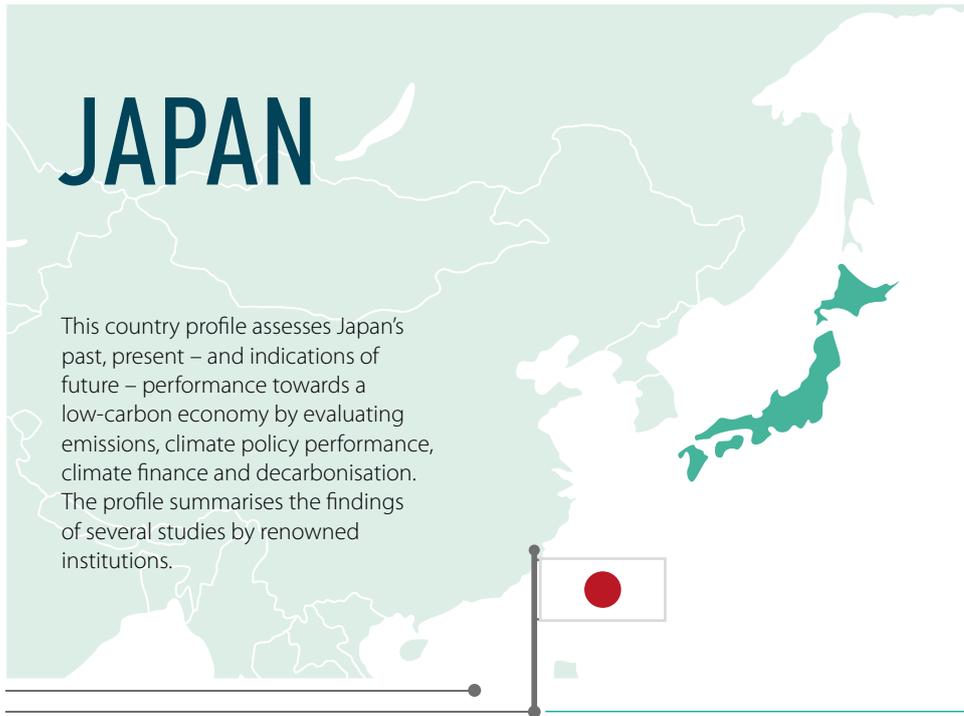




## BROWN TO GREEN:

## THE G20 TRANSITION TO A LOW-CARBON ECONOMY | 2017



# JAPAN

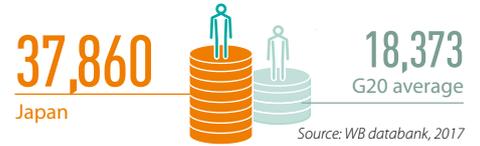
This country profile assesses Japan's past, present – and indications of future – performance towards a low-carbon economy by evaluating emissions, climate policy performance, climate finance and decarbonisation. The profile summarises the findings of several studies by renowned institutions.



### HUMAN DEVELOPMENT INDEX<sup>1</sup>



### GDP PER CAPITA<sup>2</sup> (\$ (const. 2011, international))



### SHARE OF GLOBAL GDP<sup>2</sup>



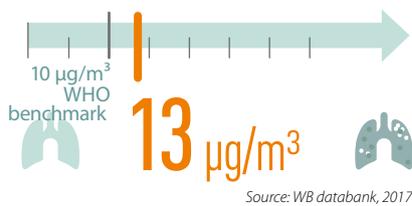
### GHG EMISSIONS PER CAPITA<sup>3</sup> (tCO<sub>2</sub> e/cap)



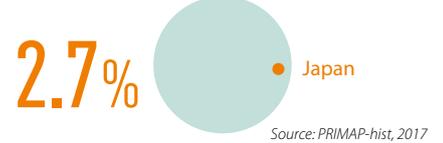
### NOTRE DAME GLOBAL ADAPTATION INITIATIVE (ND-GAIN) INDEX<sup>4</sup>



### AIR POLLUTION INDEX<sup>5</sup> (PM 2.5)



### SHARE OF GLOBAL GHG EMISSIONS<sup>3</sup>



This country profile is part of the **Brown to Green 2017** report. The full report and other G20 country profiles can be downloaded at:

<http://www.climate-transparency.org/g20-climate-performance/g20report2017>



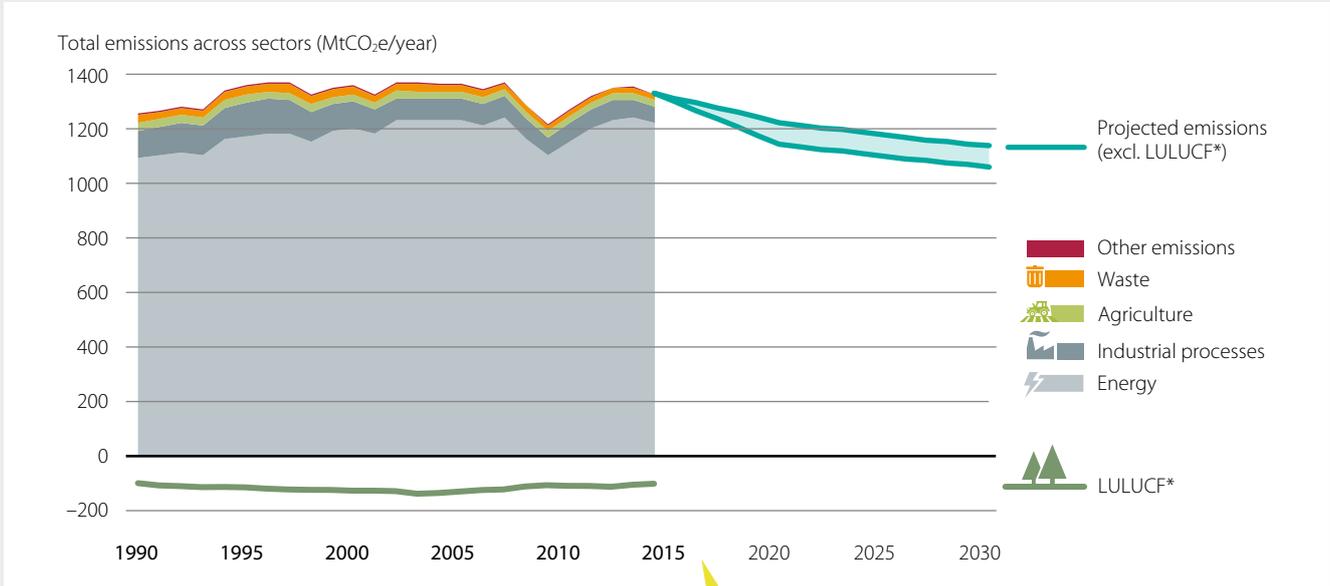
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- GREENHOUSE GAS (GHG) EMISSIONS DEVELOPMENT .....2
- CLIMATE POLICY PERFORMANCE .....3
  - POLICY EVALUATION .....3
  - CCPI EXPERTS' POLICY EVALUATION .....3
  - REGULATORY INDICATORS FOR SUSTAINABLE ENERGY (RISE) INDEX .....3
  - COMPATIBILITY OF CLIMATE TARGETS WITH A 2°C SCENARIO .....4
- FINANCING THE TRANSITION .....4
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# JAPAN

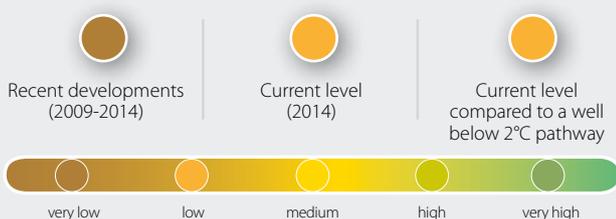


## GREENHOUSE GAS (GHG) EMISSIONS DEVELOPMENT



\*Land Use, Land Use Change and Forestry emissions according to the Climate Action Tracker  
Source: PRIMAP, 2017; CAT, 2017

### CCPI PERFORMANCE RATING OF GHG EMISSIONS PER CAPITA<sup>7</sup>



Source: CCPI 2017 – G20 Edition

Japan's emissions (excl. LULUCF) have been relatively steady over recent decades, yet are among the G20's highest, with the energy sector contributing to over 90% of the total. Emissions (excl. LULUCF) are expected to fall slightly until 2030. LULUCF\* sector has historically been a sink of emissions.<sup>6</sup>



# JAPAN



## CLIMATE POLICY PERFORMANCE

### POLICY EVALUATION <sup>8</sup>

	low	medium	high
Long term low emissions development strategy	[Progress bar from low to medium]		
GHG emissions target for 2050	[Progress bar from low to medium]		
Renewable energy in power sector <sup>a</sup>	[Progress bar from low to medium]		
Coal phase-out <sup>b</sup>	[Progress bar from very low to low]		
Efficient light duty vehicles	[Progress bar from low to medium]		
Efficient residential buildings	[Progress bar from low to high]		
Energy efficiency in industry sector	[Progress bar from low to medium]		
Reducing deforestation <sup>c</sup>	[Progress bar from low to medium]		

Climate Transparency evaluates sectoral policies and rates them whether they are in line with the Paris Agreement temperature goal. For more detail, see Annex.

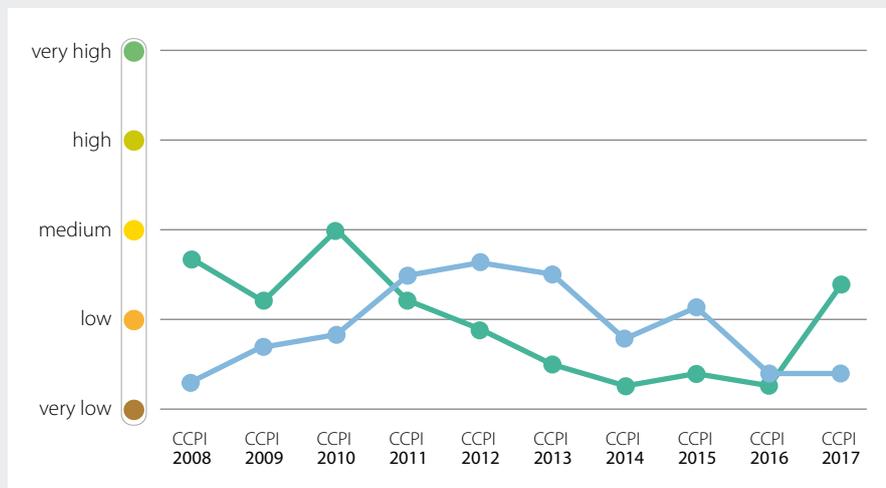
- a) Share of renewables in the power sector (2014): 14%
- b) Share of coal in total primary energy supply (2014): 29%
- c) Forest area compared to 1990 levels (2014): 100%

Source: own evaluation

### CCPI EXPERTS' POLICY EVALUATION <sup>9</sup>

Japan is one of the lowest performing countries in the CCPI's climate policy section. National experts are critical of Japan prioritizing nuclear and coal power over renewable energy. There is, however, some progress on energy efficiency, especially in

the residential sector. After the G7 summit in late May, Japan's international policy evaluation improved as G7 countries -except the US- emphasized the relevance of the Paris Agreement and their commitments to it.



- Evaluation of international climate policy
- Evaluation of national climate policy

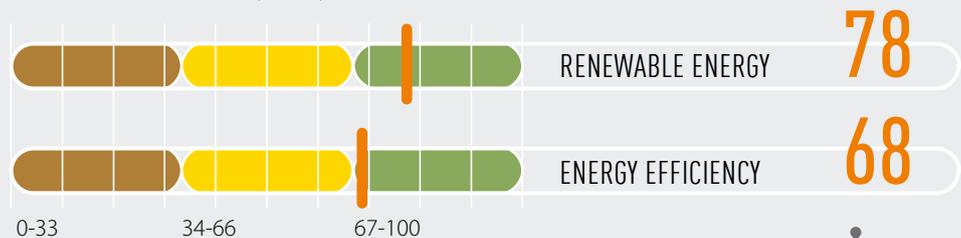
### CCPI EVALUATION OF CLIMATE POLICY (2017)



Source: CCPI 2017 - G20 Edition

### REGULATORY INDICATORS FOR SUSTAINABLE ENERGY (RISE) INDEX

RISE scores reflect a snapshot of a country's policies and regulations in the energy sector. Here Climate Transparency shows the RISE evaluation for Renewable Energy and Energy Efficiency.



Source: RISE index, 2017

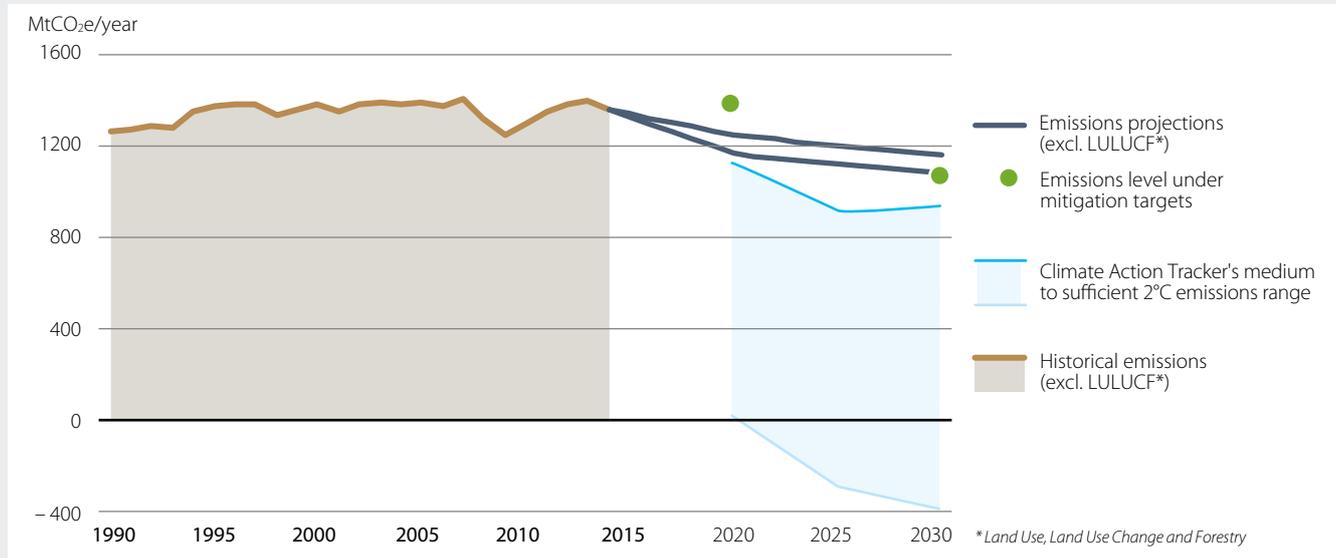


# JAPAN



## CLIMATE POLICY PERFORMANCE

### COMPATIBILITY OF CLIMATE TARGETS WITH A 2°C SCENARIO <sup>10</sup>



Source: CAT, 2017

Uncertainty around the future role of nuclear, coal and renewable energy makes it difficult to predict Japan's future emissions. While a large amount of coal-fired generating capacity is being constructed or planned, the recent cancellation of a coal plant could indicate a higher impact of efficiency improvements and a larger renewable energy deployment towards 2030 than Japan plans in its NDC. This would shift emissions projections downwards and bring the NDC 2030 target – of 26% below 2013 levels, including LULUCF – within reach. The Climate Action Tracker rates Japan's target "inadequate," meaning that if all countries were to adopt this level of ambition, global warming would likely exceed 3–4°C by 2100.

### CLIMATE ACTION TRACKER EVALUATION OF NATIONAL PLEDGES, TARGETS AND NDC <sup>10</sup>



Source: CAT, 2017

# JAPAN



## FINANCING THE TRANSITION

### INVESTMENTS

#### INVESTMENT ATTRACTIVENESS

Strong levels of recent investment will be aided by Japan's feed-in tariff (FIT) regime for wind being extended to 2019. Solar volumes may fall, following the country's move from FiTs to auctions and a focus on smaller rooftop projects. (RECAI, 2017).



#### ALLIANZ CLIMATE AND ENERGY MONITOR <sup>11</sup>



Source: Allianz, 2017; EY, 2017

#### RENEWABLE ENERGY COUNTRY ATTRACTIVENESS INDEX (RECAI) <sup>12</sup>



#### TREND



# JAPAN



## FINANCING THE TRANSITION

### GREEN BONDS

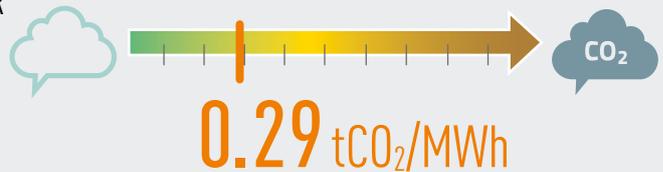
Green bonds are bonds that earmark proceeds for climate or environmental projects and have been labelled as 'green' by the issuer.<sup>13</sup>



Source: Calculations done by Climate Bonds Initiative for Climate Transparency, 2017

### EMISSIONS OF NEW INVESTMENTS IN THE POWER SECTOR

This indicator shows the emissions per MWh coming from newly-installed capacity in 2016. The smaller the value, the more decarbonised the new installed capacity.

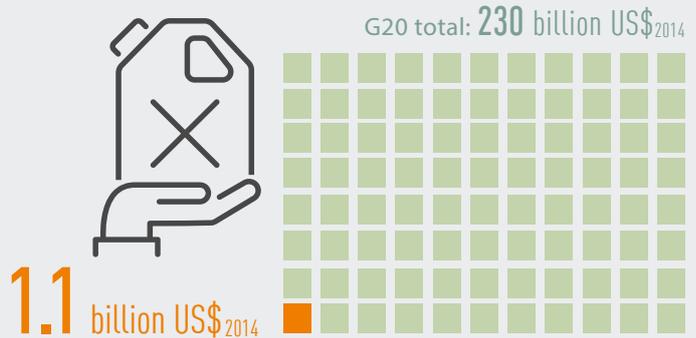


Source: Calculations done by IDDRI for Climate Transparency, 2017

## FISCAL POLICIES

### FOSSIL FUEL SUBSIDIES (FOR PRODUCTION AND CONSUMPTION)<sup>14</sup>

Japan's direct public spending on energy research as a percentage of its GDP is the OECD's largest. In its G20 progress report, Japan reports it has no inefficient fossil fuel subsidies. However, it provides oil and gas production and exploration subsidies to Japanese companies overseas and, to a lesser extent, domestically, totalling US\$ 1.1 billion in 2014. Research funding toward fossil fuels was increased after the 2011 earthquake, and the Fukushima disaster.



Source: Calculations done by ODI based on OECD inventory, 2017

### EFFECTIVE CARBON RATE<sup>16</sup>

In 2012, effective carbon rates in Japan consisted primarily of specific taxes on energy use. The Tokyo municipality and the Saitama province operated emissions trading systems, but their emissions base was small compared with the emissions of the country as a whole. Japan priced 83% of carbon emissions from energy use, and 16% were priced above €30/tCO<sub>2</sub> (~US\$ 37).<sup>17</sup>



Source: OECD, 2016; World Bank, 2016.



# JAPAN



## FINANCING THE TRANSITION

### PROVISION OF INTERNATIONAL PUBLIC SUPPORT

Japan's climate finance contribution was the G20's largest, with the majority delivered through bilateral channels including the Japanese Bank for International Cooperation (JBIC) and Japan's International Cooperation Agency (JICA). Japan's contribution includes export credits to support Japanese company investment

in developing countries. Japan is one of few countries (with Australia) that supports coal efficient technologies in its bilateral flows. Japan's GCF pledge is the second largest, behind the -now uncertain- pledge from the US, but ranks third in contributions to the multilateral climate funds (both absolute and relative to GDP).

#### PLEDGE TO THE GREEN CLIMATE FUND (GCF)

Obligation to provide climate finance under the UNFCCC	Signed pledge to the GCF (Million US\$)	Pledge per 1000 dollars of GDP (US\$ <sub>2011</sub> (constant))
yes	1,500	0.32

Source: GCF, 2017

#### CONTRIBUTIONS THROUGH THE MAJOR MULTILATERAL CLIMATE FUNDS<sup>18</sup>

Annual average contribution 2013-2014 (Billion US\$)	Annual average contribution 2013-2014 per 1000 dollars of GDP (Billion US\$)	Adaptation	Mitigation
0.25	0.05	5%	95%

Source: Climate Funds Update, 2017

#### BILATERAL CLIMATE FINANCE CONTRIBUTIONS<sup>19</sup>

<b>Bilateral finance commitments</b> (annual average 2013-14) (Billion US\$)  <b>8.14</b>	<b>Bilateral finance commitments per 1000 dollars of GDP</b> (annual average 2013-14) (Billion US\$)  <b>1.71</b>	<b>Financial instrument (average 2013-2014)</b>				
		Grant	Concessional Loan	Non-Concessional loan	Equity	Other
		5%	18%	11%	0%	66%
		<b>Theme of support (average 2013-14)</b>				
		Mitigation	Adaptation	Cross-cutting	Other	
		84%	14%	2%	0%	

Source: Party reporting to the UNFCCC, 2013-14

In order to accommodate a number of reporting processes, the early Biennial Update Reports (BURs) rely on country definitions for instruments and themes. Over time, countries will be required to better define the terms they use, such as the nature of 'other' financial instruments.

#### CLIMATE FINANCE CONTRIBUTIONS THROUGH MULTILATERAL DEVELOPMENT BANKS (MDBs)<sup>20</sup>

MDBs in aggregate spent \$21.2 billion on mitigation and \$4.5 billion on adaptation in developing countries in 2014.

**No national disaggregation available**

Source: MDB report, 2015

#### FUTURE CLIMATE FINANCE COMMITMENTS

Prime Minister Abe announced at the Summit Meeting of COP21 that Japan will provide, in 2020, approximately YEN 1.3 trillion of public and private climate finance, 1.3 times up from the current level, to developing countries.

Source: "Roadmap to US\$100 Billion" report, 2016.



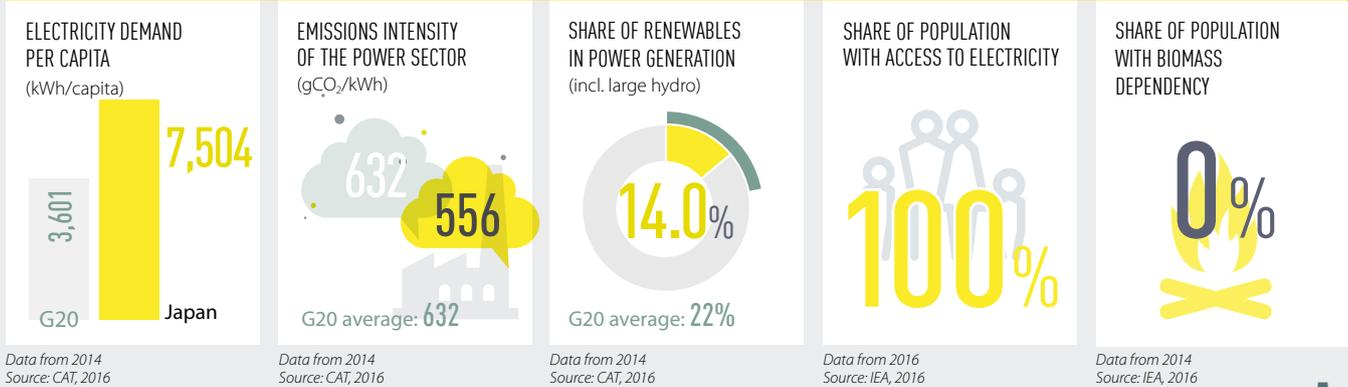
# JAPAN



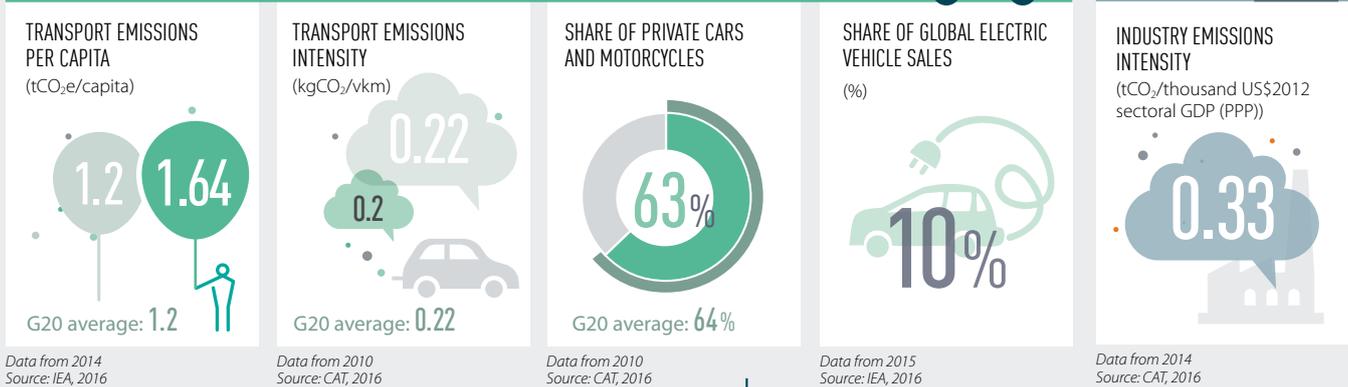
## DECARBONISATION

### SECTOR-SPECIFIC INDICATORS

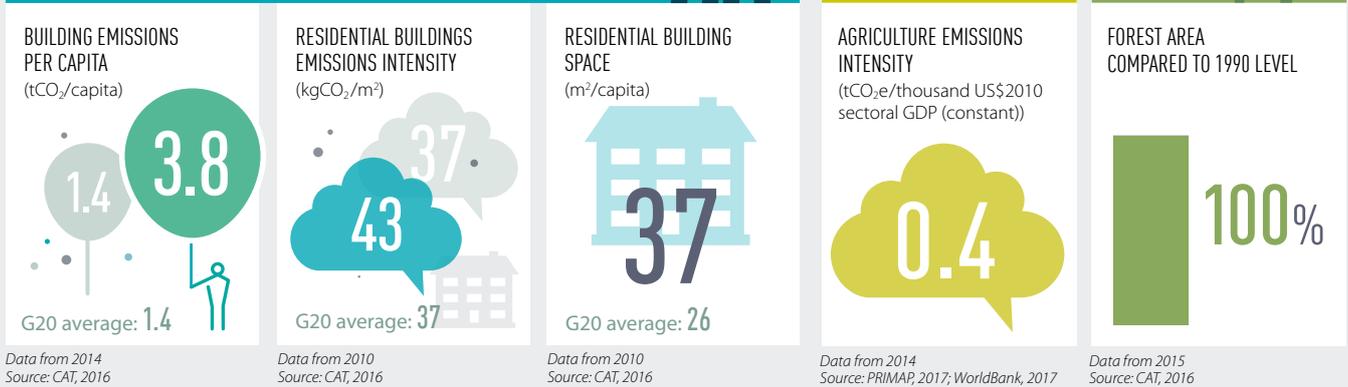
#### POWER SECTOR



#### TRANSPORT SECTOR



#### BUILDING SECTOR

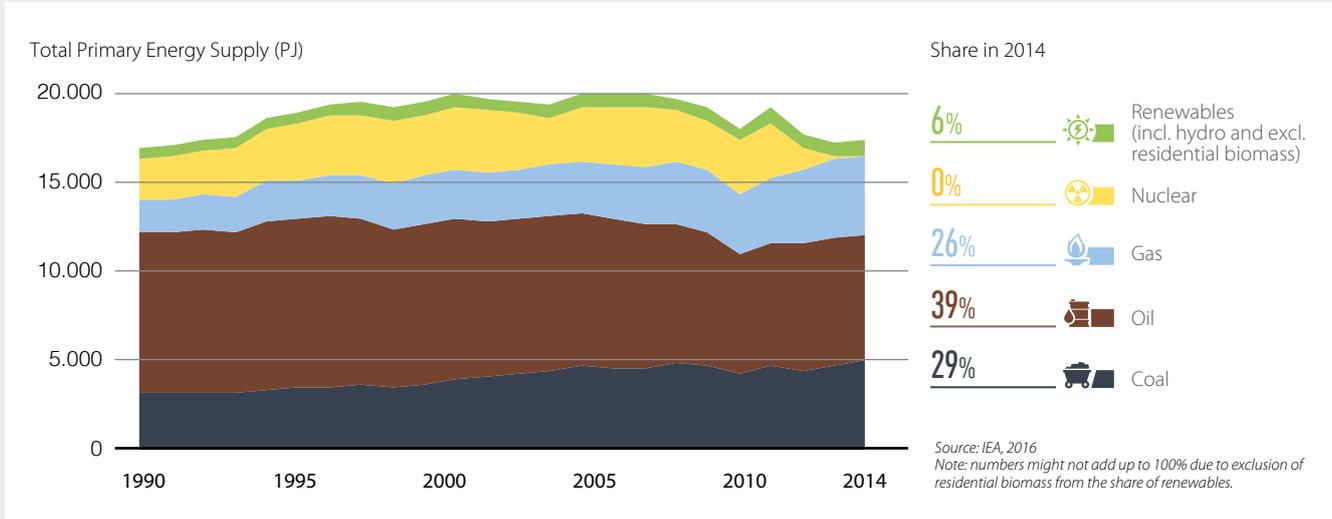


# JAPAN



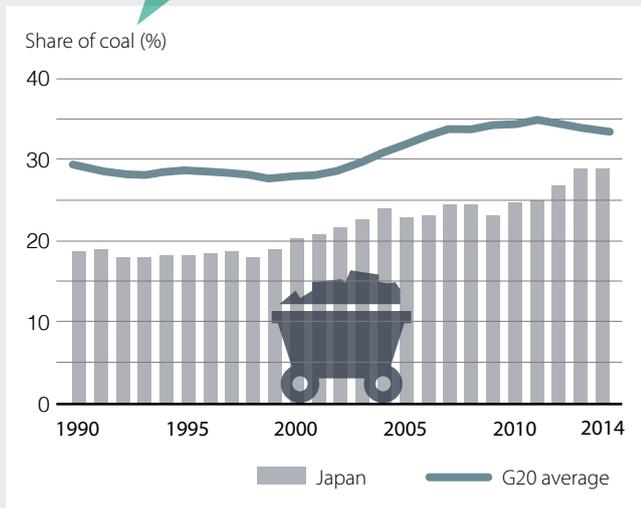
## DECARBONISATION

### ENERGY MIX <sup>21</sup>



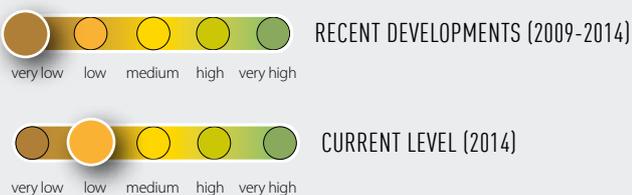
### SHARE OF COAL IN ENERGY SUPPLY <sup>22</sup>

Since 1990, Japan's coal share has steadily increased. In 2014, coal supplied close to 30% of the country's energy. Although with a high share, Japan's coal share is still below the G20 average.



Source: IEA, 2016

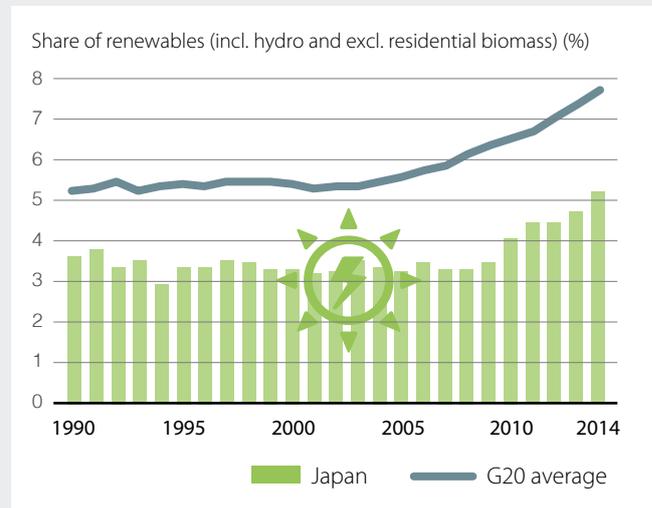
### PERFORMANCE RATING



Source: own evaluation

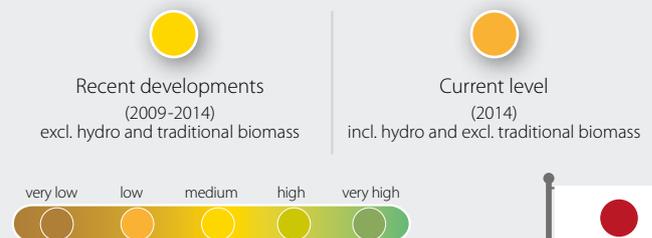
### SHARE OF RENEWABLES IN ENERGY SUPPLY <sup>23</sup>

At 5%, the share of renewables in Japan's energy mix was 3% points below the G20 average of 8% in 2014.



Source: IEA, 2016

### CCPI PERFORMANCE RATING OF THE SHARE OF RENEWABLES <sup>7</sup>



Source: CCPI 2017 - G20 Edition

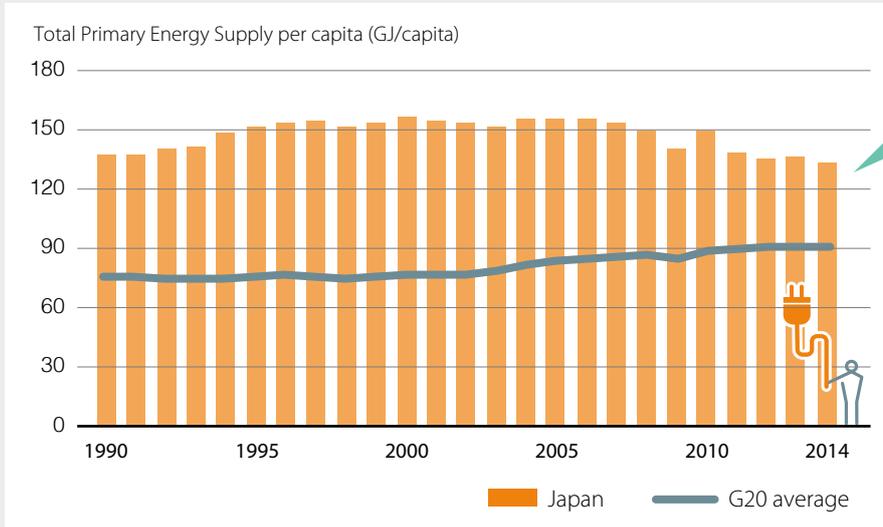


# JAPAN



## DECARBONISATION

### ENERGY USE PER CAPITA<sup>24</sup>



Still significantly higher than the G20 average per capita energy use, Japan's per capita energy use has declined to below 1990 levels.

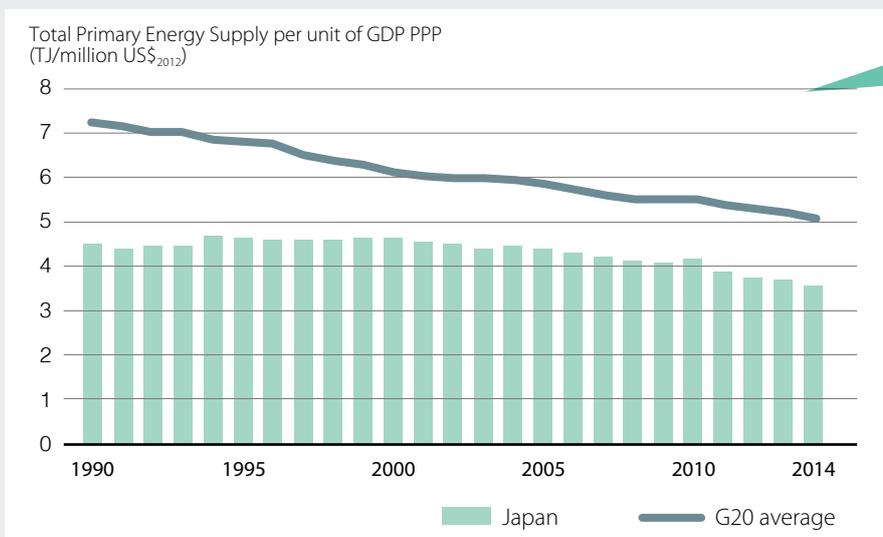
Source: IEA, 2016

### CCPI PERFORMANCE RATING OF ENERGY USE PER CAPITA<sup>7</sup>



Source: CCPI 2017 – G20 Edition

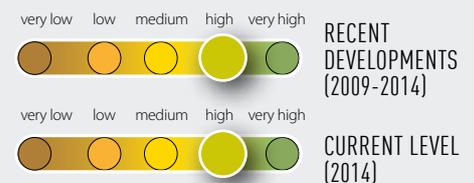
### ENERGY INTENSITY OF THE ECONOMY<sup>25</sup>



The energy intensity of Japan's economy was relatively stable between 1990 and 2000. Since then, energy intensity has steadily decreased and it is below the G20 average.

Source: IEA, 2016

### PERFORMANCE RATING



Source: own evaluation

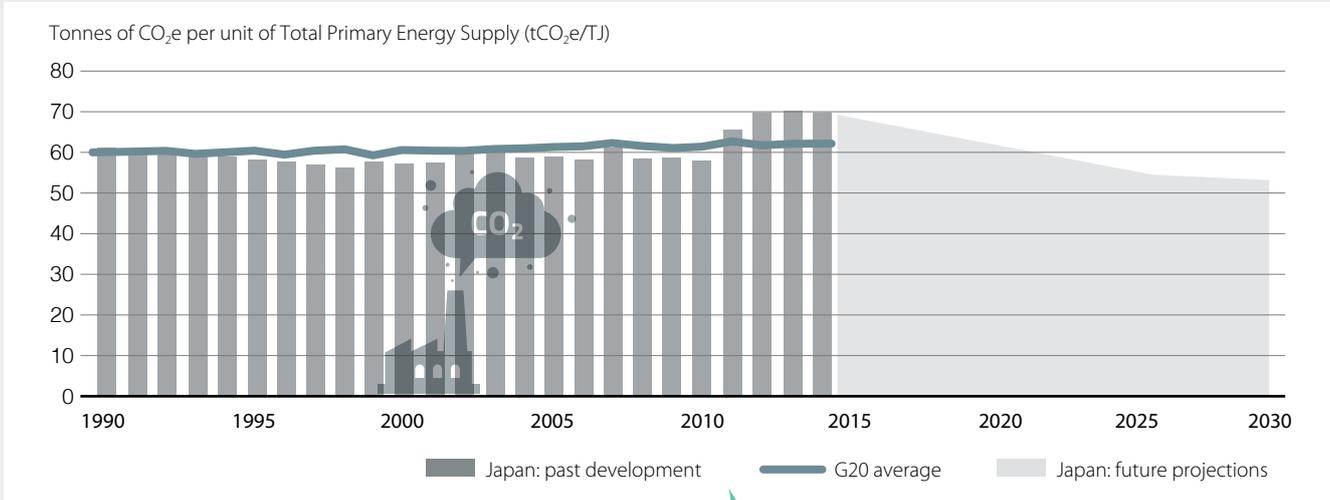


# JAPAN



## DECARBONISATION

### CARBON INTENSITY OF THE ENERGY SECTOR <sup>26</sup>



Source: IEA, 2016

### PERFORMANCE RATING

very low low medium high very high



RECENT DEVELOPMENTS (2009-2014)

very low low medium high very high



CURRENT LEVEL (2014)

Source: own evaluation

With fluctuations in the share of nuclear energy after Fukushima, the carbon intensity of Japan's energy supply rose above the G20 average in 2011. Projections show a downward trend until 2030.

# ANNEX



## KEY INDICATORS

- 1) The Human Development Index (HDI) is a composite index published by the United Nations Development Programme (UNDP). It is a summary measure of average achievement in key dimensions of human development. A country scores higher when the lifespan is higher, the education level is higher, and GDP per capita is higher. Data for 2016.
- 2) Gross Domestic Product (GDP) per capita is calculated by dividing GDP with midyear population figures. GDP is the value of all final goods and services produced within a country in a given year. Here GDP figures at purchasing power parity (PPP) are used. Data for 2015.
- 3) PRIMAP-hist combines several published datasets to create a comprehensive set of greenhouse gas emissions pathways for every country and Kyoto gas covering the years 1850 to 2014 and all UNFCCC member states as well as most non-UNFCCC territories. The data resolves the main IPCC 1996 categories. Data for 2014.
- 4) The ND-GAIN index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. It is composed of a vulnerability score and a readiness score. In this report, we display the vulnerability score, which measures a country's exposure and sensitivity to the negative impact of climate change in six life-supporting sectors – food, water, health, ecosystem service, human habitat and infrastructure. In this report, we only display the vulnerability score of the index. Data for 2015.
- 5) Average level of exposure of a nation's population to concentrations of suspended particles measuring less than 2.5 microns in aerodynamic diameter, which are capable of penetrating deep into the respiratory tract and causing severe health damage. Data for 2015.

## GREENHOUSE EMISSIONS (GHG)

- 6) This indicator gives an overview of the country's emissions profile and the direction the country's emissions are taking under current policy scenario.
- 7) The Climate Change Performance Index (CCPI) aims to enhance transparency in international climate politics. On the basis of standardised criteria, the index evaluates and compares the climate protection performance of countries in the categories GHG emissions, renewable energy and energy use. It assesses the recent developments, current levels, policy progress and the compatibility of the country's current performance and future targets with the international goal of limiting global temperature rise well below 2°C.

## CLIMATE POLICY PERFORMANCE:

- 8) The table below displays the criteria used to assess a country's policy performance. For the sector-specific policy criteria the 'high' rating is informed by the Climate Action Tracker (2016) report on the ten steps needed to limit warming to 1.5°C and the Paris Agreement.
- 9) The CCPI evaluates a country's performance in national climate policy, meaning the performance in establishing and implementing a sufficient policy framework, as well as international climate diplomacy through feedback from national climate and energy experts.
- 10) The Climate Action Tracker is an independent, science-based assessment that tracks government emissions reduction commitments and actions. It provides an up-to-date assessment of individual national pledges, targets and NDCs and currently implemented policies to reduce greenhouse gas emissions.

## FINANCING THE TRANSITION

- 11) The Allianz Climate and Energy Monitor ranks G20 member states on their relative fitness as potential investment destinations for building low-carbon electricity infrastructure. The investment attractiveness of a country is assessed through four categories: policy adequacy, policy reliability of sustained support, market absorption capacity and the national investment conditions.
- 12) The Renewable Energy Country Attractiveness Index (RECAI) produces scores and rankings for countries' attractiveness based on macro drivers, energy market drivers and technology-specific drivers which, together, compress a set of 5 drivers, 16 parameters and over 50 datasets. For comparability purposes with the Allianz Monitor index, we divided the G20 members included in the latest RECAI ranking (May 2017) in two categories and rate the top half as "high performance" and the lower half as "medium performance".
- 13) The green bonds country indicator shows which countries are active in the green bond market by showing green bonds per country as a percentage of the overall debt securities market for that country. Green bonds were created to fund projects that have positive environmental and/or climate benefits.
- 14) The data presented is from the OECD inventory: [www.oecd.org/site/tadffss/](http://www.oecd.org/site/tadffss/) except for Argentina and Saudi Arabia for which data from the IEA subsidies database is used. The IEA uses a different methodology for calculating subsidies than the OECD. It uses a 'price-gap' approach and covers a sub-set of consumer subsidies. The price-gap approach compares average end-user prices paid by consumers with reference prices that corresponds to the full cost of supply.

To endnote 8) Rating

	Criteria description		
	● Low	● Medium	● High
Long term low emissions development strategy	No long term low emissions strategy	Existing long term low emissions strategy	Long-term low emissions strategy submitted to the UNFCCC in accordance with Article 4, paragraph 19, of the Paris Agreement
GHG emissions target for 2050	No emissions reduction target for 2050 (or beyond)	Existing emissions reduction target for 2050 (or beyond)	Emissions reduction target to bring CO <sub>2</sub> emissions to at least net zero by 2050
Renewable energy in power sector	No policy or support scheme for renewable energy in place	Support scheme for renewables in the power sector in place	Support scheme and target for 100% renewables in the power sector by 2050 in place
Coal phase-out	No consideration or policy in place for phasing out coal	Significant action to reduce coal use implemented or coal phase-out under consideration	Coal phase-out in place
Efficient light duty vehicles	No policy or emissions performance standards for LDVs in place	Energy/emissions performance standards or support for LDVs	National target to phase out fossil fuel cars in place
Efficient residential buildings	No policy or low-emissions building codes and standards in place	Building codes, standards and fiscal/financial incentives for low-emissions options in place	National strategy for near-zero energy buildings (at least for all new buildings)
Energy efficiency in industry sector	No policy or support for energy efficiency in industrial production in place	Support for energy efficiency in industrial production (covering at least two of the country's subsectors (e.g. cement and steel production))	Target for new installations in emissions-intensive sectors to be low-carbon after 2020, maximising efficiency
Reducing deforestation	No policy or incentive to reduce deforestation in place	Incentives to reduce deforestation or support schemes for afforestation /reforestation in place	National target for reaching zero deforestation by 2020s

## ANNEX (continued)

G20



- 15) This footnote had to be deleted as the data for the corresponding indicator was not available at the time of publication of this report.
- 16) In addition to carbon pricing mechanisms, emissions trading schemes and various energy taxes also act as prices on carbon, although they are generally not developed with the aim of reducing emissions. The OECD report presents calculations on 'Effective Carbon Rates' as the sum of carbon taxes, specific taxes on energy use, and tradable emission permit prices. The calculations are based on 2012 energy policies and prices, as covered in OECD's Taxing Energy Use database. According to OECD estimates, to tackle climate change emissions should be priced at least EUR 30 (or US\$ 37) per tonne of CO<sub>2</sub> revealing a major 'carbon pricing gap' within the G20.
- 17) The effective carbon rate presented in this country profile does not factor in emissions from biomass, as many countries and the UNFCCC treat them as carbon-neutral. However, in many cases biomass emissions are found to be non-carbon neutral over their lifecycle, especially due to the land use changes they cause.
- 18) Finance delivered through multilateral climate funds comes from Climate Funds Update, a joint ODI/Heinrich Boell Foundation database that tracks spending through major multilateral climate funds. Figures include: Adaptation for Smallholder Agriculture Programme; Adaptation Fund; Clean Technology Fund; Forest Carbon Partnership Facility; Forest Investment Program; Global Environment Facility (5th and 6th Replenishment, Climate Focal Area only); Least Developed Countries Fund; Partnership for Market Readiness; Pilot Program for Climate Resilience; Scaling-up Renewable Energy Program; and the Special Climate Change Fund.
- 19) Bilateral finance commitments are sourced from Party reporting to the UNFCCC under the Common Tabular Format. Figures represent commitments of funds to projects or programmes, as opposed to actual disbursements.
- 20) Data for the MDB spending on climate action includes ADB, AfDB, EBRD, EIB, IDB, IFC and the World Bank. Data is self-reported annually by the MDBs, based on a shared methodology they developed. The reported data includes MDBs own resources and expenditure in EU13, not funding from external sources that are channelled through the MDBs (e.g through bilateral donors and dedicated climate funds that are captured elsewhere). Data reported corresponds to the financing of adaptation or mitigation projects or of those components, sub-components, or elements within projects that provide adaptation or mitigation benefits (rather than the entire project cost). It does not include public or private finance mobilised by MDBs.

## ■ DECARBONISATION

- 21) Total primary energy supply data displayed in this factsheet does not include non-energy use values.
- 22) The share of coal in total primary energy supply reveals the country's historical and current proportion of coal in the energy mix. As coal is one of the dirtiest of fossil fuels, reducing coal's share in its energy mix is a crucial step for a country's transition to a green economy.
- 23) The share of renewable energy in total primary energy supply shows a country's historical and current proportion of renewables in the energy mix. The numbers displayed in the graph do not include residential biomass and waste values. Replacing fossil fuels and promoting the expansion of renewable energy is an important step for reducing emissions.
- 24) TPES per capita displays the historical, current and projected energy supply in relation to a country's population. Alongside the intensity indicators (TPES/GDP and CO<sub>2</sub>/TPES), TPES per capita gives an indication on the energy efficiency of a country's economy. In line with a well-below 2°C limits, TPES/capita should not grow above current global average levels. This means that developing countries are still allowed to expand their energy use to the current global average, while developed countries have to simultaneously reduce it to that same number.
- 25) TPES per GDP describes the energy intensity of a country's economy. This indicator illustrates the efficiency of energy usage by calculating the energy needed to produce one unit of GDP. A decrease in this indicator can mean an increase in efficiency but also reflects structural economic changes.
- 26) This indicator describes the carbon intensity of a country's energy sector (expressed as the CO<sub>2</sub> emissions per unit of total primary energy supply) and gives an indication on the share of fossil fuels in the energy supply.

For more detail on the sources and methodologies behind the calculation of the indicators displayed, please download the Technical Note at:

<http://www.climate-transparency.org/g20-climate-performance/g20report2017>