



SDG 7: Affordable and clean energy

Ensure access to affordable, reliable, sustainable and modern energy for all



With 193 governments coming together to agree a common framework to tackle 17 major world issues by 2030, business engagement to achieve them is seen as critical. So how do you understand the implications of the SDGs and prioritise them? How do you quantify and minimise the potential risks, and explore the opportunities?

This is an extract from PwC's Navigating the SDGs: a business guide to engaging with the UN Global Goals 2016 on SDG 7 Affordable and clean energy. For more on the other 16 SDGs, go to www.pwc.com/globalgoals

What's the global challenge?

- The UN sees transitioning to **clean, sustainable energy** as fundamental to continued **human prosperity** over the coming century.¹ And yet, **1 in 5 people lack access to modern electricity**, while 3 billion people still use kerosene, wood, coal, or even dung for cooking and heating.² The **poorest in the world** are the least likely to have access to a source of power, and are **much more likely to remain poor** as long as they are not connected.³
- It's not simply a question of access, it's about ensuring the **quality, reliability, safety** and **affordability** of the energy services that power homes and essential community services, such as schools and clinics, as well as economic activity.⁴ The productive use of renewable energy in rural areas can often **reduce the absolute costs** for energy consumed,⁵ and help to **raise incomes and improve health**, providing power to pump water for irrigation, to process crops and power cottage industries, whilst at the same time **reduce deforestation** from logging for firewood.
- People across the world are impacted by the effects of **climate change**, and it's the production and use of energy that makes up **two-thirds of all GHG emissions**. Furthermore, by **2030 global demand** for energy is expected to rise by **20–35%***.⁶ Already, global **electricity consumption** per person has more than **doubled** since 1970s.⁷
- To address energy-related emissions, we must invest in **low carbon technologies** and **energy efficiency**. Ultimately, to fully implement 180 plus national action plans submitted to the UN in 2015⁸, a cumulative **investment of \$13.5 trillion** in low carbon technologies and energy efficiency until 2030⁹ is needed. The challenge is huge: to **decarbonise the global electricity supply**, at least **65%** must be generated from **renewables by 2050**¹⁰. Investment is also needed to improve the **rate of energy efficiency gains**.
- As the world heads down a path of decarbonisation, research predicts that on average the **cost of electricity generation** will rise by **30% to 50%** by 2050. To meet a **2 degree** limit to global warming (see SDG 13), we could see the cost of electricity rise at a much faster rate. To limit this cost increase we must invest in technology innovation which will **lower the cost of generation** and **improve energy efficiency**¹¹, which could in turn reduce demand in countries with high energy consumption.

* Growth in Energy Demand: This range is based on a New Climate Economy staff review of recent projections, including: International Energy Agency (IEA), 2013. Energy Technology Perspectives 2012. US Energy Information Administration (EIA), 2013. International Energy Outlook 2013, Global Energy Assessment, 2012.

Why does it matter for business? And what can business do?

Access to energy is both a risk and an opportunity for business. Increasingly businesses are engaging more actively in managing their own energy supplies, by adopting smarter energy management approaches in order to make them more resilient to price fluctuations and intermittency. Understanding this transition, along with achieving energy efficiency gains can help to future-proof a business.

- ▶ **Poor access to energy** in developing countries **slows the growth of GDP**. Research has shown that, for example, the under-performance of Africa's power infrastructure has restricted economic growth, reducing per capita GDP growth by 0.11 per cent per year for the continent as a whole, and by as much as 0.2 per cent in Southern Africa¹². This is a **barrier to growth for businesses** in these markets as well.
- ▶ A number of companies are taking part in public-private projects to **improve energy access**, one example being "Power Africa", where the governments of Ghana, Tanzania, Kenya, Nigeria, Ethiopia and Liberia and a group of private sector firms are taking part in an initiative to improve access to clean, reliable power in Africa, and ultimately deliver electricity to more than 20 million new households and companies by 2018¹³. South Africa occupies a central position in the global debate regarding the most **effective policy instruments** to accelerate and sustain private investment in renewable energy. In 2009, the government began exploring **feed-in tariffs (FITs)** for renewable energy, but these were later rejected in favour of **competitive tenders**. The resulting program, now known as the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), has successfully channelled substantial private sector expertise and investment into grid-connected renewable energy in South Africa at competitive prices¹⁴.
- ? *Have you considered investing corporate funds in energy projects in any of your countries of operation to help meet local need, as well as delivering a return on investment?*
- ▶ In addition to the predicted **rising cost of electricity** generation, we are likely to see the imposition of a **price of carbon** become more widespread around the world.^{15,16} Indeed, 74 countries and over 1,000 companies expressed support for carbon pricing at the 2014 UN Climate Summit. Businesses should consider how to respond to these changes, for example by increasing the proportion of energy demand which is met by **renewable sources**, both to manage carbon costs and to take advantage as they become more **cost-competitive**, even, in some cases, in the absence of subsidies¹⁷.
- ▶ Business can also benefit from a win-win by implementing **energy efficiency measures**.
- ? *What share of your energy demand is currently met by renewable energy? Do you have a policy and/or targets in place which relate to the procurement or generation of more renewable energy on an annual basis?*
- ? *Do you have a policy in place to improve your energy efficiency? How successful have you been in reducing your energy consumption per unit of output?*

You could also think about:

- ? *Aiming to **source 100 percent of your energy from renewables**. This is a major challenge for any business, but it is precisely what some of the world's largest companies have committed to doing. The Climate Group in partnership with the Carbon Disclosure Project (CDP) are leading the charge, with their **RE100 campaign**.^{18,19} Google, Johnson & Johnson, NIKE, Inc., Procter & Gamble, Starbucks, IKEA Group, BT Group, H&M, Nestlé, Philips, Unilever, and Walmart have already signed up to RE100, pledging to **source 100% of their electricity from renewable energy**. The latest report finds that on average, companies are already halfway towards meeting their goals²⁰.*
- ? ***Investing in various financial products aimed at driving clean energy action**. You could do this by, for example, investing in the developing **Green Bond** market; using Development Finance Institutions' **de-risking instruments** to mobilise **private capital**; or exploring **insurance products** that focus on removing specific risks. This is important because **significant investment is needed** to mount an effective global response to our energy challenges. To help guide investors, the UN's initiative '**Sustainable Energy for All**' (SE4All) has published a report²¹ setting out the broad investment themes named above, amongst others, in greater detail.*

Key links to other SDGs:



Goal 1 – No poverty: energy poverty means that poor people are the least likely to have access to a source of power, while it is more likely that they will remain poor as long as they are not connected.²² This issue is especially pertinent to Sub-Saharan Africa, which is home to the largest population of people living without electricity access (ca. 621 million people).²³

Goal 10 – Reduced inequalities: energy access is not uniform around the world, nor is it uniform within nations. This goal aims to empower and promote the social, economic and political inclusion of all by 2030, which includes addressing lack of access to energy by the poorest.

Goal 12 – Responsible consumption and production: the need for energy consumption to become more efficient links to the broader need for resource efficiency in consumption and production and to decouple economic growth from environmental degradation.

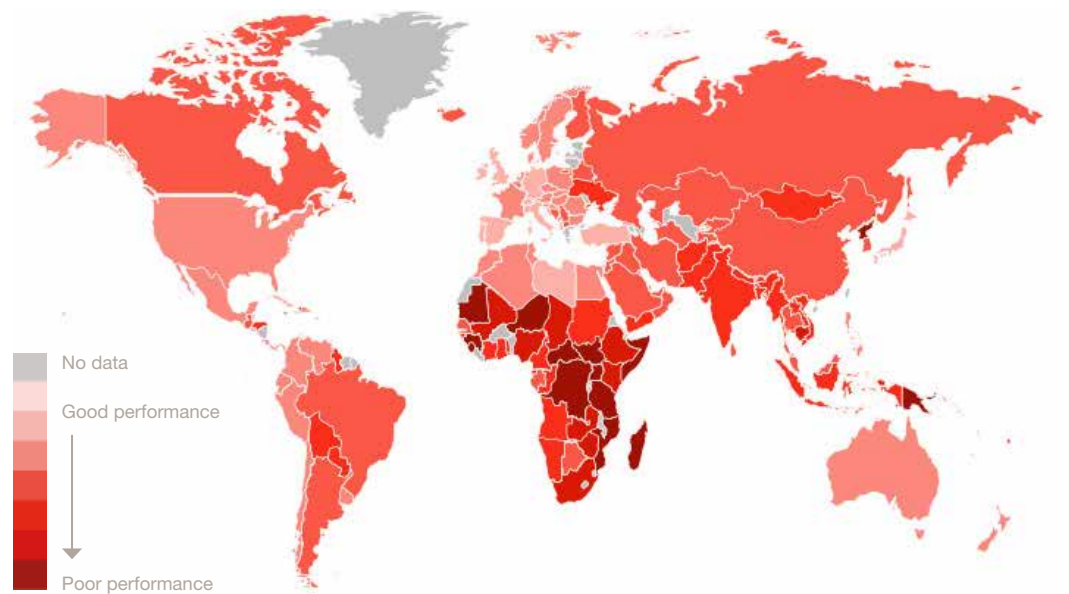
Goal 13 – Climate action: the challenges of climate and energy are inexorably connected: to address the increase in global temperature, we must de-link energy use from emissions by decarbonising our power sources, i.e. reducing emissions from energy.

Targets in focus

This SDG has five targets, the first target is shown in the heat map; “By 2030, ensure universal access to affordable, reliable and modern energy services”. For details on the remaining targets, please see ‘Global Goals and targets’ on page 5.

The lie of the land – exploring the distance to cover to achieve

Target 7.1: By 2030, ensure universal access to affordable, reliable and modern energy services



Case Study

Company: M-KOPA

Sector: Renewable Energy

Region/country of impact:
East Africa

Aligns to: SDG 7



M-KOPA addresses the tremendous demand for affordable off-grid energy by providing pay-as-you-go solar power and telecommunication technologies.

Global Challenge: Access to energy is essential to address the major challenges we face. The largest population of those without access to energy lies in the African continent. More affordable low carbon technologies need to be used to combat climate change and achieve energy efficiency.

Business Response: In Kenya, over 6 million off-grid households spend over \$1 billion on kerosene. The founders of M-KOPA realised the detrimental health and climate impacts of the energy system in Kenya, and found that a home solar system worth US\$200 would be a significantly better alternative, but the upfront cost was too high for homes to purchase. M-KOPA tackled this affordability problem by having customers pay a \$30 deposit upfront to take home the solar system from a sales location. The customer can then make daily top-ups of around 40 cents for credits, which enable the solar energy system to discharge power for 24 hours. After the customer has paid for 365 credits, the system automatically switches to free use. The customer then owns the system and does not need to spend any more for home power for the life of the system.

Benefits: So far, M-KOPA has connected over 340,000 homes in Kenya, Tanzania and Uganda to affordable power. 99% of households have said they have saved money on kerosene and phone charging by using M-KOPA's solar system. This suggests that the average consumer savings over the lifetime of the product from using solar over kerosene could be over US\$700. Although it was the most affordable energy source for households, kerosene could soak up as much as 20% of a household's disposable income. Kerosene is a poor quality and flammable fuel that produces harmful emissions. It has been calculated that M-KOPA has reduced CO2 emissions significantly. M-KOPA enables off-grid communities to leap from using unreliable non-renewable energy to affordable and sustainable practices, without the process of excessive polluting in between.

Source: M-Kopa

<http://www.m-kopa.com/news/lessons-from-m-kopas-first-three-years-of-innovative-energy-service-3/#>

<http://www.un.org/sustainabledevelopment/energy/>

<http://solar.m-kopa.com/about/our-impact/>

Global Goals and targets

Please note 'Targets' are referenced as n.1 n.2 n.3 etc. 'The means of implementing the targets' are referenced as n.a n.b n.c etc.



Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

- 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services
- 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix
- 7.3 By 2030, double the global rate of improvement in energy efficiency
-
- 7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology
- 7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, and small island developing States

Sources

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How well are countries performing against the indicators that sit behind the SDG goals and targets?

SDG 7 Indicator Profile: Access to electricity

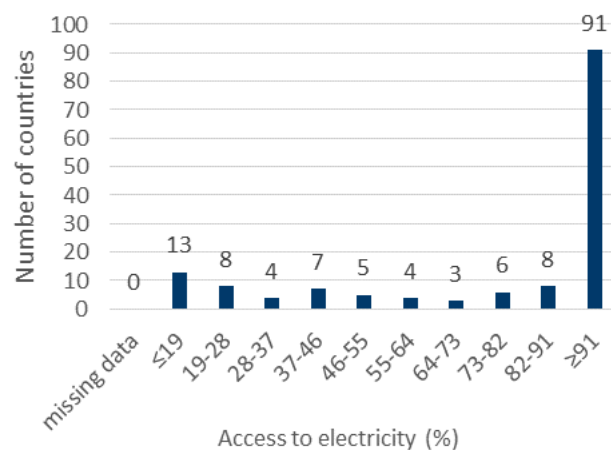
(NB. this table is from the SDG Index & Dashboards - Global Report)



Access to electricity (%)

Country	Value/Rating	Country	Value/Rating
Albania	100 ●	Montenegro	100 ●
Algeria	100 ●	Morocco	100 ●
Armenia	100 ●	Netherlands	100 ●
Australia	100 ●	New Zealand	100 ●
Austria	100 ●	Norway	100 ●
Azerbaijan	100 ●	Poland	100 ●
Belarus	100 ●	Portugal	100 ●
Belgium	100 ●	Romania	100 ●
Bosnia and Herzegovina	100 ●	Russia	100 ●
Bulgaria	100 ●	Serbia	100 ●
Canada	100 ●	Singapore	100 ●
China	100 ●	Slovakia	100 ●
Croatia	100 ●	Slovenia	100 ●
Cyprus	100 ●	Spain	100 ●
Czech Republic	100 ●	Suriname	100 ●
Denmark	100 ●	Sweden	100 ●
Egypt	100 ●	Switzerland	100 ●
Estonia	100 ●	Tajikistan	100 ●
Finland	100 ●	Thailand	100 ●
France	100 ●	Tunisia	100 ●
Georgia	100 ●	Turkey	100 ●
Germany	100 ●	Ukraine	100 ●
Greece	100 ●	UK	100 ●
Hungary	100 ●	USA	100 ●
Iceland	100 ●	Venezuela	100 ●
Iran	100 ●	Argentina	99.8 ●
Iraq	100 ●	Trinidad and Tobago	99.8 ●
Ireland	100 ●	Chile	99.6 ●
Israel	100 ●	Brazil	99.5 ●
Italy	100 ●	Costa Rica	99.5 ●
Japan	100 ●	Jordan	99.5 ●
Kazakhstan	100 ●	Uruguay	99.5 ●
Korea, Rep.	100 ●	Mexico	99.1 ●
Kyrgyzstan	100 ●	Vietnam	99 ●
Latvia	100 ●	Paraguay	98.2 ●
Lebanon	100 ●	Dominican Republic	98 ●
Lithuania	100 ●	Kuwait	97.7 ●
Luxemb.	100 ●	Oman	97.7 ●
Macedonia	100 ●	Qatar	97.7 ●
Malaysia	100 ●	Saudi Arabia	97.7 ●
Malta	100 ●	UAE	97.7 ●
Mauritius	100 ●	Ecuador	97.2 ●
Moldova	100 ●		

Distribution of countries



Country	Value/Rating	Country	Value/Rating
Colombia	97 ●	Swaziland	42 ●
Indonesia	96 ●	Congo, Rep.	41.6 ●
El Salvador	93.7 ●	Zimbabwe	40.5 ●
Pakistan	93.6 ●	Benin	38.4 ●
Jamaica	92.6 ●	Haiti	37.9 ●
Peru	91.2 ●	Angola	37 ●
Panama	90.9 ●	Gambia	34.5 ●
Bolivia	90.5 ●	Sudan	32.6 ●
Mongolia	89.8 ●	Togo	31.5 ●
Gabon	89.3 ●	Cambodia	31.1 ●
Sri Lanka	88.7 ●	Ethiopia	26.6 ●
Philippines	87.5 ●	Guinea	26.2 ●
South Africa	85.4 ●	Mali	25.6 ●
Honduras	82.2 ●	Kenya	23 ●
Guyana	79.5 ●	Zambia	22.1 ●
India	78.7 ●	Mauritania	21.8 ●
Guatemala	78.5 ●	Lesotho	20.6 ●
Nicaragua	77.9 ●	Mozambique	20.2 ●
Nepal	76.3 ●	Uganda	18.2 ●
Bhutan	75.6 ●	Rwanda	18 ●
Cabo Verde	70.6 ●	Congo, Dem. Rep.	16.4 ●
Lao PDR	70 ●	Madagascar	15.4 ●
Ghana	64.1 ●	Tanzania	15.3 ●
Bangladesh	59.6 ●	Niger	14.4 ●
Senegal	56.5 ●	Sierra Leone	14.2 ●
Cote d'Ivoire	55.8 ●	Burkina Faso	13.1 ●
Nigeria	55.6 ●	CAR	10.8 ●
Cameroon	53.7 ●	Liberia	9.8 ●
Botswana	53.2 ●	Malawi	9.8 ●
Myanmar	52.4 ●	Burundi	6.5 ●
Yemen	48.4 ●	Chad	6.4 ●
Namibia	47.3 ●		
Afghanistan	43 ●		

Source : World Bank (2016). Years : 2012. Detailed metadata and quantitative thresholds used for each indicator are available online at www.sdgindex.org. Data refer to the most recent year available during the period specified.

How well are countries performing against the indicators that sit behind the SDG goals and targets?

SDG 7 Indicator Profile: Access to non-solid fuels

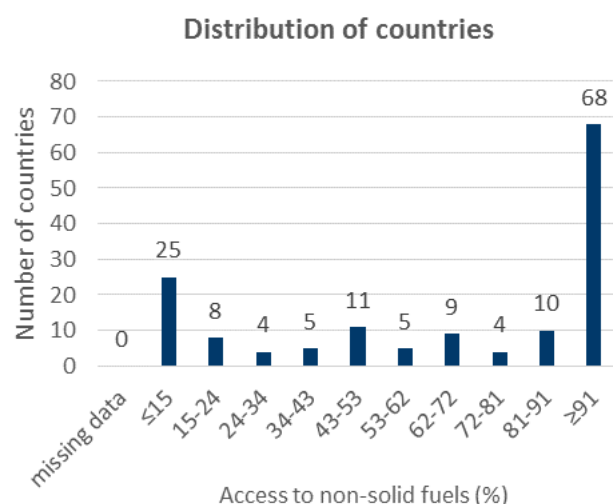
(NB. this table is from the SDG Index & Dashboards - Global Report)



Access to non-solid fuels (%)

Country	Value/Rating
Algeria	95 ●
Argentina	95 ●
Australia	95 ●
Austria	95 ●
Belarus	95 ●
Belgium	95 ●
Canada	95 ●
Cyprus	95 ●
Czech Republic	95 ●
Denmark	95 ●
Ecuador	95 ●
Egypt	95 ●
Finland	95 ●
France	95 ●
Germany	95 ●
Greece	95 ●
Hungary	95 ●
Iceland	95 ●
Iran	95 ●
Iraq	95 ●
Ireland	95 ●
Israel	95 ●
Italy	95 ●
Japan	95 ●
Jordan	95 ●
Korea, Rep.	95 ●
Kuwait	95 ●
Lebanon	95 ●
Luxemb.	95 ●
Malaysia	95 ●
Malta	95 ●
Mauritius	95 ●
Morocco	95 ●
Netherlands	95 ●
New Zealand	95 ●
Norway	95 ●
Oman	95 ●
Poland	95 ●
Portugal	95 ●
Qatar	95 ●
Russia	95 ●
Saudi Arabia	95 ●
Singapore	95 ●
Slovakia	95 ●

Country	Value/Rating
Slovenia	95 ●
Spain	95 ●
Sweden	95 ●
Switzerland	95 ●
Trinidad and Tobago	95 ●
Tunisia	95 ●
Turkey	95 ●
Ukraine	95 ●
UAE	95 ●
UK	95 ●
USA	95 ●
Uruguay	95 ●
Venezuela	95 ●
Latvia	94.8 ●
Costa Rica	94.5 ●
Brazil	94.4 ●
Chile	93.6 ●
Azerbaijan	93.3 ●
Bulgaria	93.1 ●
Dominican Republic	93.1 ●
Lithuania	93.1 ●
Guyana	93 ●
Croatia	92.5 ●
Kazakhstan	91.1 ●
Jamaica	89.1 ●
Moldova	89 ●
Estonia	88.8 ●
Suriname	88.1 ●
Mexico	86.1 ●
Colombia	85.7 ●
South Africa	84.9 ●
Romania	82.8 ●
Panama	82.5 ●
Armenia	81.5 ●
El Salvador	77.9 ●
Gabon	74.4 ●
Thailand	73.9 ●
Montenegro	71.9 ●
Bolivia	71 ●
Cabo Verde	68.3 ●
Serbia	67.9 ●
Macedonia	67.3 ●
Yemen	66.8 ●
Kyrgyzstan	66.3 ●



Country	Value/Rating
Tajikistan	65.5 ●
Peru	63.6 ●
Botswana	62.6 ●
Albania	61.4 ●
Bhutan	60.3 ●
Bosnia and Herzegovina	54.7 ●
China	54.3 ●
Georgia	54.3 ●
Paraguay	50.9 ●
Philippines	50.5 ●
Honduras	49 ●
Senegal	48.6 ●
Nicaragua	45.9 ●
Indonesia	45.3 ●
Namibia	45.1 ●
Angola	44.8 ●
Swaziland	44.5 ●
Vietnam	43.8 ●
Guatemala	43.3 ●
India	42.4 ●
Mauritania	42 ●
Lesotho	39 ●
Pakistan	36.1 ●
Zimbabwe	33.9 ●
Mongolia	27.6 ●
Nigeria	25.6 ●
Sri Lanka	25.4 ●
Cameroon	24.6 ●
Congo, Rep.	22.9 ●
Cote d'Ivoire	21.8 ●
Sudan	20.7 ●
Kenya	19.6 ●
Nepal	18 ●

Country	Value/Rating
Zambia	17.2 ●
Ghana	16.3 ●
Afghanistan	14.9 ●
Chad	11.8 ●
Cambodia	10.6 ●
Bangladesh	9.3 ●
Haiti	9.1 ●
Gambia	9 ●
Benin	8.9 ●
Myanmar	8.3 ●
Burkina Faso	8.1 ●
Congo, Dem. Rep.	7 ●
Tanzania	5.6 ●
Togo	5.6 ●
Burundi	5 ●
CAR	5 ●
Ethiopia	5 ●
Guinea	5 ●
Lao PDR	5 ●
Liberia	5 ●
Madagascar	5 ●
Malawi	5 ●
Mali	5 ●
Mozamb.	5 ●
Niger	5 ●
Rwanda	5 ●
Sierra Leone	5 ●
Uganda	5 ●

Source : SE4All (2016). Years : 2010. Detailed metadata and quantitative thresholds used for each indicator are available online at www.sdgindex.org. Data refer to the most recent year available during the period specified.

How well are countries performing against the indicators that sit behind the SDG goals and targets?

SDG 7 Indicator Profile: CO₂ from fuels & electricity

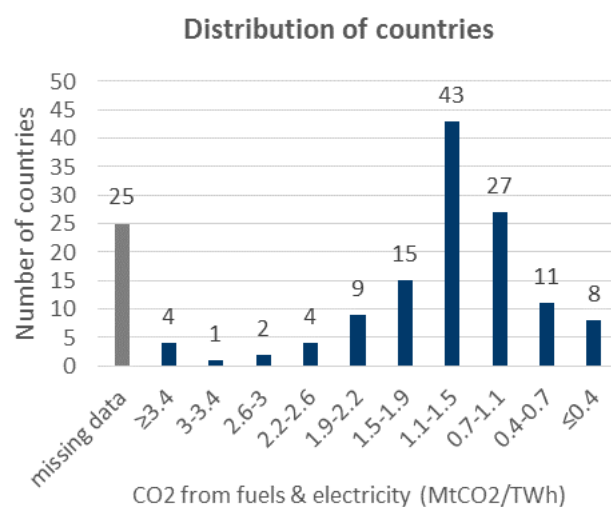
(NB. this table is from the SDG Index & Dashboards - Global Report)



CO₂ from fuels & electricity (MtCO₂/TWh)

Country	Value/Rating
Iceland	0.1 ●
Paraguay	0.1 ●
Sweden	0.2 ●
Tajikistan	0.2 ●
Mozamb.	0.2 ●
Norway	0.3 ●
Zambia	0.3 ●
Congo, Dem. Rep.	0.3 ●
Albania	0.5 ●
France	0.6 ●
Switzerland	0.6 ●
Montenegro	0.6 ●
Uruguay	0.6 ●
Kyrgyzstan	0.6 ●
Armenia	0.7 ●
Finland	0.7 ●
Georgia	0.7 ●
New Zealand	0.7 ●
Costa Rica	0.7 ●
Spain	0.8 ●
Canada	0.8 ●
Brazil	0.8 ●
Portugal	0.9 ●
Slovenia	0.9 ●
Bulgaria	0.9 ●
Cameroon	0.9 ●
Malta	1 ●
Singapore	1 ●
El Salvador	1 ●
Nicaragua	1 ●
Ethiopia	1 ●
Austria	1 ●
Vietnam	1 ●
Panama	1 ●
Honduras	1 ●
Peru	1 ●
Belgium	1.1 ●
Denmark	1.1 ●
Israel	1.1 ●
Slovakia	1.1 ●
Egypt	1.1 ●
Latvia	1.1 ●
Chile	1.1 ●

Country	Value/Rating
Lebanon	1.1 ●
Korea, Rep.	1.1 ●
Sri Lanka	1.1 ●
Colombia	1.1 ●
Ghana	1.1 ●
Bangladesh	1.1 ●
Dominican Republic	1.1 ●
Cote d'Ivoire	1.1 ●
Myanmar	1.1 ●
Czech Republic	1.2 ●
Germany	1.2 ●
Greece	1.2 ●
Italy	1.2 ●
Japan	1.2 ●
Romania	1.2 ●
Turkey	1.2 ●
Bosnia and Herzegovina	1.2 ●
Croatia	1.2 ●
Serbia	1.2 ●
USA	1.2 ●
Gabon	1.2 ●
Guatemala	1.2 ●
Philippines	1.2 ●
Cyprus	1.3 ●
Hungary	1.3 ●
UK	1.3 ●
Mauritius	1.3 ●
Argentina	1.3 ●
Ireland	1.3 ●
Tunisia	1.3 ●
Jordan	1.3 ●
Venezuela	1.3 ●
Azerbaijan	1.3 ●
Congo, Rep.	1.3 ●
Kenya	1.3 ●
Sudan	1.3 ●
Estonia	1.4 ●
Macedonia	1.4 ●
Kuwait	1.4 ●
Ukraine	1.4 ●
Nepal	1.4 ●
Pakistan	1.4 ●



Country	Value/Rating
Zimbabwe	1.4 ●
Malaysia	1.5 ●
Thailand	1.5 ●
Russia	1.5 ●
Moldova	1.5 ●
Netherlands	1.5 ●
Mexico	1.5 ●
Australia	1.6 ●
UAE	1.6 ●
India	1.6 ●
Senegal	1.6 ●
Saudi Arabia	1.7 ●
South Africa	1.7 ●
Ecuador	1.7 ●
Tanzania	1.7 ●
Belarus	1.8 ●
Poland	1.8 ●
Jamaica	1.8 ●
Morocco	1.8 ●
Iran	1.9 ●
Iraq	1.9 ●
Algeria	1.9 ●
Indonesia	2 ●
Haiti	2 ●
Qatar	2.1 ●
Bolivia	2.1 ●
Nigeria	2.1 ●
Oman	2.2 ●
Trinidad and Tobago	2.4 ●
Lithuania	2.5 ●
Kazakhstan	2.6 ●
Namibia	2.6 ●

Country	Value/Rating
Yemen	2.8 ●
Cambodia	2.9 ●
Angola	3.1 ●
Mongolia	3.7 ●
Niger	4.8 ●
Luxemb.	5.4 ●
Botswana	6.1 ●
Afghanistan	n/a ●
Benin	n/a ●
Bhutan	n/a ●
Burkina Faso	n/a ●
Burundi	n/a ●
Cabo Verde	n/a ●
CAR	n/a ●
Chad	n/a ●
China	n/a ●
Gambia	n/a ●
Guinea	n/a ●
Guyana	n/a ●
Lao PDR	n/a ●
Lesotho	n/a ●
Liberia	n/a ●
Madagascar	n/a ●
Malawi	n/a ●
Mali	n/a ●
Mauritania	n/a ●
Rwanda	n/a ●
Sierra Leone	n/a ●
Suriname	n/a ●
Swaziland	n/a ●
Togo	n/a ●
Uganda	n/a ●

Source : IEA (2015). Years : 2013. Detailed metadata and quantitative thresholds used for each indicator are available online at www.sdgindex.org. Data refer to the most recent year available during the period specified.

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