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National Roundtable on the Environment and the Economy

Carbon Country Benchmarking: Preliminary Report

November 16, 2009

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Introduction

Background

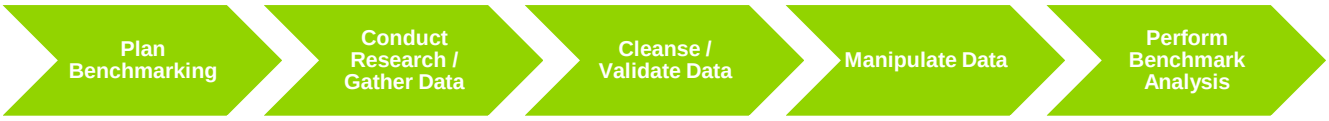
Deloitte & Touche LLP was retained by the National Roundtable on the Environment and the Economy to conduct a comparative assessment of the 'low-carbon' performance of Canada relative to other G8 countries, China, Australia and Norway. The objective of the benchmarking exercise was to understand Canada's position relative to other comparator countries in areas deemed important to Canada's national ability to compete and succeed in a global low-carbon economy.

Purpose of this report

This report describes the approach undertaken by Deloitte to design and execute the benchmarking study, and presents the preliminary findings.

Indicator definitions and draft scoring results for three weighting scenarios are provided as companion files to this document. The electronic database containing source data, formulas and scoring results is also provided as a companion file to this document.

Country benchmarking methodology



Our approach to conducting the benchmark exercise consisted of five (5) steps, as described below:

Step 1: Plan benchmarking

Deloitte was initially provided a draft benchmarking framework and list of 25 performance indicators developed by The Conference Board of Canada. The framework and indicators were developed as an output of a multi-stakeholder consultation exercise facilitated by the Conference Board. Through discussion with the NRTEE team, it was agreed that the draft framework and list of indicators required revision and modification.

A draft benchmark framework was drafted by Deloitte that was design to measure country 'carbon competitiveness' as expressed by overall level of country carbon productivity. It was subsequently agreed by Deloitte and the NRTEE project team that the purpose of the exercise was to assess Canada's position relative to other comparator countries in a variety of performance categories deemed important to Canada's ability to reduce carbon emissions while also fostering economic growth and prosperity.

Working from the original Conference Board framework, the following modified benchmarking framework was agreed upon:

- **Status indicators**: energy, emissions and other related outputs; and
- **Capacity indicators**: innovation, infrastructure, investment, skills, institutions and policy.

In selecting the analytical framework, it was acknowledged that differing stages of economic development, physical geography and natural resource endowments make comparing countries difficult, because countries require different efforts to reach their specific objectives in relation to their current status and needs. However, it was felt that the indicator categories identified above had common importance for all countries and were therefore appropriate for the purpose of this exercise.

It was agreed that given the project execution timelines, selection of indicators was to be based on the following criteria:

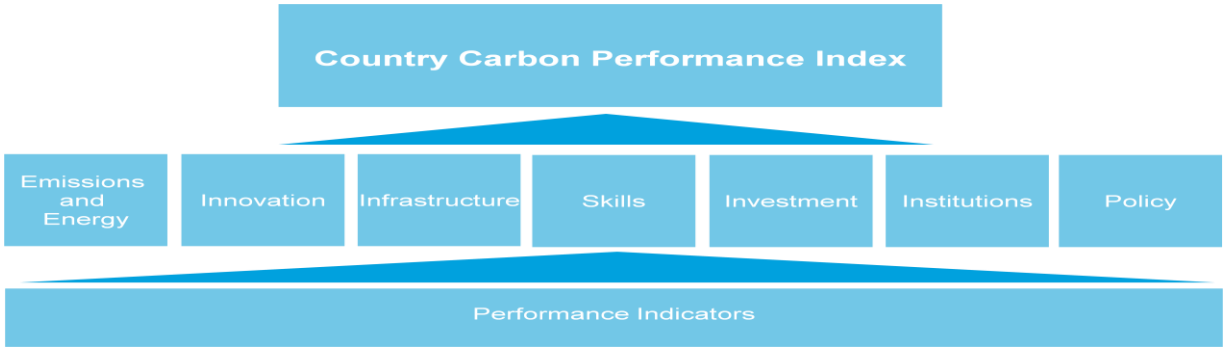
- Relevant to emerging definitions of country low carbon performance (*Note: Subjective selection as tight project timelines did not allow for the upfront selection of indicators on the basis of established theory or empirical evidence, nor through the application of

testing techniques such as principal components analysis / analytic hierarchy process / linear regression analysis in the prioritization of indicator importance.);

- Public availability of indicator data (e.g. free or nominal fee) from credible sources;
- Broad in geographical scope (in order to capture all comparator countries) and regularly produced;
- Relative ease of data manipulation (e.g. in complete format within existing datasets, and / or in correct format within multiple data sources that could be quickly researched and manipulated); and
- Quality of the data (e.g. completeness, reliability of data).

After application of these decision criteria, a draft list of 33 potential indicators with high perceived importance was identified.

The benchmarking framework selected consisted of an overall composite index comprised of 2 major support categories (status and capacity), 7 building block categories and the 33 draft indicators.



Step 2: Conduct research / Gather data

We validated the existence and accessibility of the identified information sources as well as sought to identify additional information sources (and additional indicators) to assist with enhancing the benchmark data sets. Our review focused on secondary sources, including:

- OECD;
- International Energy Agency;
- Energy Information Administration (U.S.); and
- Various published reports / studies.

Where possible we sought to collect time series data and sought information for a common base year (e.g. 1990 for energy use and CO_2 emissions data; 2007/08 for institutions and policy data).

Through this process a final list of 24 indicators were selected to conduct the country benchmark analysis.

Step 3: Cleanse / Validate data

This step involved validating, organizing, and 'cleansing' data (i.e. some interpretation was required) in order to present the data in a uniform manner so that it could be accurately analyzed. This included:

- Documentation of sources of data, and data definitions;
- Application of a naming scheme to identify data set / type of data; and
- Scanning the data for truncated / repeating / nonsense / missing / zero values / outliers / duplicates.

Step 4: Manipulate data

The indicators differed in terms of completeness, magnitudes, trends, and volatility. We had to normalize, standardize, and restructure the data in a manner that allowed it to be properly analyzed. Sub tasks within this step included:

- Consolidation of fragmented data;
- Imputation of missing data (this was a key issue with countries such as China and in particular Russia) – depending on the indicator under consideration, we either defaulted to the most recent year with data available or, in order to smooth out volatility for some cases, we derived a value from the most recent 3-year performance average;
- Normalization of data; and
- Standardization of data (to enable direct comparisons).

Step 5: Perform benchmark analysis

In conducting the benchmark analysis, we had to determine appropriate weightings for the indicators, building block categories and support categories. As outlined above, the selection of the indicators and building block categories was strongly influenced by the pre-project scoping exercise. No rank correlation type exercise was conducted to determine the relationship between the Index and potential indicators in order to screen for their inclusion, and as a result no such analysis was available as input to the relative importance/attributed weightings for each of the final selected indicators.

In the absence of such analysis to inform the relative weighting of indicators, building block and support categories, we defaulted to an equal weighting approach. This approach consisted of the following:

- Each of the 7 building block categories were equally weighted (1/7);
- Each of the indicators within the building block categories was assigned a weight based on the number of metrics in its concept category, times 1/7 (e.g. 1/7 x 1/7 = 1/49);
- Countries were assigned a score for each indicator on the basis of their relative position to other comparator countries;
- The overall composite index score for each country was derived by taking the mean of all weighted scores across all indicators.

While there are strengths and weaknesses associated with adopting an equal weighting approach, we felt that in this situation that such an approach was prudent and defensible. Benefits of this approach include avoiding the introduction of deliberate bias of the index results against any particular country or group of countries, and enabling the reproduction and enhancement of the index in subsequent iterations (equal weighting of the building block categories means that as further research is conducted, and a data improves, that indicators can be tweaked and/ or replaced without affecting the overall integrity of the index).

We then ran three scenarios in order to test the importance of the underlying index assumptions to the overall index results. These scenarios were arbitrarily selected through discussion with the NRTEE. The advantages of selecting different scenarios include helping to gauge the robustness of the results; to increase the index transparency; and to identify the countries whose performance can improve or deteriorate under certain assumptions. The scenarios selected were:

- Equal weighting of each of the 7 building block categories;
- 2/3 weighting on capacity category; 1/3 weighting on status category; and
- 1/3 weighting on capacity category; 2/3 weighting on status category.

The relative rankings of countries remained relatively static across the 3 selected scenarios, as outlined below:

Country	Equal Weight	2/3 Weight Capacity	2/3 Weight Status
Canada	**6**	**6**	**7**
USA	**7**	**7**	**8**
Japan	**4**	**4**	**4**
Russia	**11**	**11**	**11**
Germany	**2**	**2**	**2**
Italy	**7**	**8**	**6**
France	**1**	**1**	**1**
UK	**5**	**4**	**5**
China	**10**	**10**	**10**
Australia	**9**	**9**	**9**
Norway	**3**	**3**	**2**

Considerations

There are a number of aspects of the current index design that warrant further consideration:

- The status category also functions as the energy and emissions building block category, whereas the capacity category is comprised of six building block categories;

- The current weighting scheme results in an index that is dominated by very few indicators– some of the building block categories within the capacity category of the index contain only one or two sub-indicators. This means that it is relatively easy for a country to influence its overall ranking through performance improvement / deterioration in a single building block category, whereas the larger number of sub-indicators within the emissions and energy building block means that improvement in any single sub-indicator will have little effect on the overall index score;

- The index is not sensitized to country level of economic development, or to other features such as stage of technology adoption, geography and whether a country is a net importer / exporter of energy. The issue of economic development is particularly relevant in this exercise for China and Russia, and consideration could be given to applying a different weight to these countries. Also, given the likely importance of low-carbon technology adoption in transitioning to a low-carbon economy, it may be worthwhile to consider separating countries into core and non-core innovators, with the core representing those close to the technological frontier and the non-core those that depend on technological adoption from abroad. The core innovators could be assigned a larger weight as this is projected to be a key factor in their growth.

- There are time lags in some datasets, some data (e.g. CO2 emissions) trail by several years, and some datasets have significant holes. Our research into publicly available datasets indicates that there are existing fee-for-service databases available that could yield better information for current indicators as well as providing additional indicators. Further, there are a number of potential indicators that were excluded from inclusion in this index due to the level of effort required to source the information and compile it into an indicator (e.g. low-carbon and renewable technology jobs – this information is available in disaggregated form, as has been demonstrated by the recent Innova study). As indication of the potential cost of sourcing existing data from private data providers, our review found the following information was available at the following cost:

    - Renewable technology patents – Derwent Patent Index / ThomsonReuters ($7,000);

    - Business expenditure on energy R&D – ANBERD database ($750-$1,000);

    - Energy infrastructure investment – various providers (~$5,000);

    - Energy transmission infrastructure – various providers (~$5,000).

- It may be worth considering conducting a ‘backcasting’ exercise to assess how well the index holds up over time, and to assess the historical performance trajectory of the comparator countries. In essence, applying the index to country performance in multiple years (e.g. 1990, 2000, 2009) would enable a detailed comparison of not only countries to each other, but also would enable a historical reflection on the relative positioning of countries on the issue of energy use and climate change over the past two decades.

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			STATUS INDICATORS																	
			Emissions / Trade /Tech																	
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Canada	**6**	**56.06**	656.21	6	2.08%	6	0.47	9	19.70	10	0.24	9	1.10	3	11.40%	2	14.10%	4	11,160	6
USA	**7**	**53.03**	6371.39	10	20.18%	10	0.45	8	20.95	11	0.16	8	1.48	7	1.70%	8	12.60%	6	23,810	10
Japan	**4**	**60.61**	1390.63	8	4.40%	8	0.10	2	4.57	1	0.10	6	1.20	4	2.00%	6	16.30%	3	13,267	8
Russia	**11**	**15.15**	1690.34	9	5.35%	9	1.05	11	11.92	8	0.43	10	1.63	10	2.30%	4	7.30%	8	17,723	9
Germany	**2**	**74.24**	857.86	7	2.72%	7	0.23	6	10.44	7	0.09	3	1.34	5	1.50%	9	17.10%	2	6,493	3
Italy	**7**	**53.03**	480.45	4	1.52%	4	0.21	4	8.03	4	0.08	1	1.51	9	4.80%	3	2.70%	11	2,491	1
France	**1**	**78.79**	424.55	3	1.34%	3	0.15	3	6.84	3	0.09	3	0.74	2	1.80%	7	46.50%	1	7,986	4
UK	**5**	**59.09**	580.92	5	1.84%	5	0.22	5	9.46	6	0.08	2	1.49	8	0.40%	11	10.20%	7	9,458	5
China	**10**	**28.79**	6896.54	11	21.84%	11	0.49	10	5.20	2	0.46	11	2.01	11	2.20%	5	12.70%	5	--	11
Australia	**9**	**42.42**	383.49	2	1.21%	2	0.38	7	17.94	9	0.12	7	1.41	6	1.30%	10	4.10%	10	11,160	6
Norway	**3**	**68.18**	41.12	1	0.13%	1	0.09	1	9.01	5	0.10	5	0.29	1	39.70%	1	5.10%	9	5,682	2

			CAPACITY INDICATORS																										
			Innovation		Infrastructure		Skills				Financing										Institutions & Policy								
Country	OVERALL	CCI Score	Low Carbon Patents Per Million	Rank	Infrastructure Index Score	Rank	Sustainability MBA Programs	Rank	Share of 'Low Carbon' Tertiary Graduates	Rank	Strength of IP Regime	Rank	Clean Tech IPO Average Value	Rank	Clean Technology Venture Capital Per '000 GDP	Rank	Percent of Stimulus Directed at Low Carbon Power	Rank	Current GERD Expenditure	Rank	Low Carbon Growth Plan	Government Body for Low Carbon Competitiveness	Presence of a Carbon Price	Emissions Reduction Target	Low Carbon Fuel Standard	Carbon Productive Building Codes	Rank
Canada	6	56.06	1.98	4	59.0	6	9	2	21.1%	8	5.50	5	$ 32,742,826	7	$ 0.215	4	8.30	7	$ 0.351	3	no	no	no	yes	no	--	10
USA	7	53.03	1.58	6	68.0	2	97	1	16.8%	10	5.40	6	$ 135,261,133	3	$ 0.590	1	12.00	5	$ 0.172	6	no	yes	no	yes	no	--	8
Japan	4	60.61	5.30	1	45.0	10	1	6	21.4%	7	5.40	6	$ -	11	$ 0.007	10	2.60	9	$ 0.725	1	yes	no	no	yes	Yes	--	7
Russia	11	15.15	0.22	10	n/a	11	-	11	23.2%	4	2.70	11	$ -	11	$ 0.004	11	-	11	--	11	no	--	no	yes	no	--	11
Germany	2	74.24	2.56	3	64.0	3	1	6	27.2%	2	5.70	3	$ 91,537,985	4	$ 0.203	5	13.20	4	$ 0.142	7	no	no	yes	yes	yes	--	4
Italy	7	53.03	0.53	9	64.0	3	-	11	21.7%	6	3.90	10	$ 10,657,800	9	$ 0.078	7	1.30	10	$ 0.219	4	no	no	yes	yes	yes	--	4
France	1	78.79	1.48	7	58.0	7	5	4	25.8%	3	5.80	1	$ 447,000,000	2	$ 0.083	6	21.20	3	$ 0.426	2	no	no	yes	yes	yes	yes	2
UK	5	59.09	1.21	8	60.0	5	8	3	22.1%	5	5.30	8	$ 16,931,696	8	$ 0.255	3	6.90	8	$ 0.097	8	yes	yes	yes	yes	yes	yes	1
China	10	28.79	0.03	11	69.0	1	1	6	35.7%	1	4.00	9	$ 67,602,028	5	$ 0.046	8	37.80	1	--	11	no	yes	no	yes	no	--	8
Australia	9	42.42	1.62	5	53.0	8	4	5	21.1%	9	5.80	1	$ 58,095,134	6	$ 0.046	8	9.30	6	$ 0.085	9	no	yes	no	yes	no	yes	6
Norway	3	68.18	3.68	2	49.0	9	-	11	15.8%	11	5.70	3	$1,131,000,000	1	$ 0.318	2	29.70	2	$ 0.197	5	no	yes	yes	yes	no	yes	2

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Canada	6	57.02	656.21	6	2.08%	6	0.47	9	19.70	10	0.24	9	1.10	3	11.40%	2	14.10%	4	11,160	6
USA	7	56.20	6371.39	10	20.18%	10	0.45	8	20.95	11	0.16	8	1.48	7	1.70%	8	12.60%	6	23,810	10
Japan	4	59.50	1390.63	8	4.40%	8	0.10	2	4.57	1	0.10	6	1.20	4	2.00%	6	16.30%	3	13,267	8
Russia	11	14.88	1690.34	9	5.35%	9	1.05	11	11.92	8	0.43	10	1.63	10	2.30%	4	7.30%	8	17,723	9
Germany	2	75.21	857.86	7	2.72%	7	0.23	6	10.44	7	0.09	3	1.34	5	1.50%	9	17.10%	2	6,493	3
Italy	8	50.41	480.45	4	1.52%	4	0.21	4	8.03	4	0.08	1	1.51	9	4.80%	3	2.70%	11	2,491	1
France	1	77.69	424.55	3	1.34%	3	0.15	3	6.84	3	0.09	3	0.74	2	1.80%	7	46.50%	1	7,986	4
UK	4	59.50	580.92	5	1.84%	5	0.22	5	9.46	6	0.08	2	1.49	8	0.40%	11	10.20%	7	9,458	5
China	10	30.58	6896.54	11	21.84%	11	0.49	10	5.20	2	0.46	11	2.01	11	2.20%	5	12.70%	5	--	11
Australia	9	42.98	383.49	2	1.21%	2	0.38	7	17.94	9	0.12	7	1.41	6	1.30%	10	4.10%	10	11,160	6
Norway	3	65.29	41.12	1	0.13%	1	0.09	1	9.01	5	0.10	5	0.29	1	39.70%	1	5.10%	9	5,682	2

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Canada	7	54.55	1.98	4	59.0	6	9	2	21.1%	8	5.50	5	$ 32,742,826	7	$ 0.215	4	8.30	7	$ 0.351	3	no	no	no	yes	no	--	10
USA	8	48.05	1.58	6	68.0	2	97	1	16.8%	10	5.40	6	$ 135,261,133	3	$ 0.590	1	12.00	5	$ 0.172	6	no	yes	no	yes	no	--	8
Japan	4	62.34	5.30	1	45.0	10	1	6	21.4%	7	5.40	6	$ -	11	$ 0.007	10	2.60	9	$ 0.725	1	yes	no	no	yes	Yes	--	7
Russia	11	15.58	0.22	10	n/a	11	-	11	23.2%	4	2.70	11	$ -	11	$ 0.004	11	-	11	--	11	no	--	no	yes	no	--	11
Germany	2	72.73	2.56	3	64.0	3	1	6	27.2%	2	5.70	3	$ 91,537,985	4	$ 0.203	5	13.20	4	$ 0.142	7	no	no	yes	yes	yes	--	4
Italy	6	57.14	0.53	9	64.0	3	-	11	21.7%	6	3.90	10	$ 10,657,800	9	$ 0.078	7	1.30	10	$ 0.219	4	no	no	yes	yes	yes	--	4
France	1	80.52	1.48	7	58.0	7	5	4	25.8%	3	5.80	1	$ 447,000,000	2	$ 0.083	6	21.20	3	$ 0.426	2	no	no	yes	yes	yes	yes	2
UK	5	58.44	1.21	8	60.0	5	8	3	22.1%	5	5.30	8	$ 16,931,696	8	$ 0.255	3	6.90	8	$ 0.097	8	yes	yes	yes	yes	yes	yes	1
China	10	25.97	0.03	11	69.0	1	1	6	35.7%	1	4.00	9	$ 67,602,028	5	$ 0.046	8	37.80	1	--	11	no	yes	no	yes	no	--	8
Australia	9	41.56	1.62	5	53.0	8	4	5	21.1%	9	5.80	1	$ 58,095,134	6	$ 0.046	8	9.30	6	$ 0.085	9	no	yes	no	yes	no	yes	6
Norway	2	72.73	3.68	2	49.0	9	-	11	15.8%	11	5.70	3	$1,131,000,000	1	$ 0.318	2	29.70	2	$ 0.197	5	no	yes	yes	yes	no	yes	2

	INNOVATION	Status	Available Years	Years in Use	Raw Data Sources	Data points	Calculation
11	· Low carbon patents per million people	Complete	1995-2005	1995-2005	OECD, Patent Database (June 2008) - Accessed Nov2009 (OECD); World Bank Online Database - Accessed Oct2009 (WB)	Renewable PCT Patents (OECD); Nuclear PCT Patents (OECD); Furel Cell PCT Patents (OECD); Population (WB)	Renewable PCT Patents (OECD) PLUS Nuclear PCT Patents (OECD) PLUS Fuel Cell PCT Patents (OECD) SUM DIVIDED BY Population (WB) MULTIPLIED BY 1,000,000
	INFRASTRUCTURE						
12	· Infrastructure Index Score	Complete	Q4 2006 - August 2009. Missing Q4 2008 all countries and all Russian Federal Data	Q4 2006 - August 2009 (except 2008 Q4)	E&Y Renewable Energy Country Attractiveness Index (EY)	Index Score August 2009 - (EY)	Index Score August 2009 - (EY)
	SKILLS						
13	· University/college graduates in low-carbon disciplines	Complete	1999-2007 - poor records from Russia, China and Canada	1999-2007 trend plus 2005 (single year report)	UNESCO/UIC Table 16: Graduates by broad field of education in tertiary education - Accessed Nov2009 (UN)	Total Tertiary Graudates Science (UN); Total Tertiary Graudates Engineering/Manufacturing/Construction(UN); Total Tertiary Graudates Total All Disciplines (UN)	Total Tertiary Graudates Science (UN) PLUS Total Tertiary Graudates Engineering/Manufacturing/Construction(UN) SUM DIVIDED BY Total Tertiary Graudates Total All Disciplines (UN)
14	· Sustainability MBA programs per million people	Complete	2001	2001	Beyond Grey Pinstripes (2004) Accessed Nov2009 (BGP); World Bank Online Database - Accessed Oct2009 (WB)	MBA Programs (BGP); Population (WB)	MBA Programs (BGP) DIVIDED BY Population (WB) MULTIPLIED BY 1,000,000
	FINANCING						
15	· Strength of IP Regime	Complete	2009 (perhaps prior years)	2009	World Economic Forum Global Competitiveness Report, 2009-2010 (WEF)	IP Regime Strength Index (WEF)	IP Regime Strength Index (WEF)
16	· Clean technology venture capital per 000 GDP	Complete	2001-2009 - Spotty data for Japan, China and Russia and Australia	2001-2008	Cleantech.com IPO database (Accessed Nov2009); World Bank Online Database - Accessed Oct2009	Cleantech VC (CT); GDP USD (WB)	Cleantech VC (CT) DIVIDED BY GDP USD (WB) MULTIPLIED BY 1000
17	· Clean technology Market Capitalization per IPOs	Complete	2005-2009 - No data for Japan and Russia	2005-2009	Cleantech.com IPO database (Accessed Nov2009)	Cleantech IPOs (CT); Cleantech IPO Marketvalue (CT)	Cleantech IPOs (CT) DIVIDED BY Cleantech IPO Marketvalue (CT)
18	· % stimulus spending on low carbon initaitives	Complete	2009 - no Russia data	2009	HSBC 2009. A Climate for Recovery Update (March)	% of total economic stimulus plan funding directed to low-carbon power (renewables, CCS/other), and energy efficiency (building EE, low carbon vehicles) (HSBC)	% of total economic stimulus plan funding directed to low-carbon power (renewables, CCS/other), and energy efficiency (building EE, low carbon vehicles) (HSBC)
19	· Low-Carbon Government Energy R&D Expenditure per Country GDP (000s 2008 USD)	Complete	1990 - 2008 - no Russia or China	1990-2008	IEAOECD RD&D Database (IEA) Accessed Nov2009; World Bank Online Database - Accessed Oct2009	RD&D Spend Data: IEAOECD (OECD); GDP USD (WB)	RD&D Spend Data: IEAOECD (OECD) DIVIDED BY GDP USD (WB) MULTIPLED BY 1000
	INSTITUTIONS & POLICY						
20	· Presence of government bodies for low carbon	Complete	2009	2009	Source: Global Climate Change Policy Tracker: An Investor's Assessment Detailed Analysis of Targets by Region and Country, Deutsche Bank, October 2009	Various - see source data notes	Binary - Yes/No
21	· Low carbon growth plans	Complete	2009	2009			Binary - Yes/No
22	· Presence of a carbon price/ % coverage of economy	Complete	2009	2009			Binary - Yes/No
23	· Mandatory economy wide-emissions reductions target (%)	Complete	2009	2009			Binary - Yes/No
24	· Low carbon fuel standard	Complete	2009	2009			Binary - Yes/No
25	· Updating the stringency of building codes	Complete	2009	2009			Binary - Yes/No

	EMISSIONS/TRADE/TECH	Status	Available Years	Years in Use	Raw Data Sources	Data points	Calculation
1	· Current Total Carbon Emissions (MTOE)	Complete	1965 onwards for most (except Russia and China)	1965 and forward	BP Statistical Review of World Energy 2009 = BP	Total World Emissions (BP)	Total World Emissions (BP)
2	· Share of global emissions (energy only)	Complete	1965 onwards for most (except Russia and China)	1965 and forward	BP Statistical Review of World Energy 2009 = BP	Share of Global Emissions (BP); Total World Emissions (BP)	- Emissions (MTOE) country share DIVIDED BY total world share Emissions (MTOE)
3	· Emissions/GDP	Complete	1965 onwards for most (except Russia and Germany)	1965 and forward	BP Statistical Review of World Energy 2009 = BP; World Bank Online Database = WB	Total Country Emissions (BP); Total GDP (WB)	- Emmissions (MTOE) DIVIDED BY country GDP (current $US)
4	· Emissions/capita	Complete	1965 onwards for most (except Russia and Germany)	1965 and forward	BP Statistical Review of World Energy 2009; World Bank Online Database - Accessed Oct2009	Total Country Emissions (BP); Population (WB)	- Emmissions (MTOE) DIVIDED BY country popuation
5	· % renewable energy generation	Complete	1965 onwards for most (except Russia and Germany)	1965 and forward	BP Statistical Review of World Energy 2009	Primary Energy (BP); Nuclear Consumption (BP); Hydroelectric Consumption (BP);	Nuclear Consumption (BP) PLUS Hydroelectric Consumption (BP); SUM DIVIDED BY Primary Energy (BP);
6	· Energy intensity	Complete	1965 onwards for most (except Russia and Germany)	1990 and forward	BP Statistical Review of World Energy 2009; World Bank Online Database - Accessed Oct2009	Primary Energy (BP); GDP (WB)	- Primary Energy (MTOE) DIVIDED BY country GDP (current $US)
7	· Emissions/kwh (MTCD/TwH)	Complete	1965 onwards for most (except Russia and Germany)	1990 and forward	BP Statistical Review of World Energy 2009; World Bank Online Database - Accessed Oct2009	Carbon Emissions MTCD (BP); Electricity Consumption TwH (BP)	Carbon Emissions MTCD (BP) DIVIDED BY Electricity Consumption TwH (BP)
8	· % renewable energy generation	Complete	2006	2006	ECOFYS - Factors underpinning future action – country fact sheets 2008 update (EF)	Solar/Wind/Other, Geothermal, Hydro - all 2006 EF;	Solar/Wind/Other (EF) + Geothermal (EF) + Hydro (EF)
9	· % other no-emissions electricity generation	Complete	2006	2006	ECOFYS - Factors underpinning future action – country fact sheets 2008 update (EF)	Biomass/waste; Hydro - all EF 2006	Biomass/waste (EF) + Hydro (EF)
10	· Vehicle km traveled	Complete	1994-2008	1994 and forward	ITF Travel Data Access October 2009 (ITF)	Vehicle KMs Rail (ITF); Vehicle KMs Water (ITF); Vehicle KMs Road (ITF); Population (WB)	Vehicle KMs Rail (ITF) PLUS Vehicle KMs Water (ITF) PLUS Vehicle KMs Road (ITF) SUM DIVIDED BY Population (WB)