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

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Abstract

The German "Energiewende" –the transformation of the energy system towards climate compatibility, safety and efficiency– has been described as a national effort of generational dimensions, a German "Apollo Project". The German government has installed a system of monitoring and evaluation, and this paper looks at this process through the lens of Monitoring and Evaluation (M&E) traditions. It investigates to what degree the foundational documents can serve to define indicators and what processes are implemented. The paper describes the actual M&E modalities and derives some recommendations.

Introduction

The German Energiewende ("Energy Transformation") has been described as a national effort of generational dimensions, or a German "Apollo Project" – referring to JFK's effort to put a man on the moon, an unimaginable and very symbolic achievement at the time. The US space program has triggered technological innovation in many fields, in addition to demonstrating and perpetuating US leadership and reputation in seemingly unrelated dimensions like military power or climate science. However, the Energiewende is actually a much larger project: its costs are higher by an order of magnitude – we estimate its cost at 500 to 600 billion Euros - and its potential impacts on Germany's economic development are bigger for Germany than the moon landings' were for the US. While the external reputational impacts are hardly measurable, the risks of transforming an infrastructure vital for economic and social wellbeing bear more similarities to open heart surgery. Mistakes can be very costly while the upside risks might surface only after long delays. In order to stay on track and be efficient, the process will have to be managed "in real time", on the basis of good information, with a strong hand and a clear vision.

From the viewpoint of the evaluator, the case is clear: this national experiment can only be successful if and when economic developments, energy security as well as environmental impacts are monitored in real time, and evaluated well enough that political and regulatory decisions can be taken fast enough to prevent negative consequences. Risks of a lack of evidence-based policy making are the perpetuation of costly trends, technology lock-in effects, but also a slow-down of momentum. But how can the necessary decisions and their potential consequences be taken building on evidence from evaluations?

Background

German energy policy is guided by the so called EU-20-20-20 targets: the EU aims to achieve a reduction in GHG emissions of 20 % compared to 1990 levels, a share of renewable energy of 20 % and an increase in energy efficiency of 20 % compared to baseline projections, all by 2020. The effort sharing decision (DECISION No. 406/2009/EC) lays out that Germany will have to reduce its emissions not covered by the EU Emissions Trading System by 14 % compared to the situation in 2005. 18 % of final energy across all sectors from renewable energies need to be reached (RES Directive, 2009). The National Renewable Energy Action Plan translates this to 38.6 %

renewables in electricity, 15.5 % in heating and 13.2 % in transport (NREAP Germany, 2010). The efficiency target boils down to a 251 Mtoe reduction in primary energy consumption (20 % compared to 2008 (European Commission, 2012). The national Energiewende targets (see below) are broadly aligned with these EU targets.

In terms of an M&E tradition, German fiscal regulations require monitoring of programs (§7 BHO). However, in the energy and environment field, the evaluation tradition in Germany is so far rather weak. Single (subsidy) programs are evaluated at specific request of the funding ministries or (in exceptional cases) the parliament. But the results are mainly used for internal information and potentially marginal changes in the funding schemes. The evaluators are never independent from the program sponsors. In very few cases, federal agencies are tasked with permanent and independent monitoring of the energy market - examples being the grid regulator Federal Network Agency and the Bundesrechnungshof (as the agency monitoring fiscal governance) – or are undertaking evaluations – an example being the Monopolkommission (agency supervising competition issues). For the Energiewende, however, the government has committed to permanent monitoring and subjecting its report to an independent expert commission.

This paper starts with a description of the history of the Energiewende idea and its objectives. It then takes stock of the existing M&E effort of "Monitoring of the Energiewende" itself, and discusses the merits of and experience with the systems.

A short history of the Energiewende

The term "Energiewende" literally translates to "U-Turn on Energy". It was introduced in the German public discussion by researchers from the "Öko-Institut", a self-administered NGO of environmentally-minded scientists, through a publication in 1980 (Krause et al, 1980). Their roots were very much based in the environmental and peace movement in Germany, and by its very nature, the "Energiewende" was a vision for an energy system without nuclear power and oil.

During the 1980s, a number of seminal events and processes influencing the public opinion dominated the media: Acid rain ("Waldsterben" - trees dying of acidification), a large chemical spill in the Rhine river in 1986, the Chernobyl nuclear accident in the same year, the "Ozone Hole" and the increasing scientific certainty on the greenhouse gas effect were contributing to a growing skepticism towards nuclear power and fossil fuels. The ideas of the Energiewende gained traction mainly with the alternative movement, the Green Party entering the parliament on a peace, pro-environment, anti-nuclear energy platform.

By the end of the decade, a parliamentary study commission had established an all-party consensus that climate change was posing serious threats, and action against it was necessary. Throughout the 1990s, the country was fighting about the way how to achieve climate change objectives. While the potential to become more energy efficient was clearly acknowledged but scarcely realized, renewable energy was doubted by most experts in its capacity to substitute for significant shares of nuclear or fossil fuels. In 1991 the first version of the renewable electricity feed-in law was put in place. In 1995 – coinciding with the first Conference of the Parties to the UNFCCC in Berlin, Germany committed to its first set of greenhouse gas reduction objectives. Germany failed to achieve these targets despite the collapse of the East German industry after the 1990 reunification.

The anti-nuclear movement remained strong throughout these decades and in 2000, the red (social-democratic) and green (environmentalist) coalition government established the phase-out of nuclear power. No new nuclear power plants would be built – actually had not been built since Chernobyl, and the existing ones were assigned a credit of power that remained to be produced until decommissioning. These credits were transferable between power plants, so if one plant decommissioned earlier, the others could produce more power. Close-down of the last plants was

expected for around 2022. In addition, the red-green coalition government fortified the renewable energy support with the Renewable Energy Sources Act (EEG) which was the foundation for the renewables boom taking place in Germany in the first decade of the 21st century.

Ironically, the major "breakthrough" of the Energiewende came only after the conservative and neoliberal forces took over government in the 2009 elections. While the conservative party chancellors and parliamentary factions had been driving forces for a number of Energiewende-related decisions, they were also a stronghold of the traditional energy utilities as well as pro-nuclear power. The conservative platform for that election had included a reversal of the nuclear phase-out and the government held true on their word. In the fall of 2010, the phase-out was revoked by law, extending lifetimes by 8 to 14 years. At the same time, the government committed to strong renewable energy and energy efficiency objectives in the so called "Energiekonzept" (see below). The process was accompanied by high-level negotiations between utilities, industry, unions, and other stakeholders in the context of the "Energiegipfel" (energy summit) and scientific scenario studies for the power sector, helping to shape the quantitative targets and pathways. Generally, the ambitious renewable energy and energy efficiency objectives of the Energiekonzept are interpreted as a negotiation token for the environmentally minded factions of parliament and population to swallow the nuclear re-phase-in.

Then a tsunami led to the nuclear accident at Fukushima, Japan, in March 2011, reawakening the German Chernobyl trauma. A shaken chancellor Merkel announced the immediate shutdown of all 17 nuclear power plants in Germany. Three months later, the newer power plants went back online but 8 nuclear power stations remained offline and are now being decommissioned.[1] But, the Energiekonzept itself, and its targets were not revoked. They were slightly rephrased in a semi-official paper ("Eckpunkte", Bundesregierung 2011) and remain in place until today.

The Energiewende in numbers

While – depending on who speaks - "Energiewende" might mean very different things, there are in fact quantitive objectives spelled out in the Energiekonzept. Table 1 lists the quantative targets that have been formulated in the Energiekonzept 2010 (BMWi, BMU, 2010). Some of them have been reiterated in the "Eckpunkte" (Bundesregierung, 2011).

The quantitative targets can be formulated in a hierarchy. The ultimate impact objective is the reduction of GHG emissions by 40 % (2020), 55 % (2030), 70 % (2040) and 80 % (2050) as compared to 1990 levels. On the next lower level in the hierarchy five intermediate indicators are specified, each with a more or less complete pathway, and again all related to environmental objectives. These are the share of renewables in gross energy consumption, the share of renewables in gross electricity consumption – each with a specified target for each decade - the primary energy consumption and electricity consumption – each with a target for 2020 and 2050 – and the objective to have an annual increase in energy productivity of 2,1 %. The Energiekonzept (BMWi, BMU 2010) also specifies objectives for the heat and transportation sectors – areas in which the German climate and energy policy has traditionally been less impactful than in the electricity sectors. While all the other targets are reiterated in the "Eckpunkte" document (Bundesregierung 2011), these targets are not. In addition, the room heating energy consumption receives two different formulations, which are contradicting: While the annual rates of building energy modernization should be increased to a level of 2 % per year, so as to reach an "energy-neutral building sector" in

[1] During the nuclear moratorium six pre-1980 power plants (Unterweser, Bibilis A, Bibilis B, Philippsburg 1, Isar/Ohu 1, Neckarwestheim 1) with 6,3 GW capacity were temporarily shut down and two (Brunsbüttel, Krümmel) were not allowed to go back online after previous shutdown.

2050, the document also specifies that the CO_2 emissions from heating needs should be reduced by 80 % only.

Table 1. Quantitative targets for the Energiewende (from Wörlen, Rieseberg 2012a)

	Target	*Source*	2020	2030	2040	2050	Remarks
GHG	Greenhouse gas emissions	*EK p.5, EP No.7*	-40%	-55%	-70%	-80% to -95%	rel. to 1990
Renew-ables	Share of renewables in gross energy consumption	*EK p.5,*	18%	30%	45%	60%	
	Share of renewables in gross electricity consumption	*EK p.5, EP No.14*	35%	50%	65%	80%	
Efficiency	Primary energy consumption	*EK p.5*	-20%			-50%	rel. to 2008
	Annual increase in final energy productivity	*EK p.5*					2,1% p.a.
	Gross electricity consumption	*EK p.5, EP No.14*	-10%			-25%	rel. to 2008
	Share of electricity generation from combined heat and power	*CHP-Act*	25%				
Buildings	Annual rate of building energy renovation	*EK p.5*				climate neutral buildings	2% p.a.
	Heating energy consumption*	*EK p. 22*	-20%			-80%	
Transport	Final energy consumption transport sector	*EK p.5*	-10%			-40%	rel. to 2005
	Number of electric verhicles	*EK p.30*	1 Mio.	6 Mio.			

* not included in the monitoring reports (2012, 2014)

EK = Energiekonzept 2010 (BMWi/BMU, 2010); EP = Eckpunkte 2011; (Bundesregierung, 2011) rel. to: relative to

The selection of indicators is noteworthy in two respects. Firstly, like most energy policy measures in Germany – the Energiewende is argumentatively embedded in three political objectives – security of supply, affordability and environmental compatibility. Of these, only the environmental compatibility is measured by a quantitative target on the impact level with an explicit development path formulated in the document. Secondly, beyond the definition of quantitative targets for renewable energy and energy efficiency objectives, quantitative targets are few and far between. Very few of the quantitative targets are original to the Energiekonzept. Almost all were already stated in other announcements. The exceptions are 10 GW of new conventional power plants and 2 CCS plants that would need to be built by 2020, and that the power exchange balance with the neighboring countries is expected to remain neutral or positive, i.e. that one requirement is that Germany generates as much power as it consumes, another expression of self-reliance on power consumption.

The document also specifies an input indicator: It estimates that an annual incremental gross investment of 20 billion Euros is necessary. This is certainly not a deterministic value but a rough assessment given for orientation. The price implications of this additional investment are not discussed further, and in fact, in order to reach the target, much more investment than 20 billion Euros will be necessary. The positive growth implications of such investments and the innovation effects are highlighted in the document, potentially in order to underscore the political palatability of the concept as a whole.

Do the monitoring systems for the Energiewende constitute good practice?

In principle, the effort to monitor the Energiewende is laudable. A complex endeavor like the Energiewende can only be communicated and discussed on the basis of data that clearly reflect the progress towards objectives, as well as the inputs and changed states of the system. The publication of annual progress reports enhances transparency. However, a number of aspects have not been acknowledged and integrated into the design of the Energiewende-M&E system. The following discussion covers two components – modalities and indicators - and compares them with good practice recommendations on M&E systems. A description of the practical impact of the system over the last two years serves to illustrate the consequences of these design flaws.

Good practice in evidence-based policy making is generally solving the following challenges (Segone 2010; Levin et al 2014):

- Constructive dialogue between "evidence providers" and policy makers
- Matching demand with supply of appropriate evidence; ownership of evaluation and monitoring results by those evaluated as well as the decision makers for the respective evaluandum helps accept evaluation recommendations
- Making evidence "usable" for the policy-making community
- Effective dissemination and wide access
- Stakeholder participation
- Incentives to use the evidence in policy making

This listing already implies some structural independence between the "evidence providers" and the evidence users. Moreover, the policy-making community should actually use the evidence. As Levin et al (2014) state: a good M&E system is one that influences the system to be evaluated.

Monitoring the Energiewende – the modalities

The responsibility of managing the monitoring process was jointly taken by the Ministries of Economics and Technology[2] (BMWi) and for Environment (BMU)3. With the new government in December 2013, the responsibility moved completely to BMWi. In addition, there is a commission of independent experts tasked with advice ("Begleitung") to the monitoring process. From the start, the Federal Network Agency (Bundesnetzagentur / BNetzA) also had a Secretariat that supported the BMWi as well as the commission in its efforts.

In practice, the Ministry provides a draft, the experts comment upon it and the Federal Network Agency provides a platform for public consultations on the draft(s). In the first year, a draft of the indicators was circulated (see below), and discussed in a public online discussion. Stakeholders of all kinds were allowed to submit their opinions on the indicator framework. In December of 2012, the first monitoring report, covering the year 2011, and the expert commission's testimony were published (BMWi, BMU, 2012).4 The second report covering the period until 2012 was published in April 2014 (BMWi, 2014).5 Overall, the reports have not received any significant

2 As of 2013 the Federal Ministry of Economic Affairs and Energy (BMWi)

3 As of 2013 the Federal Ministry for the Environment, Nature Conservation, Building and Nucelar Safety (BMUB)

4 The report's summary is also available in English: "First Monitoring Report "Energy of the future": http://www.bmwi.de/English/Redaktion/Pdf/first-monitoring-report-energy-of-the-future,property=pdf,bereich=bmwi2012,sprache=en,rwb=true.pdf

5 The report's summary is also available in English: Second Monitoring Report "Energy of the future" http://www.bmwi.de/English/Redaktion/Pdf/zweiter-monitoring-bericht-energie-der-

media attention. The second one in particular was overshadowed by the discussion focused on the Renewable Energy Source Act reform.

Poor definition of the audience / stakeholders of the monitoring

It is somewhat unclear who the target audience of this report is. The report itself specifies the Federal Government as its target group. As within the Federal Government, the BMWi is responsible for energy, the Ministry would in effect be reporting to itself. The report also fulfills reporting requirements under the general energy sector framework law (Energiewirtschaftsgesetz, EnWG) of the BMWi and of the Renewable Energy Source Act of the BMU (now also BMWi), both to the Federal Government.

On the other hand, the Federal Network Agency is also soliciting public comments on the report through an open call on their website. This call for comments was put out on April 8, 2014. Until the time of this writing (May 19th 2014) no public comments have been published, and probably none has been committed either. No public echo to the report has been noted even as it is one of the best data sources on the current state of the German energy system.

No separation between monitoring and evaluation; no clear mandate for recommendations and lack of accountability for follow-up

This implies that the government uses the report to discuss its own political objectives, rather than be informed about the impacts of the regulations and subsidy programs that it has implemented. The second report, for example, before presenting the findings, makes the political statement that the order of the day is to better steer the deployment of renewable energy ("*Jetzt kommt es vor allem darauf an, den weiteren Ausbau besser zu steuern, kosteneffizienter zu gestalten und dadurch zu verstetigen*", S. 2) without describing any supportive findings based in the data of the report.

It would be possible for the government to use the monitoring report as the basis for deriving future policy measures. However, this would require that the Ministry had a structured way of taking note of the data documented in the monitoring report, of drawing conclusions from the information and of implementing the recommendations that stem from these conclusions, in the sense of a "Management Response". Yet, due to the fuzziness in the definition of the report's purpose and audience, no such process is implemented. In addition, the indicators are not set up to distinguish on any methodological basis between general progress towards policy objectives, and specific influences (or lack thereof) of specific policies – no baseline assessment is conducted. During the first report the joint ownership / editorial rights of two ministries (Ministry for Economics and Technology as well as Ministry for Environment) led to the fact that these two ministries partially served as checks and balances for each other. However, more recently this control and accountability function was dropped in the second report due to the restructuring of the government.

Monitoring and non-independent evaluation?

On the other hand, the report itself and the commenting structure through the expert commission really do have similarity to a monitoring system (the government report) and an evaluation system (the commission's review). While the commission is installed at the grace of the Ministry, the experts are financially independent of the commission, and their reports have been rather critical of the government's reporting and selection of findings. On the other hand, without

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any binding recommendations, and without any public notice, nobody will even notice if the government is following up on their recommendations or not.

Monitoring the Energiewende – the indicators

During the first year of the monitoring, the monitoring unit worked towards operationalizing the indicators. The indicators from the objectives tables were complemented by a large number of possible other key parameters of the energy system, so that eventually a tableau of 42 indicators was contained in the first draft template circulated for public discussion by the Federal Network Agency. This large set of indicators had several unfavorable traits.

Disregard for the natural indicator hierarchy

As indicated in the last section, the objectives and targets specified in the document can be used to some degree as indicators. However, the document does not differentiate between those parameters that can be directly influenced by government policies and those that are some causal links removed from government intervention. For example, the government could in theory directly build 10 GW of power plants or 2 CCS plants, but it cannot directly increase the energy productivity on a macro-economic level by 2 % annually. Rather than acknowledging the difference between output, outcome and impact indicators, the listing was sorted by poorly defined "themes" ("development of the energy system", "energy efficiency", "power plants", "renewable energy", "grid infrastructure", "GHG emissions", "energy prices and costs", and "macroeconomic impacts"), with 3 to 7 indicators each.

Too many indicators

Wörlen and Rieseberg (2012a) analyze these 42 indicators more closely for Agora Energiewende (2012) and state that some of them are actually not a single number but an array of data, so that the number of indicators to report and digest is 65 (Annex I). Such a high number of indicators is not suited for a short status report to policy makers. To compound matters further, it seems, the Federal Network Agency called for suggestions to add indicators in its first round of public consultations.

Poor choice and definition of the indicators

As discussed above, a small number of the indicators were already mentioned in the original Energiekonzept (BMWi, BMU 2010). They were rather specific as they were mostly linked to EU-level targets. In these areas, there were reporting structures and guidelines established due to the EU obligation. These proved useful for the national monitoring system.

In the other areas, some of the indicators from the first drafts were only weakly related to the Energiewende and its objectives. In addition, many of the proposed indicators were poorly defined. Indicators like "international comparison of energy efficiency" or "reduction of burden for energy-intensive industries" are not SMART (specific, measurable, accepted, reasonable, time-bound). They are neither measurable nor interpretable in terms of progress or state indicators. For others, it is not clear how to interpret them, since they lack targets. Is more of "price of CO_2 emission certificate" or "installed generation capacity" better or worse? Last but not least, even though the monitoring template was produced for annual measurement, long-term impact indicators that require in-depth

time series analysis for their measurement like "employment effects" were included in the monitoring template.

Alternative systems

As recommended by the expert commission, the indicator system needs to acknowledge the hierarchy of outputs, outcomes, and objectives. A useable indicator system would indeed include not only a collection of data but a compiled index of one to three dimensions that would communicate clearly areas of progress and stagnation and signal where there is actual need for action.

Interestingly, about 8 different groups of organizations – consultancies, think tanks, lobby groups and news magazines (cf. table 2) - are seeing this gap and trying to establish their own "Energiewendeindex" – indices that measure progress on the Energiewende according to their own definition. An extensive discussion can be found in Wörlen & Rieseberg (2012b). Most of them do not monitor or measure progress, however, as progress is slow. As the authors of these indices are publicity-oriented they emphasize a metric that is more prone to react fast: public opinion on the Energiewende. Not all of these indices are still updated. Most of the organizations kept up their efforts for about two years, and then abandoned them.

Ultimately this means that most attempts at describing the Energiewende in any kind of gripping index have failed so far.

Table 2. Indices measuring progress on the Energiewende

Organization	1st publication	Frequency	Latest publication	Source
Institut der deutschen Wirtschaft Köln: Energiewende-Radar	09/2012	Single		Institut der deutschen Wirtschaft Köln (2012)
Öko-Institut: Energiewendekostenindex	10/2012	Single		Öko-Institut (2012)
ZEW: Indikatoren für die energiepolitische Zielerreichung	06/2012	Single		ZEW (2012)
A.T. Kearney / Wirtschaftswoche: Energiewende-Check	06/2012	Yearly	2013	A.T. Kearney & Wirtschaftswoche (2012)
IG BCE: Deutscher Energie-Kompass	06/2012	Yearly	2013	Innovationsforum Energiewende (2013)
BDI: Energiewende-Navigator	10/2012	Yearly	2013	BDI (2013)
McKinsey: Energiewendeindex	09/2012	Quarterly	4/2013	McKinsey (2014)
Dena / Ernst & Young: Deutscher Energiewende-Index	06/2012	Quarterly	4/2013	Dena, Ernst & Young (2013)

Learning by doing: from the first report to the second

Like the authors of this paper, the first expert commission statement in 2012 (Löschel et al 2012) suggested that the government should focus on core indicators and form hierarchies to make the report less complex and to be actually capable to transport a message. In addition, the expert commission called on the government to take a stronger stance and evaluate its own performance with respect to the effectiveness and efficiency of the policy measures taken. In addition to some fundamental methodological remarks, the expert commission suggests specifically,

- To discuss the potential challenges more explicitly, such as the need for a sustainable biomass supply to the transport, heat and electricity sector, or conflicting policy measures and strategies;
- To include non-GHG indicators[6] for the environmental impact of the Energiewende;
- To discuss the security of supply regarding natural gas imports or electricity in Southern Germany;[7]
- To better structure the analysis of the overall economic impacts of the Energiewende;
- And to include an indicator for efficiency of electricity use and adapt the energy efficiency assessment to take into account weather conditions and stocks of final products.

As a reaction to the experts' statement, the second government monitoring report (2014, for the year of 2012) has indeed structured the indicators better, by identifying 12 core indicators with quantitative goals (Annex I). Instead of reducing complexity and concentrating on core indicators though, the government increased the overall number of indicators from 49 to 65. A total of 83 tables and graphs present the developments of various aspects of the Energiewende, from GHG emissions to industrial subsidies.

The 12 core indicators are presented in a table, but the word "core indicator" is mentioned only three times throughout the methodological chapter of the report. The report itself still merely describes the developments in all fields of the energy sector without referring back to the core indicators in any prominent way. With few exceptions the government refrains from judgement regarding goal achievement of the indicators, and stops short of pointing out crucial developments. The report is largely descriptive, lists the measures taken by the government and does not formulate a message how the transition is proceeding based on indicators.

With regards to the specific requests by the commission, the government's second monitoring report carries out the following adjustments:

- The conflict of competing uses of biomass is not discussed. The government just states that biomass use must comply with ecological criteria.
- For assessing the non-GHG environmental impacts of the Energiewende, such as land use change, a Commission on Nature Conservation and Energy Transition will be formed. The government also describes the efforts to find a suitable final disposal site for radioactive waste in this section. Indicators to measure the overall impacts of the energy transition as requested by the experts are not included.
- The government elaborates extensively on security of supply in Southern Germany and describes the supply situation of natural gas in depth.
- For a better analysis of economic impacts assessment, the reader is referred to the 2015 report.
- The government has adjusted the efficiency indicators as requested.

With respect to the overall progress of the energy transition the tone of the government's second monitoring report in 2014 is overly optimistic, almost self-congratulatory ("The Energiewende is getting there "[8]), even as it states in passing on page 86 of the 138-page report that with current measures taken a GHG reduction of only 35 % will be achieved by 2020. The fact that GHG emissions are far off-track six years before goal attainment is not even included in the summary of the report, even as GHG emissions are the central target of the whole Energiewende

6 The commission suggested the following indicators: land consumption, emission of air pollutants, water load, resources consumption, radioactivity and final disposal of radioactive waste.

7 Large industrial electricity consumers are located in the south of Germany, the electricity production infrastructure though is largely based on fossil fuels and particularly on nuclear capacities, with the nuclear phase out plus a delayed construction of grid infrastructure, particularly during the winter the security of supply in the south is difficult.

8 Own translation of „Die Energiewende kommt voran"

with a proposed 40 % reduction by 2020.

Promptly, the expert commission criticizes in its 2013 report the lack of an adequate positioning of the message (Löschel et al 2014). The commission therefore urges the government to make an effort in the reform of the emission trading scheme and points out that efforts in energy efficiency are far off track particularly in the field of housing. The commission suggests to take into consideration rebound effects of energy efficiency policy and therefore to rely more on rebound-free measures such as energy price increases. The commission states that with respect to energy efficiency there is largely stagnation in the transport sector and no measures taken to improve modal split and increase the use the public transport. They criticize the lack of analysis and tracking goal achievement, admonishing: *"Problems need to be stated clearly, their causes need to be investigated and conclusions need to be drawn for political action. "*[9]

Conclusion and Recommendations

The Global Green Growth Best Practice Report (Levin et al, 2014) points out that a good M&E system is one that has impact. The impact of such a system is noted when the information from the M&E system is used for management, and changes the evaluandum. In this sense, the monitoring system for the German Energiewende is a long way from constituting good practices. The discussion showed that there are shortcomings in the M&E modalities as well as the structure of the report. Even though the reports have been notably improved into an all-encompassing description of developments and measures taken, the M&E system had no impact, either because it was not noted, or because the government did not want to acknowledge that the system could be improved. This is particularly noteworthy since the government has already since 2009 started to track and forecast its achievement of the EU targets. For many of the shortcomings that were identified, easy remedies can be defined. Implementing them would help improve the effectiveness of the monitoring system.

Create effective implementation supervision mechanism: debate in parliament

The most important function of this monitoring system is to "keep the eye on the ball" – manage energy policy in such a way that the Energiewende is on track. For this, the highest echelons of the German government should understand instantly whether or not the Energiewende is on track. The monitoring report has the potential to provide the grounds for accountability and transparency. But the government will only take it serious if the public takes note of the data, and public discussion is generated around the challenges and strategic conflicts. The basis for this would be that the report clearly states them. As the commission pointed out, this is not the case yet.

Public support for the underlying objectives of the Energiewende – phasing out nuclear power while ensuring climate integrity – is strong in Germany, but it can be weakened by rumors and misinformation. As the Energiewende moves on, losers are increasingly vulnerable, and efforts to spin public opinion will strengthen further. The monitoring system needs to adopt a design that makes it the general reference for all data relating to the Energiewende, successes as well as derailed developments, and baseline as well as actual indicator values.

One reason for the lack of public notice might be that, the monitoring report is just one of many similar policy reports and statements, including internal planning documents as well as reports to the European Commission. Some of them have more legal clout and are traditionally met with higher interest. Compiling them all into one or two documents per year would foster a public reception of the information included.

9 own translation

A side benefit would be that the report would most likely be discussed extensively in parliament. This way, the government would not report only to itself anymore, more eyes would help improve the level of interest and discussion.

Structure the indicator system along Energiewende objectives and by functionality; limit number of indicators; create index for easy communication

The three dimensions of the Energiewende objectives are environment, security of supply and affordability. As Wörlen and Rieseberg (2012a) demonstrate, all indicators with relevance for the Energiewende can be assigned to one of these objectives, and those that cannot have no clear relationship or relevance for the Energiewende and should be dropped.

Wörlen and Rieseberg (2012a) further propose to distinguish in indicators that measure progress on the way to the concrete targets, and others that signal potential risk, and can serve as a monitor for safeguards. They acknowledge that this is not a typical project monitoring system but a complex sectoral transformation process so that it might be important to monitor such risks. But it is important to distinguish between factual success and maintenance of safeguards.

When drawing up an indicator system it typically is very helpful to think more clearly in terms of what can be influenced and what cannot be influenced with the policy measures at hand. Admittedly, a sectoral transformation program like the Energiewende also needs to have very wide systems boundaries, but even then the system can only be managed well if these are acknowledged. Traditionally, a distinction along the indicator hierarchy – input, output, outcome, impact – would be made, but it is obviously difficult to develop a log frame or even a results chain for the Energiewende as it is a complex bundle of rules, regulations, support programs and market trends. These tests for relevance (the R in SMART) are highly recommended for any indicator systems.

But in addition, a key figure needs to be developed that captures the whole story at once. The 8 different “Energiewende”-indices floated in the media demonstrate the need for this type of story-telling.

Binding short-term commitments and follow-up

Improving the transparency of the report and identifying the target group will raise its profile. It will force the report to focus on the issues at hand, improve data and methodology, and refrain from unfounded self-congratulation. As the report is submitted every year, it might even be an opportunity for the Ministry to actually set the topics for the debate for the next year. It could do so by using the report for announcing its work program, and including binding short-term commitments for the next year. If these are well founded in the data and comply with the overall objectives, the Ministry could use this report actively as an instrument that yields political power and shows real impact. However, so far, the government has yet to awake to the opportunity that Monitoring and Evaluation constitutes.

Annex I: List of Indicators of the Second Monitoring Report

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

* Core indicator

Source: BMWi (2014) own translation

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