's Green Public Procurement Programme<br>■ Green Business Initiative<br>■ Green Hospitality Award<br>■ Packaging Waste Prevention Programme<br>■ Cleaner Greener Production Programme (CGPP)<br>■ SMILE Resource Exchange |
| | International | |
| Legislation | | ■ Water Services Act |
| Finance | | ■ National Energy Efficiency Fund (NEEF)<br>■ R&D Tax Credit Scheme<br>■ Science Foundation Ireland (SFI) |

| | | |
|---|---|---|
| Information | | ■ SEAI's Large Industry Energy Network (LIEN)<br>■ Innovation Partnership Programme: This programme offers financial support to companies who engage in collaborative research projects with Irish universities and Institutes of Technology<br>■ Enterprise Ireland<br>■ Applied Research Enhancement Centres<br>■ Local Authority Prevention Network (NAPN)<br>■ StopFoodWaste programme 2009 |

The "green economy" is the driving force of jobs and future growth in Ireland, hence receiving a spotlight as political will and opportunity to reestablish the economy. The Ireland government has identified fields that offer opportunities for economic growth and job creation to be renewable energies, energy and efficiency, green products and services, green financial services, agriculture·maritime·forest, tourism, water management, waste water management, low carbon transportation, the R&D, and innovation. Major activities have been a part of the 2013-2020 [169] National Energy Efficiency Execution Plan and the sustainable incentive plan[170] of the Department of Energy. Recently, a national water resource company, Irish Water (previously managed by local organizations and state parliament), was established for water management. The renewable energies are also receiving attention. Ireland is working towards becoming a world leader in maritime energy technology and wind generation energy. (EIO, 2013i).

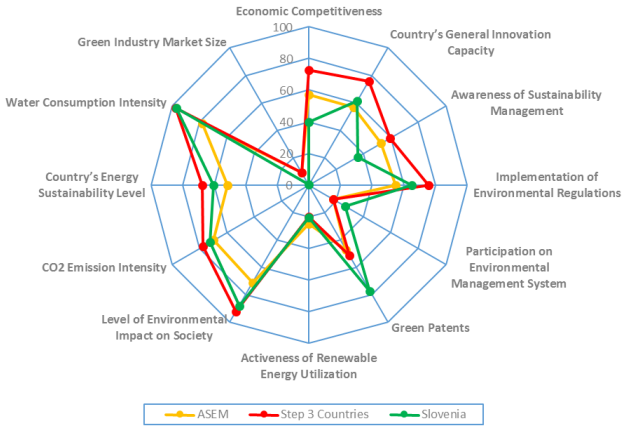
[169] National Energy Efficiency Action Plan 2013-2020

[170] Sustainable Energy Authority Ireland(SEAI)

# Slovenia

|  | 20,712 | 2.0 million | 2:33:65 | 0.880 Very High | 4.52 | 4.78 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **53.96** |
| **Eco-Innovation Capacity** | 45.49 |
| Economic Competitiveness | 39.84 |
| Country's General Innovation Capacity | 61.12 |
| Awareness of Sustainability Management | 35.50 |
| **Eco-Innovation Supporting Environment** | 65.24 |
| Implementation of Environmental Regulations | 65.24 |
| **Eco-Innovation Activities** | 41.43 |
| Firms' Participation on Environmental Management System | 26.43 |
| Green Patents | 77.35 |
| Activeness of Renewable Energy Utilization | 20.50 |
| **Eco-Innovation Performance** | 63.67 |
| Level of Environmental Impact on Society | 88.31 |
| $CO_2$ Emission Intensity | 72.31 |
| Country's Energy Sustainability Level | 60.26 |
| Water Consumption Intensity | 97.01 |
| Green Industry Market Size | 0.48 |




- Slovenia's eco-innovation activity is high. However, eco-innovation capacity and performance are low.
- Green Patents (indicator no.3.4) of Slovenia is higher than the average score of the same development state countries.
- Economic Competitiveness (indicator no.1.1) and Country's General Innovation Capacity (indicator no.1.2) of Slovenia are lower than the average score of the same development state countries.

Table 47 Eco-innovation Policy instruments of Slovenia

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Slovenia's Development Strategy 2014-2020<br>■ Strategy of Regional Development in Slovenia (SRDS), 2001<br>■ Biodiversity Conservation Strategy of Slovenia (2001) |
| | Eco-innovation | ■ Action plan on renewable energy resources for period 2010-2020, 2010<br>■ National Energy Efficiency Action Plan 2008-2016, 2008<br>■ National Strategic Reference Framework (NSRF), 2007<br>■ Spatial Development Strategy of Slovenia (SDSS), 2004<br>■ National Mineral Resource Management Programme - General Plan 2009 |
| Programme and actions | National | ■ Water Management Plan (2009-2015)<br>■ National Strategic Plan on the Development of Fisheries in the Republic of Slovenia 2007-2013<br>■ Programme of Development Priorities and Investments 2014-2017<br>■ Resolution on the Research and Innovation Strategy of Slovenia 2011-2020 (RISS),<br>■ The Programme of Development Priorities and Investments (PDPI)<br>■ The National Environmental Action Programme (NEAP) 2005-2012<br>■ National Forest Programme (2007)<br>■ Rural Development Programme of the Republic of Slovenia 2007-2013<br>■ Resolution on the National Energy Programme (ReNEP), 2004<br>■ 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 |

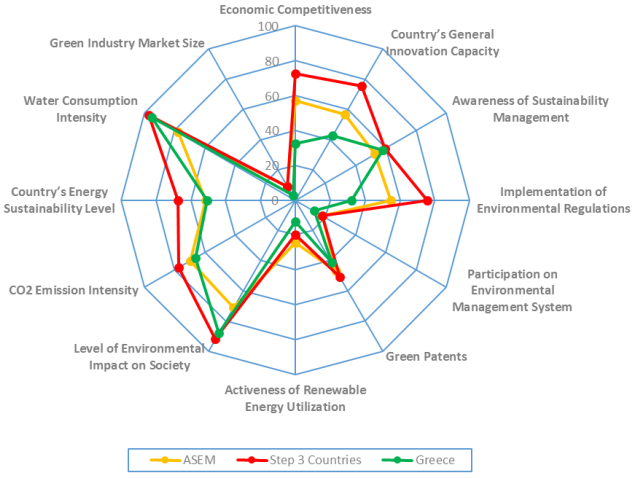
Slovenia seems to be simultaneously exhibiting opportunities and problems with eco-innovation. Slovenia ranks in third for the amount of forest and is rich in natural resources with high biodiversity. On the other hand, it is faced with environmental problems as well as economic and political problems that either block or prevent the advancement of eco-innovation. Slovenia's circular economy is currently showing a sharp decline in the ecology industry exports, turnover, and employment. The country even failed to attract green investment in the basic stage. However, the material productivity has doubled between 2011 and 2013 and the overall R&D workforce has increased through eco-innovation related publishing and patents. These events signify the accumulation of eco-innovation knowledge and the public

awareness. Slovenia's eco-innovation includes the innovative automobile technology from global corporations, efficient electric equipment and mobility, energy efficiency of buildings, and sustainable architecture. The corporation's R&D expenditure has been increasing in these fields, which makes up for the decreased R&D expenditure from the government in 2012 and 2013. One of the prospective fields of eco-innovation is the biomass industry. One of the current obstacles of the eco-innovation is limited amount of funds due to the existing social and economic crises. Especially after the political change in 2011, the new law enactments and economic reform attempts in the R&D field (especially eco-innovation) faced opposition (EIO, 2013q). Even with those circumstances, there has been gradual progress toward a sustainable life style in the past two years. Non-governmental organizations and some leading companies are proposing more ecologically oriented solutions, while continuing to follow the EU policies.

# Greece

|  | 17,657 | 10.8 million | 4:13:83 | 0.865 Very high | 3.85 | 4.09 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **39.85** |
| **Eco-Innovation Capacity** | 44.34 |
| Economic Competitiveness | 32.52 |
| Country's General Innovation Capacity | 42.78 |
| Awareness of Sustainability Management | 57.71 |
| **Eco-Innovation Supporting Environment** | 32.35 |
| Implementation of Environmental Regulations | 32.35 |
| **Eco-Innovation Activities** | 22.12 |
| Firms' Participation on Environmental Management System | 12.41 |
| Green Patents | 41.48 |
| Activeness of Renewable Energy Utilization | 12.46 |
| **Eco-Innovation Performance** | 60.60 |
| Level of Environmental Impact on Society | 88.08 |
| $CO_2$ Emission Intensity | 66.15 |
| Country's Energy Sustainability Level | 50.83 |
| Water Consumption Intensity | 95.01 |
| Green Industry Market Size | 2.91 |




- Greece's eco-innovation capacity, supporting environment, activity and performance are lower than the average scores of ASEM member countries and the 3rd group countries.
- Awareness of Sustainability Management (indicator no. 1.5) is higher than the average score of ASEM member countries.
- Most of the indicators of Greece are lower than the average score of the same development state countries.

Table 48 Eco-innovation Policy instruments of Greece

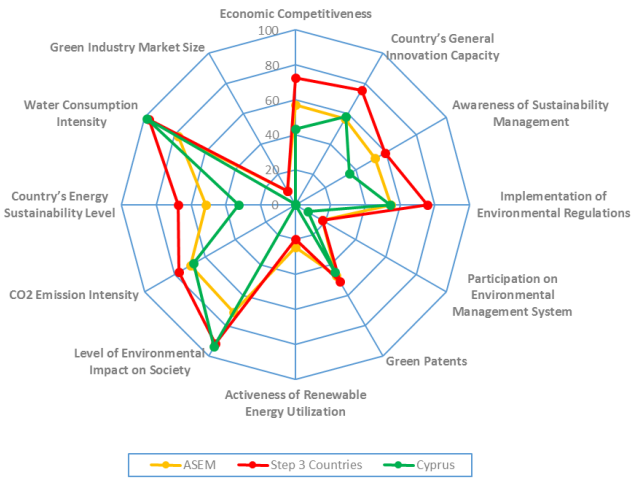
| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ National Sustainable Development Strategies(NSDS)<br>■ Greek Sustainable Development Strategy<br>■ Green Growth Strategic Action Programme (2010-2015)<br>■ National Strategic Framework Programme 2007-2013<br>■ Environment and Sustainable Development |
| | Eco-innovation | ■ the Greek National Strategic Framework for Research and Innovation (NSFRI)<br>■ Action Plan for energy conservation in urban/commercial housing for the period 2010-2015 |
| Programme and actions | National | ■ Operational Programme Competitiveness and Entrepreneurship and all Regional Operational Programmes: 'Synergasia 2011'<br>■ Internship (stage) and Innovation & Entrepreneurship Units of Universities<br>■ Promotion of the purchase of new "resource efficient" vehicles<br>■ 'Building the Future' (2012-2020)<br>■ Green agricultural and island communities - New development model<br>■ Energy Efficiency of Household Buildings (2011)<br>■ MoEECC |
| Legislation | | ■ Investment Incentives Law 2013<br>■ The new Investment Incentives Law(April2013) |
| Finance | | ■ The National Fund for Entrepreneurship and Development (ETEAN)<br>■ the Green Fund 2010<br>■ Green Fund 2010 |
| Information | | ■ JEREMIE (Joint European Resources for Micro to Medium Enterprises) initiative<br>■ Coralla (Cluster Initiative targeting at enhancing competitiveness, entrepreneurship and innovation, by providing cluster-development support activities)<br>■ Enterprise Europe Network<br>■ PRAXI/HELP-FORWARD Network (=HELlenic Project FOR Wider Application of R&D)<br>■ The National Fund for Entrepreneurship and Development (ETEAN)<br>■ Enterprise Europe Network<br>■ National Organization for the Alternative Management of Packaging and Other Products<br>■ Mediterranean Component of the EU Water Initiative (MED EUWI)<br>■ Union for the Mediterranean: Mediterranean Strategy for Water |

Greece politically promotes eco-innovation with emphasis on the renewable energies and energy efficiency. Greece still depends heavily on the fossil fuel imports to produce power. However, the Greece government has set a goal to change more than 20% of the final energy consumption to renewable energies by 2020. Greece shows eco-innovation capacity in specific fields that are not at the matured stage yet. The architecture field has attempted to implement eco-innovation, and the solar power industry, primary industry and the food industries also showed progress. Green and alternative tourism has also showed a significant growth. According to the Eurostat, renewable energies cover 11.6% of the total energy consumption in Greece. The hindrances to the eco-innovation in Greece are identified as the absence of overall framework for eco-innovation and ecological industry support. Most importantly, systematic fund support for eco-innovation is currently impossible given the country's economic crisis. Small size of companies also impedes the commercialization of eco-innovation. From the administrative point of view, complex and bureaucratic administrative procedures inhibit the promotion of eco-innovation by businessmen and investors. On the other hand, the driving forces for eco-innovation are considered to be abundant natural resources (sunlight, wind, tide, and etc.) for development of renewable energies, growth of green and alternative tourism, innovation in the agriculture/food industries, and improvement in the quality of scientific communication (EIO, 2013g).

# Cyprus

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 21,531 | 1.2 million | 2:10:88 | 0.850 Very high | 4.48 | 4.07 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **44.11** |
| **Eco-Innovation Capacity** | 45.66 |
| Economic Competitiveness | 43.50 |
| Country's General Innovation Capacity | 58.00 |
| Awareness of Sustainability Management | 35.50 |
| **Eco-Innovation Supporting Environment** | 54.55 |
| Implementation of Environmental Regulations | 54.55 |
| **Eco-Innovation Activities** | 17.70 |
| Firms' Participation on Environmental Management System | 8.17 |
| Green Patents | 44.84 |
| Activeness of Renewable Energy Utilization | 0.08 |
| **Eco-Innovation Performance** | 58.54 |
| Level of Environmental Impact on Society | 93.90 |
| $CO_2$ Emission Intensity | 67.69 |
| Country's Energy Sustainability Level | 32.53 |
| Water Consumption Intensity | 98.42 |
| Green Industry Market Size | 0.14 |




- Cyprus's eco-innovation capacity, supporting environment, activity and performance are lower than the average scores of ASEM member countries and the 3rd group countries.
- Level of Environmental Impact on Society (indicator no. 4.1) and Water Consumption Intensity (indicator no. 4.4) of Cyprus are higher than the average score of ASEM member countries.
- Most of the indicators of Cyprus are lower than the average score of the same development state countries and ASEM member countries.

Table 49 Eco-innovation Policy instruments of Cyprus

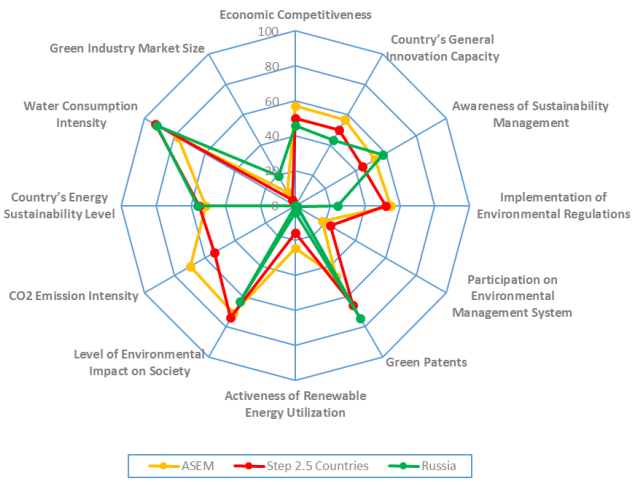
| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ National Sustainable Development Strategy (NSDS) 2007<br>■ Reviewed National Sustainable Development Strategy (NDS 2010)<br>■ Strategic Development Plan 2007-2013 |
| | Eco-innovation | ■ 2nd National Energy Efficiency Action Plan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

According to the Eco-IS of 2013, Cyprus ranked at the bottom of eco-innovation results. In Cyprus, organizations and companies are individually pursuing eco-innovation (EIO, 2013) and there are no outstanding fields. Renewable energies using abundant natural resources are highlighted and the agriculture and food industries are becoming the main players. The EU supported projects are underway, and these projects cover water management, industrial waste, basin size water management, atmosphere quality, and bio-fuel and industry productions. The driving forces for eco-innovation in Cyprus are the financial support of the EU and the environmental regulations of the government to solve urgent environment issues such as water and energy shortages, and waste and atmosphere pollution problems. On the other hand, the hindrance factors are low economic scales for eco-innovation investments and traditionally poor investment on R&D by companies and the government. The economy of Cyprus is controlled by the SMEs, but there is insufficient investment and innovation focused on the particular area. Occasional banning of the SME participation in research projects is also considered to be a hindrance factor (EIO, 2013b).

# Russian Federation

|  | 8,447 | 142.4 million | 4:36:60 | 0.798 High | 4.46 | 4.19 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **36.47** |
| **Eco-Innovation Capacity** | 49.07 |
| Economic Competitiveness | 45.93 |
| Country's General Innovation Capacity | 43.20 |
| Awareness of Sustainability Management | 58.08 |
| **Eco-Innovation Supporting Environment** | 24.06 |
| Implementation of Environmental Regulations | 24.06 |
| **Eco-Innovation Activities** | 26.60 |
| Firms' Participation on Environmental Management System | 1.44 |
| Green Patents | 74.44 |
| Activeness of Renewable Energy Utilization | 3.91 |
| **Eco-Innovation Performance** | 46.15 |
| Level of Environmental Impact on Society | 63.46 |
| $CO_2$ Emission Intensity | 0.00 |
| Country's Energy Sustainability Level | 56.01 |
| Water Consumption Intensity | 91.67 |
| Green Industry Market Size | 19.59 |




- Russia's eco-innovation capacity, supporting environment, activity and performance are lower than the average scores of ASEM member countries and the 3rd group countries.
- Awareness of Sustainability Management (indicator no. 1.5) and Green Patents (indicator no. 3.4) of Russia are higher than the average score of ASEM member countries and the same development state countries.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and $CO_2$ Emission Intensity (indicator no. 4.2) of Russia are lower than the same development state countries.

Table 50 Eco-innovation Policy instruments of Russian Federation

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ the Concept of transition of the Russian Federation towards sustainable development1996<br>■ 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)<br>■ The Energy Strategy of Russia for the period up to 2030<br>■ the Transport Strategy of the Russian Federation for the period up to 2030, 2008<br>■ the Water Strategy of the Russian Federation (2009)<br>■ “the Strategy in the field of Hydrometeorology and Related Areas for the period to 2030 (including aspects of climate change)", 2010<br>■ Ecological Doctrine 2002 |
| Programme and actions | National | ■ “Energy efficiency in the energy sector“<br>■ national programme “Energy Conservation an d Improving Energy Efficiency for the period up to 2020, 2010<br>■ "High-speed environmentally clean vehicles" (until 2005)<br>■ the Federal Targeted Program "Development of Water Industry of the Russian Federation in 2012-2020", 2011 |
| Legislation | | ■ Air Polluting Waste Centers and the List of Hazardous Materials 2010<br>■ Federal Act on Protection of Environment 2002 |

Russia does not have a clear eco-innovation policy but it has established strategies for sustainable development including long term social economy[171], energy[172], transportation[173] and water resources[174]. The green industry growth for the sustainable development, through environmentally friendly production and energy efficiency as well as alternative resources are recognized as a potential source for the expansion of Russia’s economy. However, Russia does not show any signs on expediting these developments through any unified measures. Nevertheless, the major sectors with eco-innovation advancements have established plans and programs that allow an environmentally friendly approach, especially energy[175], transportation and water resource[176] fields are in operation.

[171] 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

[172] Energy of Russia (1998-2005), The Energy Strategy of Russia for the period up to 2030

[173] the Transport Strategy of the Russian Federation for the period up to 2030, 2008

[174] 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

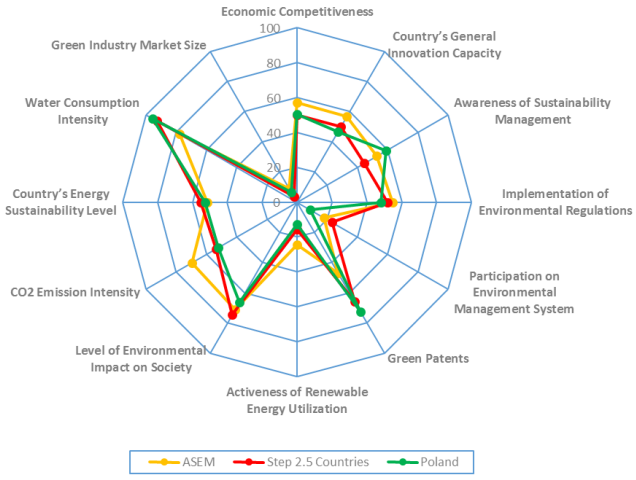
[175] Energy efficiency in the energy sector, national programme “Energy Conservation an d Improving Energy Efficiency for the period up to2020, 2010

[176] the Federal Targeted Program "Development of Water Industry of the Russian Federation in 2012-2020", 2011

# Poland

|  | 12,662 | 38.6 million | 3:41:56 | 0.843 Very high | 4.48 | 4.62 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **46.51** |
| **Eco-Innovation Capacity** | 51.90 |
| Economic Competitiveness | 50.41 |
| Country's General Innovation Capacity | 46.52 |
| Awareness of Sustainability Management | 58.77 |
| **Eco-Innovation Supporting Environment** | 48.13 |
| Implementation of Environmental Regulations | 48.13 |
| **Eco-Innovation Activities** | 31.24 |
| Firms' Participation on Environmental Management System | 8.69 |
| Green Patents | 72.42 |
| Activeness of Renewable Energy Utilization | 12.60 |
| **Eco-Innovation Performance** | 54.77 |
| Level of Environmental Impact on Society | 66.40 |
| $CO_2$ Emission Intensity | 52.31 |
| Country's Energy Sustainability Level | 52.68 |
| Water Consumption Intensity | 95.87 |
| Green Industry Market Size | 6.58 |




- Poland's eco-innovation capacity, supporting environment, activity and performance are lower than the average scores of the same development state group countries.
- Awareness of Sustainability Management (indicator no. 1.5) and Green Patents (indicator no. 3.4) of Poland are higher than the average score of ASEM member countries and the same development state countries.
- Firm's Participation on Environmental Management System (indicator no. 3.2) and Activeness of Renewable Energy Utilization (indicator no. 3.5) of Poland are lower than the same development state countries.

Table 51 Eco-innovation Policy instruments of Poland

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Poland 2020<br>■ Sustainable Development of Rural Areas, Agriculture and Fishery Strategy<br>■ The National Development Strategy (2007-2015) [177] |
| | Eco-innovation | ■ Strategy for Changing Production and Consumption Patterns to Support Durable and Sustainable Development<br>■ The Strategy-Energy Security and Environment 2020 outlook<br>■ Transport Development Strategy[178]<br>■ National Renewable Energy Action Plan<br>■ Second National Energy Efficiency Action Plan for Poland<br>■ A new three-year National Action Plan on sustainable public procurement for 2010-2012 (2010)<br>■ National Strategy for Management of Water Resources 2030 (2010)<br>■ Innovativeness and Efficiency of the Economy Strategy (2012-2020) |
| Programme and actions | National | ■ Renewable Energy Source(RES) development<br>■ Operational Programme Infrastructure and Environment<br>■ Bank Gospodarstwa Krajowego Energy Efficiency Programme<br>■ 16 Regional Operational Programmes<br>■ Energy Policy of Poland until 2030<br>■ Long-term program for the promotion of biofuels in 2008-2014 (2007)<br>■ GEKON programme<br>- To gather various initiatives that support Polish research institutions and companies in developing environmentally-friendly technologies<br>■ Sustainable Production through Innovation in Small and Mediumsized Enterprises in the Baltic Sea Region, SPIN.<br>■ National Environmental Policy (2009-2012) and its 2016 Outlook<br>■ The 2014 National Waste Management Plan |

[177] 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.

[178] 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.

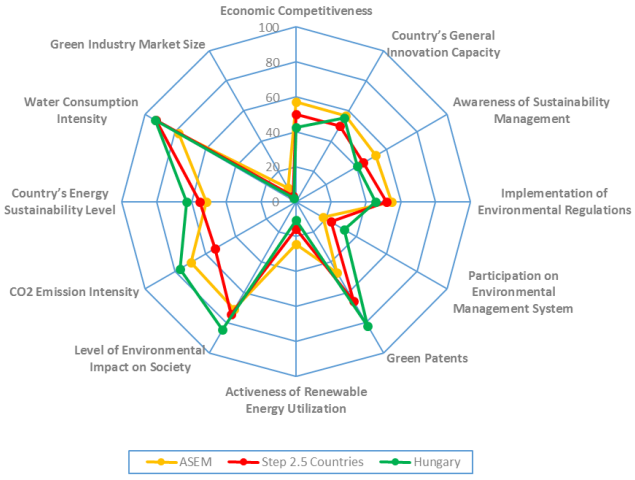
| | | |
|---|---|---|
| | | ■ Assumptions to the National Development Programme for Low carbon Economy<br>■ National Programme for the Development of Low-Emission Economy<br>■ National Programme for Municipal Waste Water Treatment (2009)<br>■ Poland 2030: Development Challenges (2009)<br>■ The Enterprise Development Programme (PRP) (2011-2020) |
| | International | |
| Legislation | | |
| Finance | | ■ National Fund for Environmental Protection and Water Management<br>■ Green Investments Scheme |
| Information | | ■ 15 clusters 8 technology platforms functioning in Poland strongly involved in developing environmentally-friendly solutions, including eco-innovations<br>■ Swiss-Polish Cooperation Programme |

Poland's major national strategies and local development strategies include eco-innovation policies. The driving force of eco-innovation of Poland is considered to be the high prices of energy. The low price of alternative energy will be able to motivate willingness to pay for energy and raw material. The regional improvement of eco-innovation and the modernization of companies for improved reputation are also considered to be the driving forces for Poland's eco-innovation. On the other hand, the low level of innovation in overall economy of Poland becomes hindrance to eco-innovation. The problems that the Polish companies are directly faced with are resulted from its intrinsic economic characteristics. (EIO, 2013n). The energy efficiency, renewable energies, clean energy is identified as main targets of eco-innovation in the Poland's national development challenges 2030.

# Hungary

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 12,021 | 9.9 million | 4:31:65 | 0.828 Very high | 4.35 | 4.54 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **49.34** |
| **Eco-Innovation Capacity** | 45.96 |
| Economic Competitiveness | 42.28 |
| Country's General Innovation Capacity | 55.32 |
| Awareness of Sustainability Management | 40.30 |
| **Eco-Innovation Supporting Environment** | 45.72 |
| Implementation of Environmental Regulations | 45.72 |
| **Eco-Innovation Activities** | 41.67 |
| Firms' Participation on Environmental Management System | 32.02 |
| Green Patents | 82.29 |
| Activeness of Renewable Energy Utilization | 10.72 |
| **Eco-Innovation Performance** | 63.99 |
| Level of Environmental Impact on Society | 84.84 |
| $CO_2$ Emission Intensity | 76.92 |
| Country's Energy Sustainability Level | 62.85 |
| Water Consumption Intensity | 93.12 |
| Green Industry Market Size | 2.20 |




- Hungary's eco-innovation activity and performance are higher than the average scores of the same development state group countries. However, eco-innovation capacity and supporting environment are low.
- Green Patents (indicator no. 3.4) and the indicators of the eco-innovation performance of Hungary are higher than the average score of ASEM member countries and the same development state countries.
- Awareness of Sustainability Management (indicator no. 1.5) and Activeness of Renewable Energy Utilization (indicator no. 3.5) of Hungary are lower than the same development state countries.

Table 52 Eco-innovation Policy instruments of Hungary

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Economy Development Operational Programme (New Hungary Development Plan)<br>■ National Biodiversity Strategy and Action Plan<br>■ National Rural Development Strategy<br>■ National Sustainable Development Strategy (NSDS) (2007-2025/2050)<br>■ New Hungary Development Plan (NSRK, 2007-2013)<br>■ Energy Strategy until 2030<br>■ River Basin Management Plan (RBMP) of Hungary<br>■ National Spatial Structure Plan<br>■ National Basic Plan for Nature Protection<br>■ National Spatial Development Concept, National Spatial Structure Plan |
| | Eco-innovation | ■ National Environmental Technology Innovation Strategy (NETIS) 2011-2020<br>■ National Energy Strategy 2030<br>■ Third National Environmental Action Programme 2009-14<br>■ Energy Efficiency Action Plan (EEAP) for Hungary until 20167 |
| Programme and actions | National | ■ SME Voucher 2012<br>■ Hungarian National Ecolabel<br>■ National Environment Programme (NEP) 2009-2014<br>■ 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<br>■ National Innovation Agency<br>■ “Innovation Cluster” accreditation |

The R&D field expenditure of Hungary in 2012 was over 301 million Euros. The annual R&D expenditure is 120 Euros per person, which is only a quarter of the EU’s average but it exceeds the average of newly joined EU countries. In 2013, the EU and national funding organizations went through a lot of changes. Hungary, like other member countries, established plans and tried to find opportunities to improve eco-innovation performance. Out of the Middle Eastern European countries, Hungary ranked 3rd place in the R&D expenditure. In comparison to that of 2012, Hungary’s overall eco-innovation performance decreased and it currently ranked 23 out of 28 Europe countries. This shows the decrease in funds for

eco-innovation as government environment and also decrease in the energy R&D budget and expenditure. The Hungarian government has established the NETIS 2011-2020 plan[179] in order to make the green economy concept main stream and fulfill the scenario mentioned in the government's national energy strategy 2030[180]. However, it has agreed to Russia's financial package of building 2 new nuclear reactors at the Paks nuclear plant without social agreement. After 2011, wind energy investments were no longer made; the level of wind energy production remains at 329MW, same as that of 2011 (Hungary planned to reach the wind energy production level of 7-800MW by 2020). Even with green industry activities, policies, and strategies, environmental problems are still expanding. The Norwegian Grand and EEA drew 133 million Euro to support the economic growth Hungary from 2009-2014, among which79 million Euros were assigned to environment programs (green industry innovation, dual research development, energy efficiency, renewable energies utilization, climate change adaptation). Hungary is behind in the utilization of the renewable energies among the Western European countries and has low building energy efficiency. Geothermal power, though poor in utilization, shows great potential for Hungary's energy production (EIO, 2013h).

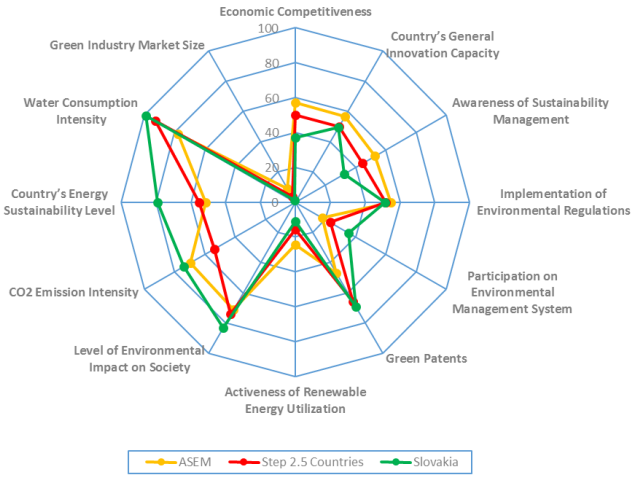
[179] National Environmental Technology Innovation Strategy 2011-2020

[180] National Energy Strategy 2030

# Slovakia

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 15,893 | 5.4 million | 3:30:67 | 0.844 Very high | 4.23 | 4.41 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **49.23** |
| **Eco-Innovation Capacity** | 39.51 |
| Economic Competitiveness | 36.99 |
| Country's General Innovation Capacity | 49.29 |
| Awareness of Sustainability Management | 32.25 |
| **Eco-Innovation Supporting Environment** | 51.60 |
| Implementation of Environmental Regulations | 51.60 |
| **Eco-Innovation Activities** | 38.53 |
| Firms' Participation on Environmental Management System | 35.28 |
| Green Patents | 69.06 |
| Activeness of Renewable Energy Utilization | 11.26 |
| **Eco-Innovation Performance** | 67.26 |
| Level of Environmental Impact on Society | 83.27 |
| $CO_2$ Emission Intensity | 73.85 |
| Country's Energy Sustainability Level | 79.11 |
| Water Consumption Intensity | 99.00 |
| Green Industry Market Size | 1.06 |




- Slovakia's eco-innovation activity and performance are higher than the average scores of the same development state group countries. However, eco-innovation capacity and supporting environment are low.
- Green Patents (indicator no. 3.4) and the indicators of the eco-innovation performance of Slovakia are higher than the average score of ASEM member countries and the same development state countries.

- Awareness of Sustainability Management (indicator no. 1.5) and Activeness of Renewable Energy Utilization (indicator no. 3.5) of Slovakia are lower than the same development state countries.

Table 53 Eco-innovation Policy instruments of Slovakia

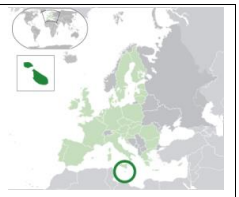
| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ The Slovak Republic Strategy for Sustainable Development 2001<br>■ Development Strategy of the Slovak Society 2030<br>■ The Energy Policy (2006)<br>■ The Slovak Republic Action Plan for Sustainable Development for the years 2005-2010 |
| | Eco-innovation | ■ Research and Innovation Strategy for Smart Specialization of the Slovak Republic (RIS3) 2013<br>■ The Concept of Using Renewable Energy Sources (RES) 2003<br>■ Strategy for a Higher Utilization of Renewable Energy Sources in the Slovak Republic 2007<br>■ Energy Efficiency Action Plan for 2011 - 2013<br>■ National Renewable Energy Action Plan 2020<br>■ The Action Plan for Renewable Energy Sources 2002-2012, 2002<br>■ The Biomass Action Plan for 2008 - 2013 (2008)<br>■ Strategy of the energy efficiency in buildings until 2010 without look up to 2020<br>■ Strategy of the state housing policy until 2015<br>■ Roadmap for implementation of the Environmental Technologies Action Plan (ETAPII) in Slovak republic(2008)<br>■ National action plan for green public procurement for the years 2007 - 2010 |
| Programme and actions | National | ■ National Reform Programme for 2011-2014<br>■ National Business Award for the Environment<br>■ The Ministry of Economy Award “Innovative Action of the Year”<br>■ Slovak organization for R&D activities (SOVVA)'s help<br>■ National Program for development of biofuels (2005)<br>■ Operational Programme Transport 2007-2013(2007)<br>■ Waste management Programme for 2006-2010<br>■ National Forest Programme of the Slovak Republic<br>■ Slovak Investment and Trade Development Agency (SARIO)'s support |
| 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 |

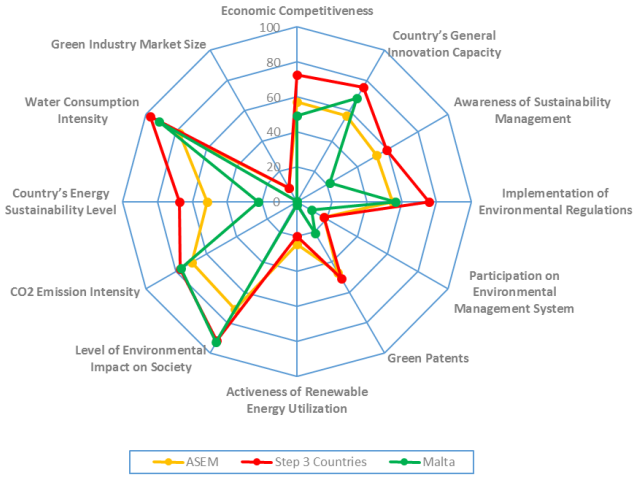
Slovakia has relatively high scores in numbers of ISO 14001 registered agencies and material productivity. However, it does not own any eco-innovation sector or market. The renewable energies and building energy efficiency seem to be the prospective fields. The natural conditions of Slovakia are most adequate for the water power generation and biomass development. Appropriate resources for biomass are found within the forests. National eco-innovation is faced with difficult tasks such as waste management, traffic infrastructure reconstruction/modernization, and the expansion of energy conservation in construction. Slovakia promotes national policies that are in line with eco-innovation. New policies related to the waste management have been passed by the Slovakia parliament and the government, strengthening their environmental laws. In 2013, the government announced a research innovation strategy[181] and set the basic strategy for research and innovation support. However, eco-innovation is leaning towards energy conservation and new renewable energies. Financial support mainly replies on the EU's fund, while execution programs are disseminated. Due to high turnover rates in public officials, the administrators are unskilled in handling.

[181] Research and Innovation Strategy for Smart Specialization (RIS3 SK)

# Malta

|  | 21,540 | 0.4 million | 2:13:85 | 0.839 Very high | - | - |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **42.55** |
| **Eco-Innovation Capacity** | 46.36 |
| Economic Competitiveness | 49.19 |
| Country's General Innovation Capacity | 68.23 |
| Awareness of Sustainability Management | 21.65 |
| **Eco-Innovation Supporting Environment** | 56.42 |
| Implementation of Environmental Regulations | 56.42 |
| **Eco-Innovation Activities** | 10.77 |
| Firms' Participation on Environmental Management System | 9.67 |
| Green Patents | 20.85 |
| Activeness of Renewable Energy Utilization | 1.80 |
| **Eco-Innovation Performance** | 56.65 |
| Level of Environmental Impact on Society | 93.13 |
| $CO_2$ Emission Intensity | 76.92 |
| Country's Energy Sustainability Level | 22.00 |
| Water Consumption Intensity | 91.18 |
| Green Industry Market Size | 0.02 |




- Malta's eco-innovation capacity, activity and performance are lower than the average scores of the same development state group countries.
- Country's General Innovation Capacity (indicator no. 1.2), Level of Environmental Impact on Society (indicator no. 4.1) and $CO_2$ Emission Intensity (indicator no. 4.2) of Malta are higher than the average score of ASEM member countries and the same development state countries.
- Awareness of Sustainability Management (indicator no. 1.5) and Activeness of Renewable Energy Utilization (indicator no. 3.5) of Malta are lower than the same development state countries.

Table 54 Eco-innovation Policy instruments of Malta

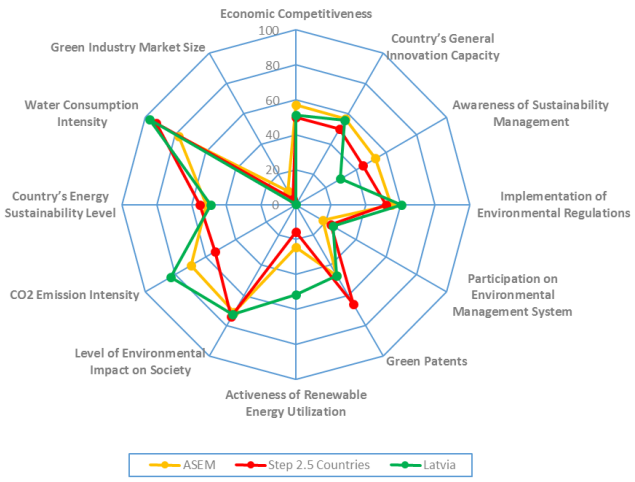
| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ A Sustainable Development Strategy 2006<br>■ A SUSTAINABLE DEVELOPMENT STRATEGY FOR THE MALTESE ISLANDS 2007-2016 |
| | Eco-innovation | ■ draft National Strategic Plan for Research & Innovation (2011-2020)<br>■ The first integrated National Environmental Policy (2012) |
| Programme and actions | National | ■ ERDF Environment Actions<br>■ The Green Public Procurement (GPP) Action Plan<br>■ The ERDF Innovation Actions Grant Scheme for the Environment the roof thermal insulation scheme (2012)<br>■ photovoltaic panels scheme (2013)<br>■ 'Plug-in Vehicles' scheme (2012)<br>■ DemoEV: Demonstrating the feasibility of electric vehicles towards climate change mitigation project FERTILANDIA<br>■ Deep-offshore wind (DOW)<br>■ The collaborative R&D Grant Scheme<br>■ ERDF Research and Development Grant Scheme<br>■ Training Aid Framework financial assistance<br>■ The Technician Apprenticeship Scheme (TAS)<br>■ An Environment Protection Act (2001) |
| Information | | ■ EuroMedITI (The Euro-Mediterranean Initiative for Technology and Innovation) |

Although Malta has not created a market, it established the first Smart-grid formation in the world. The green tourism business, in particular, is rapidly developing. Malta has been implementing Eco-Certification, which certifies the environmental, socio-economic, and cultural sustainability of the hotels in Malta. Gozo, which is the second biggest island in the Malta islands, will become an eco-island by 2020. The driving forces for eco-innovation of Malta are its abundant natural resources in terms of new renewable energies and the biodiversity. The field of solar energy, especially, has high potential for development. Related to the innovation capacity, Malta has been increasing its investment in R&D, and has been promoting policies that will help create researchers and raise employment rates of researchers. Each part of the government agencies has been providing financial incentives and accounting support in order to support innovation including the eco-innovation. On the other hand, the dominance of the SMEs might be limiting the possibilities for innovation. The intimate structure of Malta's market size is very small, and it is very difficult to grow a corporation, merely focused on the regional private consumers or corporations. Malta is one of the slowest growing countries within the Europe eco-innovation area in terms of the financial market growth.

# Latvia

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 13,729 | 2.0 million | 3:23:74 | 0.819 Very high | 4.64 | 4.89 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **51.89** |
| **Eco-Innovation Capacity** | 45.51 |
| Economic Competitiveness | 51.22 |
| Country's General Innovation Capacity | 55.76 |
| Awareness of Sustainability Management | 29.56 |
| **Eco-Innovation Supporting Environment** | 60.43 |
| Implementation of Environmental Regulations | 60.43 |
| **Eco-Innovation Activities** | 41.18 |
| Firms' Participation on Environmental Management System | 24.67 |
| Green Patents | 47.09 |
| Activeness of Renewable Energy Utilization | 51.80 |
| **Eco-Innovation Performance** | 60.44 |
| Level of Environmental Impact on Society | 72.59 |
| $CO_2$ Emission Intensity | 83.08 |
| Country's Energy Sustainability Level | 48.98 |
| Water Consumption Intensity | 97.26 |
| Green Industry Market Size | 0.30 |




- Latvia's eco-innovation supporting environment and activity are higher than the average scores of the same development state group countries.
- Activeness of Renewable Energy Utilization (indicator no. 3.5) and $CO_2$ Emission Intensity (indicator no. 4.2) of Latvia are higher than the average score of ASEM member countries and the same development state countries.
- Awareness of Sustainability Management (indicator no. 1.5) of Latvia is lower than the same development state countries.

Table 55 Eco-innovation Policy instruments of Latvia

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ the National Development Plan 2014-2020<br>■ Latvian Sustainable Development Strategy of Latvia until 2030<br>■ Environmental Policy Strategy 2009-2015 (MEPRD)<br>■ Strategic development plan for Latvia 2010 -2013 |
| | Eco-innovation | ■ Transport Development Strategy (Ministry of Transport) 2007 - 2013<br>■ Strategy for Energy Development 2007-2016 (Ministry of Economy)<br>■ Strategy for Renewable Energy Consumption 2006-2013<br>■ Electromobility Development Plan 2014-2016<br>■ Draft Action Plan for Government Declaration Implementation<br>■ Latvian First Energy Efficiency Action Plan 2008-2010<br>■ National Waste Management Plan 2006-2012 (MEPRD)<br>■ Development plan for Forests and forest based industries development (Ministry of Agriculture) |
| Programme and actions | National | ■ Programme support for green technology development (2014-2017)<br>■ Export Guarantees and Credit Guarantee Scheme<br>■ State Research Programmes 2010-2013 (renewed 2014-2020)<br>■ Practical Application Research Projects (2011-2013)<br>■ Programme Innovation in the area of Green Technologies funded by Norwegian Financial Mechanism (2009-2014)<br>■ Market Oriented Research Projects (2012-2013)<br>■ Development of Research Base Infrastructure and Commercial Research Infrastructure (2011-2013)<br>■ Motivation Programme for entrepreneurship and innovation (2009-2014)<br>■ Competence Centre Programme (2011-2015)<br>■ Cluster Programme (2012-2015)<br>■ Green Technology Transfer Contact Points (2008-2013)<br>■ Green Holidays - certificate for vacation properties for eco-travel development<br>■ Green Spoon - label for food quality and its ecological origin<br>■ Green Public Procurement (since 2004)<br>■ Campaigns on energy efficiency of housing stock and the use of renewable energy sources<br>■ Climate Change Mitigation Program 2005-2010 (MEPRD)<br>■ programme of promotion of commercial environment of entrepreneurship 2007 - 2013<br>■ Programme for promotion of implementation of Innovative |

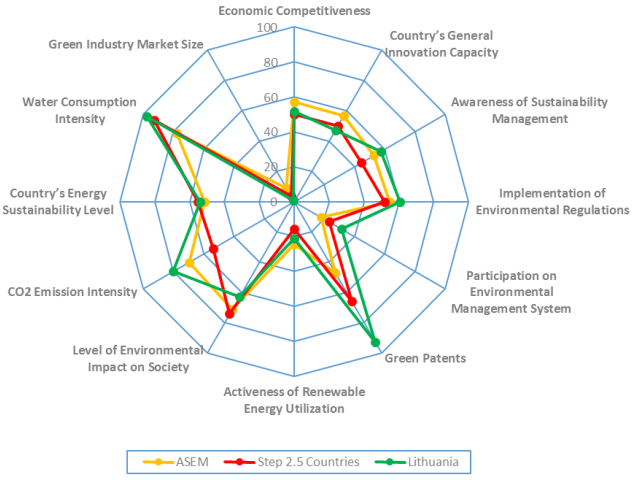
| | | |
|---|---|---|
| | | technologies |
| | International | - |
| Legislation | | - |
| Finance | | ■ Green Investment scheme(GIS) |
| Information | | - |

Latvia lacks the efforts and research towards eco-innovation. There are no specific goals set for eco-innovation; environmental technology corporates are scarce; and the social awareness about green growth potential is low. However, Latvia has set a goal to develop renewable energies and achieve energy efficiency by 2020 and is trying to support eco-innovation through national funding programs. Since over half of Latvia's land being composed of natural eco-environments, Latvia is highly attractive as an eco-tourist area (EIO, 2013j).

# Lithuania

|  | 14,318 | 2.9 million | 4:30:66 | 0.839 Very high | 4.66 | 4.85 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **55.06** |
| **Eco-Innovation Capacity** | 52.16 |
| Economic Competitiveness | 51.63 |
| Country's General Innovation Capacity | 47.32 |
| Awareness of Sustainability Management | 57.53 |
| **Eco-Innovation Supporting Environment** | 60.70 |
| Implementation of Environmental Regulations | 60.70 |
| **Eco-Innovation Activities** | 48.36 |
| Firms' Participation on Environmental Management System | 31.17 |
| Green Patents | 92.83 |
| Activeness of Renewable Energy Utilization | 21.08 |
| **Eco-Innovation Performance** | 59.03 |
| Level of Environmental Impact on Society | 62.95 |
| $CO_2$ Emission Intensity | 80.00 |
| Country's Energy Sustainability Level | 54.16 |
| Water Consumption Intensity | 97.43 |
| Green Industry Market Size | 0.59 |




- Lithuania's eco-innovation supporting environment and activity are higher than the average scores of the same development state group countries.
- Green Patents (indicator no. 3.4) and $CO_2$ Emission Intensity (indicator no. 4.2) of Lithuania are higher than the average score of ASEM member countries and the same development state countries.
- Level of Environmental Impact on Society (indicator no. 4.1) and Green Industry Market Size (indicator no. 4.6) of Lithuania are lower than the same development state countries

Table 56 Eco-innovation Policy instruments of Lithuania

| | | |
|---|---|---|
| National plan and strategy | Sustainability | - |
| | Eco-innovation | ■ Lithuanian innovation development programme 2014-2020 (in the beginning of 2014)<br>■ National strategy for the development of renewable energy sources (2010)<br>■ Baltic sea environmental protection strategy(2010)<br>■ National strategy for the implementation of the United Nations Framework Convention on Climate Change(UNFCCC) (2009)<br>■ Drinking water supply and wastewater management development strategy for 2008-2015 (2008, 2009)<br>■ National energy strategy (2007)<br>■ Lithuanian national strategy for sustainable development (2003, 2009r)<br>■ National environmental protection strategy (1996).<br>■ Long-term development strategy of the state (2002)<br>■ National strategy for the development of renewable energy sources (2010)<br>■ National housing strategy<br>■ Lithuanian forestry policy and its implementation strategy (2002)<br>■ Lithuania 2030<br>■ Energy efficiency action plan (2007) -<br>■ Action plan 2010-2015 for the strategy for the baltic marine environment protection (2010)<br>■ National strategic waste management plan 2007-2013(2007) |
| Programme and actions | National | ■ Green industry innovation programme (2012)<br>■ Industrial Biotechnology Development Programme (2011)<br>■ Affirmation of the Priority Trends of R&D(2007)<br>■ National Programme for Implementation of Green Public Procurement (2010)<br>■ Natural Resources Protection and Sustainability Program (2007)<br>■ NATIONAL REFORM PROGRAMME<br>■ THE PROGRAMME FOR MODERNIZATION OF MULTI-APARTMENT BUILDINGS (2004, a2009)<br>■ NATIONAL STRATEGIC WASTE MANAGEMENT PLAN 2007-2013 (2007),<br>■ BIOLOGICAL DIVERSITY PRESERVATION AND PROTECTED ARES PLANNING AND MANAGEMENT PROGRAMM FOR 2007-2013(2007,a2010) |

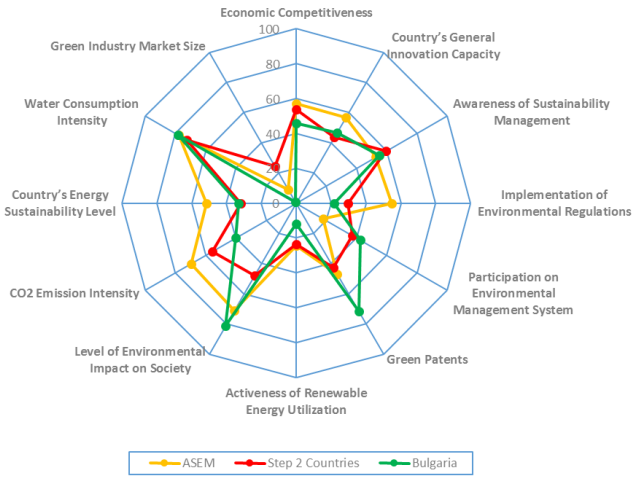
| | | |
|---|---|---|
| | | ■ PROGRAMME OF THE LITHUANIAN FISHERIES SECTOR 2007-2013 (2007, a2008)<br>■ PLANT GENETIC RESOURCES PRESERVATION PROGRAMME (2007)<br>■ National Green Procurement Implementation 2007 |
| | International | - |
| Legislation | | ■ Law on Energy from Renewable Sources (2011, a2013) -<br>■ Law on Biofuel, Biofuelsfor Transport and Bio-Oils(2009) |
| Finance | | - |

Lithuania increased the R&D funding in the fields of landfill pollution materials and clean production, resource and energy efficiency, promotion of renewable energies, water resource preservation and biotechnology. Activities including electric transportation, parts and waste management, and utilization of renewable energy resources are in progress. Lithuania lacks in the policy measures for promoting eco-innovation, 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. Many organizations are participating in various innovation policy programs in progress. In order to promote innovation such as increased utilization of renewable energies, pollution control and water resource management, various plans, strategies, and regulations are being implemented. However, no new policies have been developed since 2011 (EIO 2013k).

# Bulgaria

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  | 6,582 | 7.2 million | 5:27:68 | 0.782 High | 4.31 | 4.48 |  |
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **39.99** |
| **Eco-Innovation Capacity** | 49.25 |
| Economic Competitiveness | 45.93 |
| Country's General Innovation Capacity | 46.74 |
| Awareness of Sustainability Management | 55.07 |
| **Eco-Innovation Supporting Environment** | 21.93 |
| Implementation of Environmental Regulations | 21.93 |
| **Eco-Innovation Activities** | 42.07 |
| Firms' Participation on Environmental Management System | 42.54 |
| Green Patents | 71.75 |
| Activeness of Renewable Energy Utilization | 11.93 |
| **Eco-Innovation Performance** | 46.71 |
| Level of Environmental Impact on Society | 81.35 |
| $CO_2$ Emission Intensity | 40.00 |
| Country's Energy Sustainability Level | 33.27 |
| Water Consumption Intensity | 78.10 |
| Green Industry Market Size | 0.81 |




- Bulgaria's eco-innovation capacity and performance are lower than the average scores of the same development state group countries.
- Country's General Innovation Capacity (indicator no. 1.2) and $CO_2$ Emission Intensity (indicator no. 4.2) of Bulgaria are higher than the average score of ASEM member countries and the same development state countries.
- Awareness of Sustainability Management (indicator no. 1.5) and Activeness of Renewable Energy Utilization (indicator no. 3.5) of Bulgaria are lower than the same development state countries.

Table 57 Eco-innovation Policy instruments of Bulgaria

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ National strategy for development of research 2020<br>■ National Environmental Strategy 2009-2018<br>■ Bulgarian National Energy Plan<br>■ National Strategy for Biodiversity Protection<br>■ National Strategic Reference Framework, 2007-2013<br>■ The Energy Strategy of the Republic of Bulgaria till 2020<br>■ 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<br>■ Second National Action Plan for Energy Efficiency (SNAPEE) (2011-2016)<br>■ National Plan for Biodiversity Protection 2005-2010<br>■ 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<br>■ Operational Program "Innovations and Competitiveness 2014 - 2020"<br>■ BG 10 “Green Industry Innovation"<br>■ National Long-term Program to Encourage the Use of Bio fuels in the Transport Sector 2008-2020<br>■ National Long-term Program to Encourage the Use of Biomass 2008-2020<br>■ “Career Start” Program<br>■ National Program for Action on Environment and Health, 2008-2013<br>■ National action program for sustainable land management and combat against desertification in Bulgaria 2007-2013<br>■ National program for waste management activities 2009-2013<br>■ National Reform Program2010-2013 |
| | International | - |
| Legislation | | ■ Law on Employment Promotion (National Action Plan for Employment 2014) |
| Finance | | ■ The National Innovation Fund's (NIF)<br>■ National Green Investment Scheme of the National Trust Eco Fund |
| Information | | ■ ISPA Programme/CF<br>■ Bulgarian-Swiss Research Programme<br>■ Bulgarian-Swiss Cooperation Programme |

| | | |
|---|---|---|
| | | ■ Norwegian Cooperation Programme<br>■ European Territorial Cooperation Programs<br>■ Project"Bulgarian-SerbianInnovativeTeachingNetwork"<br>■ BiodivERsA21 |

Bulgaria's greatest challenge in ecological innovation is ensuring energy security against climate change. Achieving high energy efficiency, increasing energy conservation, and developing renewable energy sources are needed. Also Bulgaria is faced with social, economic, and environmental problems due to the financial and economic crises, poverty, high unemployment rates and an inadequate environment. Although the government organizations of Bulgaria have been putting in efforts to improve legislation structures in the past few years for eco-innovation, they are still behind. In 2013, Bulgaria ranked the lowest in the eco-innovation rank among the other EU member countries. Bulgaria's eco-innovation performance shows the imbalanced national innovation system and low support level from the government and investors, despite the high number of scientists and engineers. There is a certain demand for the production and implementation of green products and services, which attract the investment from companies, public organizations and educational organizations. To further expand the greenification and increase energy efficiency, local related personnel utilize the energy efficiency and renewable energy funds, which provide lower than the market rate credit and credit guarantees in terms of energy efficiency for the past several years[182]. Bulgaria has been implementing cluster policy aimed at regional decentralization and specialization while focusing on certain areas for eco-innovation. There are economic, technological, environmental, bureaucratic, and socio-cultural hindrances in achieving eco-innovation. However, the regulation policies, political support structure, procurement of skilled workers and knowledge, and new market demand in the past few years contribute toward eco-innovation vitalization. Bulgaria has established various eco-innovation policies and funding plans in 2013[183].

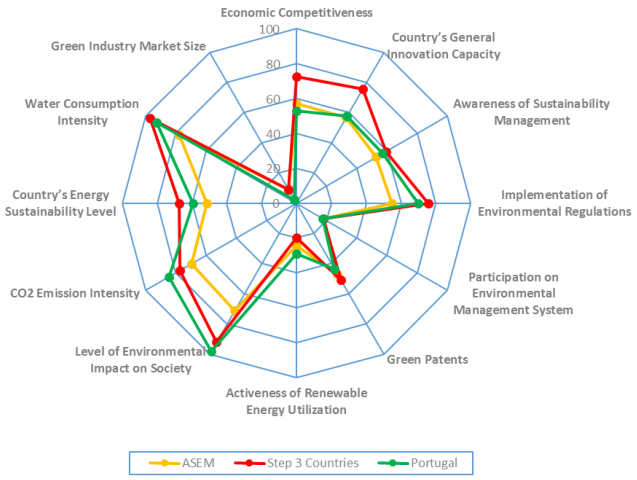
[182] Energy Efficiency and Renewable Sources Fund

[183] 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

|  | 18,984 | 10.8 million | 2:22:76 | 0.830 Very high | 4.61 | 4.56 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **55.76** |
| **Eco-Innovation Capacity** | 55.79 |
| Economic Competitiveness | 52.85 |
| Country's General Innovation Capacity | 57.58 |
| Awareness of Sustainability Management | 56.95 |
| **Eco-Innovation Supporting Environment** | 69.79 |
| Implementation of Environmental Regulations | 69.79 |
| **Eco-Innovation Activities** | 29.99 |
| Firms' Participation on Environmental Management System | 17.51 |
| Green Patents | 43.50 |
| Activeness of Renewable Energy Utilization | 28.95 |
| **Eco-Innovation Performance** | 67.47 |
| Level of Environmental Impact on Society | 98.26 |
| $CO_2$ Emission Intensity | 84.62 |
| Country's Energy Sustainability Level | 59.52 |
| Water Consumption Intensity | 92.76 |
| Green Industry Market Size | 2.20 |




- Portugal's eco-innovation capacity, activity and performance are similar with the average scores of the same development state group countries.
- Level of Environmental Impact on Society (indicator no. 4.1) and $CO_2$ Emission Intensity (indicator no. 4.2) of Portugal are higher than the average score of ASEM member countries and the same development state countries.
- Economic Competitiveness (indicator no. 1.1) and Green Industry Market Size (indicator no. 4.6) of Portugal are lower than the same development state countries.

Table 58 Eco-innovation Policy instruments of Portugal

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ General framework on environment<br>■ National Sustainable Development Strategy (ends 2015) |
| | Eco-innovation | ■ National Energy Strategy(ENE 2020)<br>■ New National Energy Efficiency Action Plan (2008)<br>■ National renewable energy action plan (PNAER)<br>■ Strategic Plan for Municipal Waste (PERSU II)<br>■ The Waste Management National Plan<br>■ The Strategic Plan for water supply and Wastewater Treatment (PEAASAR 2007-2013)<br>■ National Plan for Industrial Waste Prevention (PNAPRI)<br>■ Strategic Plan for Industrial Waste Management (PESGRI)<br>■ The Environmental Technologies Action Plan<br>■ The national Green public procurement action plan (NAP) |
| Programme and actions | National | ■ The National Climate Change Programme (2006)<br>■ Eco-design for energy related products (Decree-Law No.12/2011)<br>■ Thematic operational programme for territory valuing (2007-2013)<br>■ The MIT Portugal Programme<br>- to aim to enhance the sustainability of social activity as well as the natural and built environments<br>■ 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[184](2014~2020)<br>■ The Energy Efficiency Fund<br>■ The Portuguese Carbon Fund<br>■ The Innovation Support Fund |
| Information | | ■ Partnership agreement for the Eco- Innovation<br>- signed between APA, Portuguese Environment Agency and the AdI, Agency for Innovation, in order to promote initiatives integrating innovation and the environment.<br>■ Info-day eco-innovation<br>■ The Call on 2011 Projects Eco- Innovation |

[184] COMPETE – Program Operational 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

| | | |
|---|---|---|
| | | ■ Ecopolis Project<br>■ MOR(the Organized Waste Market) [185]<br>■ Brigantia EcoPark<br>- A partnership. Renewable energy and the environment science and technology park<br>■ Relvao Eco Park[186]<br>■ The 13th European Forum on Eco- Innovation- Developing new markets for eco-innovation (Nov 2012)<br>■ LNEG(National Laboratory for Energy and Geology, Portugal) |

Portugal has established a sustainable strategy[187] and energy plan[188]. 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 the national plans[189]. Also national plans for green technology and public acquirement of green technology through eco-innovation have been established[190]. Portugal has financially supported R&D intensively from 2007 to 2013 in order to strongly promote the eco-innovation of the SME. After the success of COMPETE, a new financial program at macro level, from 2014 to 2020, was created (COMPETE, 2014). Conditions for eco-innovation advancement through financial support such as venture capitals[191], R&D funds[192] and tax support[193] are being created with the venture capitals focusing on supporting the agriculture, energy, and forest sectors. The SIFIDE program supports corporations hiring R&D firms for the development of innovative products and services (ADI, 2013a). If corporations incorporate SIFDE, R&D and development funds are deducted

[185] 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 organized 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

[186] 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.

[187] National Sustainable Development Strategy (ends 2015)

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

[189] 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)

[190] The Environmental Technologies Action Plan, The national Green public procurement action plan (NAP)

[191] 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.

[192] COMPETE

[193] SIFIDE

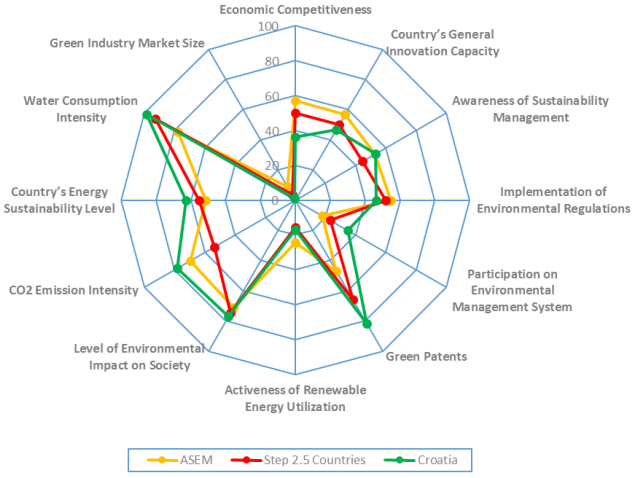
from taxes. This project be implemented until 2015. Portugal has created energy efficiency funds[194] to support energy policies[195] based on related legislature[196]. The $CO_2$ fund[197] supports climate change adaptation projects and the innovation support fund has been created as a result of renewable energies operation licenses[198]. These funds support the R&D and innovation (Simões and Godinho, 2011). Portugal shares eco-innovation information through means of partnership[199] between the eco-innovation related personnel, industrial ecological complex[200] and information sharing events[201].

[194] The Energy Efficiency Fund
[195] National Energy Efficiency Action Plan (NEEAP)
[196] Decree-Law no. 50/2010
[197] The Portuguese Carbon Fund
[198] UNFCCC at: http://www.cdmbazaar.net/repo/buyers/buyer-643470496
[199] Partnership agreement for the Eco- Innovation
[200] Brigantia EcoPark, Relvao Eco Park
[201] The 13th European Forum on Eco- Innovation- Developing new markets for eco-innovation (Nov 2012)

# Croatia

|  | 11,551 | 4.5 million | 4:27:69 | 0.818 Very high | 4.06 | 4.21 |  |
|---|---|---|---|---|---|---|---|
| Flag | GDP per capita | Population | Industry structure (1st:2nd:3rd) | HDI | Sustainable social index | Sustainable env. index | Geographic location |

| | Score |
|---|---|
| **ASEI 2015** | **49.85** |
| **Eco-Innovation Capacity** | 45.28 |
| Economic Competitiveness | 36.18 |
| Country's General Innovation Capacity | 46.77 |
| Awareness of Sustainability Management | 52.89 |
| **Eco-Innovation Supporting Environment** | 46.26 |
| Implementation of Environmental Regulations | 46.26 |
| **Eco-Innovation Activities** | 44.32 |
| Firms' Participation on Environmental Management System | 34.53 |
| Green Patents | 81.61 |
| Activeness of Renewable Energy Utilization | 16.81 |
| **Eco-Innovation Performance** | 63.55 |
| Level of Environmental Impact on Society | 76.75 |
| $CO_2$ Emission Intensity | 78.46 |
| Country's Energy Sustainability Level | 62.85 |
| Water Consumption Intensity | 98.57 |
| Green Industry Market Size | 1.13 |




- Croatia's eco-innovation capacity, activity and performance are higher than the average scores of the same development state group countries. However, eco-innovation capacity and supporting environment are low.
- Green Patents (indicator no. 3.4 $CO_2$ Emission Intensity (indicator no. 4.2) of Croatia are higher than the average score of ASEM member countries and the same development state countries.
- Economic competitiveness (indicator no. 1.5) and Green Industry Market Size (indicator no. 4.6) of Croatia are lower than the same development state countries.

Table 59 Eco-innovation Policy instruments of Croatia

| | | |
|---|---|---|
| National plan and strategy | Sustainability | ■ Sustainable Development Strategy (2009) |
| | Eco-innovation | ■ The National Renewable Energy Action Plan (NREAP) (2013)<br>■ Waste Management Strategy (2005) |
| Programme and actions | National | ■ Science and Technology Policy (2006)<br>■ Technology Infrastructure Development Programme (TEHCRO) |
| Legislation | | ■ Public procurement Act (2012)<br>■ Public Private Partnership Act (OG 129/08, 55/11)<br>■ Act on State Commission for the Supervision of Public Procurement Procedures (OG 21/2010)<br>■ Waste Act (2008) |
| Finance | | ■ Loan Agreement for the Innovation and Entrepreneurship Venture Capital Project |
| Information | | ■ Info-day eco-innovation<br>■ Sector Group Environment Support for Europe's Environmental Players[202] |

Croatia has been less influenced by eco-innovation initiatives like ETAP or Eco-AP, which have been actively promoted by the EU, than other European countries, because it joined the EU in 2013. After establishment of sustainable strategies[203], it formulated renewable energy plan[204]. It has implemented supporting policies[205] for scientific development, which become basis to eco-innovation, and established infrastructure[206] accordingly. Croatia is also operating national business loan program, in which the government provides venture funding to support eco-innovation. Public Procurement Procedure Law[207] and Public Procurement Law[208] enacted in 2010 and 2012 reflect preferential purchasing for eco-friendly products. Public and private market in environmental sector is estimated to be about 3 billion dollars, and legal basis for this is established as law related to public and private collaboration. There are policies that enhance awareness for eco-innovation and enable partnership between the interested parties.

[202] http://ec.europa.eu/environment/archives/ecoinnovation2012/2nd_forum/presentations/session2/2-5.pdf
[203] Sustainable Development Strategy (2009)
[204] The National Renewable Energy Action Plan (NREAP) (2013)
[205] Science and Technology Policy (2006)
[206] Technology Infrastructure Development Programme (TEHCRO)
[207] Act on State Commission for the Supervision of Public Procurement Procedures (OG 21/2010)
[208] Public procurement Act (2012)

# Appendix. Characteristics of the indicators and data collecting methods

| Indicator | Economic Competitiveness(1.1) |
|---|---|
| Category | Eco-innovation Capacity |
| Measuring factor | Efficiency enhancers subindex of the Global Competitiveness Index measures factors promoting economic efficiency of countries such as country's level of higher education and training, efficiency of product markets, efficiency of labor market, development of financial markets, technological foundation and market sizes. |
| Measuring element | Efficiency enhancers subindex (Pillar 5~10) of the Global Competitiveness Index 2014-2015 |
| Source | The Global Competitiveness Index 2014-2015 |
| Publisher | World Economic Forum |
| Data collection interval | Annual |
| Target | 148 countries (50 ASEM member countries are included except Brunei Darussalam) |
| Method | - The World Economic Forum's Global Competitiveness Index consists of Basic requirements subindex, Efficiency enhancers subindex, and Innovation and sophistication factors subindex covering 12개의 Pillars<br>- The Efficiency enhancers subindex consists of 53 indicators measured by number from 1 to 7 from a survey.<br>- The survey was conducted in 148 countries from February to June 2014 with a target of 14,000 companies (22 countries were surveyed on-line)<br>- GCI 2014-2015 is a synthesis of a survey in 2013 and 2014 (Applied weights are different among countries) |
| Remarks | - Composite index (114 indicators, ASEI uses 53 indicators)<br>- Published every year<br>- Most qualitative indicators among 20 ASEI indicators<br>- Korean partners : KDI, Seungjoo Lee, Research Associate, Public Opinion Analysis Unit, Youngho Jung, Head, Public Opinion Analysis Unit |
| References used | - International Labour Organization, Key Indicators of the Labour Markets, 8th Edition; national sources<br>- International Monetary Fund, World Economic Outlook Database (April 2014 edition); national sources<br>- International Telecommunication Union, World Telecommunication/ICT Indicators 2014 (June 2014 edition)<br>- International Trade Centre, Trade Competitiveness Map Data<br>- UNESCO Institute for Statistics, Data Centre (accessed May 21, 2014)<br>- World Bank/International Finance Corporation, Doing Business 2014: Understanding Regulations for Small and Medium-Size Enterprises<br>- World Economic Forum, Executive Opinion Survey<br>- World Trade Organization, Statistical Database: Time Series on Merchandise and Commercial Services (accessed July 02, 2014)<br>- World Trade Organization, Online Statistics Database (accessed June 18, 2014) |

| Indicator | General Innovation Capacity (1.2) |
|---|---|
| Category | Eco-innovation Capacity |
| Measuring factor | Measuring the level of innovation capacity including status of research institutions, human capital, infrastructure, elaborateness of market and industries, outcomes of technologies |
| Measuring element | Global Innovation Index |
| Source | The Global Innovation Index 2014 |
| Publisher | INSEAD, WIPO, Cornell University, |
| Data collection interval | Annual |
| Target | 143 countries (50 ASEM countries are included except Lao PDR) |
| Method | - The Global Innovation Index published by INSEAD, WIPO, Cornell University consists of Innovation Input Sub-index and Innovation Output Sub-Index<br>- Input Subindex consists of Institutions, Human capital and research, Infrastructure, Market sophistication and Business sophistication while Output Sub-index does Knowledge and technology outputs and Creative outputs.<br>- Each subindex consists of 3 categories and each category has 3 to 5 indicators.<br>- GII consists of 81 indicators |
| Remarks | - Composite index (81 indicators)<br>- Published annually<br>- A indicator called ISO 14001 environmental certificates (3.1.1) is directed related to Firms' participation on Environmental Management System of ASEI |
| References used | - Graduate Management Admission Council (GMAC); www.gmac.com/research<br>- United Nations, Department of Economic and Social Affairs, Population Division, World Population Prospects: The 2012 Revision (population data)(2004-13)<br>- IHS Global Insight, Information and Communication Technology Database)<br>- International Monetary Fund World Economic Outlook 2013 database, April 2013 (current US$ GDP)<br>- International Energy Agency, World Energy Balances online data service (2011-12)<br>- International Finance Corporation and World Bank, Enterprise Surveys (2005-13).<br>- International Labour Organization LABORSTA Database of Labour Statistics (2004-08), and ILOSTAT Database of Labour Statistics Beta version (2004-12)<br>- International Labour Organization, Key Indicators of the Labour Market (KILM) database, Table 17b Labour productivity (Conference board estimates), special tabulations prepared using KLIM Excel Add-in.<br>- International Organization for Standardization (ISO), The ISO Survey of Management System Standard Certifications, 1999-2012 : www.iso.org<br>- OECD Programme for International Student Assessment (PISA) (2010-12). (www. pisa.oecd.org/)<br>- QS Quacquarelli Symonds Ltd, QS World University Ranking 2013/2014, Top Universities.<br>- Reporters Without Borders, Press Freedom Index 2013<br>- SCImago (2007) SJR—SCImago Journal & Country Rank. Retrieved February 2014.<br>- Special tabulations from Thomson Reuters, Web of Science, Science Citation Index (SCI) and Social Sciences Citation Index (SSCI);http://thomsonreuters.com/ products_services/science/;<br>- Standard and Poor's and World Bank and OECD GDP estimates; extracted from World Bank World Development Indicators database (2005-12). (http://data.worldbank. org/)<br>- Thomson Reuters, Thomson One Banker Private Equity database; http://banker.thomsonib.com<br>- UNESCO Institute for Statistics, UIS online database (2004-12)<br>- United Nations Public Administration Network, e-Government Survey 2012<br>- United Nations, COMTRADE database<br>- Eurostat 'High-technology' aggregations based on SITC Rev. 4, April 2009 (2007-12).<br>- World Bank, Doing Business 2014, Employing Workers<br>- United Nations Public Administration Network, e-Government Survey 2012<br>- Yale University and Columbia University Environmental Performance Index 2014. (http://epi.yale.edu/)<br>- World Economic Forum, Executive Opinion Survey 2013-2014 (https://wefsurvey. org) |

| Indicator | Green Technology R&D Institutions Capacity (1.3) |
|---|---|
| Category | Eco-Innovation Capacity |
| Measuring factor | Number of Green (Clean) Technology R&D Institutions, Centers and University |
| Measuring element | Number of Green (Clean) Technology R&D Institutions, Centers and University |
| Source | Cleantech Group |
| Publisher | Cleantech |
| Data collection interval | Annually |
| Target | NA |
| Method | NA |
| Remarks | - Cleantech provides data to EU member countries<br>- Subscription cost is 10,000 USD per annum<br>- Cleantech covers 40 countries of which 32 countries are ASEM members.<br>- A part of the indicator is overlapped with ASEI indicator 2.1. |

| Indicator | Green Technology possessed/acquired Firms (1.4) |
|---|---|
| Category | Eco-Innovation Capacity |
| Measuring factor | Number of companies which possess green technologies |
| Measuring element | Number of Green (Clean) Technology possessed firms (Include firms in all development stages: concept, product development, shipping product/pilot, wide commercial availability) |
| Source | Cleantech Group |
| Publisher | Cleantech |
| Data collection interval | Annually |
| Target | NA |
| Method | NA |
| Remarks | - Cleantech provides data to EU member countries<br>- Subscription cost is 10,000 USD per annum<br>- Cleantech covers 40 countries of which 32 countries are ASEM members. |

| Indicator | Awareness Level of Sustainability Management (1.5) |
|---|---|
| Category | Eco-innovation Capacity |
| Measuring factor | Number of United Nations Global Compact Participant Firms |
| Measuring element | Number of United Nations Global Compact Participant Firms. The UN Global Compact is the world's largest corporate citizenship and sustainability initiative, which its networks include a number of important business associations representing leading companies from around the world. |
| Source | United Nations Global Compact |
| Publisher | UNGC |
| Data collection interval | Available on a certain date |
| Target | 199 countries including 51 ASEM members |
| Method | - https://www.unglobalcompact.org/participants/search<br>- Data available since 2000<br>- Current data used for ASEI is retrieved from a range of 1st January 2000 to 31st March 2015<br>- Both business and non-business are included<br>- Data is complete for the whole ASEM member countries |

| Indicator | Government's R&D expenditure in Green Industry (2.1) |
|---|---|
| Category | Eco-Innovation Supporting Environment |
| Measuring factor | Public spending in environmentally related RD, % total public spending |
| Measuring element | Public spending in environmentally related RD, % total public spending |
| Source | OECD Green Growth Indicators |
| Publisher | OECD |
| Data collection interval | Data upto year 2013 |
| Target | 42 countries of which 24 countries are ASEM members |
| Method | - http://stats.oecd.org/<br>- OECD's Environment>Green Growth>Economic opportunities and policy responses>Technology and innovation : R&D>Environmentally related government R&D budget, % total government R&D<br>- Currently 2013 data is used |
| Alternative data | - Cleantech's 'Government R&D expenditure in Cleantech sectors' and the International Energy Authority (IEA)'s R&D budget data: IEA Report- Tracking Clean Energy Progress (Definition - Total budget for Cleantech R&D as a proportion of GDP (PPP)) |
| Remarks | - Not all ASEM members are covered<br>- More investigation is needed to find out data for Non-OECD countries |

| Indicator | Implementation of Environmental Regulations (2.2) |
|---|---|
| Category | Eco-Innovation Supporting Environment |
| Measuring factor | Stringency and enforcement of environmental regulation |
| Measuring element | Stringency and enforcement of environmental regulation |
| Source | Sustainable Competitiveness Index |
| Publisher | World Economic Forum |
| Data collection interval | Annually |
| Target | 113 countries of which 46 countries are ASEM members except Lao PDR, Myanmar, Brunei Darussalam, Singapore and Malta |
| Method | - Two indicators called “Stringency of environmental regulation” and “Enforcement of environmental regulation” from the Sustainable Competitiveness Index<br>- The data is based on survey<br>- The indicators use the results of WEF’s Executive Opinion Survey |
| References used | - World Economic Forum, Executive Opinion Survey<br>- http://www.weforum.org/content/pages/sustainable-competitiveness/<br>- Stringency: How would you assess the stringency of your country’s environmental regulations? [1 = very lax, among the worst in the world; 7 = among the world's most stringent]<br>- 이행(Enforcement) : In your country, how would you assess the enforcement of environmental regulations? [1 = very lax, among the worst in the world; 7 = among the world’s most rigorous] |
| Remarks | - Applying the average of the results from 2 surveys<br>- Uncertainty on the application of average values |

| Indicator | Maturity of Investment Setting for Green Technology Industry (2.3) |
|---|---|
| Category | Eco-Innovation Supporting Environment |
| Measuring factor | Value of Investment towards Green Technology Firms |
| Measuring element | Value of Investment towards Green Technology Firms |
| Source | Cleantech Group |
| Publisher | Cleantech |
| Data collection interval | Annually |
| Target | NA |
| Method | NA |
| References used | - Cleantech provides data to EU member countries<br>- Subscription cost is 10,000 USD per annum<br>- Cleantech covers 40 countries of which 32 countries are ASEM members. |

| Indicator | Investment Scale towards Green Technology SMEs (2.4) |
|---|---|
| Category | Eco-Innovation Supporting Environment |
| Measuring factor | Number of venture capitals & deals made towards green technology SMEs |
| Measuring element | Number of venture capitals & deals made towards green technology SMEs |
| Source | Cleantech Group |
| Publisher | Cleantech |
| Data collection interval | Annually |
| Target | NA |
| Method | NA |
| Remarks | - Cleantech provides data to EU member countries<br>- Subscription cost is 10,000 USD per annum<br>- Cleantech covers 40 countries of which 32 countries are ASEM members. |

| Indicator | Commercialization Level of Green Technology Firms (3.1) |
|---|---|
| Category | Eco-Innovation Activities |
| Measuring factor | Number of companies with green technology widely commercialized |
| Measuring element | Number of companies with green technology widely commercialized |
| Source | Cleantech Group |
| Publisher | Cleantech |
| Data collection interval | Annually |
| Target | NA |
| Method | NA |
| Remarks | - Cleantech provides data to EU member countries<br>- Subscription cost is 10,000 USD per annum<br>- Cleantech covers 40 countries of which 32 countries are ASEM members. |

| Indicator | Firms' Participation on Environmental Management System (3.2) |
|---|---|
| Category | Eco-Innovation Activities |
| Measuring factor | Number of firms with ISO14001 certification (per billion GDP in PPP$) |
| Measuring element | Number of firms with ISO14001 certification (per billion GDP in PPP$) |
| Source | ISO 14001 Survey |
| Publisher | ISO |
| Data collection interval | Annually (latest in 2013) |
| Target | 46 countries |
| Method | - Two data sets are needed to measure: number of firms with ISO certification and GDP in PPP<br>- GCI measured for all ASEM members except 5 countries in 2012 |
| Remarks | - The same indicator as a indicator called "ISO 14001 environmental certificates"(3.3.3) of the Global Competitiveness Index<br>- Updating data with the two data sets |

| Indicator | Economic Influence of Leading Environmentally Responsive Firms (3.3) |
|---|---|
| Category | Eco-Innovation Activities |
| Measuring factor | Revenue of firms included in Newsweek Green Ranking |
| Measuring element | Revenue of firms included in Newsweek Green Ranking. |
| Source | Newsweek Green Ranking |
| Publisher | Newsweek (Sustainalytics & Trucost) |
| Data collection interval | Every two years |
| Target | 25 countries |
| Method | - Green Ranking is derived from the results of 8 indicators.<br>- It consists of three categories: environmental impacts, environmental management and environmental announcements |
| Remarks | - Sustainalytics & Trucost analyze the score<br>- A majority of ASEM member countries has no firm under the World's Greenest Companies 500<br>- Among ASEM countries from Asia, a few countries has such firms such as 34 firms from Japan, 34 firms from China, 9 firms from Australia, 7 firms from India, 6 firms from South Korea and 4 firms from Singapore<br>- Revenue data from firm are needed |

| Indicator | Green patents (3.4) |
|---|---|
| Category | Eco-Innovation Activities |
| Measuring factor | Environmental technology patent(Patent grants by technology) / Total patent grant (direct and PCT national phase entires) |
| Measuring element | Environmental technology patent(Patent grants by technology) / Total patent grant (direct and PCT national phase entires) |
| Source | OECD Green growth |
| Publisher | OECD |
| Data collection interval | Annually |
| Target | 32 countries |
| Method | - ASEI uses a indicator called “Technology and Innovation : Patents - Development of environment-related technologies” from the OECD Green growth index |
| Remarks | - Quantitative data<br>- Current data is not available<br>- Unclear definition of environment-related technologies |

| Indicator | Activeness of Renewable Energy Utilization (3.5) |
|---|---|
| Category | Eco-Innovation Activities |
| Measuring factor | Measures the contribution of renewable to total primary energy supply (TPES) |
| Measuring element | Measures the contribution of renewable to total primary energy supply (TPES) |
| Source | Energy Balances of OECD countries & Energy Balances of non-OECD countries |
| Publisher | International Energy Agency |
| Data collection interval | Annually |
| Target | 50 countries except Lao PDR |
| Method | - Data available in 2013 (estimated data)<br>- OECD country report provides data while non-OECD country report does not<br>- Charged data |
| Remarks | - Renewable energy is defined to include hydraulic power, geothermal, solar heat, wind power, tidal power, solid bio fuel, bio gasoline, bio diesel and other liquid bio fuel and bio gas |

| Indicator | Level of Environmental impact on Society (4.1) |
|---|---|
| Category | Eco-Innovation Performance |
| Measuring factor | Environmental health including air pollution, water, access to drinking water and diseases |
| Measuring element | Measuring Environmental Health of Environmental performance Index |
| Source | Environmental Performance Index 2014 |
| Publisher | Yale University & Columbia University & World Economic Forum |
| Data collection interval | Every two years |
| Target | 51 countries |
| Method | - Environmental Health Index consists of 6 indicators |
| Remarks | - Further investigation needed to review methods of standardization and calculation |
| References used | - United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision.<br>- Aerosol Optical Depth (AOD) from NASA's MODIS, SeaWiFS, and MISR satellite instruments, and the GEOS-Chem chemical transport model.<br>- World Health Organization's Household Energy Database (World Health Organization (2012).<br>- WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation(http://www.wssinfo.org/data-.estimates/table/) |

| Indicator | CO2 Emission Intensity (4.2) |
|---|---|
| Category | Eco-Innovation Performance |
| Measuring factor | CO2 emissions / GDP using exchange rates |
| Measuring element | CO2 emissions / GDP using exchange rates |
| Source | Key World Energy Statistics 2014 |
| Publisher | International Energy Agency |
| Data collection interval | Annually |
| Target | 50 countries except Lao PDR |
| Method | - CO2 emissions / GDP(PPP)(2005USD)<br>- CO2 emissions include fuel combustion only<br>- IPCC Guideline(1996) is applied to calculate the emissions |

| Indicator | Country's Energy Sustainability Level (4.3) |
|---|---|
| Category | Eco-Innovation Performance |
| Measuring factor | Energy Performance of The Energy Sustainability Index |
| Measuring element | Energy Performance of The Energy Sustainability Index |
| Source | Energy Sustainability Index |
| Publisher | World Energy Council |
| Data collection interval | Annually |
| Target | 48 countries except Lao PDR, Myanmar and Brunei Darussalam |
| Method | - Energy performance consists of 13 indicators<br>- It provides raw data |
| Remarks | - Ranking reflecting energy security, social equity and environmental impact |

| Indicator | Water Consumption Intensity (4.4) |
|---|---|
| Category | Eco-Innovation Performance |
| Measuring factor | Water withdrawal for each 1,000 US$ of GDP in cubic meters |
| Measuring element | Water withdrawal for each 1,000 US$ of GDP in cubic meters |
| Source | World Competitiveness Yearbook |
| Publisher | IMD |
| Data collection interval | Annually |
| Target | 60 countries including 39 ASEM members |
| Method | - A indicator called “4.4.15 : Water Consumption Intensity” of the IMD World Competitiveness year book<br>- IMD World Competitiveness year book provides data on 60 countries. |
| Remarks | - Charged data<br>- Referred to http://www.fao.org/nr/water/aquastat/data/query/index.html?lang=en에서 Total water withdrawal |
| References used | - Food and Agriculture Organization of the United Nations (FAO)<br>- AQUASTAT<br>- OECD Environmental Data April 2014<br>- EUROSTAT April 2014<br>- Annual quantity of freshwater withdrawn for agricultural, industrial and domestic purposes. It includes renewable freshwater resources as well as potential over-abstraction of renewable groundwater or withdrawal of fossil groundwater and eventual use of desalinated water or treated wastewater. It does not include other categories of water use, such as for cooling of power plants, mining, recreation, navigation, fisheries, etc., which are sectors that are characterized by a very low net consumption rate. Years showed as 2009 can range from 2000 to 2010. |

| Indicator | Jobs in Green Technology Industry (4.5) |
|---|---|
| Category | Eco-Innovation Performance |
| Measuring factor | Number of Employees |
| Measuring element | Number of Employees |
| Source | Cleantech Group |
| Publisher | Cleantech |
| Data collection interval | Annually |
| Target | NA |
| Method | NA |
| Remarks | - Cleantech provides data to EU member countries<br>- Subscription cost is 10,000 USD per annum<br>- Cleantech covers 40 countries of which 32 countries are ASEM members. |
| Alternative data | - IRENA Renewable Energy and Jobs Annual Review<br>- Number of direct and indirect employees related to renewable by total labor force |

| Indicator | Green Industry Market Size (4.6) |
|---|---|
| Category | Eco-Innovation Performance |
| Measuring factor | Green Market Size |
| Measuring element | BIS (then BERR) commissioned Innovas/K-matrix to undertake a market assessment of the size of the UK low carbon and environmental goods and services (LCEGS) sector in 2008. The sector has been defined using 24 sub sectors (Level 2 markets). These are sub- divided into three broad categories- Environmental, Renewable Energy and Low Carbon- the addition of each broadly mapping the evolution of the current LCEGS sector definition from its environmental roots |
| Source | LOW CARBON ENVIRONMENTAL GOODS AND SERVICES (LCEGS) Report 2011/2012 |
| Publisher | UK Department for Business Innovation & Skills |
| Data collection interval | Annually |
| Target | 224 countries of which 49 countries are ASEM members |
| Method | - Total LCEGS(Low Carbon Environmental Good and Survices) Country Markets size<br>- LCEGS - underlying data<br>- Method is not clearly presented |