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Editor's note

Non-ETS offset projects

In Europe, some countries have set up or are considering non-ETS offset schemes. France and Germany allow links with the EU ETS, whereas in Switzerland offset projects support compliance with Kyoto Protocol commitment. In addition, Central and Eastern European countries host JI projects. In December 2008, the EU Council considered non-ETS projects suitable for the 2020 targets.

This *JIQ* issue discusses the scope for non-ETS offset projects based on a recent Dutch study on offset projects by Arcadis and JIN and by exploring VER projects. From these contributions, the following five issues can be identified as important for successful non-ETS offset projects.

1) GHG level playing field

Within the EU ETS CO_2 emissions outside installation borders are not accounted for. For instance, an ETS plant that uses biomass for power production has zero emissions for this part of the production. However, non-ETS or VER projects in the field of biomass-based energy production must also take into consideration emissions taking place elsewhere in the project life cycle. Consequently, the projects compensate for their own upstream emissions. In case of linking non-ETS offset projects to the ETS, there would only be a level playing field if accounting practices for ETS and non-ETS project were harmonised.

2) AAUs used for sector policy

Some of the Central European Member States are selling surplus AAUs under the Kyoto Protocol. The revenues are used for support energy efficiency measures. Other EU Member States which do not have such surpluses only use for compensating real emissions during 2008-2012, instead of using it to stimulate real emissions reduction activities outside the ETS.

As the article on the Arcadis& JIN report in this issue will show, there are several opportunities to use the economic value of AAUs more actively for low-carbon technology development also in non-ETS sectors. Even if a Member States does not have an AAU surplus.

3) Interaction non-ETS offsets & low-carbon policies

Selling the CO_2 credits from non-ETS projects to national governments or private actors (*e.g.* to ETS installations) generates a revenue stream for low-carbon activities in non-ETS sectors. This could be additional to policies such as norms, standards, subsidies, taxes, and voluntary agreements. Conceptually, the co-existence of multiple incentives schemes is not problematic, but political discussions often focus on issues such as double-subsidising and the exact interpretation of what constitutes state aid. However, as most CO_2 project schemes have additionality requirements in place to demonstrate why the project needs the CO_2 credits, CO_2 crediting could be a welcome and environmentally integer instrument to support low-carbon activities in combination with other policy instruments.

4) Non-ETS offset programmes

Generally speaking, non-ETS projects can be regarded as small-scale, so that transaction costs are relatively high and programmatic approaches would be indispensible. Developing programmes can either be left to public authorities or to private entities. Within the agriculture sector, for instance, natural aggregators for programmatic activities could be food-processing companies or co-operations, while within the transport sector car lease companies, public transport operators, or fleet owners could be aggregators, and housing associations, ESCO's, and centralised utilities within the built environment. They could use their best professional knowledge when managing a non-ETS offset programme.

5) Enhancing low-carbon policy schemes

With respect to harmonisation of non-ETS project policies, applying 'one-size fits all' CO_2 project principles throughout the EU seems efficient from a macro-perspective. However, individual CO_2 project developers still have to unravel the existing incentive structure in their host country because of additionality requirements. Although non-ETS offset schemes undoubtedly will lead to transaction costs, there are significant opportunities for the integration of monitoring and reporting regimes for multiple incentive schemes. For instance, non-ETS project accounting procedures can support the development of systems for guarantees of origin for green gas production and renewable energy certificates.

In conclusion, non-ETS offset projects can, when cleverly designed based on JI and CDM insights, support low-carbon technology acceleration in non-ETS sectors. Only with such progressive approaches can EU Member States realise their ambitious EU targets for 2020.

In this issue

Non-ETS Offset Projects: Complementary to Energy- and Climate Policy*

During the first half of this year, Arcadis and JI Network (JIN) in the Netherlands conducted a study project on the scope or GHG reduction projects within the EU, but outside the ETS. The study was commissioned by the Netherlands Ministry of Housing, Spatial Planning and Environment (VROM) and Energy Valley. The study focusses on the potential of such projects in the Netherlands and explores in which sectors this project mechanism would be most suitable.

As Parties to the Kyoto Protocol, EU Member States have nationally assigned amounts of maximum GHG emissions per year (AAUs). Under the European Emissions Trading scheme (ETS), the Member States have transferred (or allocated) part of their AAUs to individual energy intensive installations. The remaining AAUs are managed by Member State governments by using such policy measures as voluntary agreements, energy taxes, low-carbon energy subsidies, green certificates, and command and control measures.

The emission reduction and trading within the ETS have thus far taken place separately from emission reduction action in the non-ETS sectors although in both cases activities are focussed on GHG emission reductions. This also implies that entities that reduce GHG emissions within a non-ETS sector (*e.g.* by producing biofuels as a replacement for fossil fuels) cannot benefit from the CO_2 price on the ETS-market. The main exception to this situation is Joint Implementation (JI) which allows the trade of project-based emission reductions on the ETS market (although to a limited degree, as regulated by the Linking Directive 2004/101/EC). Present JI projects are mainly located in the Member States that acceded the EU in 2004 and 2007.

There are no JI projects in the Netherlands. In 2005, an amendment to the law on environmental management to allow JI projects in the Netherlands was rejected by Parliament. The main reason for proposing the amendment was to create extra incentives for Dutch low-carbon energy technology projects by allowing the sale of CO_2 credits on the ETS market. However, the amendment was not adopted because it was argued that selling credits to ETS installations would not bring the Netherlands closer to its Kyoto Protocol commitments, as each credit transferred would either lead to a corresponding increase in GHG emissions elsewhere in the Netherlands or, when the buyer of the credits is a foreign entity, to a transfer of Dutch AAUs abroad.

The Arcadis & JIN study conducted for VROM and Energy Valley explores the potentially supportive role of non-ETS projects in light of the EU and Dutch energy and climate targets for 2020, not only as a climate policy measure but also as a measure to support clean technology deployment and diffusion within the country. In addition, in December last year, in the European Council and European Parliament climate and energy package for 2020, there is a call for harmonisation of rules for projects that reduce GHG emissions outside of the ETS. The study addressed harmonisation issues as well.

Low-carbon technology support

Allowing credits from non-ETS offset projects on the ETS market (*i.e.* next to JI projects under the Kyoto Protocol) would bring the benefit that an additional market-based tool becomes available for supporting low-carbon technology deployment and diffusion within the EU in non-ETS sectors. In order to obtain a picture of the precise role that non-ETS projects could play in this respect, the study, first, prepares an overview of existing policy measures and their effectiveness for a number of non-ETS sectors.

This could result in a number of outcomes, such as:

1. An existing policy measure is very successful and does not need to be replaced or complemented by a market mechanism;
2. An existing policy measure functions reasonably well, but a market mechanism such as carbon trading would be more effective; and,
3. An existing policy is ineffective to achieve envisaged results, while carbon emissions trading would be an effective alternative.

* This article is based on a report by Arcadis and JI Network, which has been prepared for the Netherlands Ministry of Housing, Spatial Planning and Environment, and for Energy Valley in the Netherlands: Ebbekink, E., W. van der Gaast and E. Spijker, 2009, *Domestic Offsets als aanvulling op het Nederlandse energie- en klimaatbeleid*, Arcadis/JIN, for further information, contact: Wytze van der Gaast, jin@jiqweb.org

The study subsequently focusses on sectors that fall in the second and third categories, in order to explore how non-ETS carbon offset projects could support low-carbon technology deployment and diffusion while also supporting the climate goals.

The study concludes that based on the energy conservation potential in the Netherlands, non-ETS offset projects could successfully complement existing policies in the following sectors/project categories:

1. Reduction of natural gas consumption in the built environment (government and commercial buildings and residential dwellings).
2. Production of biogas and 'green gas' (in combination with related agricultural activities).
3 Transport and mobility.

Subsequently, for each of these project categories positive and negative aspects of implementing non-ETS offset projects have been identified. These aspects are shown in Table 1.

A number of countries have already implemented a non-ETS offset project programme. The study discusses the programmes of France, Switzerland, Germany, New Zealand and the US Regional Greenhouse Gas Initiative (RGGI). A common feature of these programmes is that they aim to stimulate low-carbon technology investments that normally are difficult to target by conventional public policy and in those sectors where adequate enforcement is difficult.

Double counting

A common problem for non-ETS offset project schemes is the risk of double counting of GHG emission reduction when a project indirectly leads to a reduction of GHG emissions at an ETS-covered point source or installation. Most of the offset project programmes analysed therefore target only those sectors, project categories or energy services that do not lead to double counting with the respective ETS scheme and those sectors/categories that are difficult to reach with conventional policies and measures (*e.g.* subsidies and standards). Consequently, offset project programmes generally target projects in the areas of: landfill gas capture, biogas/green gas production, energy conservation and some forms of demand reduction in the build environment and, to a somewhat lesser extent, transport.

Table 1. Positive and negative aspects of project per category in the Netherlands

Project category	Positive	Negative
Built environment	1 Relatively simple CO_2-baseline 2 Existing policies do not cover all potential emission reduction sources or are ineffective in stimulating switch to low-carbon technologies. Carbon trading could support policies in this respect 3 Non-ETS offset projects have a stronger enforcement profile than most other policy measures (*e.g.*, CO_2 monitoring requirement)	1 Projects often have a small-scale, so that a programmatic approach is necessary 2 Only potential for heat demand reduction projects (incl. hot tap water), due to risk of double counting of low-carbon electricity projects
Biogas / green gas	1 Existing policy provides insufficient incentives for full utilisation of biogas/ green gas potential 2 Non-ETS offset biogas projects are compatible with monitoring and certification system for green gas in the Netherlands 3 Projects could significantly support the deployment of demonstrated green gas technologies in the market	1 There are concerns about 'piling' subsidies and carbon credits for projects (*i.e.* risk of non-additionality) 2 Biogas/ green gas projects require a life-cycle analysis which can complicate CO_2-reduction calculations
Transport and mobility	1 Non-ETS offset projects can be complementary (or additional) to the obligation of fuel suppliers to deliver transport fuel with a certain percentage of bio-fuels 2 Projects contribute to improving the local air quality as a result of the usage of more sustainable fuels in transport 3 A more programmatic approach is possible as projects aimed at large transport aggregators and baseline determination are relatively straightforward	1 Suitable only for a limited group of bio-fuel users 2 Other end-user groups require an aggregated of programmatic approach to cover transaction costs 3 Contrary to the relatively easy baseline determination, monitoring of transport activities within a non-ETS offset project can be burdensome and often only sample-based monitoring is feasible

In addition, offset programmes also try to keep the associated transaction costs as low as possible by encouraging project developers to use standard baseline and monitoring methodologies from the CDM. Herewith, a distinction can be made between standard calculation methodologies (without emission factors) and standard emission factors. Further, the programmes allow for the option of bundling of similar smaller projects (*i.e.* programmatic approach), so that the associated transaction costs can be spread over multiple project activities.

Non-ETS offsets as positive sum games

Basically, a non-ETS offset project is a zero-sum game: selling project credits to an ETS installation coincides with a corresponding increase in GHG emissions elsewhere in the country or an AAU transfer to another country. As a result, projects do not bring the host country closer to climate commitments. Moreover, these emission reductions can no longer be used by the government of the host country for future commitments.

Therefore, the Arcadis-JIN study recommends that governments clearly identify sectors needed for complying with climate goals, and in which sectors low-carbon technology development could be supported by the ETS market. Then, non-ETS offset projects cannot conflict with countries' climate commitments and in the long-term, the low-carbon technology diffusion in the 'offset sectors' could even have knock-on effects in the form of lower GHG emission in the future. The shape of a possible non-ETS offset project regime is shown in Table 2.

In December 2008, the European Council and the European Parliament formulated ambitious climate targets for the year 2020 and in their communications explicitly they referred to projects that reduce or avoid GHG emissions in sectors that do not fall under the ETS. By doing so, the post-2012 policy context for non-ETS offset projects looks more promising than during the process of formulating EU policies within the context of the Kyoto Protocol (between 1997 and 2005). While in those days there was a strong emphasis on the cost-effectiveness of reaching the climate targets, the post-2012 international climate regime has a stronger emphasis on stimulating technologies that can contribute to both climate- and energy targets.

Table 2. Possible design of a non-ETS offset programme

Coverage	Project categories/sectors that are relatively difficult to reach with conventional policies and where subsidies can lead to sub-optimal technology deployment, *e.g.* 1. Built environment 2. Biogas/green gas production and supply 3. Transport and mobility
Avoiding double counting	Exclude: 1. Projects that lead to double counting of GHG reductions (non-ETS and ETS) 2. Projects aimed at GHG reduction within ETS installations
Administrative procedures	1. Non-ETS offset project cycle based on JI Track-1 2. Government supervising authority 3. Wide application of standardised calculation methods and methodologies (from CDM & JI)
Credit transfer	1. Government certifies GHG emissions reductions as non-ETS offset credit 2. Government withholds an x-% share of the transferred credits as safeguard for non-additional projects and as a support for country climate targets 3. Withholding of credits depending on project size
Additionality	1. GHG emission reductions have to be additional to baseline emissions level 2. Additionality test based on a financial or barrier analysis
Scale and bundling	Promote the bundling of small-scale activities, so that substantial (portfolios of) projects can be set up and transaction costs can be spread
Role government in project selection and credit trade	The government can perform the following roles: 1. **Passive** as supervisor: to check whether CO_2-eq. emissions reductions are real and establish administrative activities to ensure proper and timely credit transfer 2. **Active** via the selection and financial support of non-ETS offset projects via a public tender: the government requests project developers via a tender to submit project proposals. The government in turn can decide to retain the acquired CO_2-credits for national climate goals or can re-sell the credits to a foreign entity 3. **Hybrid** (combination of passive and active role): in both cases the government acts as a supervisory body to ensure the quality of the credits; however, in this case project initiators have the possibility to trade their credits on the market rather than selling their credits via a public tender

Voluntary Greenhouse Gas Emission Reduction Projects: An Assessment of Existing Standards and Methodologies

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As explained in the article on non-ETS offset projects in this issue, within the EU there is a distinction between sectors covered by the ETS and so-called non-ETS sectors. Next to offset projects which could potentially be linked to the ETS market, non-ETS sectors could also host voluntary emission reduction (VER) projects.

VER credits can be used by local governments to transfer GHG emissions reduction credits in the national and international marketplace to businesses and/or other entities that need them to 'offset' their own emissions. Voluntary markets seems to be interesting mainly for smaller offset projects: around 36% of VER comes from project with less than 100,000 ton of CO_2e reduction.[1] This provides greater opportunities for small communities to contribute to sustainable development.

VERs are now standardized by several companies and organizations for use in the voluntary market, such as:

- The Voluntary Carbon Standard (VCS) Program[2], established by The Climate Group (TCG), the International Emissions Trading Association (IETA) and the World Economic Forum Global Greenhouse Register (WEF). It has a flexible approach towards baselines and additionality.
- The Gold Standard (GS),[3] owned by a group of 60 NGOs/charitable organisations. GS rules are, where possible, based on the UNFCCC regulations, to avoid extra work for VER project proponents. GS focuses exclusively on renewable energy and energy efficiency projects.
- The VER+ standard, developed by TÜV SÜD and intends to make use of the regulatory and methodological framework as defined by the Kyoto Protocol.[4]

However, since the current CDM methodologies for VER projects could in some cases turn out to be too complex, this article discusses for a range of projects what GHG accounting rules could be applied for different VER project types and how.

Specific GHG accounting rules
A project developer needs specific rules or methodologies in order to calculate the GHG emission reduction from a project. Rules can be applied to different projects within a particular project category (e.g. renewable energy production) and applicability conditions (e.g. grid-connected). Below, a number of possible VER project activities are discussed by exploring the relevant GHG accounting rules for similar CDM projects and how these could be applied under supervision of the local authorities.

Renewable energy (electricity, heat)
Many VER projects focus on renewable energy production, such as (with approved CDM small-scale project baseline methodologies applicable for VER projects between brackets):

1. Renewable electricity generation units, such as photovoltaic, wind, geothermal and renewable biomass systems that supply electricity to households (CDM methodology AMS-I.A) or to an electricity distribution system (AMS-I.D);
2. Renewable energy generation units that supply households or users with mechanical energy, such as hydropower, wind power, wind-powered pumps, solar water pumps, water and wind mills (AMS-I.B);
3. Renewable energy technologies that supply households with thermal energy, such as solar thermal water heaters and dryers, solar cookers, renewable biomass for water heating, amd space heating or drying (AMS-I.C); and
4. Combined heat and power (co-generation) system (AMS-I.C).

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[1] Hamilton, K., Bayon, R., Turner, G., Higgins, D., 2007. State of Voluntary Carbon Market: picking up steam. New Carbon Finance and Ecosystem Marketplace, available at http://ecosystemmarketplace.com/documents/acrobat/StateoftheVoluntaryCarbonMarket18July_Final.pdf
[2] See http://www.v-c-s.org/docs/Voluntary%20Carbon%20Standard%202007_1.pdf
[3] See http://www.cdmgoldstandard.org/how_does_it_work.php?id=44
[4] See http://www.tuev-sued.de/uploads/images/1179142340972697520616/Standard_VER_e.pdf
[5] See http://cdm.unfccc.int/methodologies/index.html

For renewable energy projects, the assessment of additionality could be difficult if the project activity is registered under other certification schemes, such as the Renewable Energy Certificate System (RECs).[6] For example, RECs are one type of an environmental commodity intended to provide an economic incentive for electricity generation from renewable energy sources. RECs are defined by state-based policies, which are commonly known as Renewable Portfolio Standards (RPS). Several states allow or require load-serving entities to use tradable RECs to meet a quota for the amount of their delivered electrical load that must be met by electricity from renewable generation.

However, RECs are not equivalent to carbon credits and, as currently defined, the retiring of a REC may have no impact on emissions from electric power generation. Generators that sell RECs are not transferring emission reductions, since they are unlikely to have ownership or the ability to quantify reductions using a commonly accepted standard.[7]

More importantly, RECs currently sold in voluntary markets do not pass credible additionality tests. According to present VER schemes, one MWh of renewable energy generation must not be counted toward both RPS compliance and carbon credits. As an alternative, the following tests could be taken into consideration:

- Positive technology test: electricity is generated from an eligible renewable energy technology (e.g., wind, solar, or geothermal).
- Investment additionality test: projects shown to have been started with the expectation and need for credits revenues are additional.

Treating RECs as being equivalent to offset credits is analogous to assuming that none of the electricity associated with RECs would have been generated without the additional income from the sale of offset credits. For example, GS considers projects that claim Green or White Certificates (equivalents) as non-additional, unless it is demonstrated that no double counting occurs.[8]

Energy efficiency

For energy efficiency improvement VER projects, the CDM small-scale methodologies AMS-II.A – II.H can be used. Eligible projects are:

1. Supply side energy efficiency improvements – generation (AMS-II.B) transmission and distribution (AMS-II.A);
2. Demand-side energy efficiency activities for specific technologies (AMS-II.C.);
3. Energy efficiency and fuel switching measures for industrial facilities (AMS-II.D.), for buildings (AMS-II.E.), for agricultural facilities and activities (AMS-II.F.);
4. Energy efficiency measures through centralization of utility provisions of a civil or an industrial facility (AMS-II.H.).

Biomass co-generation projects shall be considered as category I (Renewable Energy activities, see above).

Local governments have a great potential in particular in the demand-side, since energy efficiency improvements may concern buildings as hospitals, schools, universities and offices.

The assessment of additionality for energy efficiency projects is not complicated and the UNFCCC additionality tools, or equivalent tools, could be applied.

Building energy efficiency

A particular application of energy efficiency is represented by energy efficiency projects in the built environment. This category comprises any energy efficiency and fuel switching measure implemented in a single building, such as a commercial, institutional or residential building, or group of similar buildings, such as a school, district or university.

Projects that concern hot water supply using renewables such as solar collectors or heat pumps fall into category I.C (ref AMS-I.C).

Energy efficiency measures in built environment could be evaluated as kWh save per m^2 per year. Examples of eligible projects include technical energy efficiency measures (such as efficient appliances, better insulation and optimal arrangement of equipment) and fuel switching measures (such as switching from oil to gas).

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[6] See www.recs.org

[7] Gillenwater M., 2007. Redefining RECs (Part 1): Untangling attributes and offsets Science, Technology and Environmental Policy Program. Energy Policy 36 (6), 2109-2119.

[8] Gold Standard Toolkit 2.0, 2008. See http://www.cdmgoldstandard.org/uploads/file/GSV2_Toolkit%20Chapters_2008731_2.0_new.pdf

Transport/mobility

Considering the substantial impact of the transport sector on the global climate, it makes sense to tackle this growing source of GHG emissions by setting up CDM, JI or VER projects.[9] However, the share of transport projects in the CDM portfolio is negligibly small: only nine projects with 4.88 million CERs (0.2%) expected by 2012.[10] In the transport sector, there are only five approved CDM accounting methodologies, while a great number of methodologies have not been approved. The necessity to consider, evaluate and measure the direct and indirect effect as well leakages complicates baseline determination and emission reduction calculation. Examples of eligible CDM project activities correspond to categories AMS-III.C, -III.S, -III.T, III. U[11] and AM0047, AM0031.[12]

Eligible VER transport projects can be the following:

1. *Technological changes* at specific vehicles: using low-GHG emitting vehicles (AMS-III.C), as commercial vehicle fleets (AMS-III.S);
2. *Fuel switch*: switching from conventional to less emission-intensive fuels or biofuels, as biodiesel from waste (AM0047) and plant oil (AMS-III.T);
3. *Efficiency improvements*: reorganizing public or private mobility services within one transport mode;
4. *Modal shift*: shifting to more sustainable transport modes - bus (AM0031) or cable car (AMS-III.U).

Training programmes to achieve a more efficient operation of vehicles are not eligible, as the measured emission reductions are not directly attributable to the project activity (UNFCCC EB decision at accessed 24 October 2006).[13]

With respect to additionality assessments, it is necessary to define and assess the additional impact of the project on already existing transport plans in countries or regions. It might be possible to define a certain set of measures as 'additional' and calculate two different scenarios with and without this set. Another possible way is to define only a share of the emission reductions as additional.

It is recommended that for determining both baseline and project emissions of VER transport sector projects life-cycle emission factors are used because of the importance of up-stream/life-cycle emissions for this project type. For projects concerning efficiency improvements or modal shift elements, there are no CDM approved baseline and monitoring methodologies yet. Methodological rules for baselines and monitoring plan can be found especially in the Strategic Environmental Assessment (SEA) application to a Local Transport Plan (LTP). SEA provides not only procedural rules for incorporating environmental objectives in planning processes but also a suitable methodology for the assessment of the environmental impact.

Examples of projects and instruments for transport sector are presented in Table 1 on the next page.

Conclusions

The analysis performed in this paper focused on the definition and use of VER standards, in order to also make VER projects attractive for such sectors as transport, residential energy consumption, waste disposal and renewable energies that are not yet regulated by, *e.g.*, the ETS.

This article has listed applicable rules for VER project activities and highlighted specific accounting aspects for each project types, such as double counting risks and complex additionality assessment (*e.g.* renewable power), and labour-intensive monitoring (*e.g.* buildings and transport).

In the near future, it is likely that there will be an increasing role for local governments in GHG abatement activities in terms of concrete political action toward the following ambitious goal: achieve VERs that are negotiable with the Designated National Authority or exchangeable on VER platforms so that projects could either be directly financed, or generate money for planned investments in reduction strategies of local governments. An important support to the development of these mechanisms can result from the implementation of VER carbon credits registries that could facilitate the accounting of VER credits issued by several GHG reduction emission projects and their exchange in the market.

[9] Dalkmann, H., Sterk, W., Bongardt, D., 2007. The Sectoral Clean Development Mechanism – A Contribution from a Sustainable Transport Perspective. Wuppertal Institute. JIKO Policy Paper 1/2007.
[10] See http://cdmpipeline.org/publications/CDMpipeline.xls
[11] See http://cdm.unfccc.int/methodologies/SSCmethodologies/approved.html
[12] See http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html
[13] See http://cdm.unfccc.int/methodologies/SSCmethodologies/Clarifications

Table 1: Examples of VER projects in the transport sector (Dalkman *et al.*, 2007, see footnote 1).

Instruments / CDM Criteria	Planning instruments	Regulative instruments	Economic instruments	Soft policy instruments
Project activity	*Example*: Development of Strategic Environmental Assessment (SEA) in Local Transport Plans (LTP) and its implementation	*Example*: Voluntary agreement (VA) with car industries to reduce emissions from passenger cars	*Example*: Introduction of a congestion charge	*Example*: Establishment of Eco-drive scheme and implementation
Eligible?	Yes	Yes	Yes	No
Project boundary	Vehicle emissions covered by the plan	CO_2 emissions from newly registered cars	Number of vehicles moving in charging zone, small leakage effect outside the boundary (charging zone)	Emissions from all vehicles driven by trained drivers
Baseline	Business-as-usual scenario from SEA assessment	Scenario without implementation of regulation	Scenario without implementation of the measure	Scenario without implementation of the scheme has to be developed
Additionality	Plan needs to deviate from BAU scenario	Required by the EC due to climate change policy, target substantially below BAU	Measure implemented due to environmental and access-related reasons	Economic barrier, need for initial investment (driving time barely increased)
Monitoring	Transport surveys and further SEA indicators/ data	Evaluation by national Environmental Protection Agencies (EPAs) based on industry information (average fuel consumption of cars sold)	On-going evaluation, emissions calculation based on number of cars entering and leaving the charging zone and an average emission factor	On-going evaluation measuring km driven and fuel consumption
Emission reduction	Difference between baseline and actual emissions	Savings forecast in Mt CO_2	% reduction in congestion, % reduction in CO_2 emissions	Results from difference in fuel consumption before and after training (% reduction in diesel consumption of ecodriving vehicels)
Contribution to Sustainable Development	Emission savings by consideration of environmental effects when developing new LTP	Distribution of clean technology with less emitting vehicles	Less emissions by reduced congestion; strengthening public transport through investments with money from charge	Savings in fuel consumption and CO_2 emission. Knowledge gained by training can be used outside the job

Updated Technology Needs Assessments Handbook Presented

On 6 June of this year, UNDP presented the updated 'Handbook for Conducting Technology Needs Assessment for Climate Change' at a side event during the Bonn Climate Change Talks. The handbook recommends a structured, step-wise procedure for stakeholder groups in developing countries to make strategic choices for priority sectors for sustainable development and priority technologies for mitigation and adaptation. Based on these choices the handbook recommends steps to move forward to a low-carbon future.

The updated Handbook for conducting technology needs assessments (TNAs) has been developed by UNDP and the UNFCCC Secretariat, with support from the Climate Technology Initiative (CTI), as a response to the request from the *UNFCCC Ad Hoc Working Group on Long Term Cooperative Action*, as reflected in Decision 3/CP.13. This decision encouraged non-Annex I Parties to carry out TNAs and requested the UNFCCC Secretariat, "…in collaboration with the EGTT, United Nations Development Program (UNDP), United Nations Environment Program (UNEP) and CTI, to update the handbook for conducting technology needs assessments before SBSTA 28..." In addition, the updated TNA Handbook contributes to meeting the urgency of technology transfer in the context of the *Poznań Strategic Program on Technology Transfer*.

The handbook presented in Bonn is an update of the TNA Handbook which was prepared in 2004 by the Expert Group on Technology Transfer (EGTT), UNFCCC and UNDP. Between 2004 and 2008, over 90 non-Annex I Parties used the handbook with support from GEF. A synthesis report on technology needs thus identified by non-Annex Parties was presented at the TNA side event in Bonn (6 June) by the UNFCCC Secretariat (document FCCC/SBSTA/2009/INF.1).

The 2004 handbook version was designed to provide practical guidance on how to conduct a TNA in developing countries. The updated handbook differs from the 2004 version in the following ways:

1. It contains a detailed step-by-step guide for prioritising sectors and technologies – both for mitigation and adaptation.
2. It helps users to systematically categorise technologies in terms of their applicability at a small and large scale and of their availability in the short and medium to long term (medium term technologies have been demonstrated but are still pre-commercial with an expected full marketing in about 5 years). This categorisation provides a basis for comparison of technologies and provides a basis for a strategy to meet climate and development priorities in the medium to long term.
3. The technology implementation analysis has been extended from barrier and policy analysis to sector and national system analysis and specified for different technology development cycles (R&D, deployment and diffusion).
4. A new chapter "From Technology Needs to National Strategies" has been added.
5. There will be new supporting tools such as an on-line technology database ('TechWiki'), a multi-criteria decision analysis support tool, and a TNA report aid tool.

Box 1 shows the structure of the updated TNA Handbook.

Participatory process

The overall process of carrying out a TNA is estimated to require around 24 months. An important first step will be the organisation of the process, which includes the decision on the 'ownership' of the process (*e.g.* ministry or interministerial committee), the establishment of a National TNA Team (with representatives from ministries, as well as from private sector), and the recruitment of country stakeholders to enable a fully participatory TNA process.

Box 1. Structure of updated TNA Handbook

Part I - Organisation of TNA process

Ch.1. Establish a National TNA Team

2. Develop process for stakeholder engagement and networks

Part II - Making Strategic Choices for Priority Sectors and Technologies

3. Portfolios with prioritised mitigation technologies
4. Portfolios with prioritised technologies for adaptation

Part III - Moving Forwards to a Low-Carbon Future

5. Accelerating technology development, deployment and diffusion
6. From technology needs to technology strategies & preparing main TNA report

From that point on, the National TNA Team will, together with country stakeholders, identify national priorities for the country concerned with a view to the short, medium to long term in terms of, *e.g.*, increasing concerns about energy security of supply, demographic developments such as increasing urbanization, and developments due to climate change such as increasing need for cooling services in the future and changing resources for low-carbon technologies (*e.g.* less water, more sun and more or less wind). These identified priorities will form the backdrop for the remainder of the TNA process.

Prioritising technologies

Next, the TNA Handbook guides users through a number of steps for prioritising both technologies for mitigation (Chapter 3) and for adaptation (Chapter 4). As a first step, sectors with high GHG relevance and those with a high contribution to reducing climate change vulnerability risks will be identified for each country. Subsequently, for these sectors low-carbon technologies and technologies for adaptation will be identified as potentially suitable within the country context. Some of these technologies may have already been deployed in the market, but not yet diffused to a point where they are commercially available. Others could just have completed the development phase and need activities for a successful deployments. Some technologies will have been diffused in markets in other countries but would need technical adjustments to be suitable for other countries. These development aspects would also need to be addressed.

In this process of prioritising technologies, it is important that stakeholders have good knowledge of technologies and the handbook contains guidance on a technology familiarisation programme, which will contain visits to demonstration projects, expert lectures, and detailed information on relevant technologies through an on-line technology database.

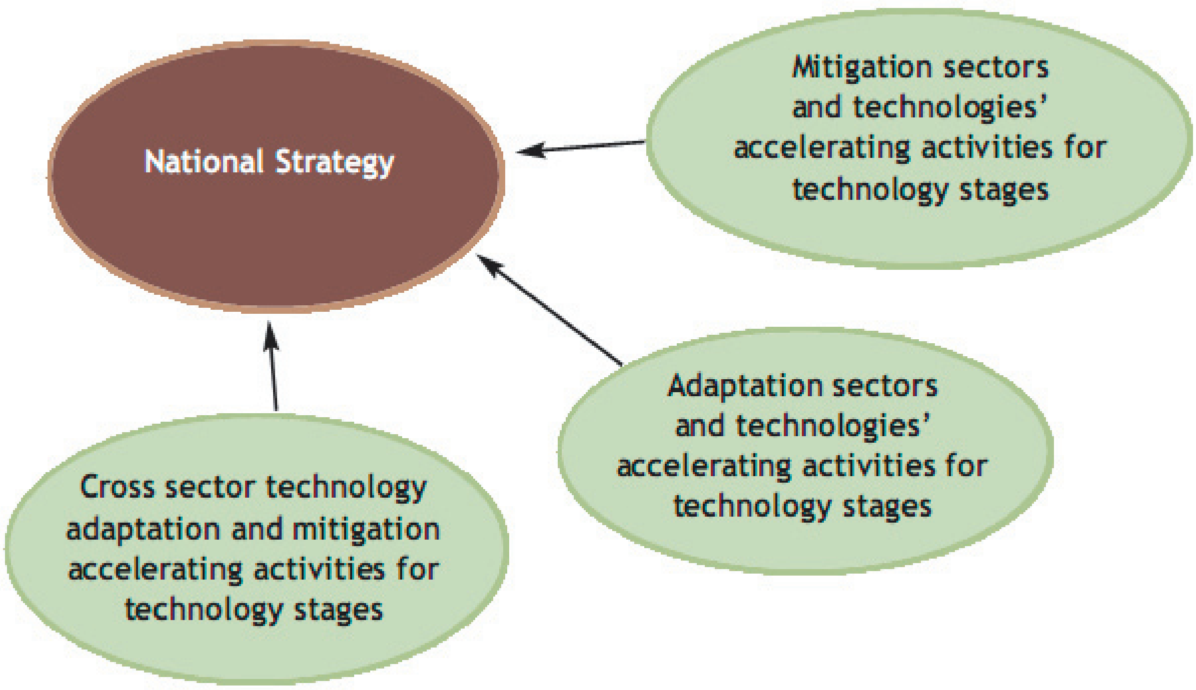
As explained above, the identified technologies will be categorised in four groups along their availability in the short or medium to long term and their applicability at a small or large scale. Subsequently, the technologies will be assessed on their contribution to the country's sustainable development priorities.

For this, the country groups will determine a set of criteria, such as the contribution of a technology to sustainable development and protection of the environment, and the investment costs of a technologies, including internal rates of return. Using a multi-criteria decision analysis (MCDA) software tool and based on these criteria, technologies will then be prioritised in stakeholder workshops.

From technology needs to national strategies

Finally, in Chapters 5 and 6 of the TNA Handbook the issues related to overall enabling frameworks for innovation and diffusion pathways for the prioritized technologies are discussed (see Figure 1). This includes R&D needs for prioritised technologies for mitigation and adaptation applicable in the medium to long term, acceleration of deployment of technologies in the market, and acceleration of

Figure 1. Main elements of natonal technology acceleration strategies



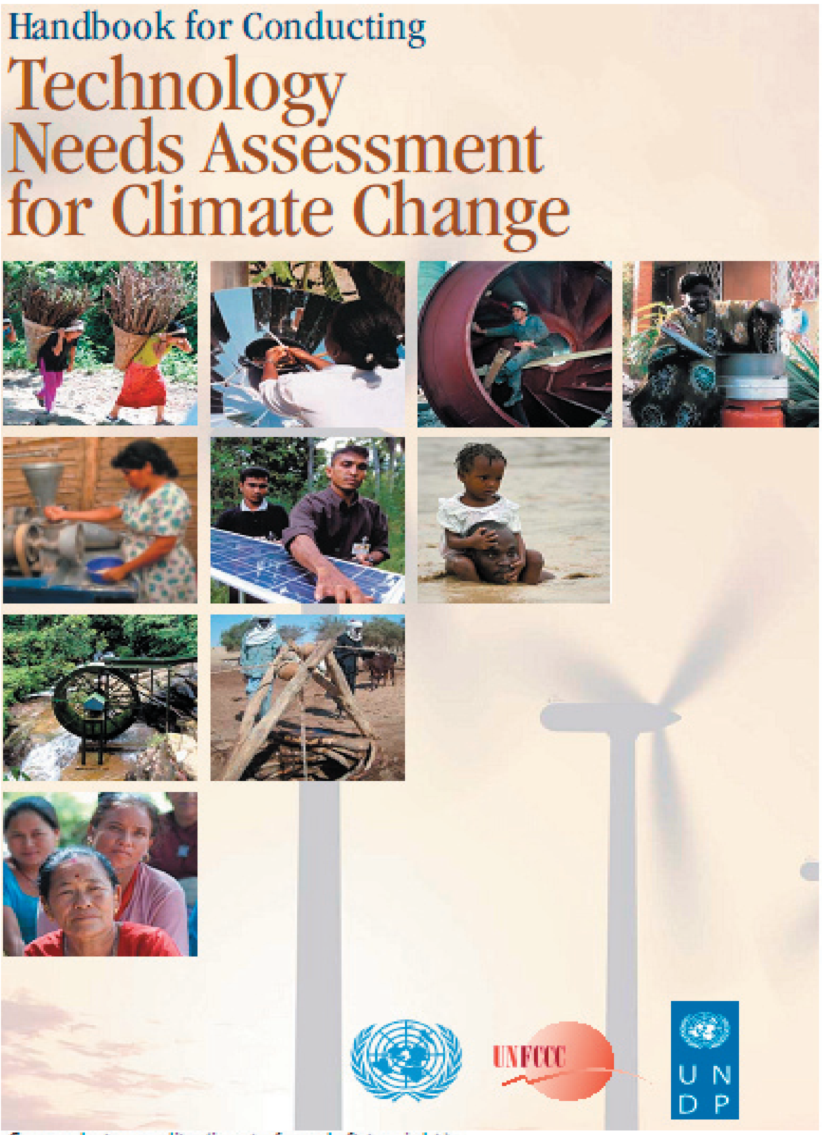
diffusion of technologies up to the point that they reach commercial applicability.

This part of the Handbook supports countries in guiding the generation of plans and strategies for building and/or supporting national R&D capacity in developing countries and international cooperation, improving technology deployment and diffusion systems in developing countries, and designing possible national strategy development processes for moving to a low carbon sustainable and resilient future.

Finally, the activities carried out throughout the TNA need to be compiled and communicated through a final synthesis report. The reporting requirements, including an annotated outline for the final TNA report, are also provided in Chapter 6. Finally, the Annexes contain additional technical details regarding information, tools and methods for TNA.

TNA Handbook: Road to Copenhagen

Before its official presentation on 6 June during the *Climate Change Talks* in Bonn, the updated TNA Handbook was endorsed as a Living Document by the EGTT at its third meeting on 14 May of this year. As a Living Document the updated TNA Handbook has become a public document, which can be downloaded from the *UNFCCC TT: Clear* Internet site (http://unfccc.int/ttclear/pdf/TNA%20Handbook%20-%20Advance%20Document%20June09.pdf) and freely used by interested entities and countries. In the following months, the Handbook will be tested before completing the final Handbook draft which will be submitted to COP-MOP-15 in Copenhagen (December of this year).



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Top row: UNDP/Elisabeth Clemens; © Samson Tolessa/GTZ, courtesy of Photoshare; World Bank/Yosef Hadar; World LP Gas Association. Second row: IFAD/L. Dematteis; World Bank/Dominic Sansoni, 2002; UN Photo/Logan Abassi. Third row: World Bank/Dominic Sansoni, 2002; UNDP-GEF Community-Based Adaptation Project. Bottom row: UNDP/Elisabeth Clemens.

The updated Handbook is the result of close collaboration with experts from the Joint Implementation Network, the Netherlands (Wytze van der Gaast), University of Edinburgh, UK (Katherine Begg), and Stockholm Environment Institute, USA (Bill Dougherty). Members of the EGTT provided valuable comments and guidance. Comments and contributions were also received from experts from GEF, UNDP, UNEP, UNEP-Risö, and the World Bank, as well as from the National Renewable Energy Laboratory and the University of San Martin - Centro de Ideas.

On behalf of UNDP (Sustainable Energy Programme of the Environment and Energy Group) the updating process was co-ordinated by Mr Minoru Takada.

The drafting and production of the TNA Handbook was financed by UNDP, with a contribution from the Climate Technology Initiative.

STRACO$_2$: Exploring CCS within a Chinese Context*

A basis policy requirement for Carbon Capture and Storage (CCS) is ensuring safety. The overall objective of the STRACO$_2$ project (Support to Regulatory Activities on Carbon Capture and Storage) has been to utilise internationally available policy lessons and explore stakeholder opinions on deploying CCS. The main goal of the project was to highlight CCS policies within a Chinese context. Stakeholder opinions were gathered through a questionnaire.

Safety and liability

Proper and practical regulation of long-term safety and liability is of crucial importance for the large-scale deployment of CCS. The analyses of these regulatory themes on the basis of the STRACO$_2$ stakeholder questionnaires, as well as a review of various international policies and relevant international projects, revealed a number of recommendations.

Very few of the existing regulations provide quantitative criteria, such as constraints or thresholds for risk assessment – *e.g.* time scales to be addressed, criteria for site abandonment, or required purity of the CO_2 stream. On the other hand, stakeholders expect regulations to provide guidelines or standards in these areas. It is thus recommended to develop more detailed technical guidelines, and to gather experience from early projects in a number of areas.

Regulations should emphasise the need for consistency between site characterisation, risk assessment, numerical modelling, monitoring, and corrective programmes. R&D on these topics is necessary, and progress is particularly required on monitoring tools, risk assessment, understanding of the potential impacts of CO_2 exposure, impurities, CO_2 storage numerical modelling tools, as well as potential corrective measures.

Stakeholders perceive investment risks as high due to the long time frame involved with CCS. More knowledge on costs of monitoring, remediation, and risk assessment of CO_2 storage will reduce CCS risks. Some provisions on optional financial instruments are identified in regulatory documents. However, insurance or funds for covering long-term liability are not yet available. It is recommended to develop a balanced set of financial instruments as soon as possible to reduce investment risks for starting up CCS projects.

Site qualification and certification

Next to safety and liability, the study reviewed official documents in order to explore for each phase of the CCS project cycle how site qualification and certification issues are addressed. For this, 11 regulatory or policy documents from various countries, 2 international conventions, and 6 guidelines were analysed. Other inputs were the CCS reports published by 7 EU funded projects, 1 UK-funded project, a European network, a European platform, 2 demonstration projects and a private partnership project with government support.

The most significant variations were observed in the level of detail reached by the documents. Indeed, each phase of a CCS project has agreed objectives. However, techniques, values, thresholds, and methods are rarely given. Most documents do not prescribe screening criteria, modelling protocols and methods, or monitoring techniques and protocols, *etc*. Similarly, very few documents address the criteria and methods for site abandonment and the time scales largely vary. In addition, site certification is only rarely mentioned in literature, and has different meanings in different documents.

STRACO$_2$ provides recommendations on the need for guidelines and standards for each phase of a CCS project lifecycle, as well as regulatory developments and R&D.

Financing and incentivisation

The deployment of CCS is slow, and the G8 deployment goals of 20 demonstration plants (>1 Mt per year) by 2010, which was declared in Aomori (Japan), will not be met. From this perspective, STRACO$_2$ analysed which investment barriers are perceived by CCS stakeholders as most problematic. It was identified that the key aspects hampering CCS R&D are related to policies and high costs.

On the issue of how these obstacles could be overcome, the respondents, literature, and policy

* This article is a summary of an FP7 project carried out by François Blanchard (co-ordinator) and Sandra Beranger (BRGM), Ton Wildenborg (TNO), Peter Stigson (Mälardalen University), Mårten Bryngelsson (Royal Institute of Technology), Durrell Mack (Development Solutions); the consortium would like to thank the European Commission and FP7 for the support provided to the project both financially and intellectually. We would also like to thank all respondents for their time and efforts in returning the questionnaire.

makers, all have a strong focus on emissions trading. However, based on questionnaire respondents it was concluded that this focus is too narrow. The short-term and uncertain characteristics of emissions trading does not appear sufficient to put CCS on the deployment trajectory required to demonstrate the technologies and prove the abatement potential of CCS within a time period needed to meet this potential. As there is a general consensus that CCS is a transition technology for most sectors, slow deployment is an immediate problem that ultimately questions CCS' abatement potential.

Policies aiming at finance (reducing capex) and incentivising (reducing opex through providing revenue) must better acknowledge the specific and complex characteristics of CCS. To this end, it is recommended that policymakers do not view emissions trading as a main driver for demonstrating CCS. The study suggests that green bonds, public-private partnerships, refunded emission payment schemes ("feebates"), and voluntary agreements have a better potential to meet the current stakeholder situation and deployment conditions.

Crosscutting Issues

The European Commission intends to make sure that CCS will be compatible with EU industrial policy strategies, which among other things means that CCS has to help securing growth and jobs. A key part of that ambition is intellectual property rights (IPR). IPR are essential since they promote and protect innovation by giving inventors exclusive rights to their inventions for a limited period. IPR are especially important for technology diffusion.

Another important industrial policy issue is allocation of R&D funds. With a limited R&D budget it is difficult to support all competing technologies. Today, there is a major focus on using CCS at coal fired power plants. Although such a focus seemed reasonable some years ago, it is not as evident today. New climate science and a better understanding of CCS life-cycle impacts have shown that in the future it may become increasingly important to also look at capturing and storing CO_2 from combustion of biomass and the atmosphere.

Several specific cross-cutting topics that are critical to prove that CCS can be a feasible and viable abatement opportunity were identified and discussed. For example, from a scientific point of view it is important that more research goes into improving the understanding of CCS in a broad system perspective and to include all environmental effects. Choosing the wrong approach when applying CCS may trade one environmental problem for another. One tool that can be used in order to avoid such trade-offs is the strategic environmental impact assessment (SEA) for policies, plans, and programmes.

CCS policies in China and China applicability

While CCS requires policies that incentivise industries to develop and adopt the technologies, China has unfortunately been slow to develop such a framework. $STRACO_2$ has therefore analysed China's environmental and energy policies to indentify how these and new policies initiatives can facilitate the development of CCS. Without the proper policy instruments and regulation in place, large scale CCS facilities are unlike to be constructed in China.

Hence, CCS in China is still at an early state and environmental and energy sustainability policies related to CCS have yet to be systematically considered. China's policies prioritise renewable energy and energy efficiency as critical areas of focus for its efforts to promote sustainable growth in China. As a result, little funding has been allocated for CCS research. In the $STRACO_2$ survey, private sector stakeholders mentioned lack of regulation as a key obstacle for CCS development. Thus, it will be important for China to start considering CCS as a top priority and develop a policy framework that provides industries with structured incentives and regulatory clarity.

$STRACO_2$ presents challenges for future Chinese policy decisions and provides recommendations on future actions that China and EU policymakers should take to promote CCS in China. The China Applicability Chapters in the report provide concrete suggestions for developing a future CCS framework in the country.

Conclusions

The project concludes that there are several aspects that should be tended to in order to provide a robust policy framework that in the short-term can enable demonstration activities to prove CCS technologies, as well as ensuring a safe deployment of CCS in a potentially larger-scale and longer-term perspective. The project consortium provides a significant body of background material, allowing policymakers and other CCS stakeholders to increase the understanding of the underlying issues on which the recommendations build on.

More detailed information can be found on the project's website: www.euchina-ccs.org.

Reports

Edwards, Rupert, 2009. ***Carbon finance for developing country greenhouse gas emissions mitigation from 2010 - 2020 and the role of a global climate change fund*****,** Climate Change Capital.

This paper discusses several sources of finance that could support low-carbon technology transfers to developing countries. It concludes that, particularly in the short term, the carbon market is too immature to drive the necessary investment on its own. This requires a broader range of policy tools and in the near future considerable work will be required on what these tools should be and how they should be implemented.

Contact: Climate Change Capital, UK, www.climatechangecapital.com

Keeler, Andrew G., and Alexander Thompson, 2009. *Industrialized-Country Mitigation Policy and Resource Transfers to Developing Countries: Improving and Expanding Greenhouse Gas Offsets*, Discussion Paper 08-05, Harvard Project on International Climate Agreements, Belfer Center for Science and International Affairs, Harvard Kennedy School, September 2008

This paper offers a proposal for enhancing existing mechanisms for GHG offsets, which allow rich countries to finance developing country actions and thereby transfer resources to poorer ones. This proposal is framed in terms of meeting the varying objectives of industrialized and developing countries. The CDM is the main existing vehicle for offsets but is plagued by high transaction costs—a function largely of its strict accounting rules—and allows for only a narrow set of project-based activities. This paper calls for less emphasis on ton-for-ton accounting and increased reliance on a broader range of activities that can contribute to reduced emissions and adaptation. Also, establishing a minimum percentage of developed-country commitments is recommended that should be met by funding developing-country actions.

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Sterk, Wolfgang, Michael Mehling, and Andreas Türk, 2009. *Prospects of linking EU and US Emissions Trading Schemes: comparing the Western Climate Initiative, the Waxman-Markey and the Lieberman-Warner Proposals*, Climate Strategies, April 2009.

Given their status as the two largest integrated economies in the world, a transatlantic link between the EU ETS and a future federal US system would not only be a strong political signal for the creation of a global carbon market, but would eliminate competitive concerns between these two players caused by different carbon prices. If a combined EU-US market was established, this transatlantic market would provide the backbone for the overall international climate regime, with subsequent enlargements to other developed and developing countries. This paper addresses the concern about environmental integrity of the trading system as a whole, negative economic or distributional impacts, and protection of design choices made in the establishment of an ETS. The paper also examines possible mechanisms for linking the EU to an US ETS.

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Zhang, ZhongXiang, 2009. In what format and under what timeframe would China take on climate commitments? A roadmap to 2050, *International Environmental Agreements: Politics, Law and Economics*, Springer, Special issue edited by Carlo Carraro and Emanuele Massetti.

This article maps out a roadmap for China's specific commitments towards 2050. It is suggested that China makes credible quantified domestic commitments during the second commitment period, commits to voluntary no-lose targets during the third commitment period, adopts binding carbon intensity targets during the fourth commitment period and takes on binding emission caps starting the fifth commitment period and aims for a global convergence of per capita emissions by 2050. This would signal that China is seriously committed to addressing climate change issues and might pave the way for reaching an international climate agreement at Copenhagen.

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Abbreviations

AAU	Assigned Amount Unit
Annex A	Kyoto Protocol Annex listing 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
CCS	Carbon Dioxide Capture and Storage
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
DNA	Designated National Authority
EGTT	Expert Group on Technology Transfer
ERPA	Emission Reduction Purchase Agreement
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
ITL	International Transaction Log
JI	Joint Implementation
JISC	Joint Implementation Supervisory Committee
KP	Kyoto Protocol
LULUCF	Land Use, Land-Use Change and Forestry
MOP	Meeting of the Parties to the Kyoto Protocol
PDD	Project Design Document
SBSTA	UNFCCC Subsidiary Body for Scientific and Technological Advice
SBI	UNFCCC Subsidiary Body for Implementation
TNA	Technology Needs Assessment
UNFCCC	UN Framework Convention on Climate Change

JIQ Meeting Planner

10-14 August 2009, Bonn, Germany
Intersessional informal consultations AWG-KP and AWG-LCA
Contact: http://unfccc.int/meetings/items/2654.php

2-3 September 2009, New Delhi, India
Third India Carbon Market Conclave 2009
Contact: http://www.ficci.com/icmc2009/

7-10 September 2009, Vienna, Austria
10th IAEE European Conference "Energy, Policies and Technologies for Sustainable Economies, Vienna University of Technology
Contact: Conference secretariat, +43 1 58801 37361, e-mail: iaeeu2009@eeg.tuwien.ac.at

8-9 September 2009, Kiyv, Ukraine
Sixth UNFCCC workshop on JI
Contact: http://ji.unfccc.int

28 September through 9 October 2009, Bangkok, Thailand
Ninth session of the AWG-KP and seventh session of the AWG-LCA
Contact: http://unfccc.int/meetings/items/2654.php

1 October 2009, Amsterdam, the Netherlands
Climex Master Class: 'Play' the Carbon Market
Contact: Axel Posthumus - axel.posthumus@climex.com

2-6 November 2009, Barcelona, Spain
Resumed ninth session of the AWG-KP and resumed Seventh session of the AWG-LCA
Contact: http://unfccc.int/meetings/items/2654.php

7 December to Friday 18 December 2009, Copenhagen, Denmark
COP 15 and CMP 5
Contact: http://unfccc.int/meetings/items/2654.php