

## FAQ – 2013 WEC Energy Sustainability Index

### **What is the goal of the Index?**

The *Energy Sustainability Index* (“Index”) is ambitious. It ranks the energy sustainability performance of countries by aggregating over 60 data sets of 129 countries to create a snapshot energy profile for each country.

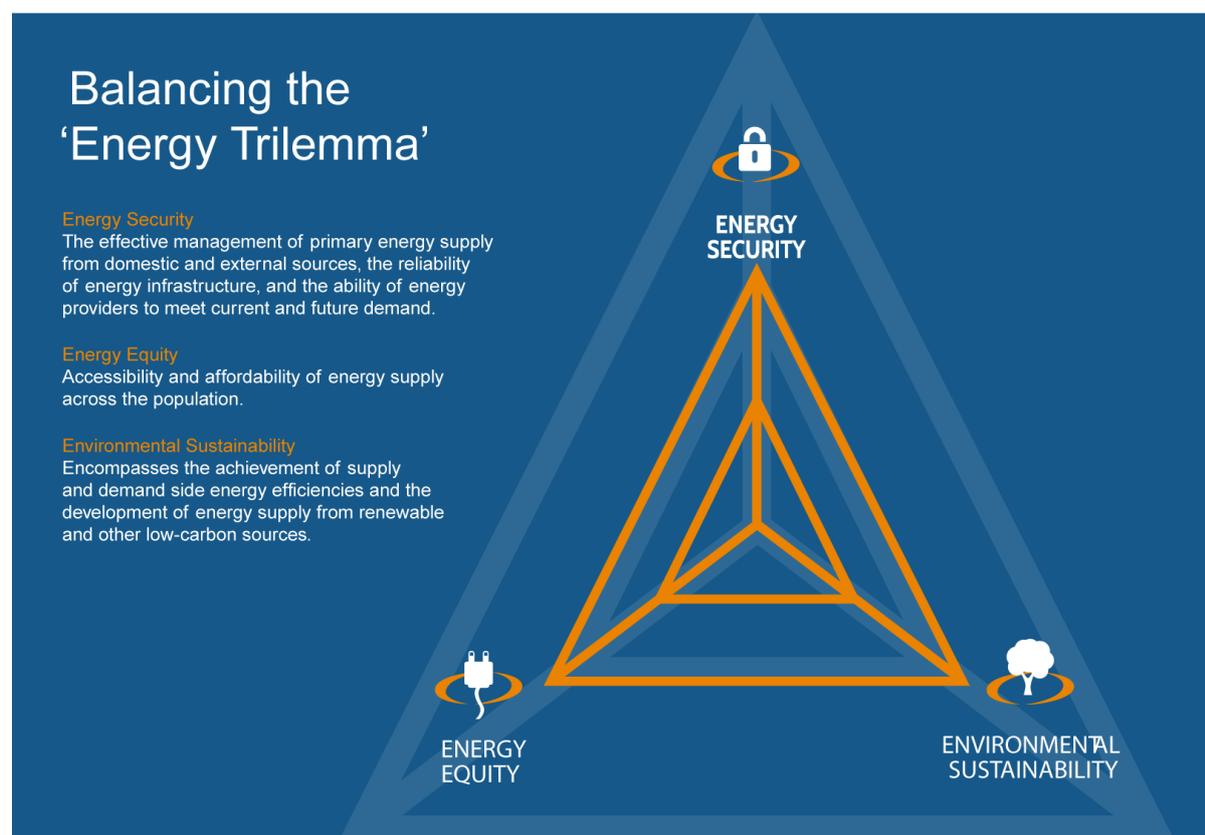
The goal of the Index is to quantitatively understand country energy performance to provide insights into the relative performance against WEC’s energy sustainability dimensions. In doing so, the Index highlights the ‘energy trilemma’ and provides numerous opportunities for discussion on country strengths and weaknesses in energy sustainability.

### **How is the Index structured?**

The Index has two main components:

- Energy performance
- Country context

The Index captures energy performance using the three dimensions of the WEC’s definition of energy sustainability:



This Index also captures the country context for policy making by examining political, societal, and economic strength. For example, under the economic strength dimension, data points include “Cost of living expenditure” captured by data on the “Cost of housing, water, electricity, gas and other fuels (Int \$ MM)” and “Individual consumption expenditure by households (Int \$ MM).”

### **What does the Index say?**

The Index shows the aggregate effect of energy policies applied over time in the context of each country relative to the performance of all the countries. Since the Index shows the aggregate effect, it does not identify the effectiveness of a particular policy since each policy interacts with a unique set of policies specific to that country over different periods. It does broadly measure the aggregate outcome of country policies; for example, the level of country CO<sub>2</sub> emissions or the overall use of electricity per capita relative to other countries. To move up in the Index ranking requires a country to improve its performance relative to peer countries.

Absolute rank is not the most important result provided by the Index. All countries have a chance to improve their energy performance, regardless of whether they are ranked first or last. Decision makers in both the public and private sectors are encouraged to look at trends in performance over the years, particularly in each dimension, and to compare their countries against their respective peer groups – regardless of whether those peer groups take a regional, economic, or structure-of- the-energy-sector point of view.

### **Why was a ‘balance score’ introduced?**

The Index ranking measures both energy and contextual performance of a country. Although the weighting of the dimensions is tilted towards the energy dimensions, the contextual dimensions often give an advantage to developed countries while penalising developing countries. Furthermore, the Index ranking does not indicate how well a country is meeting the energy trilemma challenge (balance across the three dimensions).

To overcome this challenge a balance score system that highlights how well a country manages the trade-offs between the three competing dimensions was introduced. The score looks at the energy performance only – energy security, energy equity and environmental impact. This leaves performance in the three contextual dimensions – political, societal and economic strength – aside.

The score enables the WEC to identify and show countries that perform very well in the energy dimensions and balance the energy trilemma, by giving them an easy-to-understand score for high performance. High performers receive a score of ‘AAA’, while countries that do not yet perform well receive a ‘DDD’ score.

The scores are calculated by splitting the normalised 0–10 results on the energy performance dimensions into four groups. Countries were then provided with a three-letter score. Note, the sequence of the letters in the score does not correspond to a specific energy dimension, but presents the letter scores in descending alphabetical order.

The best score ‘A’ was given for a very high performance. Countries with good results are awarded with the score ‘B’. A mediocre performance is recognised with the score ‘C’ and the score ‘D’ was given for underperformance.

### **What is the Index based on?**

Each country’s overall Index ranking is based on 22 underlying indicators across 6 different dimensions – some of which are supported by multiple data sets. For example, the environmental sustainability dimension is measured using 4 indicators each of which is supported by multiple data sets. The figure below provides an overview of underlying indicators and weighting regimes for all six dimensions.

Total score	Indicator type	Dimension	Indicators
Country performance <b>100%</b>	1. Energy performance <b>75%</b>	1.1 Energy Security <b>25%</b>	1.1.1 Ratio of total energy production to consumption (1/6 Each) 1.1.2 Diversity of electricity generation 1.1.3 Distribution losses as a percentage of generation 1.1.4 Five year CAGR of the ratio of TPEC to GDP 1.1.5 Days of oil and oil product stocks 1.1.6a For importers – Net fuel imports as a percentage of GDP 1.1.6b For exporters – Fuel exports as a percentage of GDP
		1.2 Energy equity <b>25%</b>	1.2.1 Affordability of retail gasoline (1/2 Each) 1.2.2 Affordability and quality of electricity relative to access
		1.3 Environmental sustainability <b>25%</b>	1.3.1 Total primary energy intensity (1/4 Each) 1.3.2 CO <sub>2</sub> intensity 1.3.3 Effect of air and water pollution 1.3.4 CO <sub>2</sub> grams/kWh from electricity generation
	2. Contextual performance <b>25%</b>	2.1 Political strength <b>8.3%</b>	2.1.1 Political stability (1/3 Each) 2.1.2 Regulatory quality 2.1.3 Effectiveness of government
		2.2 Societal strength <b>8.3%</b>	2.2.1 Control of corruption (1/4 Each) 2.2.2 Rule of law 2.2.3 Quality of education 2.2.4 Quality of health
		2.3 Economic strength <b>8.3%</b>	2.3.1 Cost of living expenditure (1/3 Each) 2.3.2 Macroeconomic stability 2.3.3 Availability of credit to the private sector

Enhanced methodology for 2013

### How are indicators selected for the Index?

Indicators were selected because of their high degree of relevance to the research goals and ability to measure and capture key elements of the WEC's definition of energy sustainability. The indicators also exhibit a low correlation – which minimises the impact of possible double counting of energy performance effects. Finally, it was critical that the indicators could be consistently and readily derived from reputable sources and cover a high proportion of countries – potential indicators were immediately excluded for low WEC member country coverage. For reasons of comparability between countries, data to calculate an indicator was derived from a single common unique source. The data sources include the International Energy Agency, the US Energy Information Administration, the World Bank, the International Monetary Fund, the World Economic Forum, Enerdata, the WEC and others.

### How and why was the methodology revised in 2013?

Methodology changes were made to better assess the countries' ability to mitigate their environmental impact, to provide energy equity (accessible and affordable energy) and energy security.

A number of improvements were made to the indicators of the energy security dimension. The overall goal was to reduce the volatility of the dimension results, capture the link between economic growth and energy consumption, ensure a common treatment of energy exporters and importers, and add an indicator that addresses the quality and reliability of the electricity infrastructure. Improvements made to address the challenges mentioned include:

- Modifying the former five-year compound annual growth rate (CAGR) energy consumption by linking it to a country's GDP growth over the same time period.

- Adding an indicator that captures distribution losses as percentage of generation and the reliability of the power system to reflect the quality of power infrastructure and efficiency of energy systems.
- Adjusting the indicator previously used to measure oil stocks of energy importing with a common indicator for both importers and exporters that examines products stocks, crude production and crude stocks.
- Adjusting the indicator previously used to measure a country's dependence on energy exports by adding a similar indicator for energy importing countries looking at a country's dependence on energy imports (fuel imports / exports as % of GDP).

The indicators measuring the ratio of energy production to consumption and diversity of electricity generation remained untouched.

A minor change was made to the energy equity dimension by updating the data source for the indicator for electricity access with the recently published data from the UN's Sustainable Energy for All Global Tracking Framework. The May 2013 report is a comprehensive snapshot of more than 170 countries. The WEC was part of the Sustainable Energy for All steering group, which was responsible for the development of the report. In the report, 2010 is established as the baseline year against which progress will be measured. The Energy Sustainability Index uses the established baseline data for all three Index years calculated.

The 2012 methodology used to calculate the environmental sustainability of a country's energy system was replaced. The changes are geared to acknowledge the high priority of CO<sub>2</sub> emission reduction and energy efficiency policies better. The assessment of a country's environmental sustainability is based on the following four indicators:

- Total primary energy intensity: measures the total amount of energy necessary to generate one unit of GDP.
- CO<sub>2</sub> (emission) intensity: measures CO<sub>2</sub> emissions from fuel combustion by GDP.
- CO<sub>2</sub> emissions per kilowatt hour of electricity generated.
- Effects on air and water.

With this methodology, industrialised countries sometimes score lower than non-industrialised countries, reflecting the reality policymakers are facing as a higher environmental impact is driven by a country's economic (industrial) policy.

#### **What time period does the 2012 Index capture?**

Due to constraints on the collection, processing, and dissemination of data the 2013 Index generally reflects data from 2010-2012. Recent world events that could affect the Index's outcomes are not completely captured. This includes, for example, turbulence in global nuclear industry due to the Fukushima nuclear accident, or the political unrest in the Middle East. While events can happen swiftly, policies generally take two to three years to become fully implemented and it may take longer for their effects to become evident. Therefore, the Index does not exhibit significant shifts in country rankings from one year to the next due to policy implementation.

#### **What will affect a country's ranking in the Index?**

The Index is weighted in favour of the energy performance versus contextual performance by a factor of 3:1, with the indicators for each dimension carrying equal weight within their axis. Therefore, changes in energy performance will have a greater effect on a country's ranking than contextual dimensions.

Overall, a country position is not necessarily affected by the degree of balance between the three energy performance dimensions. Given the equal weighting of the three energy

performance dimensions, countries that exhibit broadly similar good scores in these dimensions might typically score better. The newly introduced 'balance score' addresses how well a country is meeting the energy trilemma challenge balance across the three energy dimensions.

It is also important to note that the Index is relative – that is to say, the position of any one country will depend on the data points of the others. As an example, a country's ranking on the indicator "Diversity of electricity production" will depend on how its diversity (e.g., hydroelectric, nuclear, wind, conventional thermal) ranks against other countries. Put differently, a country's underlying indicator data can remain the same year-on-year but its Index position can move due to changes within other countries.

### **How can a country move up or down the Index?**

Country position can change due to changes in a country's performance or due to the relative changes other countries' performance. For example, a country with broadly unchanged data could move down the Index if other countries in the Index make improvement in those indicators – performance stagnation could impact Index position in the same way as retrograde motion of the energy performance data.

### **What policies will affect a country's position on the Index?**

The Index aggregates many different data points and it is often very difficult to pinpoint how any single policy affects a country's performance on any indicator or overall dimension. Also, factors beyond policies or even outside the country may affect the Index ranking. For example, "CO<sub>2</sub> intensity" could change due to multiple policies implemented over time aimed at reducing CO<sub>2</sub> emissions. Technological factors within specific industries (e.g., changes in automotive technology) can also have an impact, and are not directly measured by the Index.

Those factors noted, countries which implement a range of policies resulting in an overall framework that addresses the three aspects of energy sustainability are expected to rank higher on the Index. As such, it is very difficult to answer a question as to why a country moves up or down without understanding the context of every other member country in the Index.

### **What does the Index reveal?**

Detailed Index analysis highlights a few key findings. One, year-on-year changes in country performance are on average relatively small but more likely to occur in the energy performance dimensions. Thus, changes due to energy policies or other contextual factors can take time to implement and show results at a country level.

Two, the Index empirically reveals the "energy trilemma". Despite clear leaders, few countries manage to perform very well across all three energy dimensions. Currently, many countries achieve stronger performance in two dimensions, suggesting trade-offs between energy sustainability dimensions. For example, some energy exporting countries may lead on energy equity (highly affordable and accessible energy) and also on energy security (high energy exports) but may face lower scores on environmental sustainability (due to intense energy use). A trade-off between high affordability and high energy intensity becomes evident as low prices limit incentives to reduce energy consumption and to engage in energy efficiency programs.

Three, although the overall Index rank may be the most eye-catching figure, trends and balance within the three dimensions provide the most valuable information in helping countries address the energy trilemma. Rankings from three consecutive years are covered in the Index and broken down by dimension. This means a country can track the results of energy policies not only on a macro level, but on each dimension as well.

Four, the Index provides the ability for peer country comparisons be it from a regional, economic, or structure-of- the-energy-sector point of view. As countries have unique resource endowments, policy goals and challenges, the overall rank may be less meaningful than its relative performance versus its peers.

#### **What are the limitations of the Index?**

The Index cannot capture real-time energy sustainability performance due to the challenges of capturing large volumes of reliable data for a wide range of countries.

The Index cannot isolate the impact of a particular single policy.

The Index provides a relative view of energy performance of all countries simultaneously. The movement of any given country is the effect of its own and every other countries scores and tying the rational of a movement requires commenting on all countries so is therefore not practical.

#### **What questions/ discussion are revealed by the Index?**

The Index prompts an analysis of statistical grouping of countries to better understand why some are performing better and others not. The grouping of countries is sometimes obvious and other time requires more analysis to understand why certain groups occur. This leads to further dialog:

- a) What is the country's perspective/ priority on energy sustainability?
- b) How does the country want to achieve energy sustainability?
- c) What is the role of government policies (national, regional, local) in supporting energy sustainability?
- d) What policies are appropriate to drive energy sustainability (e.g., raise fuels taxes to encourage energy efficiency or encourage greater use of electric cars)? How do these policies need to evolve over time?
- e) What are the situational and contextual barriers the country faces in terms of energy sustainability, and how might these barriers be overcome?
- f) How do situational and contextual barriers differ across countries in different stages of their development and how can emerging countries combine social and economic development with environmental sensitivity?