Ambitious climate targets – the prerequisite for a successful, future oriented climate change policy. A Comparison.

Franzjosef Schafhausen

Review: Jun Arima

Disclaimer: The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official opinion or position of the German-Japanese Energy Transition Council GJETC.
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1. The challenge for global Climate Change

Climate Change is one of the major challenges for the whole mankind. Ever since 1992’s Earth Summit in Rio de Janeiro, the international community has been working towards halting damage that humans are causing to the climate system.

“Global warming is a negative externality at global level and therefore, it needs to be addressed at global level.” (Arima 2017: 1) Finally a comprehensive global strategy around the world is unavoidable. Every sector and every actor in every country must contribute to the reduction of greenhouse gases to combat Climate Change taking into account its common but differentiated responsibilities (CBDR).

From the economic point of view a global carbon price setting equal marginal costs across the countries would be an effective as well efficient solution. Nevertheless the implementation of such a global solution and the development of a global carbon market where a ton is a ton will need some time. Therefore actions on the national, regional and local level have to take place as soon as possible. Frontrunners must create “blue prints” which shows that there is not a fundamental contradiction between environment and economy. The contrary is true. Climate Change policy is not only able to reduce greenhouse gases, but will at the same time

- push innovation and creativity,
- reduce the necessity to import energy from outside the country in order to decrease the dependency of the whole economy and society from foreign energy suppliers,
- improve energy security,
- reduce other pollutants and wastes and save water resources,
- keep limited substances and resources for future generations,
- create economic growth and jobs inside the country,
- avoid damages through heavy rains, storms, droughts and flooding.

So it is not only Climate Change, but there are several other reasons to develop and implement an ambitious policy to prevent environment and to mitigate the emission of greenhouse gases and other pollutants. Especially for countries like Japan and Germany, which have only very limited domestic resources, the invention of future oriented, resource saving and highly efficient technology is crucial to keep the welfare and to improve the quality of live.
By the end of 2015 the Paris Agreement (PA) set the global climate change efforts on a completely new and ambitious basis: All 196 Parties to the United Nations Framework Convention on Climate Change (UNFCCC) agreed on a common target and approach to combat global climate change (UNFCCC 2015). All countries intend to keep average global warming well below 2 degrees celsius and are aiming to limit the temperature increase to 1,5 degrees celsius.

At the G7 Summit in Elmau, Germany in June 2015 leading industrialised nations\(^1\) pledged to make contributions to decarbonising the global economy over the course of this century. One way of achieving that would be by developing and using innovative technologies, as well as implementing future oriented infrastructure.

In May 2016, the G7 countries also underpinned their leading role by committing to early, transparent and robust implementation of their Nationally Determined Contributions (NDCs) under the Paris Agreement and by promoting increased ambitions over time.

2. Basis for the comparison of Germany’s and Japan’s Climate Change targets and Climate Change policies

A comparison between Germany and Japan has to take into account the different circumstances, traditions, lifestyles and structures of both countries. Some basic Data (Table 1) show the different structures, but also the similarities between Japan and Germany. The structure of energy and electricity supply is of major importance for the present balances of greenhouse gases. Germany is traditionally a “black” country. At the moment lignite and hard coal are dominant for the German power supply (more than 40%). But renewable resources of energy are actually representing more or less 1/3 of the national power generation.

Japan’s power generation has been dominated by nuclear energy. Beyond Fukushima by taking the nuclear power plants out of the grid fossil fuel like natural gas and hard coal substituted the power generation by nuclear energy. That’s the reason why in Japan CO\(_2\) and other greenhouse gases increased beyond March 2011.

While the greenhouse gases in Germany dropped between 1990 and 2013 by 27,8 %, the Japanese GHG-balance increased by 7,3 %. Germany fulfilled its Kyoto target of minus 21% during the Kyoto period 2008 – 2012 (base year 1990), while Japan did not comply with its Kyoto target (minus 6% during the time period 2008 – 2012 against 1990\(^{th}\) levels).

\(^1\) G7 = Canada, France, Germany, Italy, Japan, United Kingdom, United States of America
3. Comparison of Climate Change Targets

<table>
<thead>
<tr>
<th>Criterion</th>
<th>EU (Germany)</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>base year</td>
<td>1990</td>
<td>2013</td>
</tr>
<tr>
<td>target year</td>
<td>2030</td>
<td>2030</td>
</tr>
<tr>
<td>Mitigation target(s)</td>
<td>at least 40% domestic (EU-wide) reduction in greenhouse gas emissions by 2030 compared to 1990</td>
<td>26% (25.4% reduction by 2030 compared to 2005)</td>
</tr>
<tr>
<td></td>
<td>ETS: 2030 target minus 43% compared to 2005</td>
<td>GHG emissions in 2030: 1.042 billion t CO$_2$equiv.</td>
</tr>
<tr>
<td></td>
<td>Non-ETS: minus 30% compared to</td>
<td>The overall target is splitted up into CO$_2$ and Non-CO$_2$ emissions and differentiated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2005</th>
<th>between the responsible sectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>LULUCF</td>
<td>Policy on how to include LULUCF will be established before 2020</td>
<td>Minus 2.6% reduction compared to total GHG - emissions based as well on 2013 and 2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P&amp;M: forest carbon sink measures + cropland management + grazing land management + revegetation</td>
</tr>
<tr>
<td>Contribution from</td>
<td>No contribution from internationally generated emission credits –</td>
<td>Contribution by emission reductions and removals under the Joint Crediting Mechanism will be</td>
</tr>
<tr>
<td>international</td>
<td>domestic action</td>
<td>counted as Japan’s reduction</td>
</tr>
<tr>
<td>credits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional</td>
<td>The overall Target has to be splitted up in two parts: ETS as</td>
<td>Very detailed and differentiated assumption of contributions by sectors and numerous P&amp;M’s</td>
</tr>
<tr>
<td>information</td>
<td>European instrument covering approximately 45 - 50% of total</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EU’s GHG-emissions and ESD (Effort Sharing Decision) which will</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cover all sectors and installations which are not part of the EU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ETS. Decisions will be taken by EU Parliament, Council and Commission in 2017</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Comparison of the Japanese and German NDCs

3.1 Germany

Germany started on the 15th January 1990 with its National Climate Change Policy. From the beginning on the philosophy has been a strategy based on three steps

- ambitious short, medium and long term targets,
- packages of policies and measures (P&M)s,
- comprehensive and transparent monitoring schemes.

As mentioned before Germany is of the opinion that there are several social and macroeconomic reasons to developing and implementing a relatively aggressive climate change policy without compromising industry’s competitiveness and energy security. All sectors – private households, small consumers, industry, energy supply, transport, agriculture and forestry, waste management, waste water management – are covered.

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Germany’s targets for the future are not only focussing on GHG’s, but at the same time on energy efficiency, renewable energies, sectors (building sector and transport) and technologies (CHP). The German Climate Change and Energy Policy is based on short term, medium term and long term targets – 2020, 2030, 2040 and 2050. So it is easy to judge the trends against those targets defined by the federal government through monitoring, reporting and verification (MRV).

In addition to the federal targets there are numerous targets on the regional and local level. So it is not only a top down but also a bottom down approach.

<table>
<thead>
<tr>
<th>Table 3: Germany’s Climate Change and Energy Targets 2020-2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate</td>
</tr>
<tr>
<td>Greenhouse gases (vs. 1990)</td>
</tr>
<tr>
<td>Share of electricity</td>
</tr>
<tr>
<td>Overall share (Gross final energy consumption)</td>
</tr>
<tr>
<td>Renewable energies</td>
</tr>
<tr>
<td>Efficiency</td>
</tr>
<tr>
<td>Primary energy consumption</td>
</tr>
<tr>
<td>Electricity consumption</td>
</tr>
<tr>
<td>Energy consumption in buildings</td>
</tr>
</tbody>
</table>

In line with the interim target for 2030 already set by the German government, Germany’s total greenhouse gas emissions need to be reduced by at least 55 % compared with 1990 by 2030 at the latest (reference value: 1248 million tonnes total emissions of CO₂ equivalent). Table 4 gives a breakdown for each area of action, showing their envisaged contribution to achieving that target (Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety 2016). Some of the sector targets could have a far-reaching impact on Germany’s economic and social development. A comprehensive impact assessment will
therefore be carried out, the results of which will be discussed with the social partners and the civil society, thus allowing adjustments to be made to the sectoral targets in 2018.

<table>
<thead>
<tr>
<th>Action field</th>
<th>1990 (million tonnes of CO₂ equivalents)</th>
<th>2014 (million tonnes of CO₂ equivalents)</th>
<th>2030 (million tonnes of CO₂ equivalents)</th>
<th>2030 (reduction in % compared with 1990)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy sector</td>
<td>466</td>
<td>358</td>
<td>175 - 183</td>
<td>62 – 61%</td>
</tr>
<tr>
<td>Buildings</td>
<td>209</td>
<td>119</td>
<td>70 - 72</td>
<td>67 – 66%</td>
</tr>
<tr>
<td>Transport</td>
<td>163</td>
<td>160</td>
<td>95 – 98</td>
<td>42 – 40 %</td>
</tr>
<tr>
<td>Industry</td>
<td>283</td>
<td>181</td>
<td>140 - 143</td>
<td>51 – 49 %</td>
</tr>
<tr>
<td>Agriculture and Forestry</td>
<td>88</td>
<td>72</td>
<td>58 -61</td>
<td>34 – 31 %</td>
</tr>
<tr>
<td>Subtotal</td>
<td>1.209</td>
<td>890</td>
<td>538 - 557</td>
<td>56 – 54 %</td>
</tr>
<tr>
<td>Other Sectors</td>
<td>39</td>
<td>12</td>
<td>5</td>
<td>87 %</td>
</tr>
<tr>
<td>Total</td>
<td>1.248</td>
<td>902</td>
<td>543 - 562</td>
<td>56 – 55 %</td>
</tr>
</tbody>
</table>

Table 4: Emissions from fields of action set out in definition of Germany’s 2030 target. Source: (Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety 2016: 33)

Germany has achieved a great deal in terms of climate action and in progressing its “Energiewende”. Notwithstanding the structural adjustments and “learning costs” associated with these processes of change, it has also created new economic opportunities and innovations. The German government intends to continue on its chosen path, which will include consistently implementing the targets that are part of the climate change policy as well as of the “Energiewende”. While doing this, it will focus attention on making sure German industry remains competitive and has well-functioning, innovative and closed-loop value chains.

Between 1990 and 2016 Germany’s greenhouse gas emissions dropped by 27,8% compared with 1990. During this period the reduction trends have been different:

- a huge share of the reduction (minus 21%) happened between 1990 and 2005 after reunification,
- Germany’s overachieved its Kyoto target by 4% (minus 25%³),
- since 2014 the greenhouse gas emissions are more or less only stabilising.

³ Kyoto target for Germany within the EU burden sharing: minus 21% 2008 – 2012 (compared with 1990)
Figure 1: Germany’s Greenhouse Gas Emissions between 1990 and 2015. Source: (UBA, Emissionssituationen, 11.02.2016)

Since 1990 continuously a process of decoupling greenhouse gas emissions and energy consumption from Gross Domestic Product (GDP) took place (Figure 2).

Figure 2: Decoupling of GDP and emissions of CO₂ equivalent between 1990 and 2014 in Germany. Source: (s.above)

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The ongoing trend has to be strengthened during the upcoming years to be able to comply with the very ambitious national targets.

To summarize: Germany’s Climate Change and Energy policy is influenced and dominated by the position of a public majority to phase out nuclear power generation as soon as possible and the necessity to build a bridge to a low carbon society during the upcoming decades. After having had a long lasting participation process industry accepted at the end that position and would not like to be part of the problem, but part of the solution. In line with that position industry is demanding a clear political framework, reliability and time for being able to manage the transition in a step by step process.

3.2 European Union

There is a fourth administrative level – Europe. Since 2013 the implementation auf the European Climate Change policy is divided into two parts:

- **Emissions trading (ETS).** The European instrument covers roughly one half of the European GHG emissions. All big emitters of industry and the energy sector are under the ETS regime.
- **Effort sharing (ESD):** Another 50% of the GHG balance are emitted by private households, small consumers, industry and energy not covered by ETS, Transport, agriculture and forestry, wastes and waste water management. The responsibility for the development and implementation of policies and measures within those action fields are with the 27/28 Member States, monitored by the European Commission.

The Climate Change and Energy related targets of the European Union (Table 5) have to be fulfilled by activities of the 28/27 Member States.

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse Gases</td>
<td>minus 20% (base year 1990)</td>
<td>at least minus 40% (base year 1990)</td>
<td>minus 80 – 95% (base year 1990)</td>
</tr>
<tr>
<td>Renewable Energies</td>
<td></td>
<td>at least 27% renewables based on the Primary Energy Balance</td>
<td></td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td></td>
<td>at least 27% improvement against business as usual (bau)</td>
<td></td>
</tr>
</tbody>
</table>

Table 5: EU’s Greenhouse Gas and energy related targets 2020-2050

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The European Union is in line with its 2020 Climate Change target which is minus 20% by 2020 compared with 1990th levels. From the present point of view there is the opportunity that Europe will be able to overachieve the 2020 target.

The decisions which have to be taken on the 2030 target – restructuring ETS and effort sharing – are presently under discussion (so called Trilog between Commission, Council and Parliament). Decisions will possibly been taken in autumn 2017.

### 3.3 Japan

Between 1990 and 2015 Japan's greenhouse gas balance increased by 4,25%. Due to the economic development of Japan and the Fukushima Dai-Ichi catastrophe the trends during the last 26 years have been very diverse. The highest GHG emission level have been reached 2007 and 2013 where the emissions have been 11,25% away from the Kyoto base year 1990.

Japan was not able to comply with its Kyoto target which has been minus 6% 2008 – 2012 compared with 1990 level (2008 – 2012: plus 4,4%).

What’s about the ambitiousness of the Japanese NDC?

- Having the trends between 1990 and 2015 in mind,
- being aware of the changes in the energy mix beyond Fukushima,
- taking into account the macroeconomic structures and
- the specific lifestyle in Japan

There could not be any doubt that the intention by the Japanese government is very ambitious.

The energy mix in Japan changed dramatically between 1990 and 2014. The share of CO₂ neutral power generation in Japan has been close to 50% in 1998 and dropped to nearly 10% in 2014 (Table 4).

Oil and coal covered between 1990 and 2014 29% (2001) respectively 46% (2012).

LNG substituted beyond 2011 the generation by nuclear power and contributed 46% to the Japanese power supply in 2014. That means an increase of 110% compared to the early 90th.
The present situation is difficult because Japan does not have significant domestic fossil resources/energy sources and is not linked with other countries through power lines or pipelines. Similar to Germany Japan is heavily dependent on energy imports (coal, oil and gas). That means threats on energy security and a transfer of welfare from Japan to energy exporters especially for LNG which is awfully expensive.

The Challenge is now how to restructure the present energy system with a focus on the power generation and how to keep the energy security and the affordability of energy prices. The possible roadmap is highly uncertain. Jun Arima stated in his paper: “In the opinion polls, there is still a strong ‘nuclearphobia’”. In his mind “the general public tends to consider that there is no need of nuclear so long as there is no blackout and no rapid upsurge of electricity tariffs.” (Arima 2017: 11)

The solution should and could not be to withdraw the commitment by Japan on its NDC! Similar to Germany there are lots of even low cost opportunities to restructure the energy system as well on the supply and on the demand side.

The fact that the present US President is ignoring scientific evidence, natural disasters and the deep concerns all around the world on the impacts of Climate Change should not be an excuse for other countries to step out of their commitments under the Paris Agreement!

4. Conclusions

The analysis of the Japanese and German Climate Change and Energy Policy leads to some similarities but also to differences.

Similar structures and problems

- Both countries are scarce of resources.
- Both countries are highly dependent on imports. That could affect energy and resource security.
- Both countries should have an interest to keep the welfare inside the country to improve inter alia the infrastructure and support structural changes.

<table>
<thead>
<tr>
<th>Renewable Energy</th>
<th>Lowest share 1990 - 2010</th>
<th>Lowest share 2012 - 2013</th>
<th>Highest share 1990 - 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nuclear</td>
<td>0 %</td>
<td>26 %</td>
<td>37 %</td>
</tr>
<tr>
<td>Total</td>
<td>10 %</td>
<td>37 %</td>
<td>50 %</td>
</tr>
</tbody>
</table>

Table 6: Share of power generation with low CO₂ emissions in Japan
• Both countries are highly industrialised and densely populated.
• Both countries are confronted with environmental problems and damages.
• Both countries need innovation and creativity to be at the forefront of the technological development.
• Both countries have based their power generation on sources and technologies which are risky or are creating high environmental and climate problems.
• Both countries are committed to very ambitious Climate Change targets.
• Both countries need future oriented jobs and economic growth.

Differences

• Germany is located in the centre of Europe. The power lines and the pipelines are going through Germany. There are numbers of linkages to neighbour countries.
• The transition process in Germany is developing and meanwhile it is not only a top down approach but also a bottom up evolution.
• The EU Commission is working on a single energy market which would increase energy security, improve efficiency and lower prices. Germany as part of the EU is benefiting and will benefit further on.
• The EU ETS creates a basis to make Climate Change within the EU not only effective, but at the same time cost efficient.
• Japan does not have linkages to other countries in terms of power and gas.
• The Japanese power generation has been focussed strongly on nuclear power which is now creating public resistance. The Fukushima accident caused and is causing very high costs in terms of money and health.
• Traditionally the German and the Japanese societies have different lifestyles.

Nevertheless - in both countries there are lots of opportunities to improve and develop the present system to low carbon societies and low carbon economies. Both countries are highly industrialized countries with limited access to resources. While Germany is located in the centre of Europe and heavily linked to its neighbours, Japan is from the point of view of its power and energy system isolated. In addition to that Germany based its power generation on a broad mix of energy sources, while Japan focussed its power supply strongly on nuclear power.

Despite the differences mentioned above there a numerous of approaches to solve as well the Climate Change and the energy problems both countries are faced with – inter alia:

• improving energy efficiency in all sectors,
• switching from traditional energy sources to renewable energies,
• improving infrastructure,
• changing production and consumption patterns,
• changing the waste management policy and improving resource efficiency,
• inventing future oriented transport technologies, changing behaviour and offering convenient transport services to industry and consumers,
• speeding up the use of information and communication technologies (digitalisation).

Both countries are committed to combat global Climate Change and to fight greenhouse effect. There is a common understanding. Due to some differences and circumstances there are different tracks. But there is the need to exchange experiences, talk about success stories and failures, learn from each other to find a way to make Climate Change policy as well effective and cost efficient with the aim to create so called “blue prints” for other countries and actors.

Bibliography


United Nations Framework Convention on Climate Change (UNFCCC) (2017): *Submission of Japan’s Intended Nationally Determined Contribution (INDC).*


Review by Jun Arima

Having read Schafhausen’s excellent paper, I have found a couple of very intriguing differences in our approaches and perspectives.

On one hand, Schafhausen emphasizes multiple benefits of climate change policy, not only in terms of GHG emissions reduction, but also 1) pushing innovation and creativity, 2) reducing energy import, 3) improving energy security, 4) reducing pollutants, 5) creating economic growth and jobs and 6) avoiding extreme weather (page 1). On the other hand, while I don’t deny possible co-benefits of climate policies, I tend to be skeptical about the argument that climate policy is a “win-win” solution without any negative impact, in particular, on economy. My perspective derives from my own experience in the international climate negotiation. As stated in my paper, if climate policies do not entail any economic cost but create so many positive co-benefits as suggested by Schafhausen, why global warming problems have exacerbated in such way and UN negotiation has been and still is highly confrontational and acrimonious? To my mind, it is far more persuasive to argue that despite various potential co-benefits, economic costs incurred by climate policies are challenging and their implication to international competitiveness makes it difficult for countries to unilaterally take drastic actions.

Comparison between Germany and Japan is not a simple exercise due to their different national circumstances. Schafhausen’s paper rightly recognizes this point referring to Japan’s isolated geographical location without any grid linkage with other countries (page 11). Germany’s geographical location in the center of the EU, most notably its grid connection with neighboring countries, provides various advantages in terms of the 3 Es, namely, energy security (restoring energy self-sufficiency), economic efficiency (reducing electricity cost from the current level) and environment (presenting comparable GHG target). Large penetration of intermittent RE in Germany was enabled by exporting at the time of surplus and importing at the time of shortage through grid connection with neighboring countries. Even though ambitious targets for energy efficiency and renewable energy turn out to be difficult to be achieved, Germany still could achieve its GHG target either by importing electricity from neighboring countries or purchasing GHG credits from EU-ETS. Even when there is supply crunch of oil and natural gas, its volume and price...
impact could be softened within the EU as a whole. Japan is the complete opposite. While there has been an argument in Japan insisting on replicating German experience in nuclear phase out and RE promotion, it is not justifiable taking into account such large difference. Schafhausen further argues that Japan should stick to its NDC under any conditions or circumstances (page 10). Of course, I am fully convinced that Japan should continuously aim at achieving its NDC. However, Japan’s NDC has not been developed out of the blue. It was underpinned by a carefully designed energy mix so that it could simultaneously achieve the 3 Es. Therefore, if nuclear restarting does not progress as expected, we need to work out new energy mix exploring new balance among the 3 Es. It will then be examined whether there are “lots of even low cost opportunities to restructure energy system as well on the supply and the demand side”. Depending on various factors (e.g. macroeconomic situation, fossil fuel prices, RE cost), new energy mix may not automatically guarantee the same level of NDC. From my perspective, it is not sensible to stick to the NDC without due regard to the changing circumstances since the current NDC is underpinned by the energy mix aiming at the 3 Es (energy security, economic efficiency and environment), not just 1 E (environment). With regard to the energy mix, I take issues with Schafhausen’s argument that “Germany based its power generation on a broad mix of energy sources, while Japan focused its power supply strongly on nuclear power” (page 11). Comparing German power generation mix in 2014 and Japanese power generation mix before the earthquake. Japan had well diversified energy mix. It is not accurate to claim that Japan is focusing on nuclear. Japan’s current endeavor is to restore diversified energy mix while RE is expected to have higher share than nuclear.
I also have strong reservation about comparing percentage figures of GHG emissions reduction from particular base years (page 3). There are various indices for evaluating the level of ambition of countries’ mitigation efforts. For example, some literatures⁴ suggest that Japan’s marginal abatement cost for achieving its NDC is considerably higher than other countries and regions including the EU. By the way, I would like to point out that Japan complied with its Kyoto target using Kyoto credits using Kyoto mechanisms despite adverse conditions after the Fukushima Dai-Ichi nuclear accident. The sentences about Japan’s non-compliance in page 2 and page 9 are wrong.

Another difference characterizing both countries’ approach is the time frame. Germany has not only set a GHG emission reduction target for the year 2050 (80-95% below 1990), it has also set several quantified energy savings/energy efficiency and renewable energy targets for that year as well as for interim years using back-casting approach. Japan, on the other hand, is focusing on 2030 when formulating specific energy targets based on bottom up approach. Japan’s 80% reduction goal is regarded as a goal or vision rather than target and not used as a basis of back-casting approach due to various uncertainties related to


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climate science, economic, technological and societal conditions and international situation. This difference of approaches is reflected in numerical targets in 2030 of both countries.

Finally, while Germany is strongly interested in domestic GHG emissions reduction, Japan tends to put more focus on global GHG emissions reduction and its possible contribution to it. While EU’s production based CO₂ emissions marked remarkable reduction from 1995 to 2011, their consumption based CO₂ emissions remained almost the same during the period⁵.

This indicates that too narrow focus on domestic GHG emissions could simply result in carbon leakage, which could be counterproductive for global GHG emissions reduction. As presented in the Section 7 of my paper, Japan is trying to maximize its contribution to global GHG emissions reduction through dissemination of eco-friendly technologies to developing countries, input of eco-friendly goods and technologies to global value chain and development of innovative technologies.

⁵ http://www.oecd.org/sti/ind/carbondioxideemissionsembodiedininternationaltrade.html

Ambitious climate targets – the prerequisite for a successful, future oriented climate change policy. A Comparison.
Despite these differences, I strongly agree with his conclusion that Germany and Japan should exchange experiences, talk about successes and failures, learn from each other to make climate policy as well effective and cost efficient. That is exactly why the on-going GJETC is meaningful and beneficial for both countries.