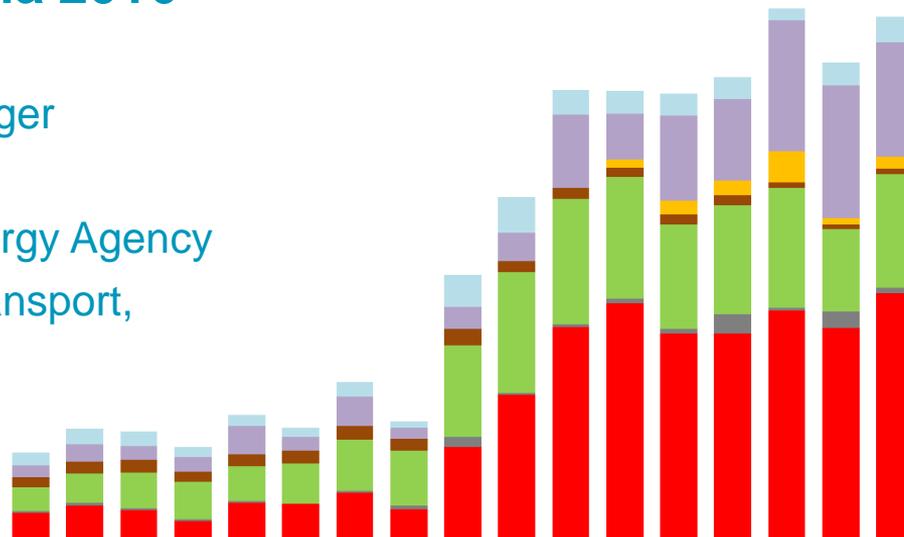


# Energy R&D Public Expenditures in Austria 2016

Andreas Indinger, Marion Katzenschlager

Survey carried out by the Austrian Energy Agency  
on behalf of the Federal Ministry of Transport,  
Innovation and Technology  
June 2017



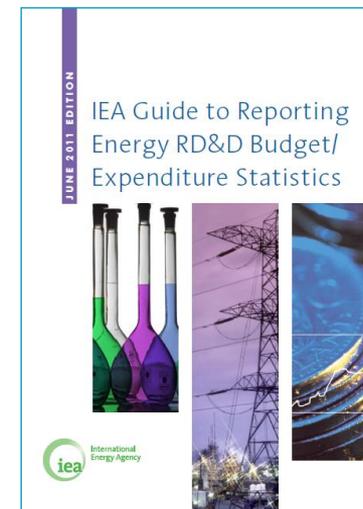
## About the Survey

- Being a member of the International Energy Agency (IEA), Austria is obliged to yearly record all energy related research, development and first-of-its-kind demonstration projects carried out in Austria and supported resp. financed by means of public funds.
- The Austrian Energy Agency has been appointed by the Federal Ministry of Transport, Innovation and Technology to gather and evaluate the data.
- This annual survey is not only an international obligation but also allows emphasizing the importance of the energy research for Austria as well as creating and checking policy goals.
- This survey has been carried out annually since 1974. Annual publication of data as full report.



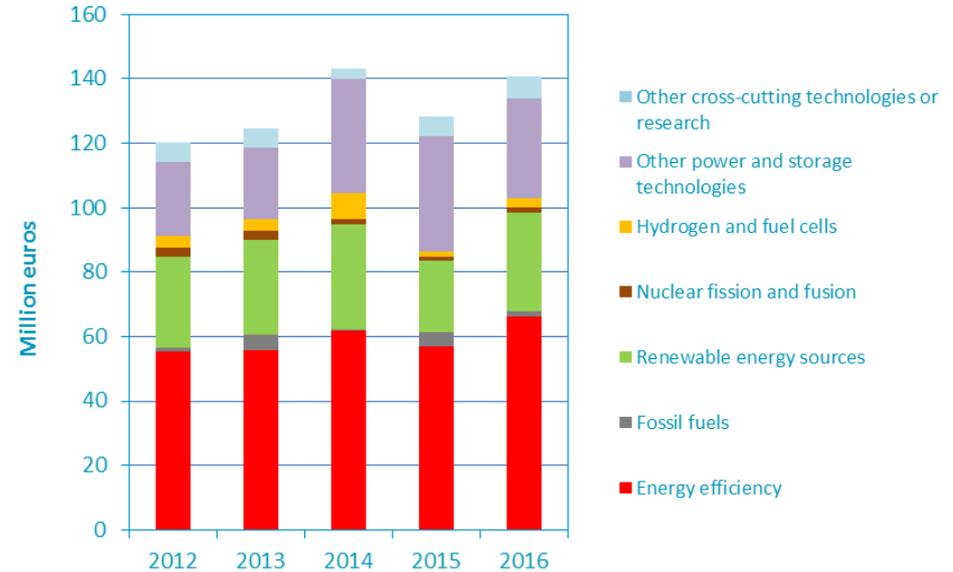
## About the method

- International standards set by IEA Guide to Reporting Energy RD&D Budget/Expenditure Statistics (June 2011) and OECD (Frascati manual).
- Data for Austria shows real expenditures (primarily obligations, that were actually committed during the year 2016) - no budgets!
- Some 970 energy research projects and activities have been registered and analyzed for the year 2016.



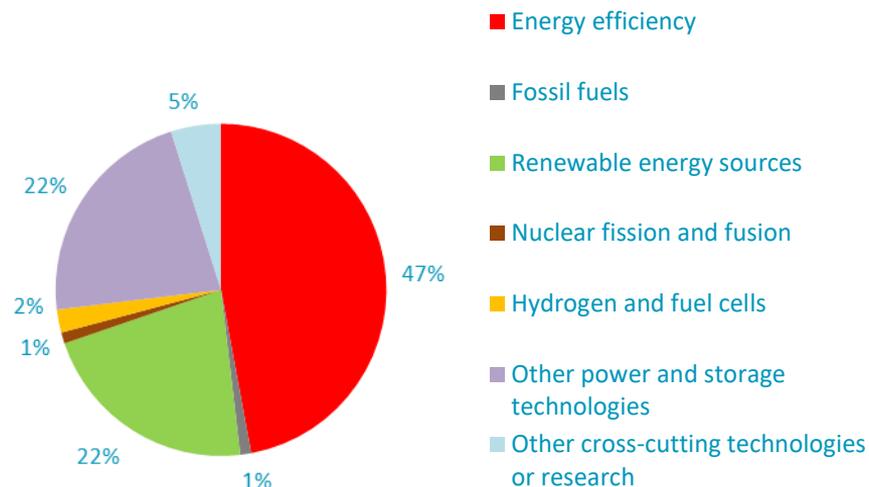
## Overview

In 2016, Austria's public expenditures for energy-related research and development amounted to 140,891,866 euros, increasing the expenditures of 2015 by 12.5%.



## Areas of R&D 2016

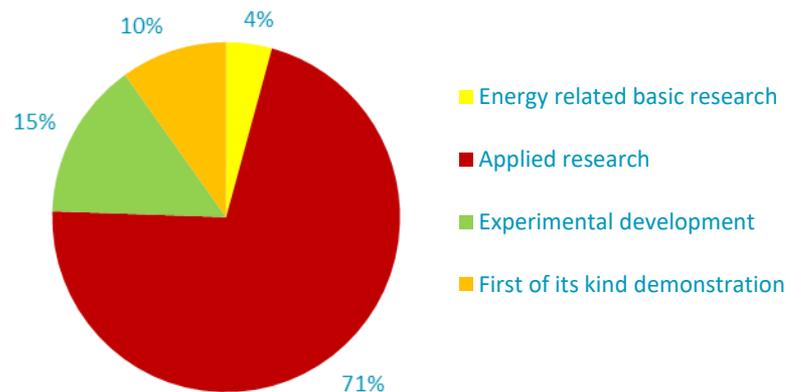
The research areas of energy efficiency, renewables, smart grids and storage define the priorities of the publicly financed energy research within Austria.



## Type of energy RD&D

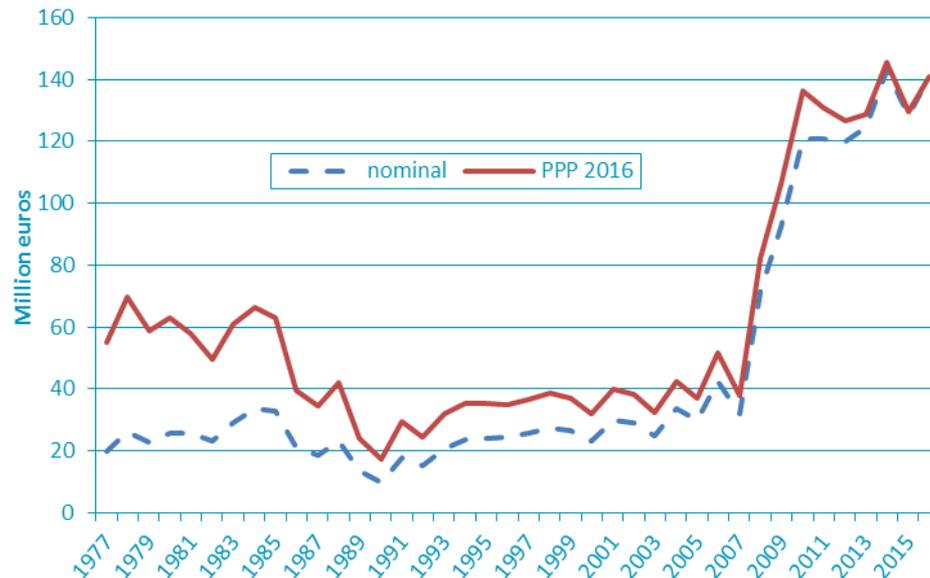
- Energy related basic research (TRL 1 - 2) represented a small yet very important portion of 4%.
- About 71% of the means were used for applied research (TRL 2 - 4).
- 15% for experimental development (TRL 4 - 7).
- First-of-its-kind demonstration (TRL 7 - 8) amounted to 10% in 2015.

TRL ... Technology Readiness Level



## Public energy R&D expenditures in Austria 1977 - 2016

During the last years, the high levels of R&D expenditure as experienced in the 1970s in consequence of the oil crises have (inflation-adjusted) again been reached and were even doubled since 2010.



## Changes compared to 2015

Topics according to the IEA code	Expenditure 2016 in euros	Changes compared to 2015 in euros	Changes compared to 2015 in %
Energy efficiency	66,320,600	+9,363,677	+16.4%
Fossil fuels	1,507,116	-2,922,875	-66.0%
Renewable energy sources	30,486,378	+8,367,874	+37.8%
Nuclear fission and fusion	1,519,662	+217,436	+16.7%
Hydrogen and fuel cells	3,162,767	+1,467,054	+86.5%
Other power and storage technologies	31,003,648	-4,876,881	-13.6%
Other cross-cutting technologies or research	6,891,695	+860,496	+14.3%
<b>Total</b>	<b>140,891,866</b>	<b>+12,476,781</b>	<b>+9.7%</b>

## „Top10“ 2016

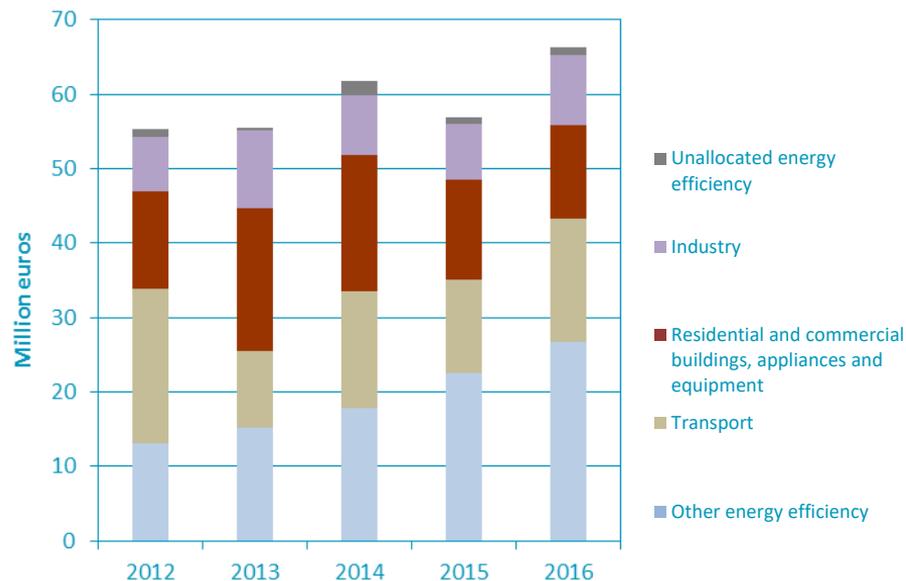
2016 not any more  
in TOP10:

- Electric power generation
- CCS

Ranking 2016	Change compared to 2015	Subcategory	2016 million euros
1	0	Electricity transmission and distribution – smart grids	17.5
2	0	Smart cities and communities	15.9
3	1	Efficient residential and commercial buildings	12.2
4	4	PV	11.6
5	0	Biofuels	11.1
6	0	Hybrid and electric vehicles	11.1
7	0	Energy efficiency in industry	9.3
8	-5	Energy storage	7.7
9	new in Top10	Waste heat recovery and utilisation	4.7
10	new in Top10	Heat pumps and chillers	3.8

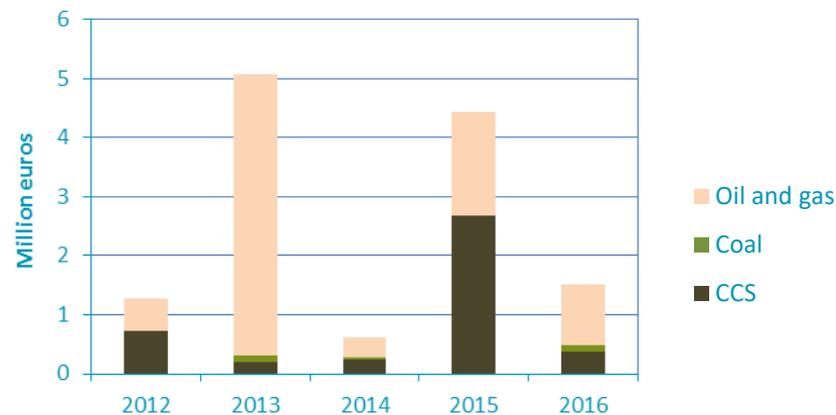
## Energy Efficiency

- 66.3 million euros in total for 2016, a plus of 9.4 million euros in one year.
- Top priority 2016: smart cities and communities (under “other...”).



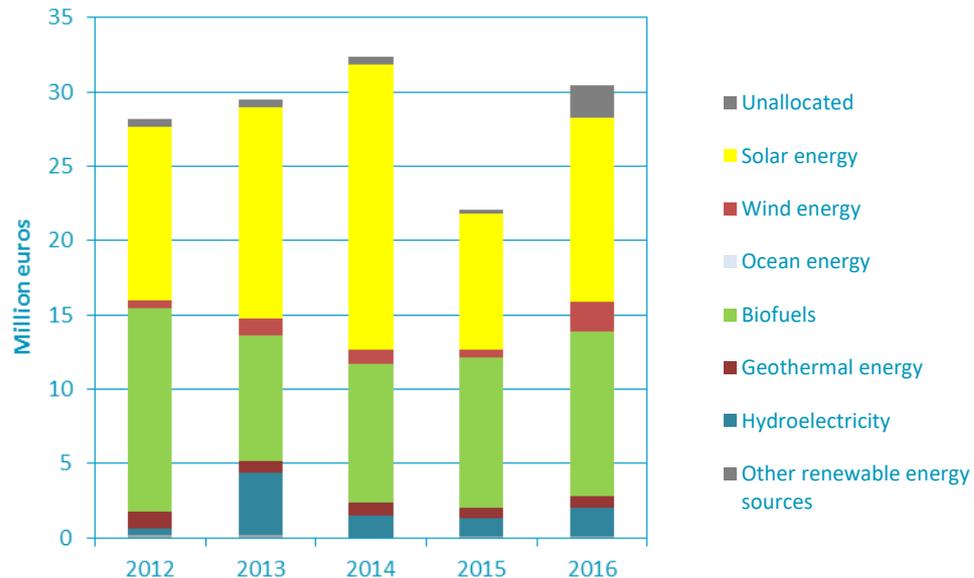
## Fossil Fuels

- 2013: RD&D activities peaked
- 2015: substantial expenditures for CCS
- 2016: decrease down to 1.5 million euros



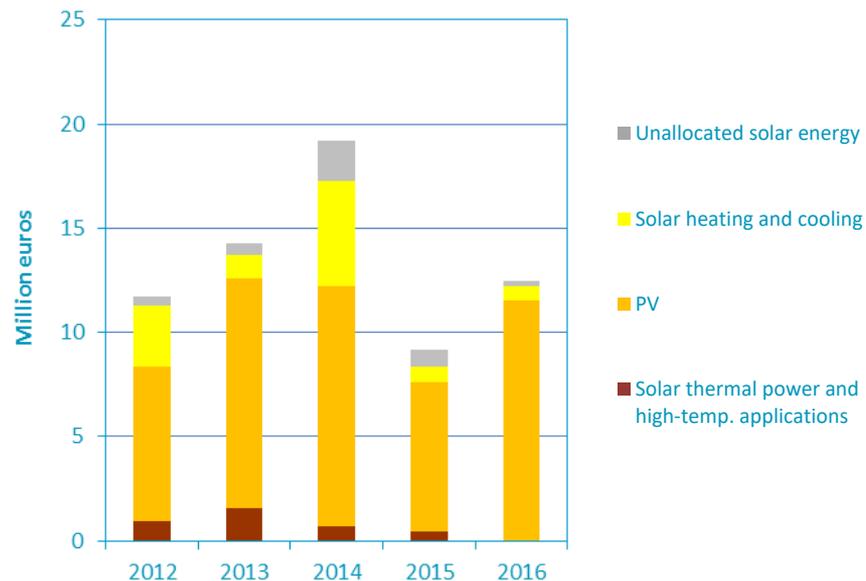
## Renewable energy sources

- Expenditures for renewable energy technologies summed up to 30.5 million euros, which was 38% above the level of 2016.
- Biofuels and solar energy provided the main share of activities.



## Solar energy

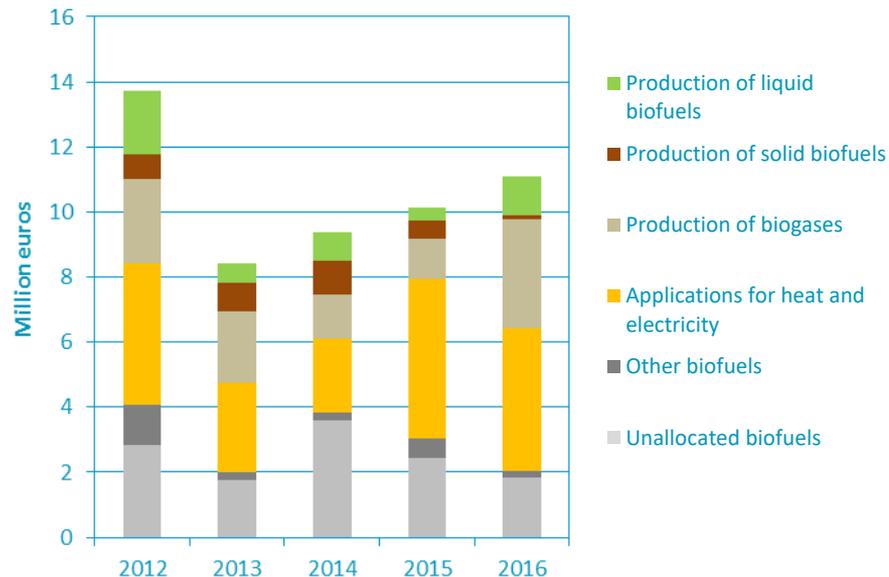
- 2016: 12.4 million euros
- Clear focus on PV in the solar portfolio (11.6 million euros in 2016)



## Biofuels

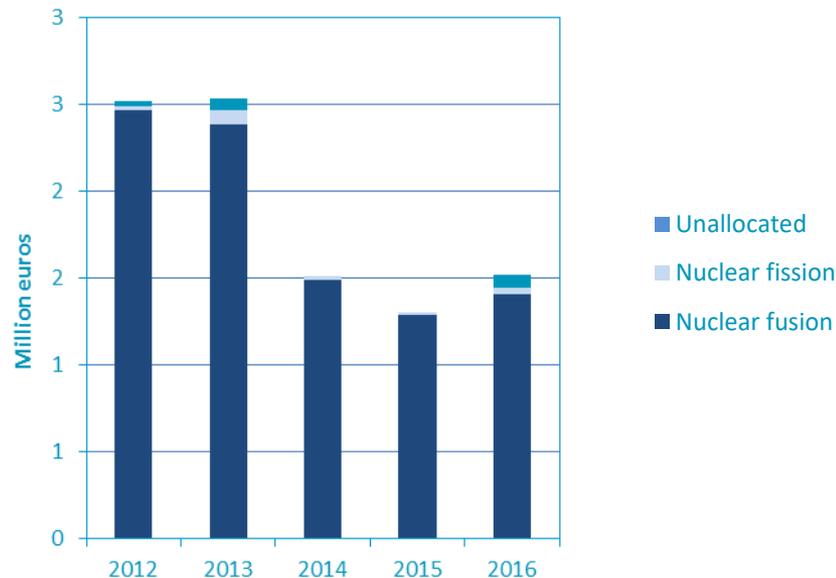
- 2016: 11.1 million euros

- High share of „unallocated“: due to many integrated projects and financing of a competence center (bioenergy 2020+).



## Nuclear fission and fusion

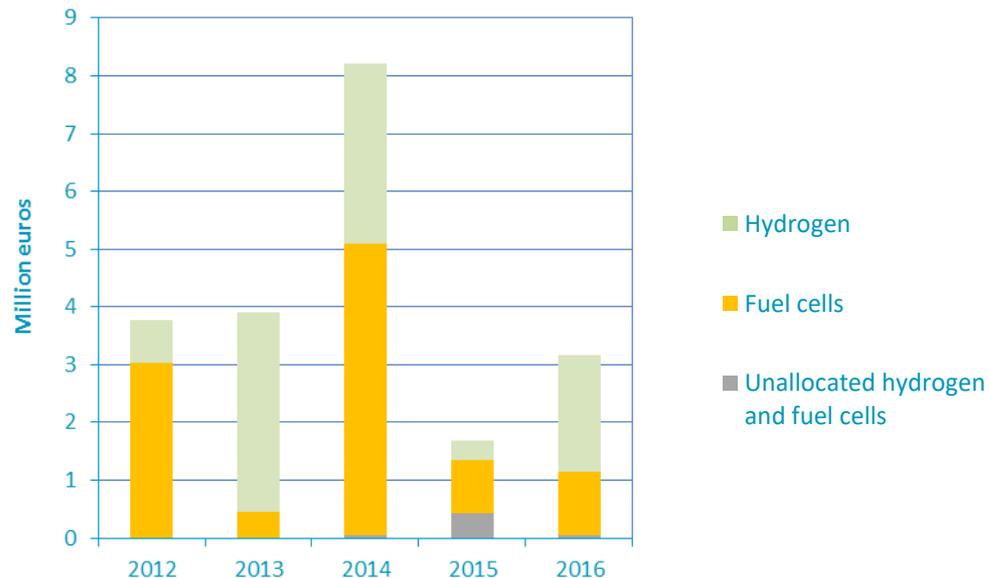
- Projects in nuclear fusion are carried out primarily at universities under the Fusion@ÖAW in the EUROfusion programme, Horizon 2020 (started in 2014).
- (ÖAW: Austrian Academy of Sciences)
- Data includes only national financial contributions.



## Hydrogen and fuel cells

- 2015: strong decrease after peak in 2014

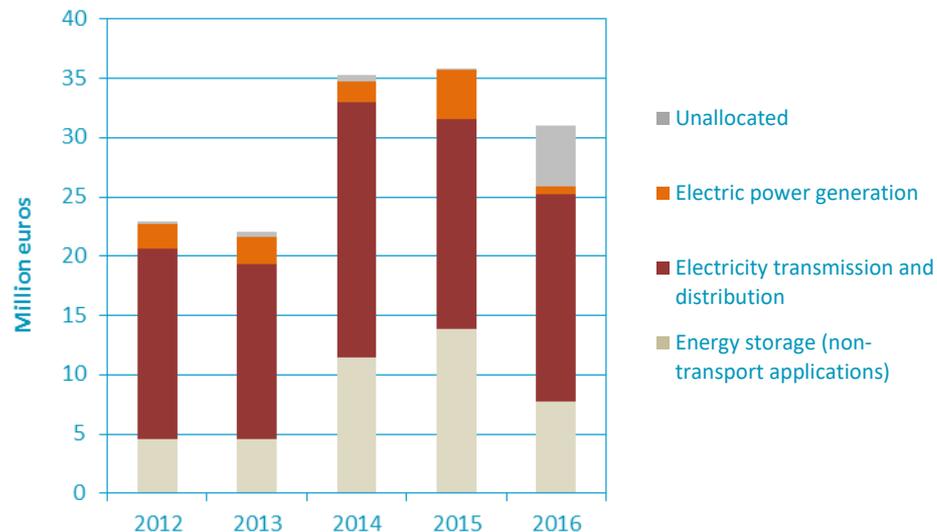
- 2016: 3.2 million euros



## Other power and storage technologies

2016: decrease to 31 million euros

- Expenditures of around 17.5 million euros for electricity transmission and distribution.
- 7.7 million euros for storage (electricity and heat).



## Who was financing in 2016?



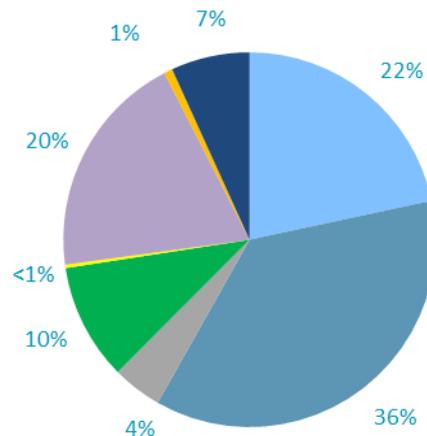
- About 73% of this expenditure were provided by governmental authorities (federal, regional, funding organizations).



- The remaining part came from (publicly funded) research institutions and universities provided in equity capital.



- No third party financing or EU projects were covered in this survey.

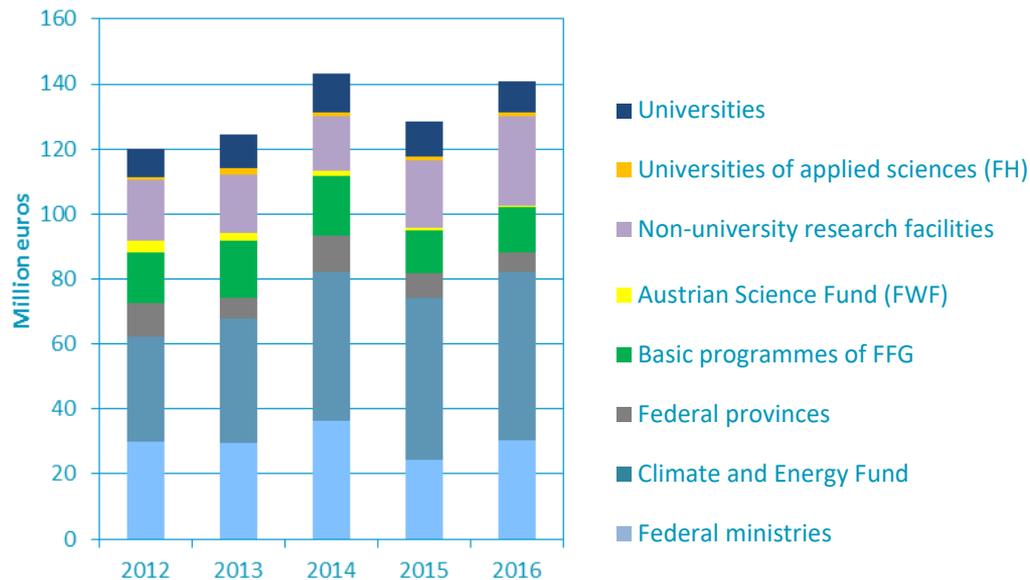


- Federal ministries
- Climate and Energy Fund
- Federal provinces
- Basic programmes of FFG
- Austrian Science Fund (FWF)
- Non-university research facilities
- Universities of applied sciences (FH)
- Universities

## Institutions financing RD&D

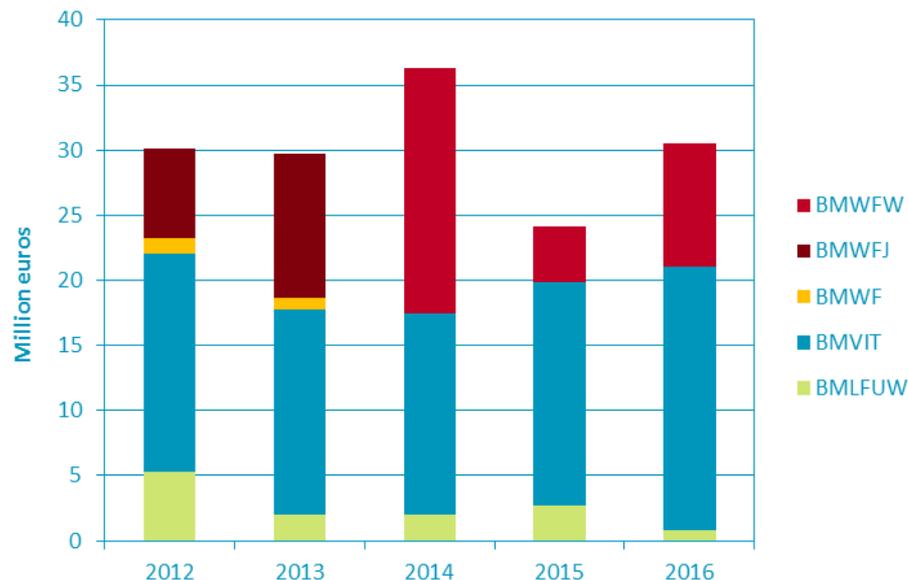
Institution	Expenditure 2016 in euros	Changes compared to 2015 in euros	Changes compared to 2015 in %
Federal ministries	30,517,069	+6,336,536	+26.2%
Climate and Energy Fund	51,491,365	+1,441,900	+2.9%
Federal provinces	6,075,588	-1,612,164	-21.0%
FFG basic programmes	4,160,312	+1,033,005	+7.9%
FWF (Austrian Science Fund)	422,327	-292,736	-40.9%
Non-university research facilities	27,571,790	+6,874,671	+33.2%
Universities of applied sciences (FH)	1,031,083	-292,662	-22.1%
Universities	9,622,332	-1,011,769	-9.5%
<b>Total</b>	<b>140,891,866</b>	<b>+12,476,781</b>	<b>+9.7%</b>

## Institutions 2012 - 2016



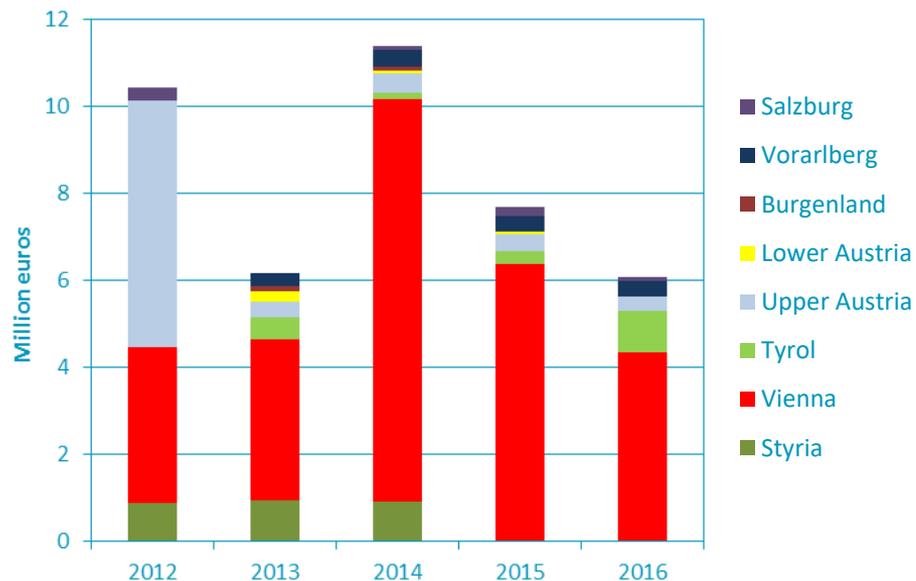
## Federal ministries

- BMWF: Austrian Federal Ministry for Science and Research (until 2013)
- BMLFUW: Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management
- BMWFJ: Austrian Federal Ministry of Economy, Family and Youth (until 2013)
- BMVIT: Austrian Federal Ministry for Transport, Innovation and Technology
- BMWFW : Austrian Federal Ministry of Science, Research and Economy (starting 2014, replacing BMWF and BMWFJ)
- *Expenditures of the Climate and Energy Fund, bottom-up programs of FFG and the Austrian Science Fund (FWF) not included.*



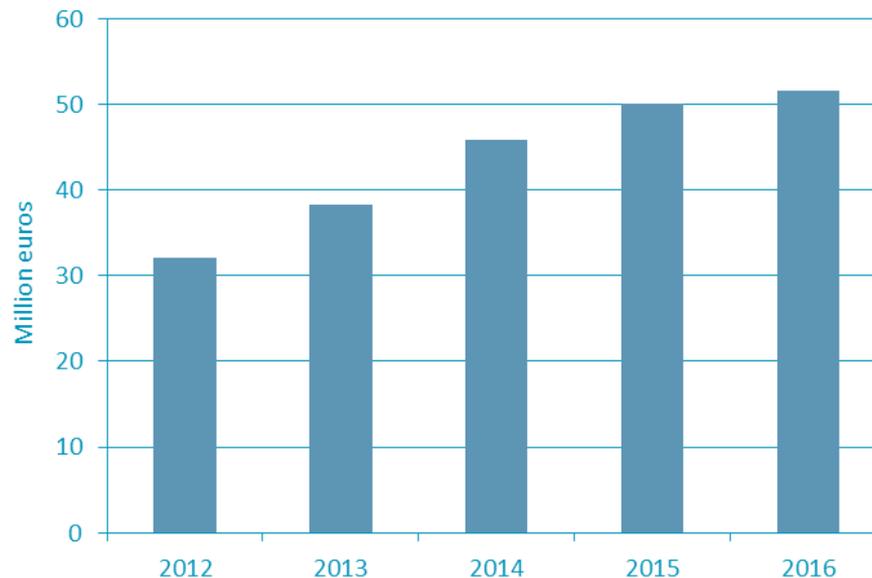
## Federal provinces

- 2014: all time high, due to strong increase of Vienna.
- 2016: the total expenditures of the nine federal provinces of Austria with Vienna still in the lead decreased to 6.1 million euros.



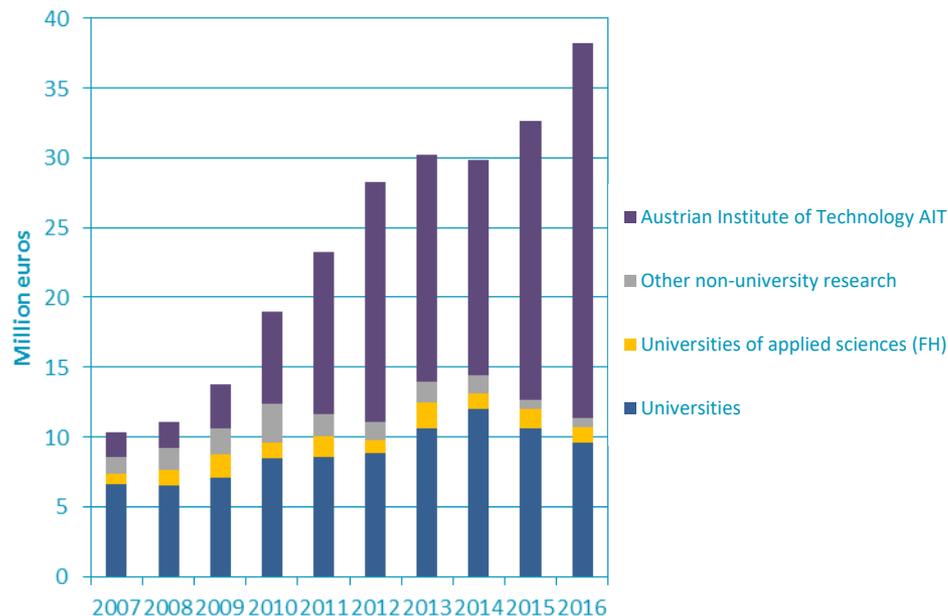
## Climate and Energy Fund

- Due to several energy research programs, the Climate and Energy Fund spent 51.5 million euros in 2016.
- Starting its operation in 2007, overall expenditures summed up to 379 million euros till now.



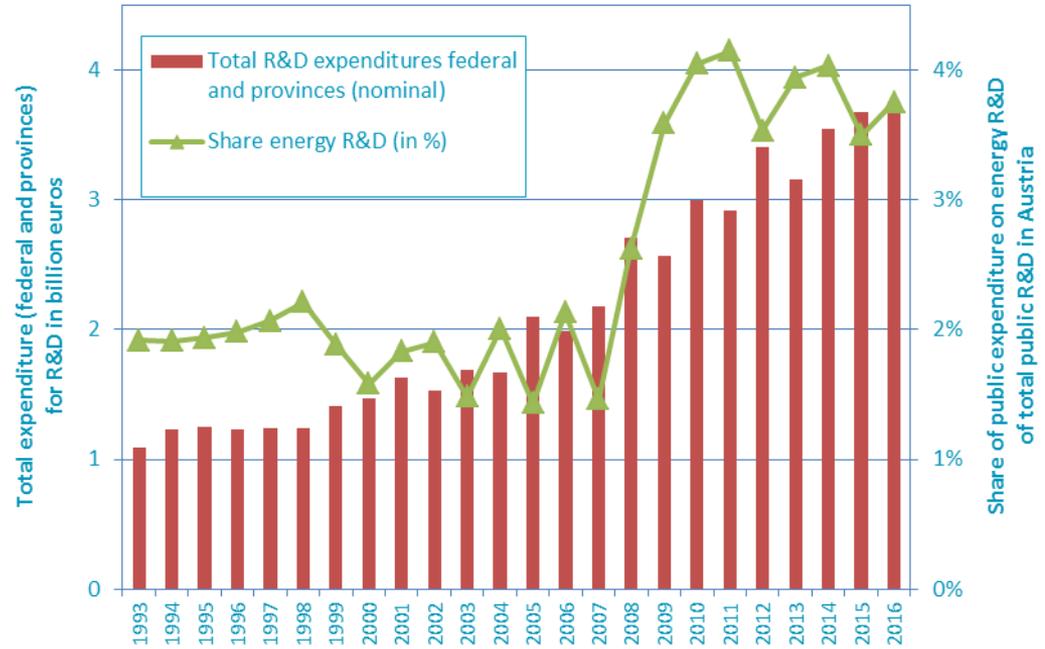
## Equity capital for R&D-infrastructure

- The expenditures of the (non-university) research institutions were 27.6 million euros; about 97% of this sum was invested by the Austrian Institute of Technology – AIT.
- Universities spent 9.6 million euros in total with equity capital (Lead: Vienna University of Technology).
- 1 million euros from universities of applied sciences (Fachhochschulen or FHs).



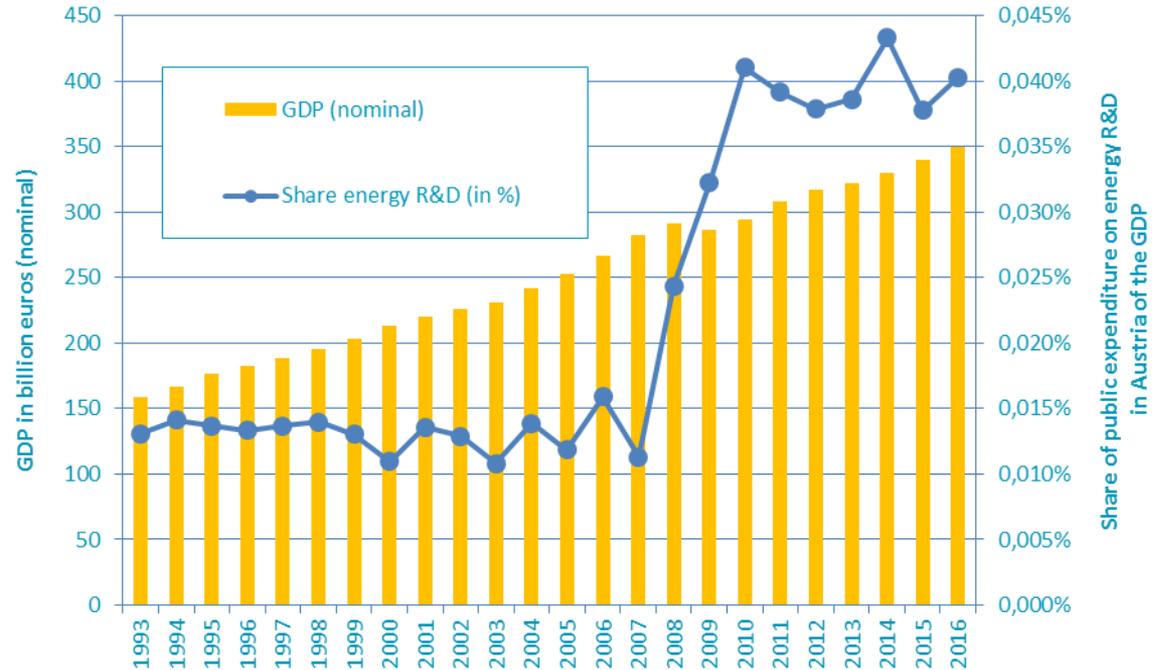
## Share in research

2016: Share of public expenditure on energy R&D of total public R&D in Austria at 3.75%.



## Share of the GDP

- From 2008 on: substantial increase
- 2010 till now: around 0,04% („innovation follower“)



## Publications

- Andreas Indinger, Marion Katzenschlager, Energieforschungserhebung 2015 – Ausgaben der öffentlichen Hand in Österreich. In: BMVIT (Hrsg.) Schriftenreihe 14/2016
- Andreas Indinger, Marion Katzenschlager, Energieforschungserhebung 2014 – Ausgaben der öffentlichen Hand in Österreich. In: BMVIT (Hrsg.) Schriftenreihe 12/2015
- Andreas Indinger, Marion Katzenschlager, Energieforschungserhebung 2013 – Ausgaben der öffentlichen Hand in Österreich. In: BMVIT (Hrsg.) Schriftenreihe 27/2014
- Andreas Indinger, Marion Katzenschlager, Energieforschungserhebung 2012 – Ausgaben der öffentlichen Hand in Österreich. In: BMVIT (Hrsg.) Schriftenreihe 38/2013
- Andreas Indinger, Marion Katzenschlager, Energieforschungserhebung 2011 – Ausgaben der öffentlichen Hand in Österreich. In: BMVIT (Hrsg.) Schriftenreihe 55/2012

And more downloads: <http://www.nachhaltigwirtschaften.at/iea/publikationen/energieforschungserhebungen.html>