Energiewende in Germany – a nationwide experiment without evaluation?

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Transforming the German energy system - Monitoring an open heart surgery.

1) Welcome to Germany
2) Germany‘s energy transition:
   - **History of Germany‘s Apollo Project**
   - **The spider web of targets**
3) Monitoring process:
   - **65 Indicators to track progress**
   - **Tracking progress: Failing the emission targets?**
   - **What the experts say**
4) Conclusions. Or: Shouldn‘t a M&E system impact the evaluandum?
5) Recommendations

1) Welcome to Germany‘s energy system

1) Basic facts about Germany

- 80 million inhabitants
- Europe's largest economy and largest emitter of GHG: 940 t $_{2012}$
- High energy consumption: 14.000 PJ $_{2013}$
  - **12 % $_{2013}$ renewables in final energy consumption**
- High electricity production:
  - **630 TWh $_{2012}$, 560 g CO2/ kWh electricity consumption $_{2013}$**
  - **24,5 % $_{2013}$ renewables in gross electricity consumption**

2) The German energy transformation („ENERGIEWENDE“)

History of Germany‘s “Apollo Project“

1991: First renewable electricity feed-in law

1995: Germany’s first GHG target of 25% by 2005 (not achieved)

2000: Schröder’s red-green coalition decides nuclear phase-out by 2022 and a strengthened feed-in legislation

2009: EU 20-20-20 targets

2010: Merkel’s coalition‘s “Energiekonzept”: ambitious RE and efficiency objectives + revocation of nuclear phase-out

2011: Fukushima, Merkel’s government revokes phase-in and passes the “Eckpunkte” paper

Spider web of „Energiewende“ targets

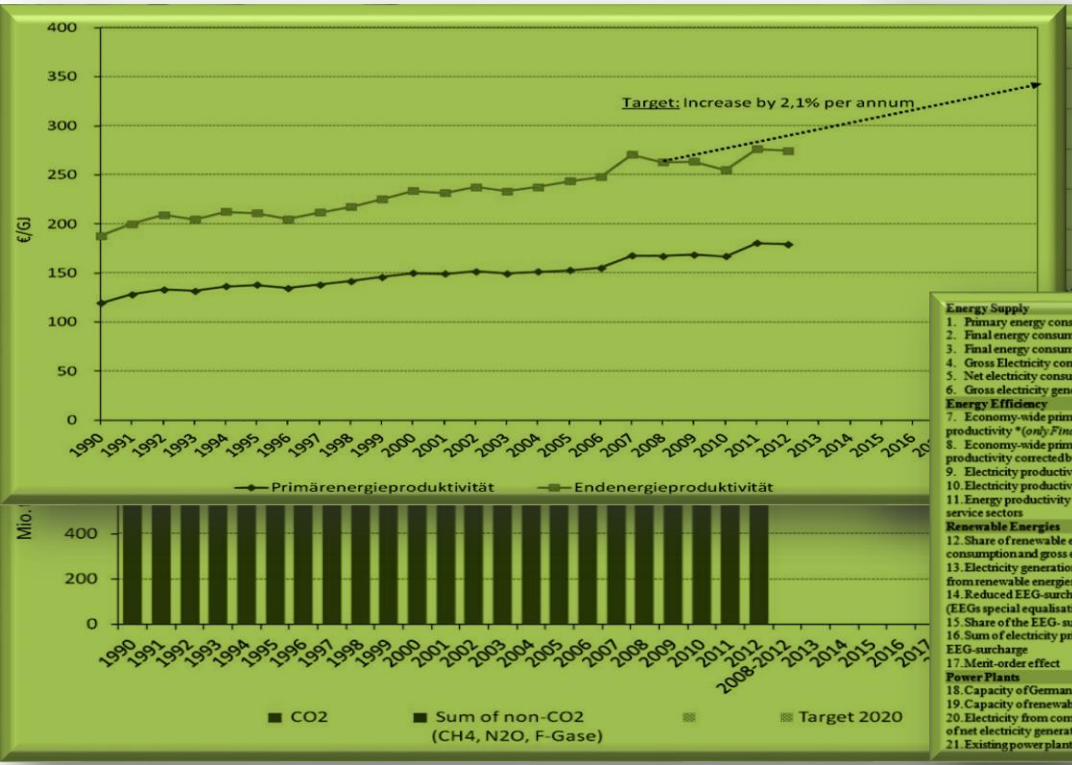
- GHG-target: - 40% by 2020 and -80 to -95 % by 2050 (relative to 1990)
- Renewables:
  - **e.g. Share of renewables in gross energy consumption**
- Efficiency:
  - **e.g. Primary energy consumption**
- Buildings:
  - **e.g. Heating energy consumption**
- Transport:
  - **E.g. Number of electric vehicles**

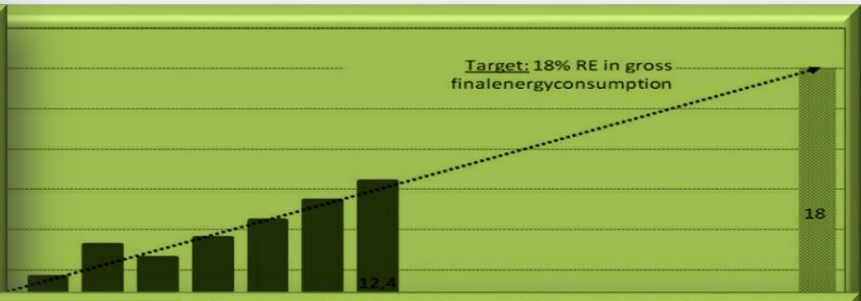
	Target	2020*	2050*	Remarks
GHG	Greenhouse gas emissions	-40%	-80% to -95%	rel. to 1990
Renew-ables	Share of renewables in gross energy consumption	18%	60%	
	Share of renewables in gross electricity consumption	35%	80%	
Efficiency	Primary energy consumption	-20%	-50%	rel. to 2008
	Annual increase in final energy productivity			2,1% p.a.
	Gross electricity consumption	-10%	-25%	rel. to 2008
	Share of electricity generation from combined heat and power	25%		
Buildings	Annual rate of building energy renovation		climate neutral buildings	2% p.a.
	Heating energy consumption*	-20%	-80%	
Trans port	Final energy consumption transport sector	-10%	-40%	rel. to 2005
	Number of electric verhicles	1 Mio.		

* Most targets are also specified for 2030 and 2040

source: Wörlen et al. 2014

3) Monitoring the Energiewende





Energy Supply
1. Primary energy consumption by energy sources*
2. Final energy consumption by energy sources*
3. Final energy consumption by sector
4. Gross Electricity consumption*
5. Net electricity consumption by sectors
6. Gross electricity generation by energy sources

Energy Efficiency
7. Economy-wide primary and final energy productivity *(only Final)*
8. Economy-wide primary and final energy productivity corrected by temperature and inventory
9. Electricity productivity of the overall economy
10. Electricity productivity of the industrial sector
11. Energy productivity of the business, trade and service sectors

Renewable Energies
12. Share of renewable energy of gross final energy consumption and gross electricity consumption*
13. Electricity generation, final energy and heat energy from renewable energies
14. Reduced EEG-surcharge for energy-intensive users (EEGs special equalisation scheme)
15. Share of the EEG- surcharge by category of plant
16. Sum of electricity price at power exchange and EEG-surcharge
17. Merit-order effect

Power Plants
18. Capacity of German power plants
19. Capacity of renewable energy
20. Electricity from combined heat and power as a share of net electricity generation*
21. Existing power plants by federal state
22. Construction and Planning of conventional power plants
23. Pumped storage hydro power plants
24. Market share of the four biggest electricity generators

Power Grids
25. Electric circuit length of higher and high voltage grids
26. Grid investments
27. Changes in average network fees
28. Costs of grid stabilization
29. SAIDI for electricity
30. investment in smart grids and smart meters
31. physical cross border flows of electricity

Buildings
32. Primary energy demand*
33. Heat demand*
34. Building Renovation rate*
35. Final energy consumption for buildings
36. Specific energy consumption for space heating in households
37. Square footage of buildings
38. Investment in buildings

Transport
39. Final energy consumption in the transport sector*
40. Inventory of electric vehicles*
41. Inventory of Fuel Cell vehicles (FCV)
42. Fuel consumption of new registered passenger cars
43. Kilometres travelled by passengers and goods

Greenhouse Gas Emissions
44. GHG emissions*
45. GHG emissions by emission sources
46. Change of CO_2-emissions from energy sector
47. CO_2-emissions from power generation
48. Change in GHG emissions per capita and per GDP unit
49. Avoided GHG emissions through use of renewable

Energy Costs
50. Change in price of energy resources
51. CO_2 prices
52. Natural gas prices by user group
53. Mineral oil prices
54. Electricity prices by user group
55. Comparison of European electricity and natural gas prices by user group
56. Tax exemptions and privileges for enterprises
57. Energy payments by user groups and as share of income
58. Energy costs for selected sectors
59. Electricity costs in relation to GDP

Economy wide effects
60. Investment in Renewables
61. Reduction of imports of fossil fuels through renewables and energy efficiency
62. Gross employment through Renewables
63. Employment change through energy efficiency measures
64. Employment change in the conventional energy sector
65. Federal expenditure on energy research programs

Monitoring the Energiewende since 2012

- Published by Federal Ministry of Economic Affairs and Energy (BMWi), supported by the Federal Network Agency
- Complex regarding the amount of data

- Government-appointed group of senior experts
- Tasked with validation and critical review of the government's monitoring report


Expertenkommission zum Monitoring-Prozess „Energie der Zukunft"

Stellungnahme zum ersten Monitoring-Bericht der Bundesregierung für das Berichtsjahr 2011

Berlin · Mannheim · Stuttgart, Dezember 2012

- Prof. Dr. Andreas Löschel (Vorsitzender)
- Prof. Dr. Georg Erdmann
- Prof. Dr. Frithjof Staiß
- Dr. Hans-Joachim Ziesing

Monitoring rhythm

- Government publishes annual monitoring report

2012: First Report for 2011 (125 pages)

- **2012: First Statement of the expert commission** (138 pages)

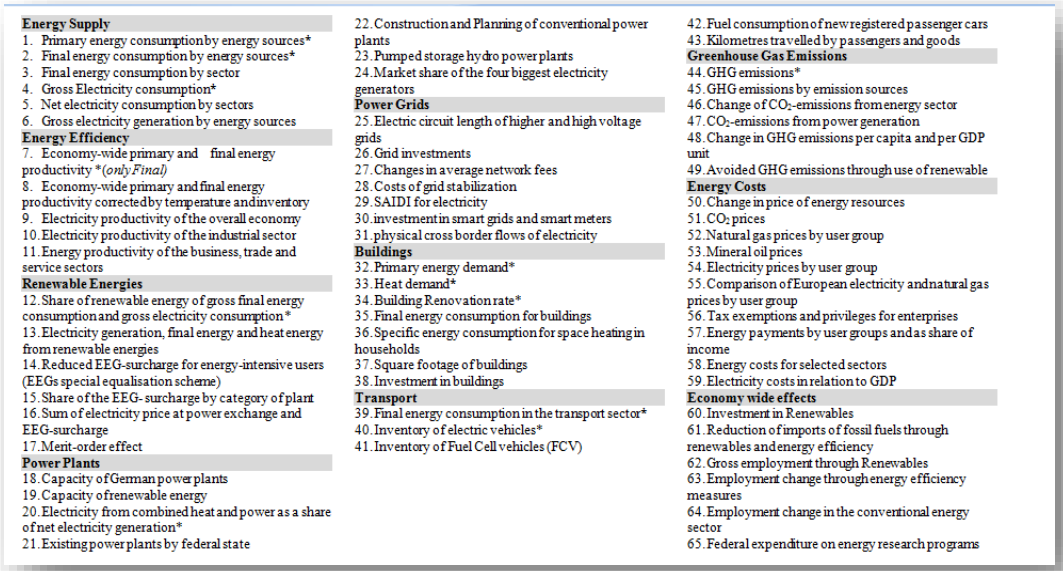
2014: Second Report for 2012 (138 pages)

- **2014: Second Statement of the expert commission** (224 pages)

- Every 3 years a more profound progress report
  - **End of 2014: First progress report**

Indicators of the Energiewende

- 10 categories,
  - **e.g. Renewables, Power Plants, Energy Costs**
- 65 indicators with 12 lead indicators
  - **e.g. Change in price of energy resources**
  - **e.g. GHG emissions**
- 83 tables and graphs



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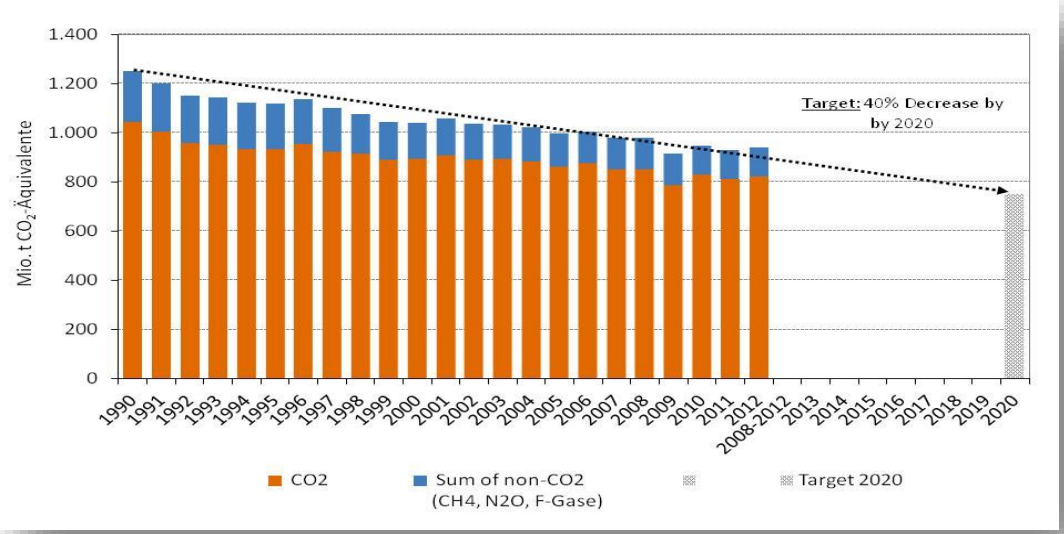
Monitoring Report 2014 translated in: Woerlen et al. (2014)

Examples from the monitoring process: Tracking Progress - GHG emission reduction

- Monitoring Report: *"The Energiewende is getting there"*
- But GHG emissions 5 percent points off track. Current mitigation efforts will reduce GHG emissions by only 35% by 2020.

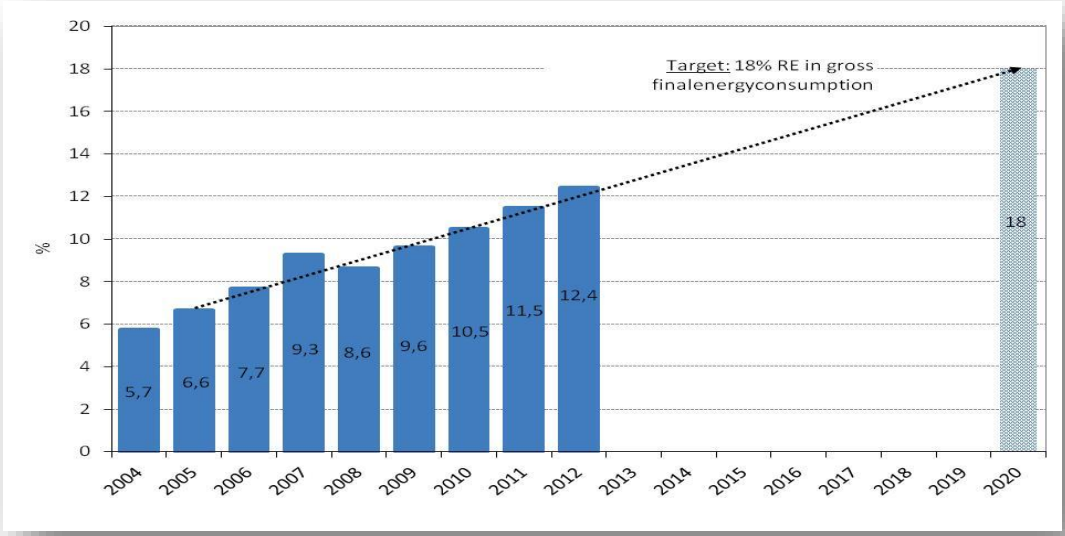


source: Monitoring Report 2014

Examples from the monitoring process: Tracking Progress - RE share in final energy consumption

☑ Overall RE share still on track,

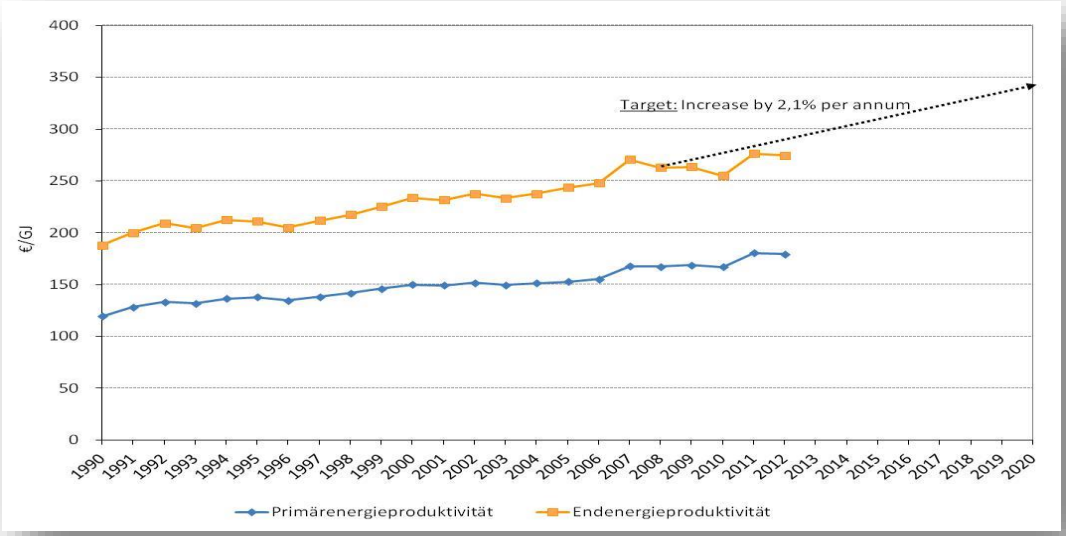
- Expert Commission: RE would need to compensate for lack of energy efficiency



source: Monitoring Report 2014

Examples from the monitoring process: Tracking Progress - Energy productivity

- Off track: ø increase 2008-2012 1.1% instead of 2,1%
- 67% of GHG target is provided by energy efficiency (Expert commission report 2014)



source: Monitoring Report 2014

What the experts say….

- **Monitoring process:**
  - Lack of analysis and evaluation
  - lack of goal hierarchy
- **GHG emissions off track:**
  - not stated clearly and no political consequences derived from it
- **Nuclear Phase-out:**
  - Grid infrastructure to southern Germany must be put in place on time
- **Energy productivity off track:**
  - No consequences drawn for overall target achievement
- **Renewables:**
  - since the increase of energy productivity is not achieved, the RE-targets are insufficient to compensate

4) A nationwide experiment without evaluation?

How should the M&E process work

- Constructive dialogue between “evidence providers” and policy makers
- ownership of evaluation and monitoring results by those evaluated
- Incentives to use the evidence in policy making
- Making evidence “usable” for the policy-making community
- Effective dissemination and wide access
- Stakeholder participation

Critique of the German Monitoring Report

- The report's target group:
  - **the Federal Government reports to itself?**
- The report's purpose:
  - **fuzziness in the definition of the report's purpose: a self-congratulating policy statement or a critical progress evaluation?**
- The report's methodology:
  - **Too many indicators**
  - **Many indicators not SMART and not operationalized, nor do they all have clear targets/ ranges**
  - **No differentiation between indicators that can be directly influenced by government policies and those that cannot**
- The development of the indicators is described but seldom clearly put into context with the Energiewende targets

M&E system should impact the evaluandum

- Evaluation tradition in Germany is still rather weak.
- The Monitoring report's methodology and its application throughout the report is still weak
- Too many indicators to allow for a publicly comprehensible message but it provides for a lot of data for researchers and experts
- As a result Public observers are developing parallel „Energiewendeindizes“
- **Impact of the monitoring report: Currently the report does not seem to be used for management and does not seem to induce changes**

5) Recommendations

5) Recommendations:
Keep the eye on the ball and act accordingly!

- Improve Transparency:
  - **Create an index for easy communication**
  - **Adopt a design that makes it the general reference for all data**
  - **Limit number of indicators and use the indicators in the report**
  - **Structure the indicator system along Energiewende objectives**
- Improve Communication:
  - **Identifying the target group, which is parliament and the public**
  - **Government should use the report for announcing its work program**
- Improve Action:
  - **Binding short-term commitments and follow-up**

Research Paper:

Wörlen, C., Rieseberg, S., Lorenz, R. (2014)

A National Experiment without Evaluation or Monitoring and Evaluating the Energiewende?

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