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Outgoing JISC Chairman Benoît Leguet:

"JI is a perfect complement for emission trading schemes, now and after 2012"

23 March of this year was the last day that Benoît Leguet served as Chair of the JI Supervisory Committee (JISC). During his term, next to supervising the 'daily' activities in the Joint Implementation (JI) market, the JISC participated in the policy level discussions on the future role of JI in long term climate policy making, as well as JI's potential role in the short to medium term to manage a possible gap between the first and the second commitment period. *JIQ* spoke with Benoît Leguet about his views on JI's further development.

JIQ: JI has two tracks. Under JI Track I, the GHG accounting is the responsibility of the Parties involved whereas JI Track II projects are supervised by the JISC. Initially, it was thought that most countries would try to use Track I, as it may be easier. However, some host countries have chosen Track II even though they are eligible for Track I. Could you explain that?

B. Leguet: I think I can give three explanations for that. First, although Track I procedures may be easier for a project developer, for host countries Track II is easier as the overall project accounting is checked by the JISC. In the case of Track I projects, the host country needs to establish infrastructures, including accreditation of auditors, assess project additionality, *etc*. This takes time. I've heard governments saying that Track I was easier, but in practice it was not.

Second, and I'm taking a would-be project developer's perspective here, Track I eligibility is not permanent. In other words, if I were a project developer, I would need to be convinced that the country where I do my project will continue to meet the Track I eligibility criteria. If not, I would have to switch to Track II, which could be risky and costly. So, going straight for Track II could be safer and less costly.

A third explanation could be, this time from a demand side perspective, that potential future ERU buyers may pose possible restrictions in terms of ERU quality requirements. This may affect the tradability of Track I ERUs. Project developers may anticipate on that and have their JI emission reductions checked and stamped through the JISC procedures.

In general, my feeling is that the distinction between JI Track I and Track II doesn't work in practice. It's confusing and it's difficult to understand why this difference is needed, especially when one option is not really quicker or slower than the other. In my opinion, a single track for JI, with minimum internationally-recognized quality standards, would be better.

JIQ: Unlike the CDM, JI coexists with the EU ETS, which may have reduced the JI potential but has also created extra demand for ERUs. What is your opinion about the interaction between ETS and JI in potential JI host countries?

B. Leguet: First of all, the EU ETS is not the only policy instrument that JI has to coexist with. There are several others in the member states. Besides, from a host country's perspective, JI is also a policy and measure, rather than a flexibility mechanism. Here, we can see a substantial difference with the CDM where such 'competition' with policy measures is much less.

On the impact of the ETS on JI, I can say that JI and CDM have been successful mainly because of the ETS, not directly because of countries' commitments under the Kyoto Protocol. Of course, the implementation of the ETS has limited the potential for JI projects in the energy and industrial sectors, but ETS installations have also been the driver in the development of CDM and JI.

In addition, the ETS has stimulated projects in non-ETS sectors in Europe, and the sectors in which those projects are developed are progressively being

In this issue

Benoît Leguet - bio sketch

Benoît Leguet is the Head of Research at CDC Climat. He joined the Caisse des Dépôts Group in 2005, in order to help set up the project mechanisms scheduled by the Kyoto Protocol on the French territory.

He has been a member of the United Nations Joint Implementation Supervisory Committee since 2008, and chaired that Committee in 2010. He is now chairing the Joint Implementation Accreditation Panel. He also lectures on the economics of climate change in various Masters programs.

Before joining the Caisse des Dépôts Group, Benoît was a member of Deloitte's Environmental Team, where he worked on greenhouse gas emission verification assignments, particularly in the energy sector, and on advisory assignments for public and private clients regarding the economic tools used to combat climate change.

Benoît is an engineering graduate of the Ecole Polytechnique and the ENSTA Paris Tech, and holds a master's degree in environmental economics from Paris-X University. He is one of the authors of the Kyoto Protocol project mechanism guides issued by the French Government, and also co-authored Comprendre la compensation carbone [Understanding carbon offsetting] (Pearson, 2008).

included in the EU ETS. That is the case for instance for N_2O emission reduction projects, which are going to be included in the EU ETS from 2013 onwards. The ETS also stimulates JI projects in agriculture. For such sectors, which are difficult to address by ETS, JI could be a good stimulus, if not the best policy measure.

JIQ: Since the Copenhagen Conference of December 2009, there has been an increasing uncertainty about the potential and role for JI after 2012. How do you see the future of JI in a new climate policy regime and in light of emerging domestic ETS systems?

B. Leguet: I believe that there is a bright future for JI, actually better than for the CDM. Why? In the spirit of John Maynard Keynes' statement that in the long run we are all dead, we could picture a 'perfect' long term climate policy world. In that world, by 2050, all countries have national GHG emission caps. However, we don't live in such a perfect world yet and until then, the group of countries with caps will become larger. In that process, JI will become increasingly important as countries currently active under the CDM will become JI host countries.

Eventually, JI will also be phased out and replaced by a cap-and-trade system globally, but its role during the transition period will be important. Also, the EU Directive on the ETS contains a text on bilateral agreements between countries with crediting of GHG emission reductions. That sounds like JI, doesn't it? The label doesn't really matter, it's the concept of "project-based mechanism under a cap" that matters. JI is a perfect complement for emission trading schemes, now and after 2012.

As I said, technically speaking the market share of JI will grow at the expense of the CDM. Conceptually, you could say that on a policy evolution curve, the CDM comes first as not all countries have commitments, then JI grows as more countries adopt commitments, with a global ETS as the final stage. That evolution will take some time though.

JIQ: In some potential JI host countries, green investment schemes seem more attractive than JI. Do you think that JI projects can be 'competitive' to existing GIS schemes, and could there be positive synergies in the near future?

B. Leguet: I don't see a real competition between GIS and JI. JI is an economic concept in line with David Ricardo's theory of comparative advantages: if you have relatively low abatement costs, you sell carbon credits. GIS takes place at a different level, more political, and, thus far, the GIS flows of AAUs have not been that big.

The thing is that I believe that JI is a much more powerful tool for searching low carbon investment options. Whereas under GIS a government needs to identify investment options, in JI these options are identified by the market. JI actually offers a lot of information to policy makers in terms of energy efficiency and emission reduction potentials, costs, and how actors in the market interact.

There could be a point in the future where JI and GIS could meet and function in conjunction. For instance, a meeting point could be sectoral programmes which qualify for JI. Sectoral JI could help solve a potential problem for GIS that credits from a GIS scheme are difficult to sell beyond the Kyoto framework. As sectoral JI projects, credits could be eligible on several more markets.

JI, under the existing rules, could provide a perfect testing ground for sectoral crediting, which is one of the so-called 'new mechanisms' discussed in the negotiations. Before 'Kyoto' and 'Marrakech' we didn't know exactly how JI and CDM accounting procedures would work and for that we had the experimental phase called Activities Implemented Jointly or AIJ. A similar experimental phase would be useful for learning how carbon trading under sectoral crediting would work and I think that JI could be very helpful for that.

JIQ: There may be several projects in non-ETS sectors for which the value of ERUs is not enough for a financially viable project. These projects could benefit from a combined revenue in terms of ERUs and government subsidies. Do you think such combinations are feasible or would this conflict with additionality requirements?

B. Leguet: I don't see any problem in combining the value of carbon credits with subsidies to make a project financially viable. The most important is that whatever combinations you make, projects should be developed in the order of costs, starting with the lowest cost options.

Combining JI credits with domestic subsidies in a project has not been a problem in terms of additionality considerations. It's quite simple: if a project can rely on national subsidy programmes, it doesn't need JI credits. But if a project can demonstrate that the subsidies are not enough, then it could add JI credit revenues. I haven't come across cases where this could be a real problem. However, it is sometimes difficult for governments to acknowledge a project is additional in a sector for which a subsidy already exists: it's like recognizing that the existing subsidies are not calibrated well enough. Or, in other words, that governments are not designing efficient policies in that sector.

The Report on Experience with JI (Annex I to the report of the JISC to CMP6) can be downloaded from:
http://unfccc.int/resource/docs/2010/cmp6/eng/09.pdf

JIQ: All in all, given your experience with the JISC, what are the main recommendations you would propose for the creation of a stable framework for JI or domestic JI offset schemes investments in a financially insecure period?

B. Leguet: I have three main recommendations for future activities in the field of JI.

The first one is to step away from the two-track JI approach, as it is confusing. Instead, we should have a single-track JI with a single authority as regulatory body. In the present situation we have JI Track II as a detailed project-to-project assessment and JI Track I as a national assessment of projects. In the case of countries with national carbon budgets, as is the case with JI, we could argue that we don't really need a project-by-project assessment. Instead, we could agree on minimum quality criteria for national procedures for JI projects. So, a bit more flexible than the current Track II and a bit more stringent than Track I.

Second, we need to manage the gap between the first and second commitment period. Otherwise, we are at risk of losing competence which has been building up over the past couple of years. For example, we now have a group of accredited auditors specialized in JI project validation and verification of project performance. These people are generally very busy and could obviously do many other tasks outside the Kyoto context. If there were no JI projects anymore because of a too long gap between the commitment periods, auditors will divert their attention away from JI. By the time a next commitment period would start, we would need to re-invest in JI auditing expertise.

I would recommend to anybody to read the "JISC Report on Experiences" submitted in Cancun which contains a very clever proposal to manage the potential gap period by using AAUs from the first commitment period until the end of the true-up period. This proposal was not understood by negotiators, which means that the JISC will have to keep reaching out and make sure this proposal is understood by the time of CMP7.

Third, and in line with this, countries can take actions to keep the JI processes alive during the gap period by undertaking domestic projects and explore the links with the ETS markets. They should start doing this now so that JI activities can continue after 2012 with credits being sold to ETS systems. I mean, we do have a third EU ETS period and perhaps other markets. In my view, this would be sensible risk management, as it helps us keeping a mechanism alive which we will need when moving forward with international climate policy making towards a low carbon future.

ClimateTechWiki
A CLEAN TECHNOLOGY PLATFORM

http://ClimateTechWiki.org

In 2007, the Conference of the Parties gave a mandate to the United Nations Development Programme (UNDP) to update the Handbook for Conducting Technology Needs Assessment for Climate Change (TNA Handbook). The objective of this handbook[1] is to support developing countries in identifying strategic sectors for achieving long-term development and climate policy targets, and to select prioritised technologies for those sectors.

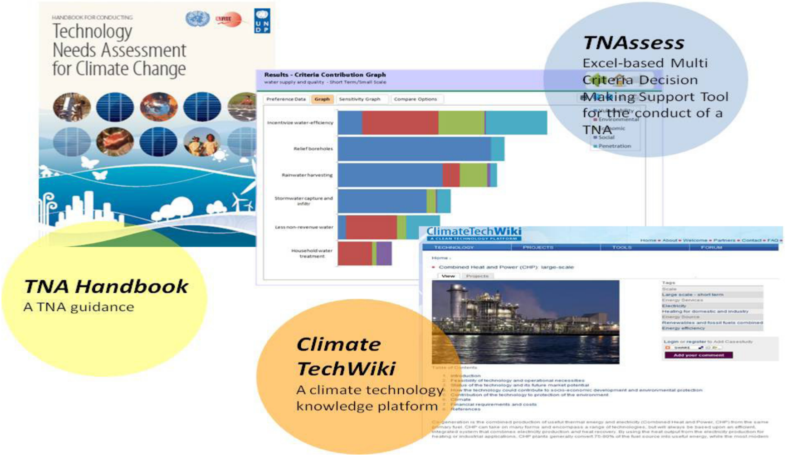

Figure 1. Overview of TNA Handbook and supporting tools

Supporting tool for TNA Handbook

In parallel to updating the TNA Handbook, an on-line platform with information about technologies for climate change mitigation and adaptation has been developed at: **http://ClimateTechWiki.org** (see Figure 1). The main reason for establishing ClimateTechWiki was to enhance the familiarity of decision makers in developing countries with potentially promising technologies for mitigation and adaptation. As explained in the TNA Handbook, "One of the problems encountered by countries implementing technology needs assessment is the lack of access to information about mitigation and adaptation technologies."

ClimateTechWiki has been developed in a joint effort by the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the Renewable Energy and Energy Efficiency Partnership (REEEP), the Netherlands Ministry of Economic Affairs, Agriculture and Innovation, the Energy research Centre of the Netherlands ECN, and the Joint Implementation Network (JIN).

ClimateTechWiki components

The information offered by ClimateTechwiki consists of the following components:

- **Descriptions of a broad set of technologies for mitigation and adaptation**: These descriptions contain easily understandable explanations of how the technology works, and what its costs, operational necessities, development benefits, GHG reduction potential and market status are. The technology descriptions are organized in a database and can be searched according to name, sector, and service (*e.g.*, electricity, heat, cooking, *etc.*).
- **Technology case studies**: For each technology, case studies can be uploaded by site visitors showing practical experience with a technology in different circumstances. A broad range of technology case studies have been made available by REEEP (see: http://reeep.org).
- **Application of technology under CDM**: Where experience with technologies under the CDM exists, the technology descriptions contain short overviews of the number of CDM projects in the pipeline, estimated (annual) GHG emission reduction, and distribution of CDM projects across regions. This information is provided by the UNEP Risoe Centre Carbon Markets Group.[2]
- **External links and networking**: The site aims at developing and facilitating a "community of practitioners" where people can contribute to the information offered by ClimateTechWiki, leave comments and have forum discussions.

[1] http://unfccc.int/ttclear/pdf/TNA%20HANDBOOK%20EN%2020101115.pdf
[2] http://cdm-meth.org

Future development of ClimateTechWiki

The developers of ClimateTechWiki aim to continue developing ClimateTechWiki from an on-line technology database to a Clean Technology Platform, which offers information and services for a wide range of stakeholders in developed and developing countries who are involved in technology transfer and the wider context of low emission and low vulnerability development.

For further information, please visit: http://ClimateTechWiki.org

European Commission Presents Climate Policy Roadmap: a vision for 2050

In March of this year, the European Commission published a Communication on *A Roadmap for Moving to a Competitive Low Carbon Economy in 2050*.[1] The roadmap is a key deliverable by the Commission under the EU Resource Efficiency Flagship, which is a framework for putting forward a series of long-term policy plans for transport, energy and climate change.[2]

The objective of the Roadmap is to describe how the EU could contribute to meeting the objective of a maximum global average temperature increase of 2ºC by the year 2050, above pre-industrial temperature levels. The Roadmap lines out how the EU can become a competitive low carbon economy by 2050 with possible action leading to GHG emission reductions of 80-95% below 1990 levels within the EU.

The Roadmap is based on an extensive modeling exercise with several possible scenarios for different sectors. Figure 1 shows the overall pathway towards an 80% GHG emission reduction by 2050. It shows that in 2005, overall EU emissions were already 7% lower than in 1990. In 2030, GHG emissions should be 40 to 44% lower so that in 2050 a reduction of around 80% can be achieved. The figure also shows that current EU-wide policies (represented by the red upper curve) would lead to an emission reduction of 40% by 2050. The difference between the red curve (current policies) and the -80% emissions curve shows the potential effect of additional policy measures.

One example of additional measures described in the Roadmap is the need for extra action for achieving the 20% energy efficiency improvement by 2020 as included in the EU Energy and Climate Package of 2008. Based on current policies, the target of a 20% share of renewable energy in EU energy consumption and the 20% GHG emission reduction target by 2020 are likely to be achieved. However, the Roadmap expects that "with current policies, only half of the 20% energy efficiency target would be met by 2020." According to the Roadmap, additional policies for achieving the energy efficiency targets would result in an extra GHG emission reduction of 5%-point by 2020: 25% reduction instead of 20% by 2020. How to achieve this, is explained in the EU Energy Efficiency Plan.[3]

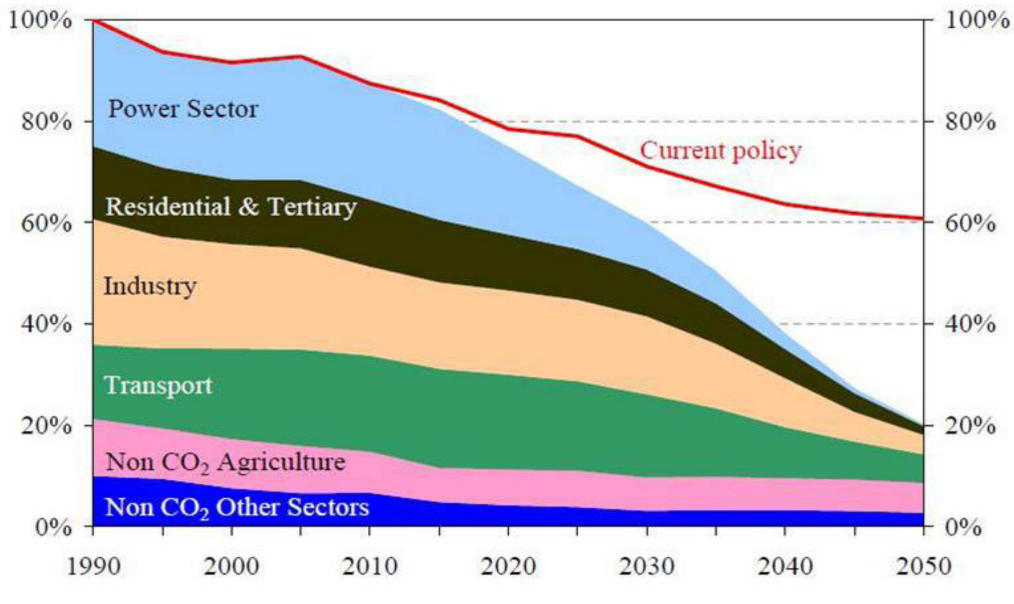

Figure 1. EU GHG emissions towards an 80% domestic reduction (1990 = 100%); source: EU Roadmap

1 European Commission, 2011, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions - A Roadmap for moving to a competitive low carbon economy in 2050, COM(2011) 112/4.

2 European Commission, 2011, EU Resource Efficiency Flagship COM (2011) 21 <http://ec.europa.eu/resource-efficient-europe>

3 European Commission, 2011, Energy Efficiency Plan – COM(2011) 109 <http://ec.europa.eu/energy/efficiency/action_plan/action_plan_en.htm>

The Roadmap underlines the importance of technology innovation for achieving the targets: "R&D, demonstration and early deployment of technologies, such as various forms of low carbon energy sources, carbon capture and storage, smart grids and hybrid and electric vehicle technology, are of paramount importance to ensure their cost-effective and large-scale penetration later on." This acceleration of technology innovation has the advantage that it helps prevent a lock-in in carbon intensive technologies with overall costs over the entire period until 2050. In order to achieve a technology acceleration, full implementation of the Strategic Energy Technology Plan with an additional R&D and demonstration budget of € 50 billion is needed until 2020.

Figure 1 also shows the differentiation of targets across the sectors. The model results are shown in Table 1.

Power sector

According to the Roadmap analysis, the production of electricity in the EU could, by 2050, take place almost fully with carbon-free technologies. From a present share of low emission technologies in the electricity production mix of 45%, an improvement to 60% is possible by 2020 and nearly 100% is feasible by 2050. An important benefit from achieving these targets is that more technologies are needed which would contribute to a more diverse energy system in the EU.

Specific scenarios for the sector will be elaborated on in the Energy 2050 Roadmap, which will present proposals for achieving a decarbonized sector, while ensuring energy security and competitiveness.

Key drivers for realising a carbon-free power sector by 2050, as identified in the Roadmap, are:

- **The EU emissions trading scheme (ETS)**: The Roadmap envisages a critical role for the ETS in making low emission technologies increasingly more attractive than conventional fossil fuel based technologies. However, in order to play that role, the Roadmap underlines the importance of sufficiently high carbon prices and long term predictability of the system. The Roadmap foresees that this may imply a reconsideration of the agreed linear reduction of the cap to total allowances tradable on the market. In addition, the Roadmap also suggests the appropriateness of energy taxation and technological support for achieving the sector targets by 2050.

- **Investments in smart grids**: In order to achieve a decarbonized power sector, a large share of renewable energy technologies is required. As many renewables have variable outputs, for continuous supply at all times, investments in electricity networks are required, such as through smart grids.

Transport

GHG emissions in the EU transport sector rose by 30% between 1990 and 2005. In order to reduce these emissions by around 60% by 2050, the Roadmap identified three technical pillars:

- Increased efficiency of vehicles through new engines, materials and design;
- Cleaner energy use through new fuels and propulsion systems; and
- Better use of networks and information and communication systems for safer and more secure transport operation.

The expectation is that, for the first period until 2050, the main GHG emission reduction can be achieved through improved fuel efficiency. Other drivers are: road pricing schemes, infrastructure charging, intelligent city planning and improving public transport, and increased investment in plug-in hybrid and electric vehicles. Further development of sustainable biofuels could support reducing GHG emissions from aviation and heavy duty trucks.

The Roadmap identifies that measures to reduce GHG emissions in the transport sector would also result in several side benefits such as: reduction of oil imports, increased competitiveness of Europe's automotive industry, and health improvement because of improved air quality in cities.

Residential and services sectors

The expected GHG emission reduction in the built

Table 1. GHG reductions compared to 1990 in sectors

	2005 (%)	2030 (%)	2050 (%)
Power sector	-7	-54 to -68	-93 to -99
Industrial sectors	-20	-34 to -60	-83 to -87
Transport (incl. CO_2 aviation; excl. maritime)	+30	+20 to - 9	-54 to -67
Residential and services	-12	-37 to -53	-88 to -91
Agriculture (non-CO_2)	-20	-36 to -53	-42 to -49
Other non-CO_2 emissions	-30	-72 to -73	-70 to -78
Total	*-7*	*-40 to -44*	*-79 to -82*

Source: EU Roadmap COM(2011) 112/4

environment by 2050 is around 90% (-12% in 2005; -37 to -53% by 2030). This is to be achieved mainly through improved energy performance of buildings, in particular through nearly-zero energy new buildings as of 2021. The latter objective has been included in *Directive 2010/31/EU* on energy performance of buildings.

In addition, energy savings and therefore GHG emission reductions can be achieved through refurbishment of existing buildings. According to the Roadmap, "over the next decade investment in energy-saving building components and equipment will need to be increased by up to € 200 billion." Suggested instruments are: smart financing schemes with preferential interest rates, as well as increasing awareness that energy saving "would help protect consumers against rising fossil fuel prices and bring significant health benefits".

Industry

GHG emissions in industrial sectors, taken together, can, according to the Roadmap, be reduced by over 85% by 2050. Half of this reduction could be reduced by efficiency gains in energy-intensive industrial processes and equipment, recycling, and application of technologies for reducing non-CO_2 emissions such as nitrous oxide and methane. For the different industrial sectors, the Commission will develop individual roadmaps.

The other half of the envisaged emission reduction could be realized through CO_2 carbon and storage (CCS). Unlike for the power sector, the EU Roadmap specifically mentions CCS as an abatement option for industrial sectors. This is possible because of the potential of a carbon-free power production mix with mainly renewable energy technologies, whereas in industrial sectors there will remain a considerable share of fossil fuel-based technologies. In order to develop CCS to such an extent that it can function as a fully developed technology towards 2050 for industrial sectors such as cement and steel, the Roadmap estimates a required annual investment of € 10 billion.

At this point, the Roadmap expresses concerns about the possible negative impacts of such investments on the competitiveness of energy-intensive sectors. Without comparable measures on a global scale, this could result in so-called carbon leakage or moving of business to countries outside the EU: "Clearly, the best protection against the risk of carbon leakage would be effective global action."

Agriculture

In the agriculture sector, GHG emission reductions can be achieved through several technologies and techniques such as: efficiency gains, efficient fertilizer use, bio-gasification of agricultural waste, improved manure management, *etc*. In addition, improved agricultural and forestry practices can contribute to enhanced sequestering and preservation of carbon in soils and trees. Restored wetlands and peat lands, forest development, targeted measures to maintain grasslands are among the examples listed in the Roadmap. The 2013 Common Agriculture Policy legislative proposals will provide more guidance on these measures.

The Roadmap furthermore explains that although the agriculture sector can potentially achieve a considerable GHG emission reduction through the above measures of almost 40% by 2030, the speed of reduction will probably slow down after that. The main reason for this is the need for increased food production due to an increasing population. This creates "dual challenges of global food security and action on climate change." For instance, agriculture is expected to cause a third of EU GHG emissions by 2050, which is a share that is three times as large as nowadays.

Implications

The Roadmap shows, based on an extensive modeling analysis, how the EU GHG emissions could be reduced by 80% by 2050. From the analysis, the following key conclusions can be drawn:

- With a view to the short to medium term, it already shows that with current policies, the renewable energy and climate targets for 2020 will be achieved. However, for a 20% increase in energy efficiency, additional measures are needed. These extra measures will also generate extra GHG emission reductions, so that a 5%-point 'climate bonus' could result by 2020.
- For the power and industry sectors, the ETS is a key instrument and for non-ETS sectors there is a key focus on energy efficiency, renewable energy and improved technical standards.
- For industrial sectors, the Roadmap expresses concerns about and calls for further analysis of competitiveness and possible carbon leakage.
- In the agriculture sector, there could be tension between the effects of increasing efficiency with lower GHG emission and increasing absolute emission levels due to increased food production.
- The Roadmap estimates that the costs of the realizing an 80% GHG emission reduction within the EU amount to € 270 billion per year up to the year 2050 (which 1.5% of the EU GDP). However, in terms of average fuel costs savings, economic benefits could amount to € 175 to € 320 billion per year up to 2050. In addition, the Commission expects job opportunities in innovative industries and increased competitiveness in low-carbon development and transfers.
- Finally, the Commission underscores the importance of global climate policy action, in particular for avoiding carbon leakage.

Offset Mechanisms under Emission Caps: Let's Stick Together!

By Jelmer Hoogzaad*

Joint Implementation (JI) is the most important offset mechanism for the capped environment. Firstly, it is the largest offset mechanism in terms of market volume in countries with an emission target. The expected amount of Emission Reduction Units (ERUs) period from registered projects currently exceeds 200 million for the 2008-12 commitment period. Secondly, JI is internationally recognised and based on UNFCCC standards, which allows it to attract investments from Annex I country governments and companies alike.

The future of JI, however, remains uncertain. The inconclusiveness of current negotiations under the UNFCCC means that the role and form of the mechanism under a future agreement remains to be determined. For JI to maintain a meaningful role in the future climate regime it is essential that two key elements be safeguarded: a globally harmonised approach to recognising emission reductions and an international framework in which JI can operate. The aim of this article is to analyse recent developments that have placed JI in a different perspective and to consider what this means for the future of this mechanism.

Recent developments

JI sets the standard for domestic offset mechanisms. While many saw JI as the mechanism through which the EU-15, Japan and Canada could invest in emission reduction projects in Central and Eastern Europe, JI has also gained an important role within the EU-15 countries themselves. Currently 73% of all registered JI projects are in the EU and 13% of all registered JI projects are located in EU-15 countries. This indicates that JI is increasingly being used not only as an offset mechanism, but as an efficient means through which countries can reduce their carbon footprint, calling into question the notion that offsetting is only viable where the host country has lower mitigation costs than the buyer countries.[1]

There are also projects which use the JI standards for baselines and additionality but do not appear in the JI pipeline. A prominent example is the domestic offset projects for which the Danish government has recently launched a tender. Through this tender, the Danish government intends to stimulate domestic offset opportunities from which it will buy the emission reductions itself. Since Denmark will not issue ERUs but will rather use the reductions as a contribution to its compliance position under the Kyoto Protocol, we see here the JI model being adapted for use purely as a policy mechanism.

The Danish example demonstrates that JI can be a basis for domestic mitigation action, in addition to being an international offset mechanism. This in turn alters the role of JI's supervisory body under the UNFCCC, the JI Supervisory Committee (JISC). The JISC already serves as a service provider to national governments that seek to reduce their carbon footprint by rewarding mitigation action by providing thorough standards for project eligibility, the estimation of emission reductions, the accreditation of independent third parties as auditors, and so on. Governments can then choose to use JI to attract private or public financing for their projects or, as in the Danish example, use JI as a basis to reward companies for mitigation action for actually achieved emission reductions.

Of course, offset mechanisms only work if there is demand for the offsets they generate. Most of the demand for offsets comes from governments and companies facing emission targets under cap-and-trade schemes. The EU ETS is a cap-and-trade scheme for the larger emitters in Europe and is currently the largest in the world in terms of market volume. Due to double-counting issues, the implementation of ETS in other countries limits the potential of offsets from those countries to sectors that are not covered by the schemes. On the other hand, when the use of offsets is permitted within schemes, demand for offsets increases. In this sense, the difficulties or delays experienced by countries such as the US, Japan, South Korea, Australia and maybe even Kazakhstan and Ukraine in establishing national ETS can be seen as a mixed blessing for the use of offset mechanisms. In the current market, however, the negative effects on demand are likely to outweigh any positive effects of keeping potential sectors open.

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1 See also: Project Mechanisms in Europe - An Overview of Policy Options for after 2012, December 2010. <http://jiactiongroup.com/documents/ProjectMechanisms-Backgroundpaper.pdf>

JI can also work as a bridging mechanism for countries on their path towards a domestic ETS. Acknowledging this role, the new EU Directive for the EU ETS, until an international post 2012 agreement is concluded, allows for the continuous use of JI-built credits in the ETS under bilateral agreements with third party countries. In parallel to the EU, Japan has also taken steps towards securing the future of cooperation on international mitigation action through bilateral agreements. However, the UNFCCC has reacted with caution, since bilateral schemes that operate in addition to the UNFCCC framework will make things unnecessarily complicated.[2]

Negotiation positions

The foregoing developments inevitably raise the question: where are we heading? The international negotiations on the future of the Kyoto Protocol will shape JI after 2012. The good news is that there is substantial support for continuation of JI beyond 2012. The various proposals for 'future mechanisms' under the negotiation track for 'Long Term Cooperative Action" (LCA) have shown significant support for the continued use of the Kyoto mechanisms. Some of the more interesting views expressed by the negotiation parties include the following:

- Australia has called for the continuation and reform of JI in addition to a "broad range of potential new market mechanisms".
- The EU has confirmed its view that new market mechanisms should complement existing Kyoto mechanisms, while emphasising the importance of further improving the CDM and JI.
- The Alliance of Small Island States (AOSIS) has stated that "building upon existing mechanisms means retaining the existing Kyoto Protocol mechanisms," but has called for reform to avoid industrial gases with high global warming potential creating perverse incentives.
- Norway, though it has not made any specific statements on JI, has asked the LCA negotiators to ensure that the "existing Kyoto mechanisms [..] will continue and be further improved." According to Norway, existing and future mechanisms could be based on sectoral approaches.
- Russia has averred that the "use of existing market mechanisms ensuring the achievement of emissions reduction while minimizing costs have proven it's efficiency."[3]

In addition, recent developments indicate that the potential of JI may be increasing. Russia has only very recently embraced the mechanism (see Figure 1). After years of inaction that had caused many public and private ERU buyers and investors to despair, the country has recently begun to approve JI projects. This is promising since Russia represents a large and important potential of relatively low-cost emission reductions, most notably in energy efficiency. In addition, Russia remains an important energy supplier for the EU, adding also a strong political motive to cooperation in the area of energy efficiency. In recent statements Russia seems to be supportive of continuing JI and recently stated that it considers the achievements of existing market mechanisms insufficient to limit global warming to 2° C increase over pre-industrial temperatures. The country proposed to supplement existing mechanisms with a new, more ambitious instrument based on a "sectoral approach".[4]

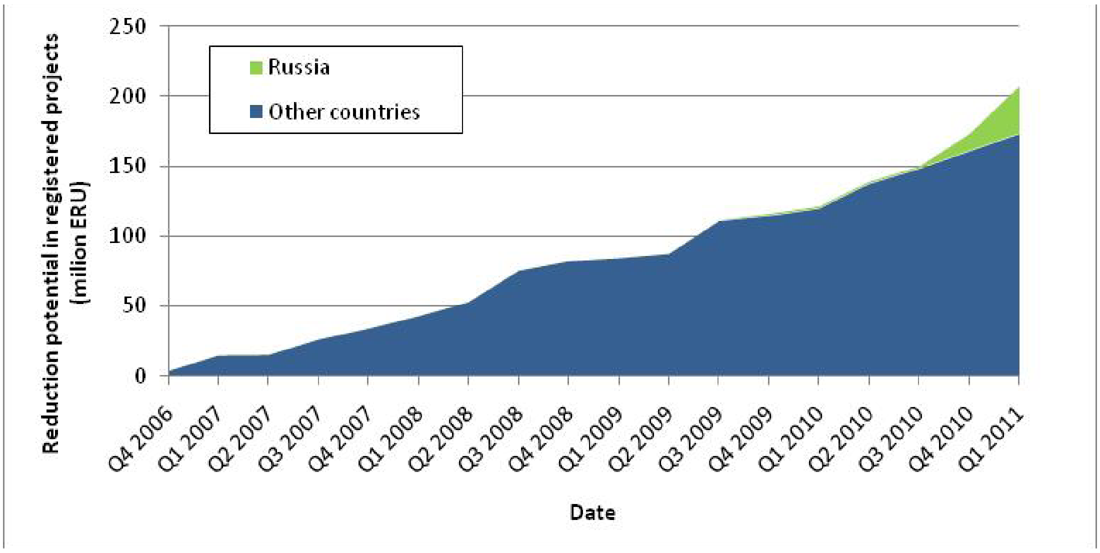

Figure 1. 2008-2012 ERU potential from registered JI projects in Russia and other JI countries.

[2] See "Japan wants new CO_2 offset scheme to complement U.N." from Reuters: <http://www.reuters.com/article/2011/03/02/us-climate-japan-idUSTRE7211MO20110302>

[3] FCCC/AWGLCA/2011/MISC.2-4 Submissions from Parties to the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, March 2011.

[4] ibid.

EU Member States are also beginning to form positions on future capped-environment offset mechanisms. The EU presidency currently rests with Hungary, and will move to Poland in July 2011. Both countries are part of the Visegrad Group, together with Slovakia and the Czech Republic. The Visegrad Group recently "agreed that domestic offsetting mechanisms are useful and cost-effective tools to reduce GHG emissions within the EU" and agreed to invite the EU to develop rules and procedures for an offset mechanism under article 24a of the revised EU ETS directive. The article lays the foundations for a new offset scheme that allows operators of EU ETS installations to offset their emissions by investing in emission reductions in the non-ETS sectors. The Visegrad statement is in line with findings from two conferences of EU policy makers recently held on the topic.

The future

One of the key advantages of an international agreement is the creation of a harmonised international market. JI and the CDM have been recognised for their success in terms of technology transfer, innovation and their ability to attract public and private sector finance. These achievements are largely owed to a market that spans globally and is governed by fairly stable prices. Whether we will continue to draw private sector interest after 2012 depends on the ability of the negotiators to maintain a harmonised market.

JI provides a harmonised approach for the recognition and generation of offsets. Yet, without an agreed framework that regulates post-2012 international GHG emissions, JI will have no basis to operate in its current form. Without a post-2012 agreement the JI institutional framework will remain intact but the issuance of ERUs remains in limbo because there is no Assigned Amount Units (AAU) contingent from which the ERUS can be issued.[5] While there may be solutions that would allow the operation of JI to continue for the years immediately after the end of the first commitment period, the long-term continuation and success of the mechanism is predicated on the conclusion of a post-2012 international agreement. Only then will it be possible to maintain the global market that is needed to match the current achievements of JI in future commitment periods.

Harmonisation within the operation of JI is, moreover, not a foregone conclusion. Currently many countries have adopted their own approach, using the freedom that JI Track I offers. The advantage is that each country can use JI to create incentives for mitigation actions that are tailored to the specific situation in the country. On the other hand, several countries have surplus AAUs. Since governments have the freedom to use their AAUs to incentivise mitigation action and create ERUs, there is a risk that ERUs are generated which are not backed by real reductions, for example when these ERUs are no longer matched 1:1 with achieved emission reductions. To provide market certainty and avoid an inflated supply of offsets, all offset mechanisms should adhere to minimum requirements that prevent issuance of ERUs that are not backed by real reductions. These criteria should not, however, compromise the ability of host countries to use their AAU reserve to develop mitigation incentives with the creativity that is needed to achieve the cuts in emissions that we need.[6]

JI has proved a reliable partner for countries on their low-carbon development path. It stimulated the development and implementation of new technologies, stimulated international cooperation in search for cost-effective mitigation opportunities and has created the capacity within JI host countries to monitor and verify emission reductions against internationally accepted standards. Therefore, JI should provide the basis for a harmonised approach to domestic offsetting schemes and post 2012 market mechanisms.

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5 Carbon Offsetting in Europe Post 2012 Kyoto Protocol, EU ETS, and Effort Sharing, Climate Focus April 2010, available at: http://www.climatefocus.com/documents/carbon_offsetting_in_europe_post_2012_kyoto_protocol_eu_ets_and_effort_sharing

6 See also the recommendations of the Future of JI from the JI Action Group, available at: http://ji-actiongroup.com/JIAGPositionPaperJIRoundtable7Jun10.pdf

Carbon Markets and Waste-to-Energy Technologies: a Good Match?

by Eise Spijker*

Introduction

Nowadays, there are several ways to use mixed waste streams as a feedstock for energy production. An interesting question in this respect is how waste-to-energy technologies can benefit from international carbon markets. In other words, to what extent does conversion of waste into energy result in GHG emission reduction and how can this be valued? This article addresses this question by taking a case study of a waste processing plant in the Netherlands. For this project, JIN has conducted a study to explore potential GHG emission reduction impacts.

The plant, which will be operated by the Dutch company Multi Purpose Industries (MPI)[1], (re)uses mixed waste as a feedstock for a (flash) pyrolysis process. The waste stream contains both short-cycle bio-carbon (organic matter) and long-cycle fossil carbon resources (*i.e.* plastics). Possible products from the plant are: minerals, recyclable materials, 'demin water', but notably energy products, such as synthetic crude oil and synthetic (non-condensable) gas.

The process

The project-related activities in this waste-to-energy process are as follows:

- **Feedstock.** The feedstock is a mixed waste stream composed of organic matter, fossil-based wastes and mineral materials, of which the main components are paper/cardboard, hard plastic, styrofoam and stone, and glass. Under business as usual (BAU) conditions, this combined waste stream would have been partly disposed in a landfill and partly combusted in a waste incinerator. Therefore, for calculating the project's GHG emission reduction, the baseline needs to contain both a landfilling and a waste combustion component ('combined baseline').
- **Logistics**. The feedstock for the process comes from two known sources (*i.e.* waste collection points) and its transport to the new plant location will be done with a standard diesel-fired truck-trailer combination.
- **Conversion**. In the conversion unit, the feedstock is, first, manually sorted. After that, the remaining material is shreddered and the inert mineral material and metals removed. This is followed by drying or dehydrating the granulized feedstock. For this residual heat is used. The 'prepped' feedstock is fed into the flash pyrolysis unit where it is largely vapourized as it is exposed to high temperatures on a fluidized bed under anaerobic conditions. The resulting vapour is cooled in a condenser unit where it results in synthetic crude oil and non-condensable synthetic gas.
- **Energy supply**. The synthetic crude oil is temporary stored on-site in buffer tanks from which it is transported in standard oil cargo trucks. The non-condensable synthetic gas is converted on-site into electricity and heat, which is partly used for operation of the conversion process. Surplus electricity will be supplied to the national power grid and the residual heat will be fed into a small local heat distribution network.
- **Energy sources replaced by the waste-to-energy process outputs**. The synthetic crude oil can be used in shipping, where it replaces fossil fuels on a one-on-one basis. The electricity and heat produced replaces electricity otherwise supplied to the grid (grid average of GHG emissions per MWh) and natural gas used otherwise for heating. Here, equivalence of service is assumed.

GHG emission impact of the process

The GHG emission reductions of the waste-to-energy project described above are estimated at 4.4 ktonnes CO_2 per year. As a baseline, the combined BAU scenario has been taken (90% waste combustion and 10% landfilling of waste) and actual project emissions have been calculated by focusing (for simplicity reasons) on the net GHG impact of the energy products produced. All project emissions and efficiency losses within the project boundary are included in the GHG balance.

The study has also analysed which baseline element has contributed most to the GHG emission reduction figure shown above: avoiding waste landfilling or avoiding waste combustion. For that purpose, two hypothetical baselines were constructed: one assuming that under BAU all waste would have been combusted (scenario A) and one assuming full landfilling of waste, whereby the landfill is covered and GHG emissions captured[2] (scenario B). This has led to a striking but intuitively logical result: avoiding

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[1] For more information on the project activity and technology, please contact MPI, Mr. Ton Koens: t.koens@mpi-group.eu.

[2] Including electricity production based on captured landfill gas.

Table 1. Emission reduction performance of pyrolysis relative to two different baseline scenarios

Project activity	Scenario A: pyrolysis instead of waste incineration	Scenario B: pyrolysis instead of landfill disposal
Transport / supply feedstock	**(-)** Lower GHG emissions due to shorter transport distance	**(-)** Lower GHG emissions due to shorter transport distance
Direct impact; fossil fraction	About equivalent emissions as fossil carbon is also oxidized (burnt)	**(+)** Higher emissions as fossil carbon is oxidized and not permanently stored in LF
Direct impact; bio-fraction	About equivalent emissions as bio-based carbon is also oxidized (burnt)	**(+)** Higher emissions as part of bio-based carbon is oxidized and not permanently stored in LF
Indirect impact; fossil fraction	**(-)** Reduced emissions as result of significant higher overall energy efficiency	**(-)** Reduced emissions as result of higher energy production (i.e. avoiding use of other energies)
Indirect impact; bio-fraction	**(-)** Reduced emissions due to higher overall energy efficiency	**(-)** Reduced emissions as result of lower LF-based emissions and higher energy production (i.e. avoiding use of other energies)
Net GHG impact	**-5.8 kt CO_2-eq./y**	**+3.7 kt CO_2-eq./y**

Source: GHG-balance study for Multi Purpose Industries performed by JIN (courtesy of Multi Purpose Industries)

landfilling of mixed waste and thereby permanent storage of carbon by using the waste in a waste-to-energy project results in significantly higher GHG emissions.[3] This is shown in Table 1: the emission reductions impact of waste-to-energy is strongest if only waste combustion is avoided. This is mainly due to a significantly higher conversion efficiency.

There are a number of impact categories identified. The direct GHG impact element involves the release of carbon into the atmosphere or disposal of carbon in the underground. The indirect impact relates to avoiding the use of conventional energy that is replaced by the energy produced as a result of the project activity. Further, distinction is made between bio-carbon and fossil-carbon due to their different treatment in CO_2 markets.

It is interesting to explore what this apparent GHG penalty would mean for transfer of waste-to-energy technologies to, *e.g.*, developing countries.

In general, government waste policies apply a certain waste hierarchy in which the useful (re)use of mixed waste is an important measure to prevent land filling. However, in our case, the carbon market - under scenario B - does not stimulate using waste plastics (or other fossil-based waste) as a 'secondary fossil energy' feedstock instead of (imported) primary fossil energy (*e.g.*, coal, gas, oil). In essence, secondary fossil feedstock (*e.g.*, often mixed wastes containing fossil carbon) thus have to compete with primary fossil fuels (generally pure). The current set up of the CO_2 market only makes a distinction that favors the use of renewable resources (*e.g.*, biomass) over fossil resources irrespective of their origin (primary or secondary). Relative to the use of biomass, this makes sense as both types of carbon stem from a different carbon cycle. However, from a sustainability perspective there are good arguments to also stimulate the use of secondary fossil feedstock for energy production in order to minimize or avoid the use of primary fossil carbon resources.

Learn from biomass policies

Currently, the carbon market seems unable to provide this stimulus, so for the time being other policy instruments might be needed to fill this gap. Here, one could learn from biomass policies that have been developed in the EU in the past years. In the Netherlands (and in other EU member states), there are policies in place that explicitly provide an additional positive stimulus for the use of secondary biomass resources relative to primary biomass resources[4].

The rationale for discriminating between primary and secondary biomass stems from the general intuition that (re)use of biomass waste streams is more sustainable than cultivating energy crops which can potentially compete with food production in terms of price and land use *etc*. This is comparable to the sustainability considerations for intensified (re) use of secondary fossil-based resources (*i.e.*, security and diversification of energy supply, lower import dependency *etc*.).

In the next *JIQ*, there will be a follow-up discussion on the ways in which a future carbon market could address some of the issues raised in this article, so that a globally more uniform policy approach to waste management can be pursued.

3 This is not only the case for the oxidization of the carbon contained in the fossil-based fraction of the waste that would have been permanently stored under BAU conditions, but also for a specific share of the carbon contained in the organic fraction of the waste, being the share of organic carbon that is oxidized as a result of the project activity (i.e. that share of organic carbon that otherwise would have been permanently stored in the landfill).

4 These policies are based on the provision specified in article 21(2) of the EU Directive 2009/28/EC on the promotion of the use of energy from renewable sources.

An Assessment of the EU Renewable Energy Targets and Supporting Climate Policies

The EU's 2020 targets for Renewable Energy (RE) (20% RE in the gross final consumption) have been addressed by several policy incentives with diverse effects. A widely implemented incentive is the Renewable Portfolio Standard (RPS) system. This is based on the possibility of trading Green Certificates corresponding to the electricity generated by RE, so that the market fixes the value of such electricity and encourages the diffusion of the most cost-effective technologies. Other such incentives are financial instruments, mainly feed-in tariffs for specific technologies, followed up by regulations and voluntary schemes.

As these policy instruments are designed and implemented in an already policy-crowded environment, there are policy interactions. These interactions can take different forms and shapes. They are considered *complementary* if they carry over positive impacts on the policy mix, or *overlapping* if they reduce the overall effects that each instrument (stand-alone) could generate in the market in achieving policy objectives. Drawing policies based on policy interactions demands specific attention from policymakers, where several methods can feed-in the necessary policy information for the subsequent steps of an *ex-ante* and an *ex-post* policy assessment.

Multi-criteria decision analysis tool: ECPI

A collaborative paper has recently been published by JIN and other institutes based on the EU-funded RES2020 project,[1] which evaluated policies through a multi-criteria decisions analysis support tool (ECPI) for the EU RE targets. This tool incorporates policy makers' preferences, relevant to the RE policy discussion, and comes up with policy solutions for the EU towards achieving the RE policy objectives.

The RES2020 project tested the following policy scenarios for projecting the RE market situation:

- **Reference Scenario** (BaU): based on policies currently in practice (without the 2008 energy and climate package)
- **RES Reference Scenario** (RES): where the target for renewable energy sources per Member State and the corresponding targets for CO_2 emission in 2020 are enforced.
- **RES Statistical Transfer Scenario** (RES_T): where the target for renewable energy sources per Member State and the corresponding targets for CO_2 emission in 2020 are enforced as in the RES Reference scenario, and the statistical transfer mechanism proposed in the *Directive (EC 2009)* is also modelled.
- **RES-30 Scenario** (RES-30): with the same assumptions as the RES Reference Scenario, but enforcing a 30% reduction target for CO_2 emissions across the EU.

Areas of PI \ Policy instruments	Feed-in tariffs for Renewable Energy	Tradable Green Certificates	EU ETS	Carbon tax
Measure identification				
Measure Type	Subsidy	Certificate	Certificate	Tax
Application in market (Mandatory (M) or Voluntary (V))	Voluntary	Mandatory	Mandatory	Mandatory
Objectives				
Nature of targets	Renewable Energy	Renewable Energy	GHG	GHG
Level of target	Low/High	Low	Low/High	Low
Energy/Environmental goals	Energy	Energy	Environmental	Environmental
Primary/Final energy	Primary	Primary	Primary	Primary
Target groups				
Obligated entities (energy producers, energy suppliers, industry, consumers)	Energy suppliers	Energy suppliers	Energy producers	Energy producers
Market flexibility for entities (Optional in/Optional out)	Opt out	x	Opt in	x
Technologies (Fossil Fuels, Renewable Energy (RE), Nuclear)	Renewable Energy	Renewable Energy	Fossil Fuels	Fossil Fuels
Additionality (no, baseline)	No	No	Yes	No
Market				
Trading commodity	x	TGC	EUA	x
Commodity liquidilty (Banking and Borrowing (Y/N))	x	Yes	Yes	x
Penalty for non-compliance	Low/High	Low	Low/High	Low
Financing				
Cost recovery (Full tariff, Limited tariff)	Limited tariff	Full tariff	Full tariff	Full tariff
Insitutional setup				
Body for setting up the scheme	Authority	Authority	Authority	Authority
Body for administering the scheme	Authority	Authority	Authority	Authority
Body for verification	Authority	Authority	Auditor	Authority
Body for registration	x	N registry	N registry	x
Body for accounting	Companies	Companies	Companies	Authority

Table 1. Design characteristics of policy instruments

Scenario results

The main policy instruments employed in these scenarios and in the ECPI tool, alongside with their design characteristics are presented Table 1.

In terms of primary energy supply and CO_2 emissions reductions, the RES2020 scenarios demonstrate that policies on renewables and GHG emissions (as specified in the RES, RES-T and RES-30% scenarios) reduce the demand for primary energy and its final use - especially by 2020 (as shown in Figure 1), compared to the demand of the reference scenario in the same time period.

[1] Oikonomou, V., Flamos, A., Gargiulo, M., Giannakidis, G., Kanudia, A., Spijker, E., Grafakos, S. (2011), Linking least-cost energy system models with MCA: An assessment of the EU Renewable Targets and supporting policies, Energy Policy 39(5), 2787-2799; the article is based on the Intelligent Energy Europe (IEE) project "RES2020: Monitoring and Evaluation of the RES directives implementation in EU27 and policy recommendations for 2020"

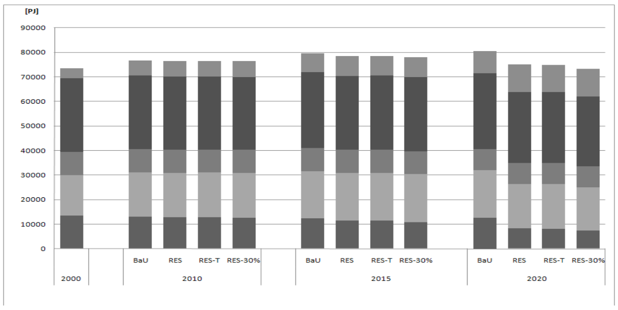

Figure 1. Primary energy supply impact

The use of renewables increases clearly already in the baseline and this is further emphasized when a renewables target is imposed. Addition of more stringent emission targets does not significantly alter the share of renewables.

Furthermore, a deeper emission reduction target does not significantly increase the share of renewables on a European level, therefore implying that the 20% renewables share seen in the results might not be reached without a specific target (*i.e.* climate constraint alone might not bring in renewables (to the extent required by the 20% target), but other mitigation measures, such as increased use of nuclear, CO_2 capture and storage, demand reductions and others might be preferred.

In the BaU scenario, total CO_2 emissions increase quite modestly, by circa 5% over the 20-year time frame. In the ETS sectors, emissions by 2020 are almost exactly what they were in 2000. However, the emissions from the non-ETS sector increase by slightly over 10% during the same time frame.

In the ETS sector, the decarbonisation is mainly due to the power production sector, where the emissions are reduced by circa 13%. Emissions in the industry (within ETS) increase simultaneously, bringing the net change close to zero. In the non-ETS sector, most of the sectors increase their emissions slightly, with the transport sector being responsible for the highest increase (see Figure 2).

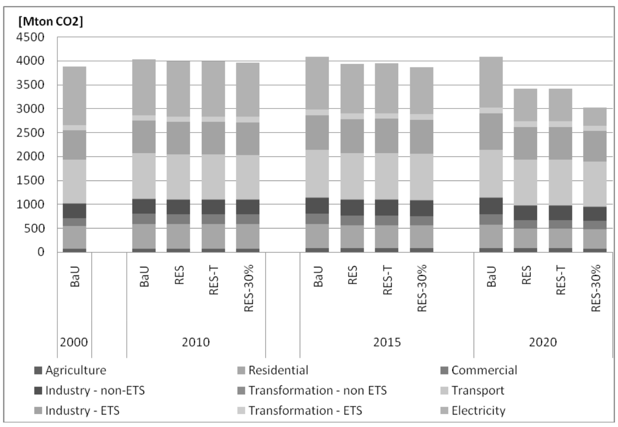

Figure 2. CO_2 emission reduction impact

In the RES scenario, in which the EU climate (and renewable) policies are implemented, the power sector is responsible for at least 55% of the mitigation efforts. Other sectors of importance are the residential sector and the industry (within ETS), both contributing about 10% of the mitigation needs. In order to reach this emission reduction, the model applies a shadow price for CO_2 emissions of circa € 50/tonne.

The difference between the RES and RES-T scenarios are almost negligible, indicating that virtual trade of excess certificates does not affect overall CO_2 emissions. When mitigation requirements are increased to 30%, the relative importance of the power sector increases even more.

In terms of discounted costs for a modelling horizon up to 2025, the overall increases caused by the policies are minor. Total discounted system costs increase by 0.22% in the RES-ref scenario, with its RES target and 20% emission reduction target. With certificate trading of the surplus certificates, this difference is even smaller, some 0.18%.

Evaluation of policy interactions

An initial remark from the evaluation of stand-alone instruments is that they all trigger investments in 'low hanging fruits', or in other words on the already commercially available RE technologies with a rather limited effect on innovation. Nevertheless, innovation can be enhanced with a stringent target, as new technological solutions will be required to reduce compliance and R&D costs in the medium and long run. In terms of costs, certificate mechanisms (*i.e.* Tradable Green Certificates, TGC, and the EU ETS) carry over higher transaction and administrative costs, due to monitoring and verification processes required in contrast to taxation and feed-in tariffs for RE, while, as expected, all instruments except feed-in tariffs tend to increase compliance costs for market parties.

The main concept determining the evaluation process in such policy interactions is the generation of any added-value of a combination of policy instruments. The benchmark upon which the added-value of policy interactions is calculated is the case where the policy instruments at stake perform when they are implemented on a stand-alone basis in the market. In other words, ECPI measures an added value of interacting policy instruments in a BaU scenario, where both policy instruments are kept separate and do not interact. The logic behind a necessity of introducing interacting instruments is when multiple policy objectives are pursued (see for instance multiplicity of criteria) and when market distortions or imperfections are present on second best regimes.

In order to better demonstrate the effects of policy interactions for individual criteria, we present the application results on selected criteria representing general policy objectives (climate, energy, financial, macroeconomic and technological criteria categories). The significance of the scores of each individual criterion in policy combination should be limited for policy making, since the aggregate scores generated by the tool can better demonstrate the overall performance of a policy interaction. The views of the policy makers reflected a clear preference towards the reduction of GHG emissions, employment effects and low administration costs.

In terms of climate objectives, policy interactions under the Reference and RES30 scenarios are in accordance with the high preference of reductions of GHG emissions expressed by policy makers (see Figure 3). The RES Reference scenario with a high feed-in tariff and an existing moderate target under the EU ETS increases substantially the climate awareness, which scores higher to the reduction of GHG emissions.

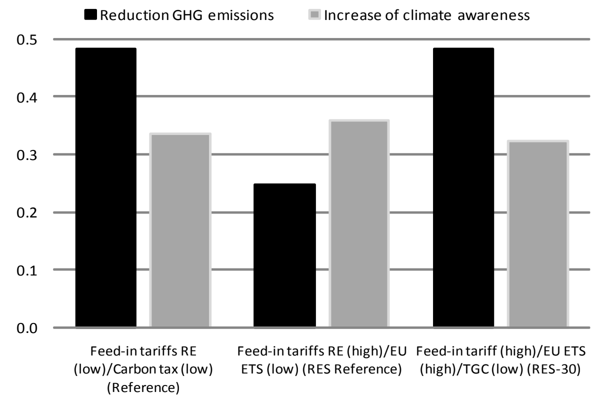

Figure 3. Policy interaction on climate criteria

Furthermore, all policy interactions generate similar results on financial criteria, with positive and negative values (Figure 4). More in detail, compliance costs are high only in case of presence of a carbon tax, while under the EU ETS and TGC schemes, these costs are lowered for participants. Transaction costs are in all cases substantial, while administration costs are progressively higher in more complicated schemes with administrative procedures, such as EU ETS and TGC. In contrast, the implementation of a carbon tax

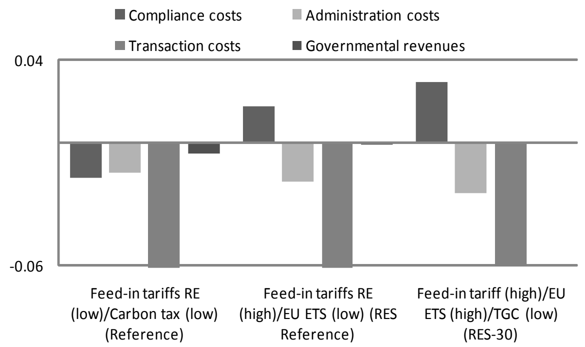

Figure 4. Policy interaction results on financial criteria

does not entail heavy administrative load, therefore costs are lower in this case.

In a further step, if we take into account the effects of interacting policy instruments on macroeconomic criteria with a view of RE target fulfilment, we can deduce that in their absolute majority all policy combinations score high. More in detail, regarding employment, a full introduction of RE technologies in RES30 leads to a stronger employment increase than in other cases. Market competition and business opportunities and trade together score higher with feed-in tariffs and EU ETS, in contrast to a carbon tax, as the EU ETS provides more business opportunities and creates parallel allowance markets (see Figure 5).

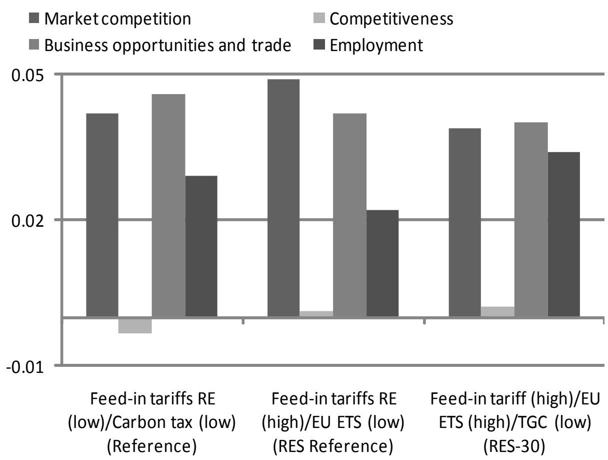

Figure 5. Policy interaction results on macroeconomic criteria

Conclusions

Aggregating the performance of each combination of policies against all criteria provides insight into the feasibility of policy instrument combinations from the perspective of policymakers.

As a general outcome, all instruments present an added value when used in parallel in the market, rather than implemented stand-alone. All three combinations present high scores, which signifies that these interacting policy instruments are desirable in the market as means to achieve RE targets. Still, a weak target of the EU ETS seems to lose ground as opposed to a higher one with supportive RE technology directed policy instruments. In all cases, the simultaneous implementation of an obligation (as a 'stick' in the form of carbon tax and EU ETS) is complemented effectively with the presence of a 'carrot' (*i.e.* feed-in tariffs for RE). These considerations seem to be reflected by the results from ECPI and it is expected that they can emphasize the importance of taking into account several criteria in such policy decisions.

Supporting Climate Policy Making by Local Governments - Guidelines by the Italian CARTESIO Network

By Alessandro Bosso, Enrico Cancila, Fabio Iraldo*

As a Party to the Kyoto Protocol Italy has a commitment to reduce its national GHG emissions by 6.5% below 1990 levels. To achieve this goal, during the first commitment period 2008-2012, the Italian emissions cannot exceed 485,7 Mt CO_2 eq. On an annual basis, this correspond to an emission reduction of 95 Mt CO_2 eq., of which 30 Mt will be achieved in industrial sectors under the EU ETS. The remaining 60 Mt will need to be reduced in the non-ETS sectors: transports, buildings and the promotion of eco-efficiency in industrial and civil consumptions.

Since regional authorities and local institutes play important roles in these non-ETS sectors, the Cartesio Network has published "Guidelines for the definition and implementation of local authorities' GHG emission reduction strategies." The Cartesio network was established in 2007 to promote, support and spread a cooperative approach in local governance and in local sustainability patterns (see Box 1). The strategy outlined in these Guidelines addresses the most recent policy acts issued by European Commission on climate change, including the April 2009 "White Paper on adapting to Climate Change". These acts state that in all sectors a strategy is necessary with answers to the following questions:

- What are the impacts, potential and effective, of climate change in the considered sectors?
- What are the costs of acting and of non-acting for emission reduction?
- How may the proposed measures interact with others policies of others sectors?

The Cartesio Guidelines (to be downloaded from: http://wwe.retecartesio.it) are also consistent with the Directive EC/2009/29. This Directive includes "implementing measures for issuing allowances or credits in respect of projects administered by Member States that reduce greenhouse gas emissions not covered by the Community scheme". Moreover, following a burden sharing approach for GHG reduction objectives, Directive EC/2009/29 states that "sub-federal or regional entities" could define "mandatory greenhouse gas emissions trading systems".

Based on the EU White Book and the Directive EC/2009/29, the Cartesio Guidelines try to suggest a more territorial-based and strategic approach for climate change policies. The main objectives of the Guidelines are:

- To support local authorities in defining an overall GHG emission reduction strategy which is consistent with their specific role and territorial governance.
- To give examples and ideas on how different strategic actions could, starting from a current GHG emissions 'snapshot', lead to GHG emission reduction impacts.
- To develop credible, participatory and practical scenarios showing opportunities from and valuing the benefits of GHG emission reduction actions, and comparing these with costs of actions.
- To define action plans for successful implementation of adopted strategies for programmes and projects, with specification of roles of different actors and authorisation and supporting tools.

For the Guidelines, the following aspects have been considered:

- Valorisation and integration of existing solutions

Box 1. The CARTESIO network

The CARTESIO network aims at promoting, supporting and spreading a cooperative approach in local governance and in local sustainability patterns. Clusters are both industrial and urban areas and the collective sustainable solutions they can develop are directed to improve synergies among organizations located in their territories. Cartesio topics for research and action are: Emas cluster approach, Eco-industrial parks, sustainable consumption and production, product supply chain policies, governance and climate change.

Cartesio network was created in 2007 and is promoted by the following Italian regional authorities: Emilia Romagna, Lazio, Liguria, Lombardia, Sardegna and Toscana. These Regional Administrations subscribed a voluntary agreement for the CARTESIO network launch. Currently, Cartesio has over 260 members, representing about 180 organisations: public authorities, enterprises and industrial associations, universities and research institutes, certification bodies. CARTESIO also officially cooperates with the Italian Environment Ministry for the promotion of cluster-oriented sustainability tools.

For further information, please visit the website: http://www.retecartesio.it

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and available instruments (e.g., GHG accounting methodologies or credits validation standards) to make them more consistent, and proposition of new solutions on how to use them in an overall strategy.

- Realization of new instruments and solutions to face specific situations, and to integrate them with existing ones.
- Gradual extension of the approach starting from supporting local authorities in applying their strategies to a specific sector (mobility, public construction, *etc*.), and then scale up the approach to other eligible sectors.
- Application of a "step by step" approach, so that local authorities can choose which methodological suggestions and operative solutions proposed by the Guidelines to use and which steps to take (*e.g*., only creation of the territorial inventory or implementation of projects for generation of GHG reduction credits), without reducing the credibility of the overall strategy.
- Ensure that the Guidelines are applicable across different kinds of local authorities and bodies (*e.g*., municipalities, provinces, and regions).
- Pay specific attention to existing carbon valuing mechanisms (*e.g*., voluntary emission reduction credits) and hypothetical ones (*e.g*., those related to burden sharing opportunities) to offer Guidelines users different solutions and suggest future possible initiatives of credits valorisation.
- Descriptions of methodological tools to give Guidelines users the opportunity to assess costs and benefits of the implementation of a GHG emission reduction strategy.

The Cartesio Guidelines have been structured in 6 chapters which, as described above, can be used individually or followed in a logical sequence to implement an overall strategy to achieve GHG emission reduction. The chapters are explained in Box 2.

The Guidelines can also be used by local bodies which have joined the Covenant of Mayors as the document can be helpful for implementing Sustainable Energy Action Plans (SEAP).

The Guidelines are tested by the Cartesio Regions (Box 1), both in local pilot projects and in European projects.

For example, in February 2010, the Emilia Romagna Regional Authority launched a funding programme to support Provinces and Municipalities to adopt local climate plans, thereby using the Cartesio Guidelines. Each local authority was engaged in the process of developing, implementing and monitoring a local climate plan. During the implementation of the different steps in the Guidelines, they are supported by a regional joint working group. The main purpose of the working group is to coordinate the work of local bodies and define regional common technical and accounting tools, coherent with the regional emissions inventory and other regional planning tools. The working group will finalise the climate plans by the end of 2012.

The regional authority itself started a pattern for the elaboration of the Emilia Romagna Regional Climate Plan and will use Cartesio methodologies, in coordination with the implementation of the local plans.

The Cartesio Network also conducts the LAIKA (Local Authorities Improving Kyoto Actions) project under the EU LIFE+ Programme. It started in October 2010 and will finish in September 2013. Project partners are the Municipalities of Bologna, Lucca, Milan and Turin, and the Centre for the Development of Products Sustainability (Cesisp), established by the University of Genoa, Polytechnic of Turin and S'Anna Advanced School of Pisa.

Box 2. Structure of Cartesio Guidelines

- Chapter 1 ("GHG emission territorial inventory") explains methodologies for preparing GHG emission inventories for areas governed by the local authority. It also addresses dealing with GHG peculiarities compared to other air pollutants (*e.g*., CORINAIR or ECO2-Regio methodologies).
- Chapter 2 ("Business-as-Usual Scenario and strategic objectives") explains how to estimate what GHG emissions would have amounted to in absence of specific local authorities measures ('baseline').
- Chapter 3 ("Planning") explains how to insert strategic objectives in appropriate Climate Plans and/or Sector Plans. It also indicates how Strategic Environmental Assessment (SEA) can support the provisional elaboration of scenarios, the climate impact assessment and the coherence of strategic objectives.
- Chapter 4 ("Definition of projects to be implemented") helps assessing the technical and economic feasibly of the projects, and their concrete contribution in reaching the reduction objectives. It explains how to define technical details, economic resources, times and responsibilities related to GHG emission reduction projects development.
- Chapter 5 ("Monitoring") describes how to choose appropriate indicators for "ex-ante" evaluation and "in itinere" and "ex-post" monitoring of project performance.
- Chapter 6 ("Validation and verification of projects, credits assignment and economic valorization") explains how to obtain economic benefits from GHG reduction plans and projects through existing mechanism of carbon credits schemes (Gold Standard, VCS 2007, VER+, *etc*.), or through proposed mechanisms that could be adopted at local, regional or national level (e.g., credits exchange between regions and public operators, assignment criterions for regional funds based on reductions achieved from the projects, hypothetical integration and mutual recognition with ETS system *etc*.).
- Examples and case studies are present in annexes.

Evolution of the Bottom-up Climate Change Approach in the USA towards Future Federal Involvement

By Job Taminiau*

In the USA, federal climate change mitigation policies have a strong focus on voluntary action by industries and end users. Several authors conclude that this focus is one of the reasons why federal US climate policies have been inadequate thus far: emission intensities have decreased but absolute emission levels have increased (Rabe, 2004; Byrne et al., 2007; PCGCC, 2002).

At the same time, significant climate policy actions have been taken by the States and regions within the U.S. (PCGCC, 2009), *e.g.*, Renewable Portfolio Standards (RPS) and regional and State level cap and trade systems. Figure 1 shows that actions by States, taken together, cover 43% of U.S. GHG emissions and address 53% of the U.S. population (Lutsey and Sperling, 2007). Moreover, horizontal diffusion of the main policy tools is common (Rabe, 2006).

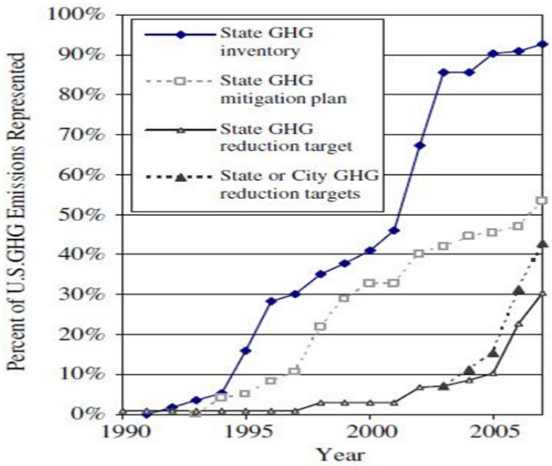

Figure 1. State level action: Percentage of U.S. GHG emissions during 1990 – 2007
Source: Lutsey, N., and Sperling, D. (2007)

Consequences of bottom-up approach

One result of State-level climate initiatives without clear Federal guidance is a regulatory patchwork (WRI, 2008; Litz, 2008), which creates a complicated operating environment for regional and national companies. On the other hand, a positive impact of the bottom-up approach is that States are in a position to innovate and experiment with policy mechanisms. Negative aspects can thus be identified before implementation at the federal level. Moreover, in a bottom-up approach policy mechanisms can be directed specifically at the characteristics of a State (Weibust, 2009). Finally, aggressive State level action, combined with horizontal diffusion of the key policy tools creates a driving force for federal action. This is illustrated by a World Resources Institute analysis of eleven successful cases of vertical diffusion (WRI, 2007).

Indicators for the level of policy action of States

Some states, such as California and the New England States, have shown leadership on the issue of climate change. Other states , such as the majority of the South Eastern States (North Carolina, Tennessee, Alabama, Georgia, Florida, South Carolina and Mississippi) have hardly take any action (DSIRE, 2010). Moreover, some states actively oppose climate change mitigation action, such as Michigan (Rabe, 2004, p. 43). This difference in attitude can be explained by the extent to which states rely on fossil fuels for energy and industrial production.

For instance, Table 1 shows that the states with the most progressive climate policies (California and New England states) use relatively little coal and much natural gas. The South Eastern states and Michigan, on the other hand, largely rely on coal. A similar picture can be shown when looking at the share of carbon-intensive goods production in a state's GDP and that of the service sectors: climate-progressive states have a relatively large service sector.

In-State electricity generation	California	New England States	Michigan	south eastern States
Coal	**1. 09 %**	**15.14 %**	**59. 35 %**	**48. 75 %**
Natural Gas	**54. 88 %**	**40.85 %**	**11. 01 %**	**2. 52 %**
Nuclear	**16. 98 %**	**27.90 %**	**26. 42 %**	**25. 47 %**
Hydro	**2. 65 %**	**5. 14 %**	**1. 06 %**	**1. 79 %**
Renewables	**11. 93 %**	**7. 37 %**	**2. 28 %**	**2. 40 %**

Table 1. In-State Electricity generation of investigated States. *Source*: EIA, 2009.

Effectiveness of bottom-up approach

Not surprisingly, these states have different GHG emission trends: climate-progressives states have been able to reduce their GHG emission growth rates during 1990-2005, whereas passive states saw their emissions grow faster than in the preceding 1980-1989 period.

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Sector	California	New England States	Michigan	south eastern States
Goods	**15. 82 %**	**11.80 %**	**20.68 %**	**18.19 %**
Services	**72. 44 %**	**78.01 %**	**67.68 %**	**67.78 %**

Table 2. The 2008 GDP division per sector of the four States
Source: Bureau of Economic Analysis (BEA), 2009.

For instance, in the South Eastern states GHG emissions increased by 34.4% during 1990-2005, resulting in a per capita emission level of 19.2 tCO_2eq. In contrast, during the same period the New England states' CO_2 emission rose by 10.8 %, resulting in per capita emissions of 13.5 ton/capita (EIA, 2008; U.S. Census Bureau, 1999). At the country level, absolute GHG emissions have increased by 17% during 1990-2005, resulting in a per capita emissions increase from 20.12 ton in 1990 to 20.19 ton/capita in 2005 (EPA, 2009).

Recommendation for U.S. federal involvement

In order to support the positive aspects of a bottom-up climate policy approach (*e.g.*, context specific policies) and address the negative impacts (*e.g.*, patchwork of regulations), four criteria for federal involvement can be identified:

1) minimum level of action in all states,
2) substantial uniformity,
3) preservation of state authority, and
4) flexibility (Litz and Zyla, 2008).

Federal action on a limited set of specific policy tools would provide a minimum level of action among states while maintaining state authority in the other policy tools.

The regulatory patchwork requires guidance as to the direction of action instead of the level of action. Currently, states can address climate change in a multitude of different ways, utilizing the same policy tools in completely different ways. While experimentation and innovation are positive characteristics, they need to be somewhat directed through federal guidelines to ensure that all states construct the policy tool in a similar manner. This reduces the complexity of the different regulations.

To maintain state-level experimentation, federal involvement should be restricted to a set of specific policy tools allowing experimentation with other policy tools. The criterion for substantial uniformity and minimum levels of action in all States requires federal policy in certain policy areas. Pin point policy can be maintained if federal policy leaves flexibility to the states as to how to implement the federal policy. This is much in line with the EU Directives, which state certain targets but leaves flexibility to the individual Member States as to how to achieve those targets.

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Reports

Institute for Global Environmental Strategies (IGES), 2011, Grid Emission Factor Calculation Sheet (Simple OM, Option A, grid power plants version). <http://www.iges.or.jp/en/cdm/report_ers.html>

A CDM project activity that substitutes grid electricity requires the calculation of a Grid Emission Factor (GEF) in accordance with the approved "Tool to calculate the emission factor for an electricity system." This calculation sheet provides automatic calculation while providing a simplified spreadsheet for the development of grid emission factor from the power system.

M. Massimiliano (ed.), 2010, Developing CDM projects in the Western Balkans, Springer, Dordrecht

The Balkan region is normally not considered as a key player in the CDM world. Nevertheless, Italy has displayed a keen interest in providing capacity building and technical assistance to this region, probably due to historical and existing economic ties. Montini, a law professor from the University of Siena, brings together experiences from processes, covering Albania, Macedonia, Montenegro and Serbia. While capacity building in Serbia already started in 2002, the other countries came on board in 2004/5. DNAs mainly became operational in 2008.

The first part of the book is on legal issues related to the CDM and the second part discusses project potential and experience.

Sikkema, R., M. Junginger, W. Pichler, S. Hayes, and A.P.C. Faaij, 2010, The international logistics of wood pellets for heating and power production in Europe: Costs, energy-input and greenhouse gas balances of pellet consumption in Italy, Sweden and the Netherlands, published online at www.interscience.wiley.com, DOI: 10.1002/bbb.208; Biofuels, Bioprod. Bioref. 4:132-153.

The European wood pellet market is booming due to climate change and renewable energy targets. This article compares typical wood pellet chains from the purchase of the feedstock from sawmills to the conversion into heat or electricity. Cost structures, primary energy inputs and avoided GHG emissions are reviewed. Three cases are defined: pellets for district heating in Sweden (replacing heavy fuel oil); bagged pellets for residential heating in Italy (natural gas); and Canadian pellets for electricity production in the Netherlands (coal).

Job Taminiau wins CE Climate Thesis Prize

Recently, on 6 April, Job Taminiau (JIN) was awarded the first prize in the **CE Delft Climate Policy Thesis Award** (www.ce.nl). His Thesis *"Comparative analysis of climate change policy in a trans-Atlantic perspective: implications of the level of governance for climate change effectiveness"* describes a difference in climate policy approach between the USA (bottom up at state level) and the EU (top down at EU-wide level). The research concludes that the advantages of the U.S. bottom-up approach are more than offset by the negative aspects. The research concludes that the top-down approach is more effective in addressing climate change.
See also the article on pp. 19-20 in this issue.

Largest avoided emissions are for power production (1937 kg CO_2 eq/tonne of pellets), followed by district heating (1483 kg). Based on a wood-pellet consumption of 8.2 million tonnes, the EU27 plus Norway and Switzerland avoided about 12.6 million tonnes of CO_2 emissions in 2008. It is concluded that wood pellets can achieve substantial GHG savings, especially when substituting coal for power production. However, wood pellets are relatively expensive, especially compared to coal. The commercial markets for CO_2 emission rights may cover some costs, but their impact is still limited.

Thomas, S.; Dargusch, P.; Harrison, S.; Herbohn, J., 2010, Why are there so few afforestation and reforestation Clean Development Mechanism projects?, Land Use Policy. 2010. 27: 3, 880-887.

Of the more than 1,600 registered CDM projects only four are afforestation or reforestation projects. This paper asks why there are so few CDM afforestation or reforestation (CDM A/R) projects given the many economic, social and environmental benefits that such activities potentially offer. The authors discuss the question from two perspectives: namely the constraints to CDM A/R project development and the features of 'successful' CDM A/R projects.

Analysis of the four registered CDM A/R projects suggests that 'successful' CDM A/R applications are likely to be characterized by the following: initial funding support; design and implementation guided by large organizations with technical expertise; occur on private land (land with secured property rights attached); and most revenue from CERs is directed back to local communities. It is argued that the CDM needs to be reformed to support the development of more CDM A/R projects.

The **Joint Implementation Quarterly** is an independent magazine with background information about the Kyoto mechanisms, emissions trading, and other climate policy issues. *JIQ* is of special interest to policy makers, representatives from business, science and NGOs, and staff of international organisations involved in climate policy negotiations and operationalisation of climate policy instruments.

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Abbreviations

AAU	Assigned Amount Unit
Annex A	Kyoto Protocol Annex with GHGs and sector/source categories
Annex B	Annex to the Kyoto Protocol listing the quantified emission limitation or reduction commitment per Party
Annex I Parties	Industrialised countries (OECD, Central and Eastern European Countries, listed in Annex I to the UNFCCC)
Annex II Parties	OECD countries (listed in Annex II to the UNFCCC)
non-Annex I Parties	Developing countries
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CER	Certified Emission Reduction (Article 12 Kyoto Protocol)
COP	Conference of the Parties to the UNFCCC
DOE	Designated Operational Entity
DNA	Designated National Authority
EGTT	Expert Group on Technology Transfer
ERU	Emission Reduction Unit (Article 6 Kyoto Protocol)
EU ETS	European Union Emissions Trading Scheme
EUA	European Union Allowance (under the EU ETS)
GHG	Greenhouse Gas
IET	International Emissions Trading
JI	Joint Implementation
JISC	Joint Implementation Supervisory Committee
LULUCF	Land Use, Land-Use Change and Forestry
PIN	Project Information Note
PDD	Project Design Document
REDD	Reducing emissions from deforestation and forest degradation in developing countries, including conservation, sustainable management of forests and enhancement of forest carbon sinks
SBSTA	Subsidiary Body for Scientific and Technological Advice
SBI	Subsidiary Body for Implementation
TNA	Technology Needs Assessment
UNFCCC	UN Framework Convention on Climate Change

JIQ Meeting Planner

8-13 May 2011, Linköping, Sweden
World Renewable Energy Congress (WREC) 2011 at Linköping Univ., Sweden
Contact: info@wrec2011.com, www.wrec2011.com.

23 May - 1 June 2011, Beijing, China
The International Carbon Action Partnership (ICAP) Training Course on Emis sions Trading for Emerging Economies and Developing Countries
Contact: http://ec.europa.eu/clima/events/0031/index_en.htm

6 - 17 June 2011, Bonn, Germany
34th session of the UNFCCC Convention Subsidiary Bodies
Contact: http://unfccc.int/meetings/items/2654.php

12 - 14 October 2011, Andhra Pradesh, India
International Conclave on Climate Change (ICCC-1) "Clean Energy & Energy Security", Center for Climate Change Engineering Staff College of India, Hyderabad, AP, India
Contact: http://www.iccc-esci.com/

28 November 2011 - 9 Decembe 2011, Durban, South Africa
COP 17 and CMP 7 (UNFCCC)
Contact: http://unfccc.int/meetings/unfccc_calendar/items/2655.php