

G20 End-use Data and Energy Efficiency Metrics Initiative
Uncovering the role of digitalization for energy efficiency indicators

Setting the scene: the role of end-use data and indicators

Nick Johnstone, Roberta Quadrelli, Mafalda Silva

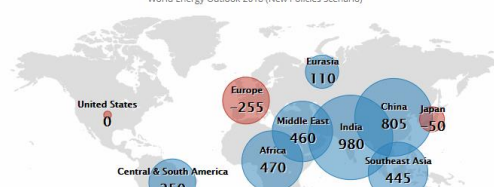
Energy efficiency is key to clean energy transitions



The Clean Energy Transitions Programme (CETP) leverages the IEA's unique energy expertise across all fuels and technologies to accelerate global clean-energy transitions, particularly in major emerging economies. The Programme includes collaborative analytical work, technical cooperation, training and capacity building and strategic dialogues.

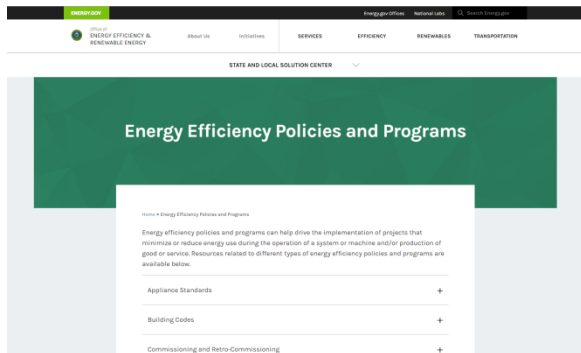
Rapid and sustainable transformation in the energy sector is essential not only to reach climate goals, but also to reduce air pollution, and to enable access to energy for the roughly nearly 1 billion without access to electricity and nearly 2.7 billion without access to clean cooking facilities as of 2017. This transition is particularly important in developing countries as up to 2040 more than 95% of growth in primary energy demand will come from non-OECD countries (with the majority of consumption driven by a small number of

Change in primary energy demand, 2017-40 (Mtoe)
World Energy Outlook 2018 (New Policies Scenario)

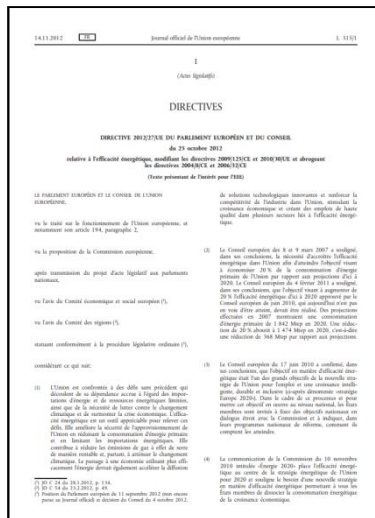


Large programme of the IEA including a work stream on data

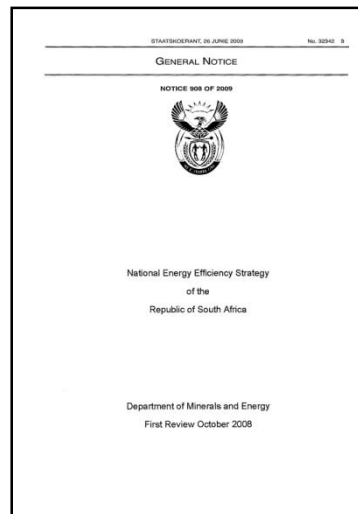
Data is key to policy work



United States: <https://www.energy.gov/eere/slc/energy-efficiency-policies-and-programs>



EU Directive on EE : <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:315:0001:0056:fr:PDF>



South Africa: Source DoE



Brazil: Source EPE

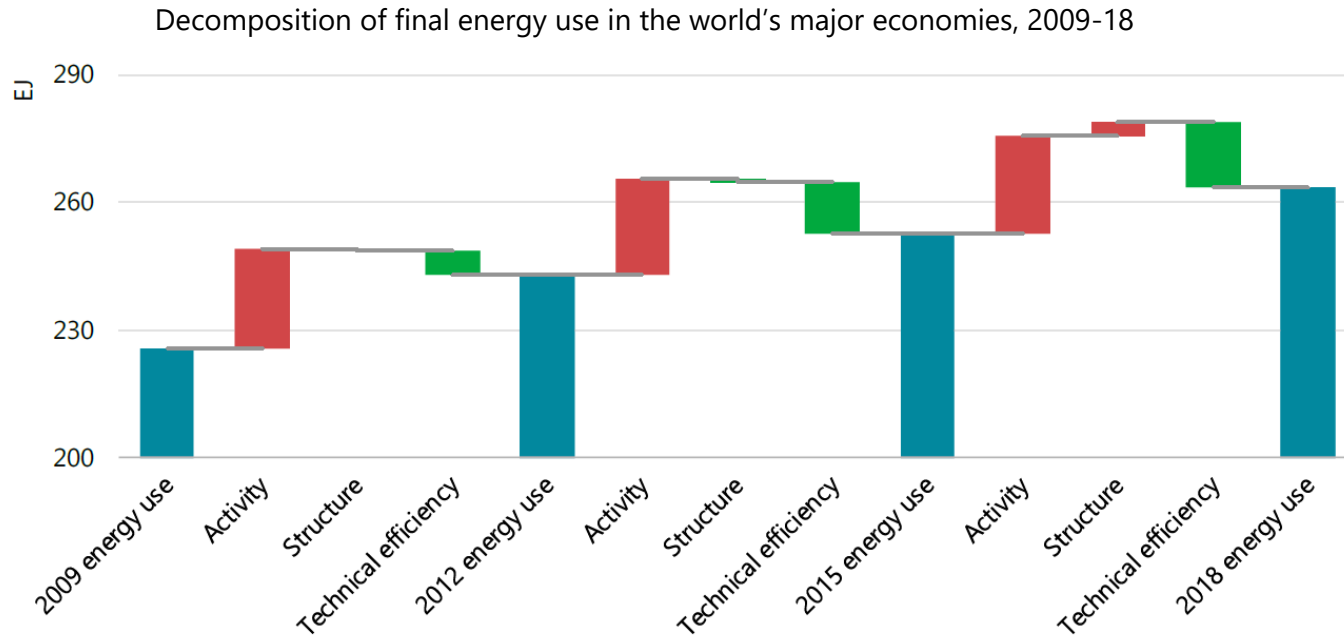
Energy efficiency is high in political agendas worldwide – is there enough evidence?

Explaining the Energy Efficiency Gap

	Sources of Energy Efficiency Gap		
	Private	Public	Social
Innovation and knowledge market failures		x	x
Adoption/demonstration externalities		x	x
Market structure failures (imperfect competition, principal-agent)		x	x
Non-internalisation of energy-associated environmental externalities		x	x
Policy failures leading to "wrong" prices		x	x
Cognitive biases related to energy usage (bounded rationality)	x		x
Myopia and discounting (bounded self-control)	x		x

Policies are needed to close the gap, but in order to design effective policies need to explain the reasons for the gap

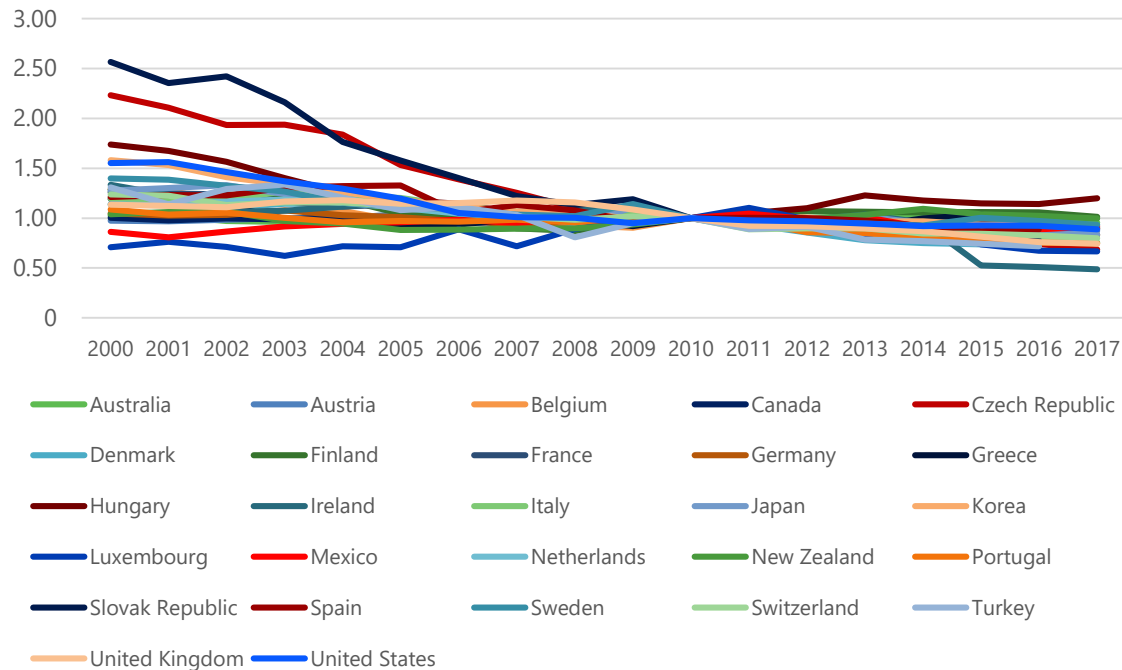
Grasping efficiency progress: relative importance in major world economies



Source: IEA (2019) *Energy Efficiency*, All rights reserved.

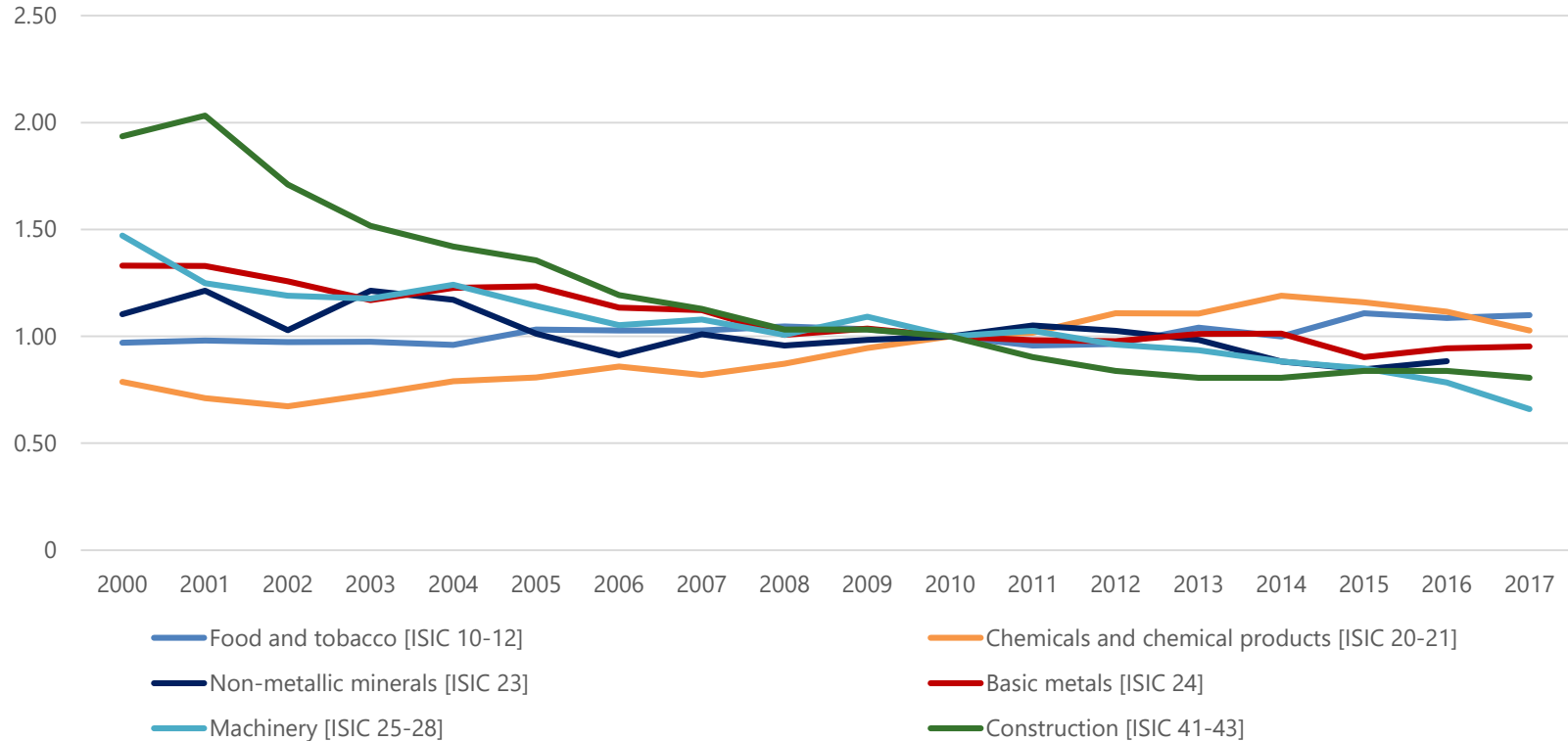
Major world economies could lead the way on energy efficiency – how do we know it's working?

Grasping efficiency progress: index of energy efficiency (MJ/\$VA, 2010=100) in manufacturing in IEA members



Major world economies could lead the way on energy efficiency – how do we know it's working?

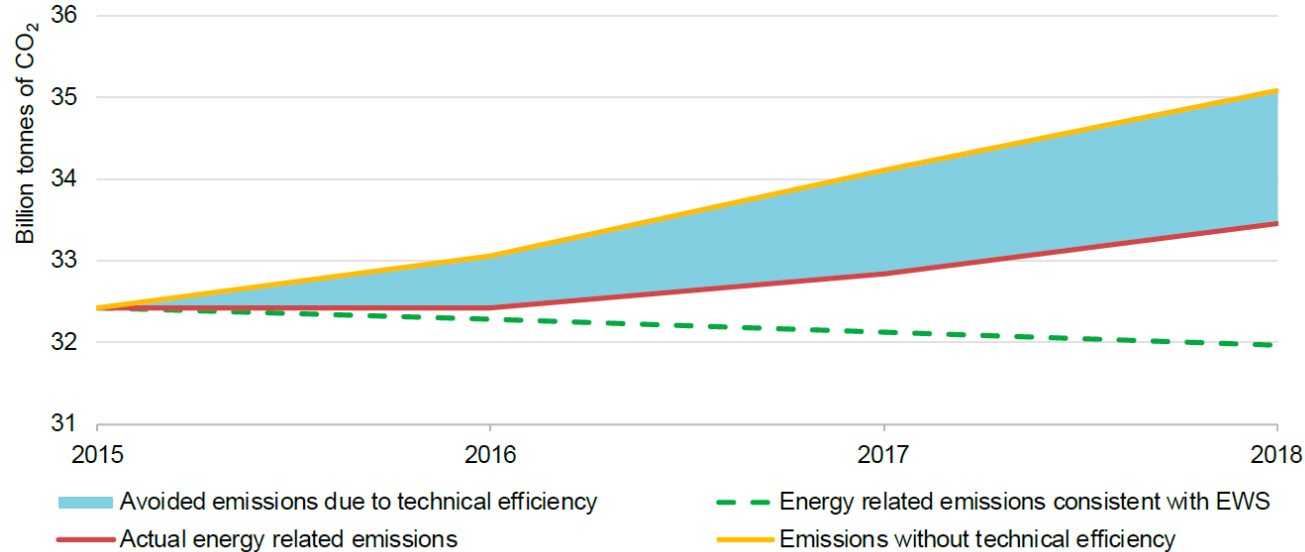
Grasping efficiency progress: index of manufacturing energy efficiency (MJ/\$VA, 2010=100) in Australia



Major world economies could lead the way on energy efficiency – how do we know it's working?

The importance of energy efficiency – e.g. GHG emission savings

Energy-related GHG emissions, actual, without technical efficiency improvements, and avoided from technical efficiency improvements, 2015-18



Source: IEA (2019) *Energy Efficiency*, All rights reserved.

Technical efficiency gains from 2015 to 2018 avoided cumulative emissions of over 3.5 billion of additional tCO₂, larger than the cumulative energy-related emissions of Japan over the same period

The G20 end-use data and energy efficiency metrics initiative

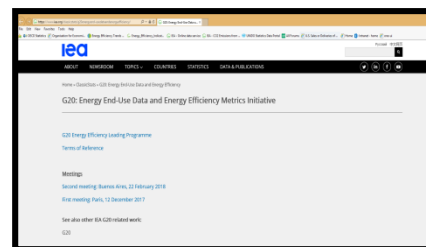
- Initiative co-led by the **International Energy Agency** and the **French government** through its national energy efficiency agency (**ADEME**)
- Approved as part of the **G20 Energy Efficiency Leading Programme**, during the **Chinese G20 presidency** in **2016**
- **Main goal:** Developing international cooperation on energy end-use data and energy efficiency metrics
- This is the **3rd** (annual) **workshop of the initiative**, under the G20 Japanese presidency. This year back-to-back with a benchmarking workshop (yesterday), given data needs for benchmarking analysis.

International cooperation at the IEA

2017 IEA Ministerial: “Ministers mandated the Secretariat to continue to strengthen its work on energy efficiency across all sectors globally, in the context of IEA’s global hub role”.

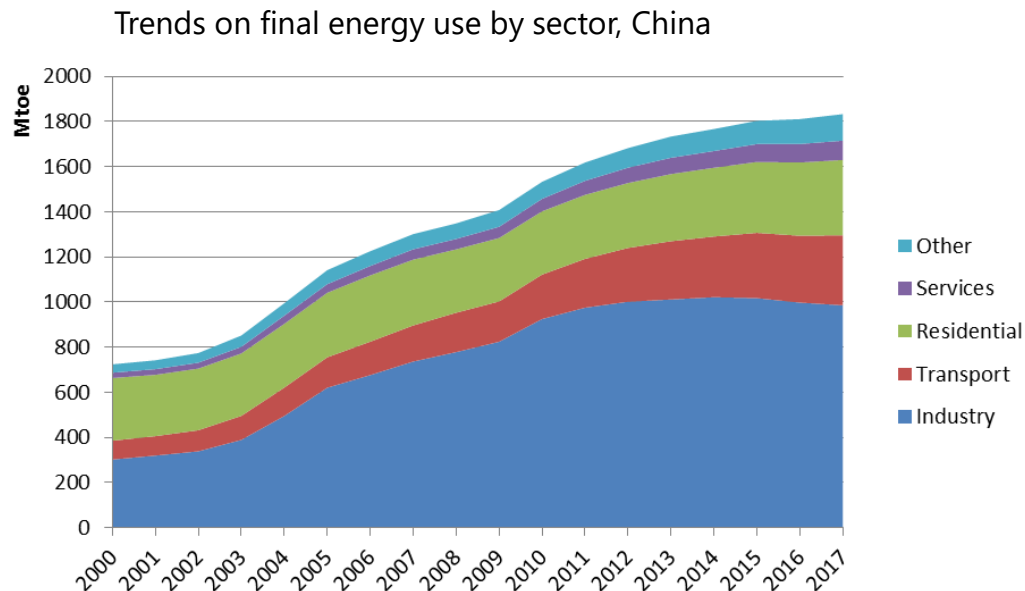
A new major programme with a particular focus on emerging economies: IEA Clean Energy Transitions Programme (CETP).

G20: Energy End-Use Data and Energy Efficiency Metrics Initiative - Discussion forum for countries to share knowledge, methodologies and experience in collecting and using energy demand and energy efficiency data for policy making.



Energy efficiency data to support strengthened IEA mandate – international cooperation is key

The energy balance is a starting point to study trends in energy demand



Data source: IEA (2019) World energy balances

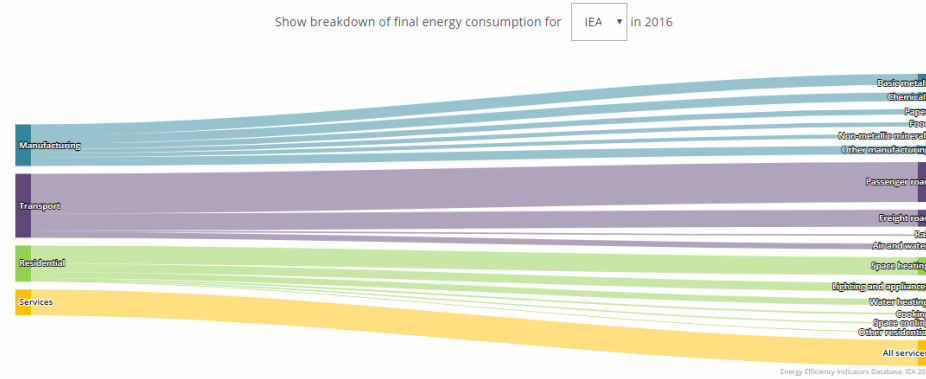
*excludes non-energy use.

A sound energy balance is the basis for end use data collection and developing efficiency indicators

IEA energy efficiency indicators work

Energy efficiency indicators 2018 overview

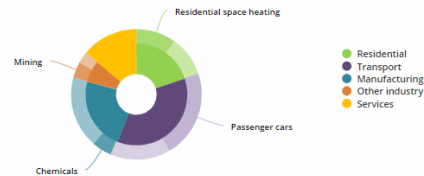
Final energy consumption by end use



The key sectors for tracking energy efficiency progress are transport, services, manufacturing and the residential sector.

Across IEA countries, the transport sector accounted for the highest share of final energy consumption in 2016 (36%), followed by manufacturing industry (23%), the residential sector (20%) and finally the services sector (14%).

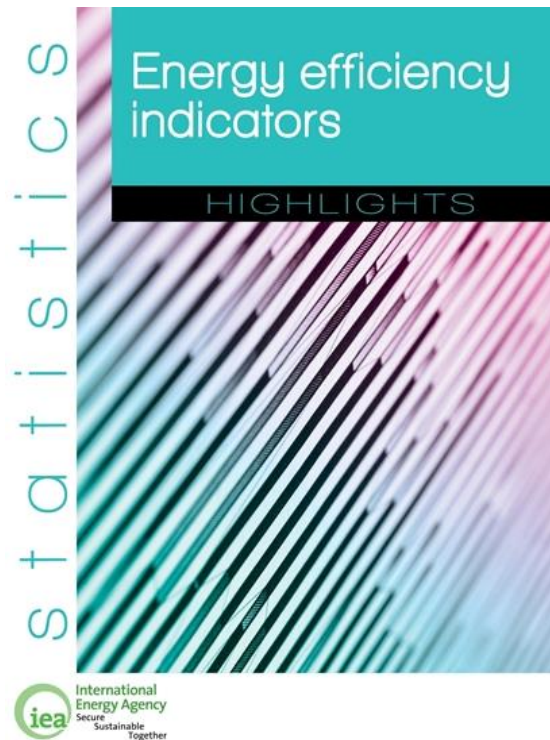
Largest energy end-uses in IEA countries, 2016



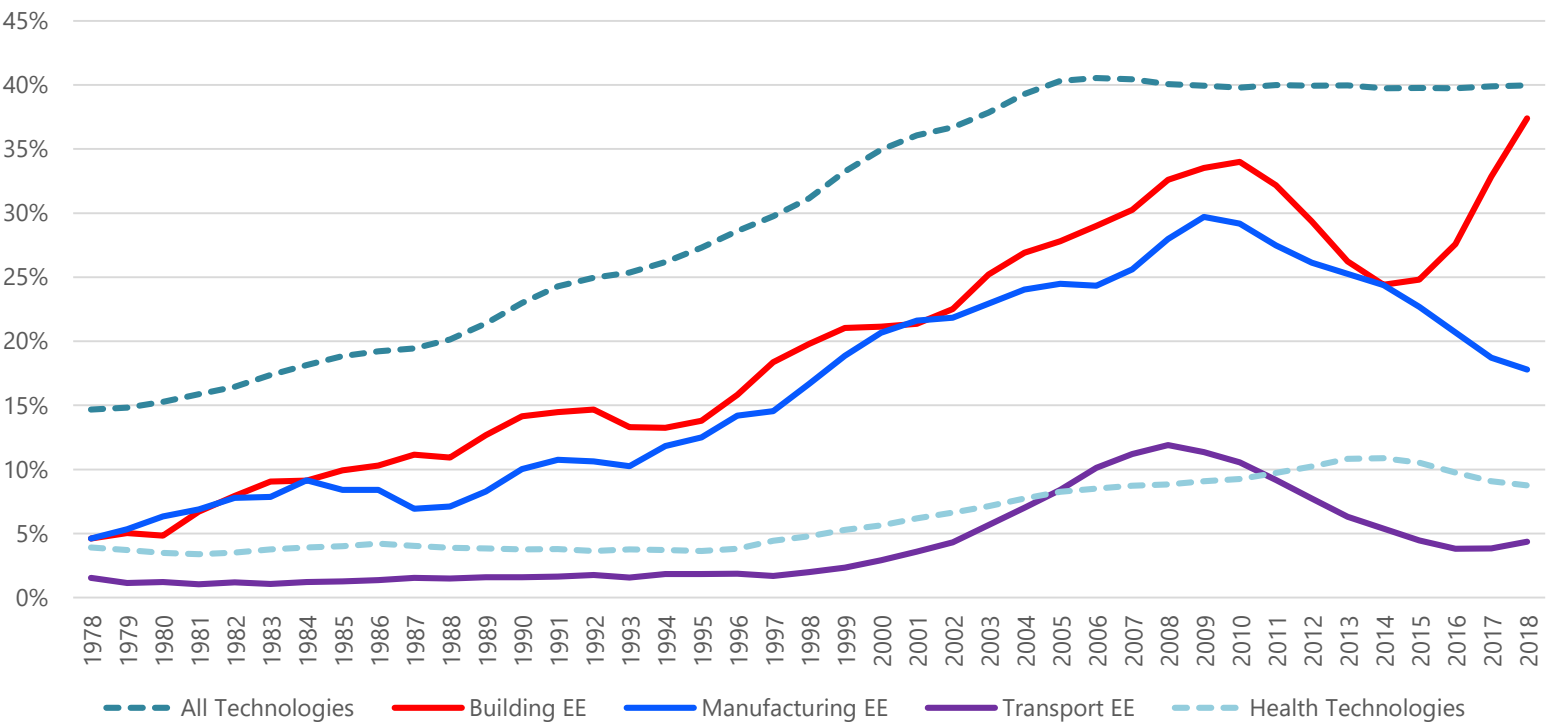
<https://www.iea.org/statistics/efficiency/>

New edition of the energy efficiency indicators report coming out next week!

- Annual report showing **energy efficiency** trends **across countries** and in IEA, for the main final consumption sectors and by end use to be released next week.
- This year, featuring Brazil for the first time.
- Download for free at the [IEA website](https://www.iea.org/publications/energy-efficiency-indicators).



Digitalisation of Innovation in Energy Efficiency: Patents with EE and ICT Co-classes



Note: 3 year moving average of % of patent families in different fields that also include an ICT co-class. Only "claimed priorities" (i.e. patent family size > 1) included. Patent extractions from EPO World Patent Statistical Database (PATSTAT) by OECD/ENV and IEA/EDC (2019).



Revealed Technological Advantage in EE Innovation

	EE_Buildings	EE_Transport	EE_Manufacturing	CCMT_Total
Australia	1.17	0.37	1.31	1.05
Austria	1.89	1.16	0.90	1.06
Belgium	0.94	0.64	1.35	1.07
Brazil	0.70	0.53	1.51	1.08
Canada	1.14	0.61	1.12	1.05
China (People's Republic of)	1.09	0.29	0.72	0.67
Czech Republic	1.33	0.71	1.07	0.90
Denmark	1.70	0.46	2.65	2.30
Finland	0.96	0.69	1.73	1.16
France	1.01	1.75	0.96	1.17
Germany	0.99	1.69	1.04	1.12
India	0.59	0.46	1.14	0.98
Ireland	1.28	0.19	0.49	0.74
Italy	1.49	0.74	0.92	0.92
Japan	0.76	1.25	1.00	0.94
Korea	1.08	0.81	1.01	1.04
Netherlands	1.89	0.33	1.24	0.95
Norway	0.69	0.48	1.26	1.31
Russia	0.48	0.43	1.34	0.90
Sweden	0.77	1.37	0.89	1.06
Switzerland	1.17	0.47	0.87	0.83
United Kingdom	1.08	1.12	0.99	1.11
United States	0.97	1.11	1.03	1.09

Note: RTA based on ratio of ratios of patents by field relative to world and relative to all fields. Values > 1 indicate higher relative propensity to patent in a given field. Only "claimed priorities" (i.e. patent family size > 1) included. Patent extractions from EPO World Patent Statistical Database (PATSTAT) by OECD/ENV and IEA/EDC (2019).

Final remarks

- Detailed end-use and activity data - and indicators - are vital for energy demand policy and planning, across sectors and end-uses.
- International collaboration is key for developing energy statistics more broadly and efficiency indicators in particular
- The IEA is keen in developing a closer collaboration across G20 on this, including establishing new work with non-member countries.

The IEA is committed to facilitate the national work with a view to strengthening long-term institutional collaboration

Final remarks

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The 2-day workshop ahead

9:30 – 10:00	Opening session – Welcome address Paul Simons (IEA deputy executive director) Valérie Quiniou (ADEME executive director of prospective and research) Masana Ezawa (Director, Energy Efficiency Division - METI Japan)
10:00 – 11:00	Session 1 – Setting the scene: the role of end-use data and indicators The importance of energy efficiency data for policy-making The necessity of disaggregating data to end use Recap of important outcomes from the previous workshops • IEA – Brian Motherway (Head of energy efficiency division) • ADEME – Didier Bosseboeuf (Coordinator of international economic studies) • IEA – Nick Johnstone (Head of energy data centre)
11:00 – 11:20	Coffee break
11:20 – 12:30	Session 2 – National and international frameworks for data collection Data governance. Institutional frameworks. Cooperation within and outside G20 Existing data collection mechanisms <i>Presentations from countries and discussion</i> • European Commission (DG Energy) • International Transport Forum • ADEME • IEA
12:30 – 14:00	Lunch
14:00 – 15:15	Session 3 - Developments in traditional data collection methodologies What has been improved recently (data quality, representativeness, reduction of costs)? What are the major challenges remaining across data collection methodologies? Best practices across end-use sectors and sub-sectors <i>Presentations from countries</i> • Brazil (EPE) • USA (EIA) • Argentina (Undersecretariat of Ren. Energy and Energy Efficiency)
15:15 – 15:45	Coffee break
15:45 – 17:00	Session 3 continued. <i>Presentations from countries and discussion</i> • Indonesia (Pusdatin – MEMR) • Italy (ENEA) • India (MOSPI)

Day 1 | November 21st

The 2-day workshop ahead

8:30 – 9:30	Coffee
9:30 – 10:00	Recap of the first day of the workshop/themes to be addressed
10:00 – 11:00	Session 4 – From data collection to statistics and indicators From surveys to end-use data Making sense of the data collected Using end use data for benchmarking work <i>Presentations from countries and discussion</i> • France (Ministry of ecological transitions) • Indonesia (Pusdatin – MEMR) • Korea (KEEI) • Germany (Fraunhofer ISI) • Italy (ENEA) Discussion
11:00 – 11:30	Coffee break
11:30 – 12:30	Session 5 – The role of new technologies/digitalization for end-use data collection Overview of the initiative paper and survey results The role of new technologies in improving end-use data collection Innovative practices implemented What are the challenges around use of new technologies for data collection? (Cybersecurity, social acceptance, affordability) <i>Presentations from countries</i> • IEA • USA (EIA) • Brazil (EPE) • UK (BEIS)
12:30 – 14:00	Lunch
14:00 – 15:15	Session 5 continued. <i>Presentations from countries and discussion</i> • India (AEEE) • Canada (Natural Resources Canada) • Germany (Fraunhofer ISI) • France (CEREN)
15:15 – 15:45	Coffee break
15:45 – 16:45	Session 6 – Setting priorities for further work Round table on G20 countries views and possible bilateral/multilateral cooperation Lessons learnt Next steps
16:45 – 17:00	Closing session and farewell

Day 2 | November 22nd

For discussion

- Where do we want to go?
- What can we achieve together from this initiative?
- What are countries' priorities?
- What can be the role of the IEA?
- How to leverage on new technologies?

