International Energy Agency

Public RD&D budget data collection: IEA's perspective

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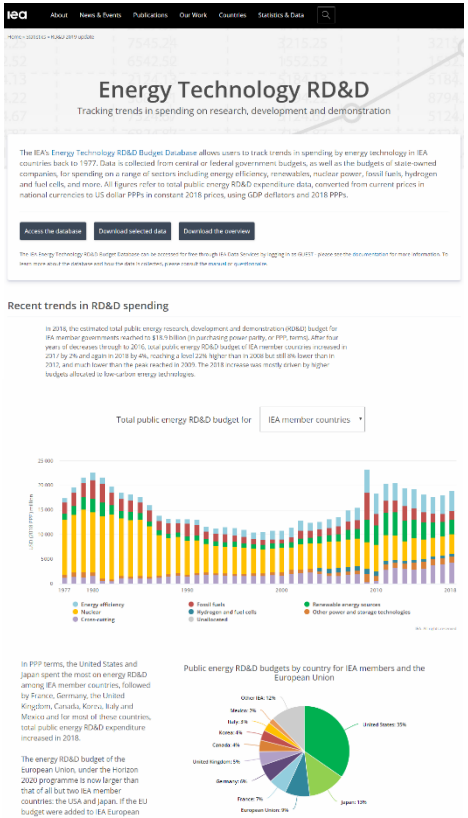
Energy Big Push Workshop, 30 October 2019, Brasilia

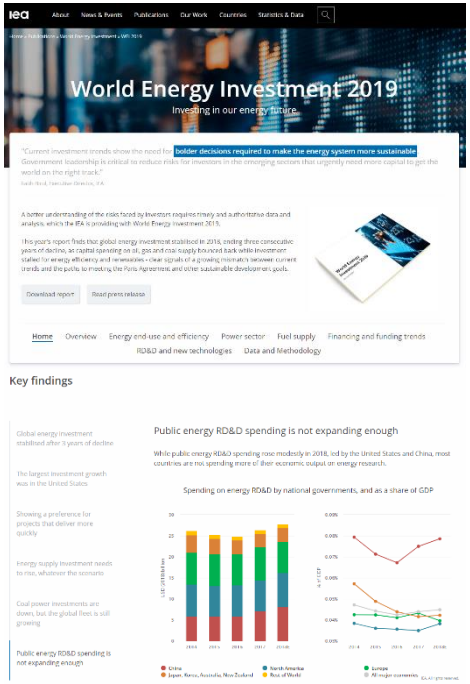
Energy technology RD&D data – IEA's perspective

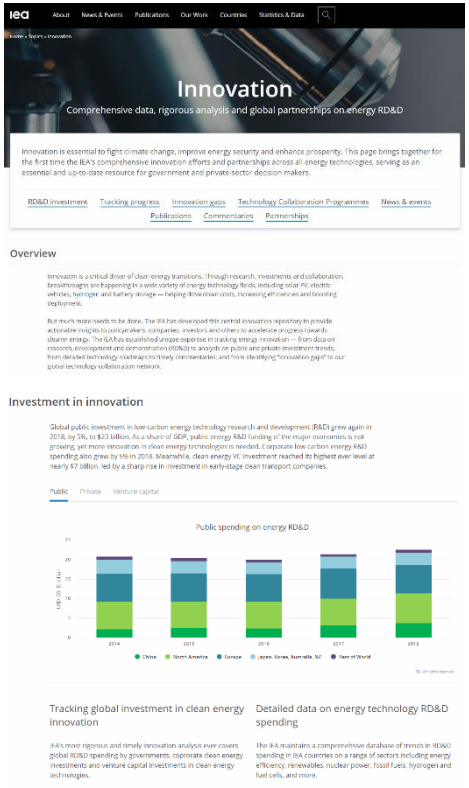
1. **Capacity building**. Work with countries to collect better data, including non-IEA.
2. **Network.** Gather different stakeholders to share expertise.
3. **Benchmark**. Refer to a common and solid methodology for coherent analysis.
4. **Data-policy integration**. Ensure the connection between policies and data

Better data quality → Better policies → Better lives

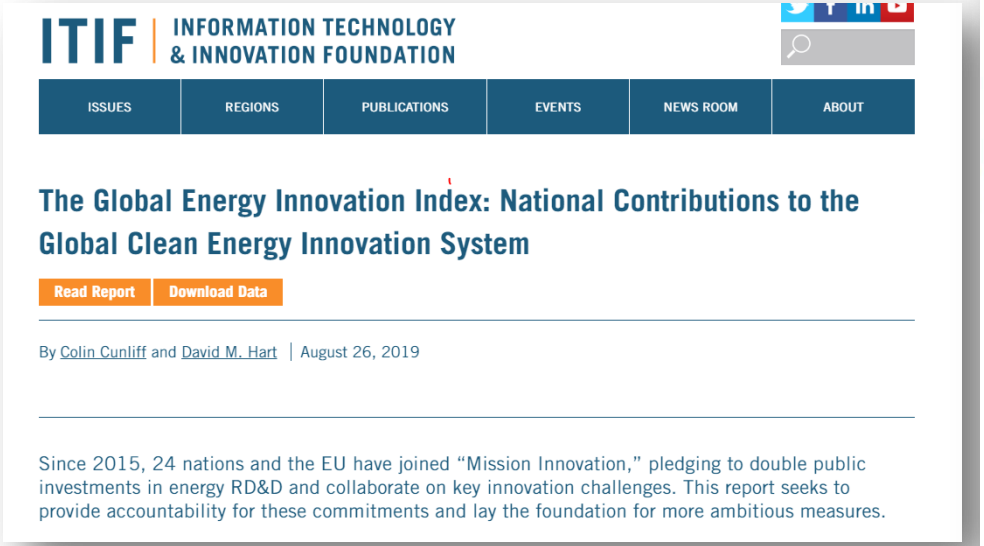
IEA work on energy technology RD&D

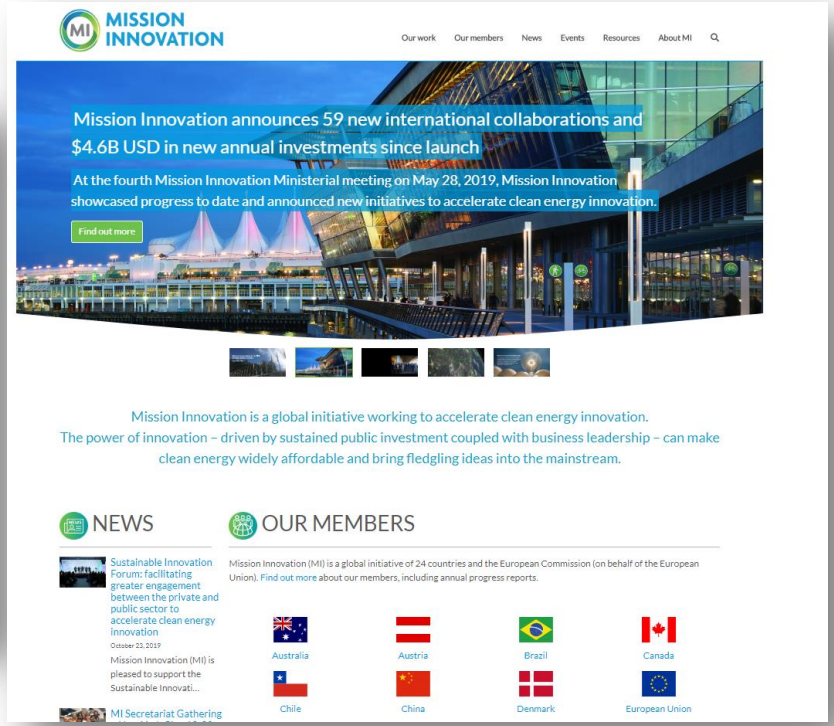






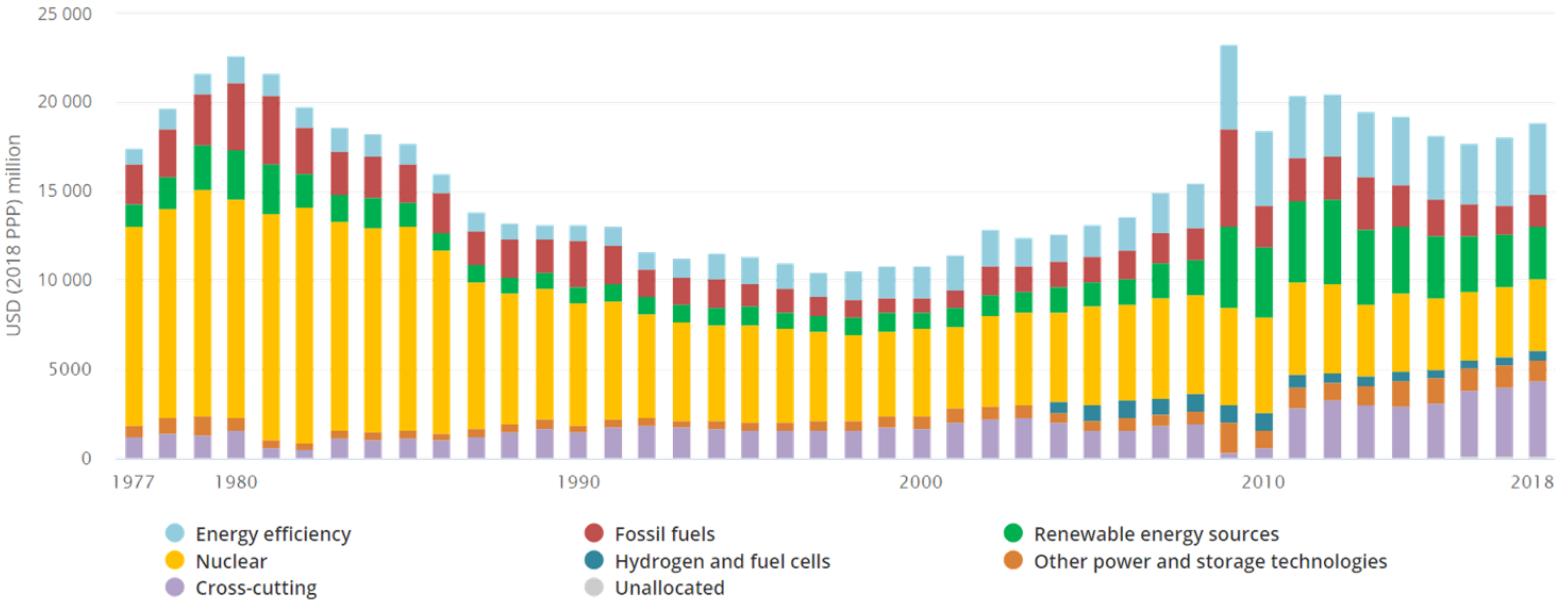
International work on energy technology RD&D





IEA - October 2019 release

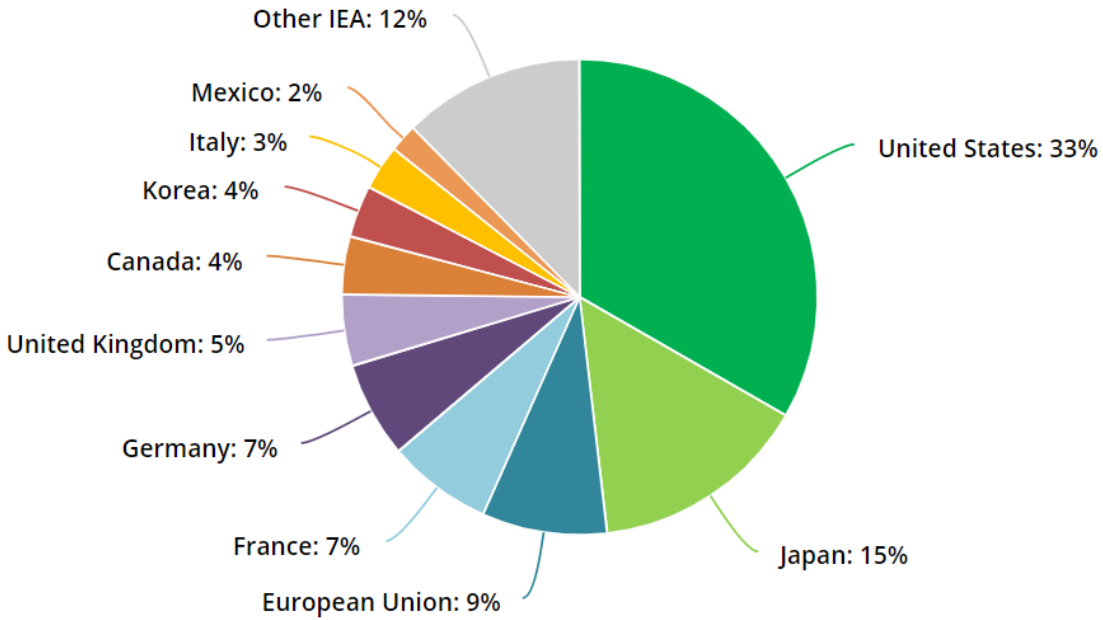
Total public energy RD&D budget for IEA member countries



Available at https://www.iea.org/statistics/rdd/

In 2018, the estimated total public RD&D budget of IEA member countries reached to **$ 19.6 billion** (in purchasing power parity, or PPP, terms)

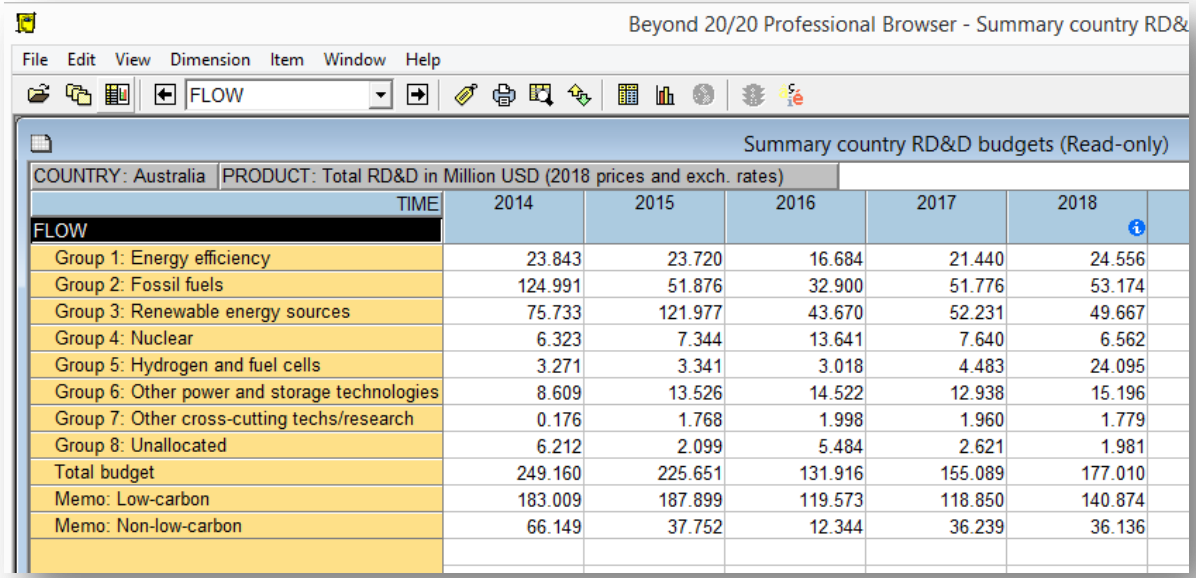
Total Public Energy RD&D budget shares – IEA Member Countries + EU



USA and Japan spend the most on energy RD&D among IEA members, followed by France, Germany, UK, Canada, Korea, Italy, Mexico. For most countries, total public energy RD&D expenditure rose in 2018.

Available at https://www.iea.org/statistics/rdd/

October 2019 release – main features



Summary country RD&D budgets (Read-only)

COUNTRY: Australia | PRODUCT: Total RD&D in Million USD (2018 prices and exch. rates)

TIME / FLOW	2014	2015	2016	2017	2018
Group 1: Energy efficiency	23.843	23.720	16.684	21.440	24.556
Group 2: Fossil fuels	124.991	51.876	32.900	51.776	53.174
Group 3: Renewable energy sources	75.733	121.977	43.670	52.231	49.667
Group 4: Nuclear	6.323	7.344	13.641	7.640	6.562
Group 5: Hydrogen and fuel cells	3.271	3.341	3.018	4.483	24.095
Group 6: Other power and storage technologies	8.609	13.526	14.522	12.938	15.196
Group 7: Other cross-cutting techs/research	0.176	1.768	1.998	1.960	1.779
Group 8: Unallocated	6.212	2.099	5.484	2.621	1.981
Total budget	249.160	225.651	131.916	155.089	177.010
Memo: Low-carbon	183.009	187.899	119.573	118.850	140.874
Memo: Non-low-carbon	66.149	37.752	12.344	36.239	36.136

B2020 - Database

Raise the exposure of the energy technology RD&D data in different format to be able to reach all users

Available at https://www.iea.org/statistics/rdd/

Raise the profile of Energy RD&D data by enhancing accessibility

October 2019 release – main features

	A	B	C	AR	AS	AT	AU	AV
1	Total RD&D spending in Million	Source: IEA All rights reserved (http://www.iea.org/t&c/termsandconditions/)						
2	Country	Currency	Economic Indicators	2014	2015	2016	2017	2018 Estimated
138	Canada	National currency (nominal)	Energy efficiency	139.179	144.22	103.171	175.915	271.876
139	Canada	National currency (nominal)	Fossil fuels	365.088	319.618	170.653	230.758	366.841
140	Canada	National currency (nominal)	Renewables	113.327	137.708	116.814	121.734	113.243
141	Canada	National currency (nominal)	Nuclear	124.559	169.26	147.449	133.295	149.183
142	Canada	National currency (nominal)	Hydrogen and fuel cells	13.444	12.584	21.193	21.66	23.075
143	Canada	National currency (nominal)	Other power and storage technologies	141.339	105.875	92.808	94.818	115.157
144	Canada	National currency (nominal)	Other cross-cutting technologies/research	39.318	5.253	8.851	20.326	22.42
145	Canada	National currency (nominal)	Unallocated	0	0	0	0	0
146	Canada	National currency (nominal)	Total Budget	936.254	894.518	660.938	798.505	1061.795
147	Canada	National Currency (2018 prices)	Energy efficiency	144.828	151.471	107.557	178.768	271.876
148	Canada	National Currency (2018 prices)	Fossil fuels	379.907	335.688	177.908	234.5	366.841
149	Canada	National Currency (2018 prices)	Renewables	117.927	144.632	121.78	123.708	113.243
150	Canada	National Currency (2018 prices)	Nuclear	129.615	177.77	153.718	135.457	149.183
151	Canada	National Currency (2018 prices)	Hydrogen and fuel cells	13.99	13.217	22.094	22.011	23.075
152	Canada	National Currency (2018 prices)	Other power and storage technologies	147.076	111.198	96.754	96.356	115.157
153	Canada	National Currency (2018 prices)	Other cross-cutting technologies/research	40.914	5.517	9.227	20.656	22.42
154	Canada	National Currency (2018 prices)	Unallocated	0	0	0	0	0
155	Canada	National Currency (2018 prices)	Total Budget	974.257	939.494	689.037	811.454	1061.795
156	Canada	USD (2018 prices and exchange rates)	Energy efficiency	111.75	116.876	82.992	137.938	209.781
157	Canada	USD (2018 prices and exchange rates)	Fossil fuels	293.138	259.019	137.275	180.941	283.056
158	Canada	USD (2018 prices and exchange rates)	Renewables	90.993	111.599	93.966	95.454	87.379
159	Canada	USD (2018 prices and exchange rates)	Nuclear	100.012	137.168	118.61	104.519	115.11
160	Canada	USD (2018 prices and exchange rates)	Hydrogen and fuel cells	10.795	10.198	17.048	16.984	17.805
161	Canada	USD (2018 prices and exchange rates)	Other power and storage technologies	113.485	85.801	74.656	74.349	88.856
162	Canada	USD (2018 prices and exchange rates)	Other cross-cutting technologies/research	31.569	4.257	7.12	15.938	17.299
163	Canada	USD (2018 prices and exchange rates)	Unallocated	0	0	0	0	0
164	Canada	USD (2018 prices and exchange rates)	Total Budget	751.742	724.918	531.664	626.122	819.286
165	Canada	USD (2018 prices and PPP)	Energy efficiency	115.955	121.274	86.114	143.129	217.675
166	Canada	USD (2018 prices and PPP)	Fossil fuels	304.169	268.765	142.44	187.75	293.708
167	Canada	USD (2018 prices and PPP)	Renewables	94.417	115.798	97.502	99.046	90.667
168	Canada	USD (2018 prices and PPP)	Nuclear	103.775	142.33	123.073	108.452	119.442
169	Canada	USD (2018 prices and PPP)	Hydrogen and fuel cells	11.201	10.582	17.689	17.623	18.475
170	Canada	USD (2018 prices and PPP)	Other power and storage technologies	117.755	89.03	77.465	77.147	92.199
171	Canada	USD (2018 prices and PPP)	Other cross-cutting technologies/research	32.757	4.417	7.388	16.538	17.95

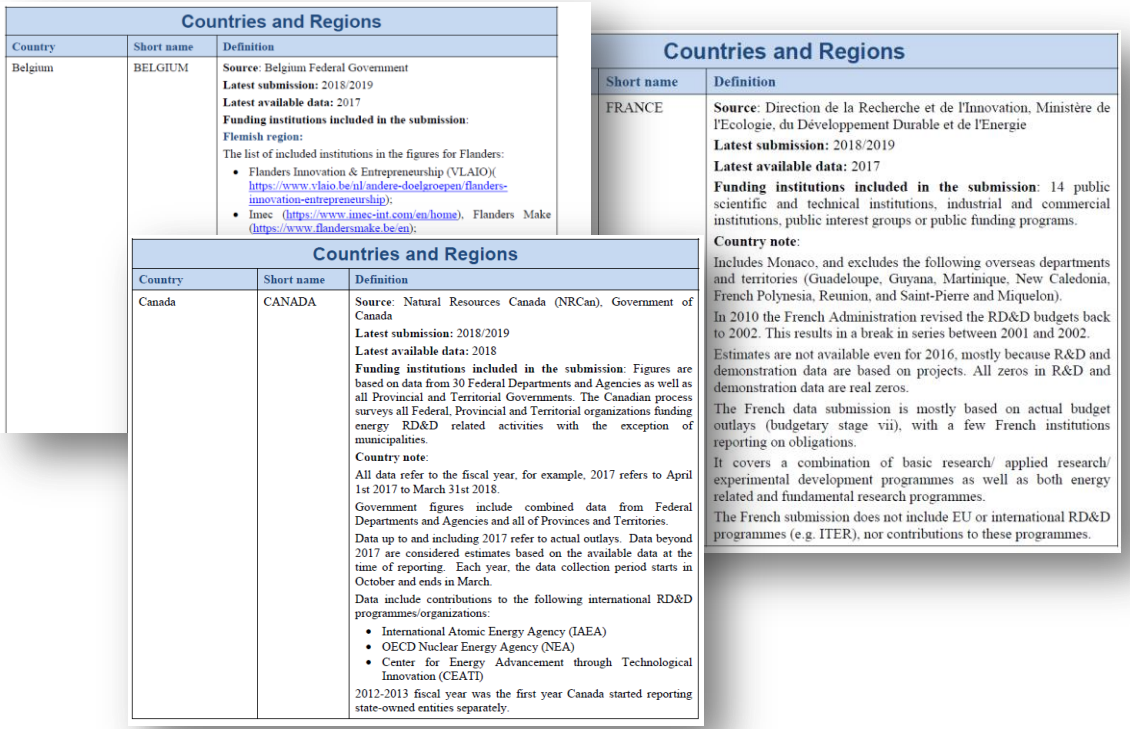
Database in Excel format now available!

Raise the exposure of the energy technology RD&D data in different format to be able to reach all users

Available at https://www.iea.org/statistics/rdd/

Raise the profile of Energy RD&D data by enhancing accessibility

Enhanced country information to increase transparency



Countries and Regions

Country	Short name	Definition
Belgium	BELGIUM	**Source**: Belgium Federal Government **Latest submission:** 2018/2019 **Latest available data:** 2017 **Funding institutions included in the submission**: **Flemish region:** The list of included institutions in the figures for Flanders: • Flanders Innovation & Entrepreneurship (VLAIO)(https://www.vlaio.be/nl/andere-doelgroepen/flanders-innovation-entrepreneurship); • Imec (https://www.imec-int.com/en/home), Flanders Make (https://www.flandersmake.be/en);

Countries and Regions

Short name	Definition
FRANCE	**Source**: Direction de la Recherche et de l'Innovation, Ministère de l'Ecologie, du Développement Durable et de l'Energie **Latest submission:** 2018/2019 **Latest available data:** 2017 **Funding institutions included in the submission**: 14 public scientific and technical institutions, industrial and commercial institutions, public interest groups or public funding programs. **Country note**: Includes Monaco, and excludes the following overseas departments and territories (Guadeloupe, Guyana, Martinique, New Caledonia, French Polynesia, Reunion, and Saint-Pierre and Miquelon). In 2010 the French Administration revised the RD&D budgets back to 2002. This results in a break in series between 2001 and 2002. Estimates are not available even for 2016, mostly because R&D and demonstration data are based on projects. All zeros in R&D and demonstration data are real zeros. The French data submission is mostly based on actual budget outlays (budgetary stage vii), with a few French institutions reporting on obligations. It covers a combination of basic research/ applied research/ experimental development programmes as well as both energy related and fundamental research programmes. The French submission does not include EU or international RD&D programmes (e.g. ITER), nor contributions to these programmes.

Countries and Regions

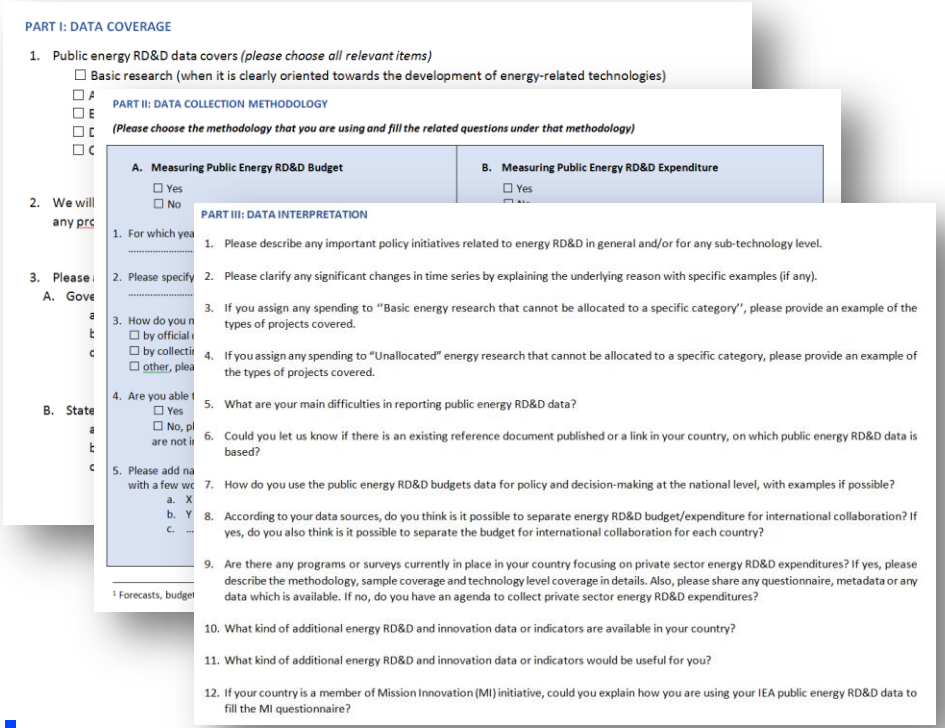
Country	Short name	Definition
Canada	CANADA	**Source**: Natural Resources Canada (NRCan), Government of Canada **Latest submission:** 2018/2019 **Latest available data:** 2018 **Funding institutions included in the submission**: Figures are based on data from 30 Federal Departments and Agencies as well as all Provincial and Territorial Governments. The Canadian process surveys all Federal, Provincial and Territorial organizations funding energy RD&D related activities with the exception of municipalities. **Country note**: All data refer to the fiscal year, for example, 2017 refers to April 1st 2017 to March 31st 2018. Government figures include combined data from Federal Departments and Agencies and all of Provinces and Territories. Data up to and including 2017 refer to actual outlays. Data beyond 2017 are considered estimates based on the available data at the time of reporting. Each year, the data collection period starts in October and ends in March. Data include contributions to the following international RD&D programmes/organizations: • International Atomic Energy Agency (IAEA) • OECD Nuclear Energy Agency (NEA) • Center for Energy Advancement through Technological Innovation (CEATI) 2012-2013 fiscal year was the first year Canada started reporting state-owned entities separately.

- The IEA database is published along with a country specific analysis which includes all the **assumptions/methodology used for reporting the data**.

- **Sources**
- **Funding institutions included in the submission**
- **Assumptions used**
- **Exclusions**

Available at https://www.iea.org/statistics/rdd/

Plans to further enhance data quality



PART I: DATA COVERAGE

1. Public energy RD&D data covers *(please choose all relevant items)*
   - ☐ Basic research (when it is clearly oriented towards the development of energy-related technologies)

PART II: DATA COLLECTION METHODOLOGY

(Please choose the methodology that you are using and fill the related questions under that methodology)

A. Measuring Public Energy RD&D Budget	B. Measuring Public Energy RD&D Expenditure
☐ Yes ☐ No	☐ Yes

PART III: DATA INTERPRETATION

1. Please describe any important policy initiatives related to energy RD&D in general and/or for any sub-technology level.
2. Please clarify any significant changes in time series by explaining the underlying reason with specific examples (if any).
3. If you assign any spending to "Basic energy research that cannot be allocated to a specific category", please provide an example of the types of projects covered.
4. If you assign any spending to "Unallocated" energy research that cannot be allocated to a specific category, please provide an example of the types of projects covered.
5. What are your main difficulties in reporting public energy RD&D data?
6. Could you let us know if there is an existing reference document published or a link in your country, on which public energy RD&D data is based?
7. How do you use the public energy RD&D budgets data for policy and decision-making at the national level, with examples if possible?
8. According to your data sources, do you think is it possible to separate energy RD&D budget/expenditure for international collaboration? If yes, do you also think is it possible to separate the budget for international collaboration for each country?
9. Are there any programs or surveys currently in place in your country focusing on private sector energy RD&D expenditures? If yes, please describe the methodology, sample coverage and technology level coverage in details. Also, please share any questionnaire, metadata or any data which is available. If no, do you have an agenda to collect private sector energy RD&D expenditures?
10. What kind of additional energy RD&D and innovation data or indicators are available in your country?
11. What kind of additional energy RD&D and innovation data or indicators would be useful for you?
12. If your country is a member of Mission Innovation (MI) initiative, could you explain how you are using your IEA public energy RD&D data to fill the MI questionnaire?

Metadata are crucial to **increase data quality.**

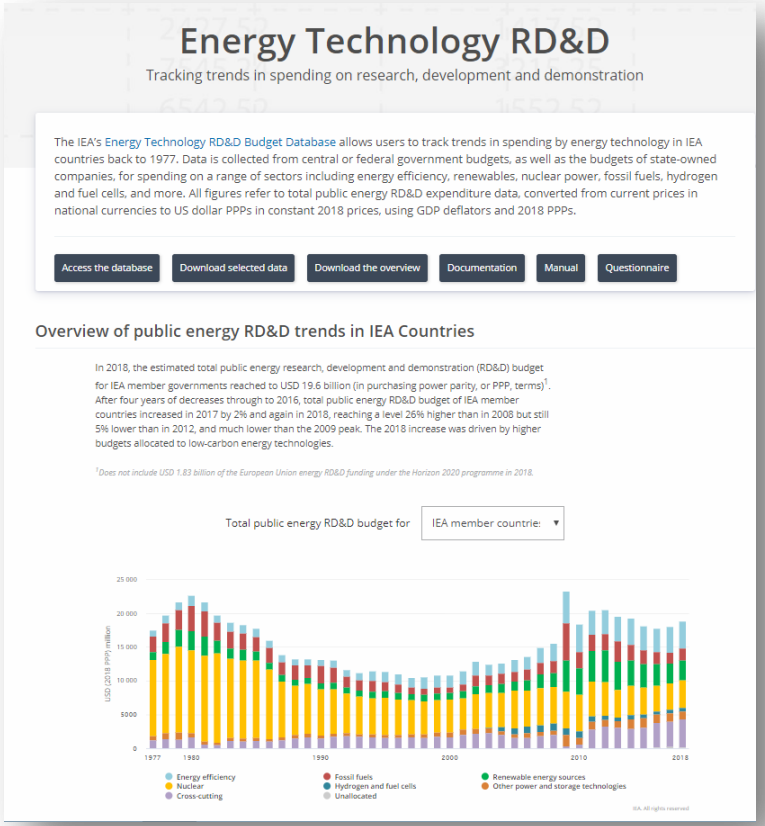
In order to increase data quality of the current data collection, IEA will soon launch an **enhanced metadata collection**

The questionnaire includes 3 Sections:

- Coverage
- Collection methodology
- Interpretation

IEA report cards – enhancing data quality with data providers

Dissemination: RD&D statistics website



Raising the exposure of Energy Technology RD&D

- **Database**
- **Interactive graphs**
- **Overview**
- **Excel file**
- **Manual**

Available at https://www.iea.org/statistics/rdd/

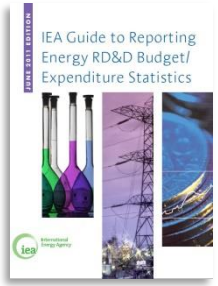
IEA – Methodology review

IEA energy RD&D: boundaries

- **It covers national budgets & expenditures on:**
- "**Basic research**" when clearly for development of energy-related technologies
- "**Applied research**" & "experimental development"
- "**Demonstration**" (large-scale but not on a commercial basis)
- **and excludes:**
- "**Deployment**"
- "**Education and training**" (partially excluded)
- "**Administration and other supporting activities**"

2 Reference publications

- ❑ *IEA guide to reporting energy RD&D budget/expenditure statistics*
- ❑ *Frascati Manual , guidelines for definitions & surveys of* R&D



IEA guide available at:
http://www.iea.org/stats/RDD%20Manual.pdf

What technologies do we cover?

Energy Efficiency	• Industry, residential, transport, …
Fossil Fuels	• Oil, gas, coal, CCS, …
Renewable Energy	• Solar, wind, biofuels, …
Nuclear	• Fission, fusion
Hydrogen & Fuel Cells	• Hydrogen, fuel cells
Other Power and Storage Technologies	• Power generation, T&D, storage
Other Cross-Cutting Technologies	• Cross-cutting and others, basic research

7 Groups of energy related RD&D, **2-digit**, **3-digit** & **4-digit** breakdowns available

thanks for your attention.