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In this issue

Figure 1. Industrial designers form one of the professions that will drive the new wave of climate knowledge.

A New Wave of Climate Knowledge

Editor's note

During the 1980s, climate change was largely the domain of meteorologist and climatologists. They observed changes in weather patterns that were difficult to explain with existing climate models. Based on this knowledge, biologists, chemists, and physicists started to focus on possible consequences of a changing climate. They were soon followed by anthropologists and economists to explore the human dimension of climate change and to express possible climate change damage in monetary terms. Since the 1990s, economists and lawyers have addressed climate policy issues related to costs and responsibilities.

Now, with the Paris Agreement close to entry-into-force, a new wave of climate knowledge brokering is needed. 'Paris' commits countries to communicate national climate plans. However, the main challenge will be the implementation of these plans, which includes acceptance of climate measures by people, as part of their everyday life. For that, we need to understand how people take decisions, what scares them off, what triggers them, etc. This new knowledge wave will be driven by psychologist and sociologists, but also by (industrial) designers, as they are trained to understand their clients or end users of their products.

Recently, the Windesheim College (Zwolle, the Netherlands) started a course on bio-based industrial design. Students collaborate with enterprises on ways to trigger clients and end users to adopt climate-friendly techniques (see page 4). It illustrates the role of a new group of knowledge providers in integrating climate solutions in people's everyday life routine.

Wytze van der Gaast

Emissions Trading Scheme Pilot in Mexico: Complying with the INDC through Market-based Mechanisms

By Andrés Prieto and Eduardo Piquero*

On 15 August of this year the Mexican Ministry of Environment and Natural Resources and MÉXICO$_2$[1] announced the development of a national emissions trading scheme (ETS) pilot. This will be the first of its kind in Latin America with involvement of a major stock exchange and a national government. The announcement surfaces as a result of the common ground between MÉXICO$_2$'s mission to develop environmental market mechanisms and the Ministry's mandate of designing a detailed strategy and roadmap to achieve the country's climate goals.

Figure 2. Announcement of the Mexican ETS Pilot, 15 August 2016. Speaker in the middle is Rafael Pacchiano Alamán, Secretary of Environment and Natural Resources.

The pilot consists of a voluntary, web-based simulation of an ETS, with the objective of providing companies with insight in how an ETS operates as well as building capacity in the private sector for participating in an ETS. Additionally, valuable policy design lessons will be extracted by studying the participants' interactions within the web platform.

As a cornerstone to commitments surrounding the historical Paris Agreement, and in anticipation of the 22nd Conference of the Parties to the UNFCCC in Marrakech in November of this year (COP22), the pilot is strongly aligned with Mexico's and the rest of the developing world's pledged emphasis on capacity building during the pre-2020 period.

Climate policy in Mexico

The pilot emerges in a context of increasing climate regulations by the Mexican government, which began during the Calderón administration with the enacting of the General Law on Climate Change, establishing Mexico's first explicit targets on greenhouse gas (GHG) emission reduction[2] and marking the beginning of Mexico's aspiration for global climate leadership.

The subsequent Peña Nieto administration built further on this with several climate-related laws and initiatives, the most notable of which includes the country's first carbon tax (somewhat of a misnomer as the tax targets CO_2 content of fossil fuels instead of GHG emissions)[3] and the Law on Energy Transition which establishes specific targets,[4] institutions and a new distribution of responsibilities in order to ensure Mexico's transition to a low carbon economy.

Moreover, the Peña Nieto administration has made significant commitments on an international level by communicating the country's Intended Nationally Determined Contribution (INDC, see Figure 3),[5] which is amongst the most ambitious in the region. Simultaneously, Mexico has maintained an active participation in climate negotiations, placing strong

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1 MÉXICO$_2$ is the environmental markets platform of the Mexican Stock Exchange.

2 30% GHG emissions reduction compared to business-as-usual by 2020, and 50% GHG emissions reduction by 2050 with respect to a year 2000 baseline (Ley General de Cambio Climático, pdf).

3 SEMARNAT presentation at Partnership for Market Readiness: Carbon Tax in Mexico (pdf).

4 35% share of clean energy in power generation by 2024 (Ley de Transición Energética, pdf).

5 Intended Nationally Determined Contribution by the Government of Mexico (INDC Mexico, pdf).

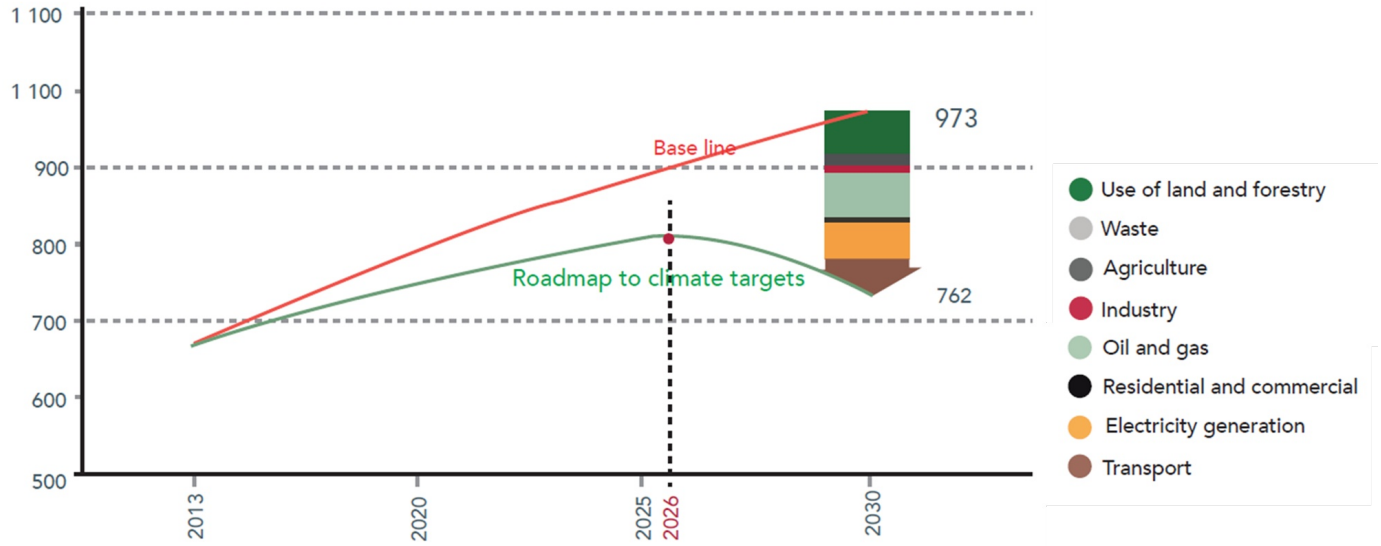

Figure 3. Greenhouse gas pathway for Mexico 2013-2030, based on the 22% reduction target determined in Mexico's INDC.

emphasis on financial and technological transfers for developing nations. The realisation of these climate targets requires an ambitious climate strategy, which also considers the country's social, political and economic features.

The latter proves particularly crucial in the context of Mexico's open, export-driven economy facing recent trends of declining growth and foreign investment amidst concerns of rising public debt and the persistence of low oil prices. Any climate solution must provide businesses with the certainty that they may maintain growth and competitiveness on a global level.

In light of that, emissions trading schemes provide an opportunity for Mexico due to their flexibility provisions and market-based design. In fact, the Minister of Environment and Natural Resources has publicly stated the Ministry's interest in launching an ETS by 2018.

Box 1. International examples for the Mexican ETS.

Global examples only strengthen the case for ETS implementation in Mexico. California's experience with emissions trading shows better than expected GHG emission reductions while maintaining impressive economic growth. Furthermore, China (a major competitor to Mexico in several industries) with its experience with ETS pilots and upcoming implementation of a national carbon market, make the case for ETS as a viable and even preferable policy tool for a growing, developing economy.

In order to prepare for the ETS, the pilot will provide a valuable opportunity to educate stakeholders on the potential advantages of regulating carbon through market incentives, and it will open communication to explore the specific challenges and opportunities of implementing an ETS in Mexico. Regionally, it will send a signal to Mexico's trading partners about the direction of the country's climate policy.

Key features of the pilot

The pilot is a market simulation that reproduces all elements of an ETS. It will be managed through a digital platform that users may log into at any time. Each participating company will choose a representative to manage the emissions trading on their behalf. For the most part, companies have chosen either the Head of Sustainability or the Head of Government Relations. The participating companies may purchase emission permits either through auctions or the secondary market. In total, the simulation will run for a period of one year divided into different cycles lasting around 2-3 months, each introducing a greater degree of complexity in the pilot's market rules.

Participating companies will be encouraged to submit numbers that best represent their actual emissions profile. The end goal of this is to maintain as close proximity to reality as possible, while using fictional resources, allowances and offsets. The end goal of this is to maintain as close proximity to reality as possible whilst also reminding participant that actual, verified emissions data will vary and the results of the simulation are not meant to model the upcoming ETS but rather to illustrate its mechanics.

Although the total number of participants is yet to be determined, enrollment is expected to be significant as participation is voluntary, non-binding, free of cost and responsive to stakeholders' interest in being informed of upcoming environmental regulation. The total number of participating companies is estimated at 100 stakeholders from a diverse array of pre-selected industries, including: transportation, iron, oil refineries, cement, paper, glass, ceramics and chemical industries. Certain industries, such as transportation, will be targeted through an upstream approach in order to reduce the number of participants needed to achieve a large scale of emissions.

The simulation will include price stability mechanisms, different types of offsets, banking, fines, benchmarking as well as other major components present in most of the world's cap and trade systems. These components will be introduced gradually in order to avoid overwhelming the participants most unfamiliar with ETS.

One of the goals of the pilot is to achieve increasing similarity to the California – Quebec - Ontario model,[6] starting from the more austere rules of the early stages of EU ETS[7] for the sake of simplicity. The reasoning behind this, besides early data suggesting the success of California's ETS, is related to Mexico's close political and economic ties with California which may provide some basis for full or partial linkage between the systems.

In parallel, the Ministry shall continue its work on the RENE, the country's mandatory GHG emissions inventory. When developing an ETS, Mexico will need to construct a national baseline for GHG emissions which will inform the determination of individual emission caps. This will require a strong reporting tool that includes annual mandatory verification of all largest emitters. Indeed, the success of ETS in the country lies in the strength of this emissions registry programme.

A few important aspects of what an ETS would look like in Mexico cannot be answered by the pilot and will thus be excluded, such as policy harmonisation between an ETS and the recently introduced carbon tax and the interaction with the Clean Energy Certificates (RECs) market that will launch in 2018.

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6 Key features that will be included: Auction Reserve Floor Price, Allowance Price Containment Reserve, Compliance Offset Protocol, carbon leakage prevention measures.

7 Lack of price controls and banking, allocation by grandfathering.

Dutch Pop-Up Museum for Bio-based Design

Recently, a Bio-based Pop-up museum has been initiated as a collaboration effort by the K&C Centre for Art and Culture, the Windesheim University of Applied Sciences, and a number of small and medium-sized enterprises (SMEs) in the Netherlands. The museum aims at showing examples of how (industrial) design can be based on use of bio-based materials. It will be a mobile exhibition which will 'pop up' in several places in the northern part of the Netherlands.

In September of this year, the project began with a kick-off event to inform (industrial) design students at Windesheim about the importance of using bio-based materials for achieving, among others, the climate goals of the Paris Agreement. At this event, students obtained background information from Wytze van der Gaast (JIN) about climate change and how use of bio-based materials can contribute to a low-emission future. SMEs presented their businesses and introduced the assignments for the students. Each SME had formulated a research question based on a desired improvement of their business operation, to be addressed by the students during this course year.

In a next phase of the project, results (bio-based products and processes) will be presented in the Pop-up museum to a wider audience at several locations.

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TRANSrisk Case Study Analysis: Context Analysis for Low-Emission Transition Pathways

How feasible would it be to have all rooftops in the Netherlands covered by solar panels for electricity? What are policy options for low emission pathways in the Austrian iron and steel sector? What barriers exist for diffusion of bio-energy technologies in Indonesia? These and a range of similar questions are currently being addressed by the TRANSrisk project in a detailed case study analysis.

TRANSrisk is a research project funded by the EU Horizon 2020 programme, which started in September of last year (for earlier articles on the project, see the JIQ Magazine issues October 2015 and December 2015/January 2016). The goal of TRANSrisk is to explore pathways towards a low-emission future with a specific focus on uncertainties and risks that may stand in the way of successful implementation. The TRANSrisk consortium brings together a set of bottom-up, top-down and agent-based models and participatory tools for stakeholder consultation in order to approach low-emission pathway formulation from different (quantitative and qualitative) angles.

Stakeholder engagement is an important aspect of the project as it aims to mobilise stakeholders' tacit knowledge to enable better informed decision-making. For example, while a model-based scenario may present a portfolio with (technology and policy) options for a low-emission future, some of these options may be considered risky by domestic stakeholders as it may, for example, require additional imports of raw materials, lead to grid instability or be considered unsafe. By combining stakeholders' knowledge and preferences with model-based scenarios, low-emission pathway formulation can become more robust and implementation more feasible. At the same time, models help to inform stakeholders about the implications of implementing a low-emission technology on a large scale which may (or may not) affect their perceptions.

TRANSrisk's combined quantitative – qualitative research approach is being applied through 15 case studies in both developed and developing countries (an overview of case studies in shown in Box 2). According to the approach, for each case study, which can be both at the level of a country or a sector, a desired low-emission future is formulated based on a set of specific research questions. The next step is to identify possible pathways toward this desired future, including preferred technology and policy options. However, any pathway contains considerable uncertainty and may imply risks, and it is therefore important to formulate ways to identify (and reduce) these uncertainties and pathway risks.

Co-funded by the European Union

The TRANSrisk project aims to assess low emission transition pathways that are technically and economically feasible and acceptable from a social and environmental viewpoint. See also the article on Low-Carbon Transition Pathways in Livestock Farming on page 9, and the project leaflet (pdf).

For the latter, TRANSrisk applies the tool of system mapping. The origins of mapping markets or systems stem from work by Mark Albu and Allison Griffith in a project which aimed at ways to improve sustainable livelihoods for rural areas in developing countries.[1] In these countries, working with stakeholders, a desired future had been formulated with preferred technology options, but it was not clear how well these options could be implemented at the desired larger scale: what barriers existed, how certain were the assumed costs and benefits and what were the risks? In order to address these and other questions, a stakeholder consultation was held. The answers were then presented in a map which showed the business context for the chosen pathway (incl. policy environment, habits, bureaucracy, etc.), the market value chain with actors and their interconnections, as well as how supportive a country's legal, financial and educational institutions were for the pathways. With these market or system maps, barriers could be identified as well as solutions to clear these.

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[1] Albu, M. and A. Griffith, 2005. Mapping the Market: A framework for rural enterprise development policy and practice, Practical Action.

Box 2. List of TRANSrisk case studies.

Austria	Steel sector: energy supply and demand.
Canada	Fossil fuels sector with a focus on oil sands in Alberta.
Chile	Solar PV (heating/cooling); wind, natural gas plus solar storage and sea water desalination.
China	Building sector (residential, government, and commercial).
Greece	Solar PV, distributed generation, and distributed storage.
India	Solar and wind.
Indonesia	Bioethanol and biogas production technologies and fuel sources.
Kenya	Energy security and access: 1) increasing electricity generation capacity (on and off-grid), 2) diversifying the electricity mix (geothermal, reduced dependence on fossil fuels) and 3) household cooking energy, especially charcoal.
Netherlands	Biogas from aniimal manure for heating/cooling and electricity (see Page 9), and solar PV.
Poland	Energy security: PV, wind, coal (lignite), and renewable energy.
Spain	Solar, wind, and other renewables.
Sweden	Road freight transport, and energy supply (biofuels, highways, batteries, etc.).
Switzerland	Solar, hydro, nuclear, and the electricity sector.
UK	Nuclear power.

In TRANSrisk, a similar system mapping approach is used, for which a software tool has been developed by the project partners. This tool aims to quickly organise stakeholder inputs on how they experience the relevant system for their sector or country, and where they believe barriers exist for realising a low-emission future.

On 4-5 October of this year, TRANSrisk partners presented their case studies by explaining:

- Research questions, the answers to which will, in the course of the case study, shape the low-emission pathways;
- the political, economic, social, and environmental context and priorities for each case study; and
- the currently existing policy mix relevant for each case study.

With this information, for each case study a better understanding has been obtained of the past and current situation in the sector or country, as well as of possible futures, including a first assessment of risks for these futures.

In the next stage, possible futures will be simulated with help of stakeholder consultation and supporting modelling analysis. A key challenge for this stage may become whether the desired future(s) in a country or sector will be derived from the 2-degree Celsius target in the Paris Agreement or be based on stakeholder preferences. In the first option, the climate goal is the lead consideration, and the aim is to find ways for enhanced stakeholder support for that. In the second option, a country's social, economic and environmental priorities become lead, with the aim to realise these with the lowest emissions possible. By combining modelling and stakeholder consultation tools, in iterative research steps, TRANSrisk hopes to bring the outcome of both options closely together. Moreover, TRANSrisk partners will extend, in their case studies, the system map analysis in order to identify and characterise possible risks to successful implementation of pathways in the countries and/or sectors. Based on that, solutions will be formulated to mitigate these risks.

The results of the case study analysis will be published on the TRANSrisk website (www.transrisk-project.eu), with the first core publication due at the end of November.

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Energy Efficiency Policy Mixes under Article 7 of the EU's Energy Efficiency Directive

Energy efficiency policy is expected to play a key role for meeting the European Union's climate and energy targets, particularly for reduced energy demand and reduced CO_2 emissions. While most analyses have focused on single policy measures, the ENSPOL project developed a more generic framework to assess the effectiveness of policy mixes. Based on an assessment of the interaction of policies of the EU Member States, some policies seem to complement others, while in other cases there are overlaps that hinder the effectiveness. This provides lessons on how policy mixes can be made more effective and efficient.

EU Member States have produced reports to show how they will meet the targets set by Article 7 of the Energy Efficiency Directive (EED). They have taken a wide range of approaches, with most countries having employed a mix of policies, rather than single policies. ENSPOL has demonstrated which types of policy interactions seem to work efficiently in the various countries, which can serve as guidance to EU Member States that plan to introduce or amend the existing policy instruments they use for the Article 7 targets.

Policy classes

As a starting point, ENSPOL has defined six 'policy classes'. For a policy mix, several policies from one or more of these classes are to be combined. Therefore, it has been analysed to what extent policies from these classes are suitable for interaction with other policies, in order to create a policy mix.

- **Energy and/or CO_2 taxes** that increase the cost of (carbon-based) energy. These increase incentives to reduce energy consumption and to use more efficient technologies.
- **Purchase subsidies** may include grants or tax rebates, but also Energy Efficiency Obligations (EEOs) are classified as a 'purchase subsidy' because this is how they appear to beneficiaries.
- **Access to capital** includes loans and on-bill finance. Instruments in this class are an alternative to purchase subsidies and should generally not be used together.
- **Information and feedback** instruments include campaigns, education, advice, feedback, and engagement. These instruments are judged to be complementary with all other instruments.

ENSPOL Energy Saving Policies

This article is a summary of the third policy brief published by the ENSPOL project. ENSPOL was an EU-funded project (March 2014 - August 2016) aimed at supporting EU Member States in the effective implementation of Article 7 of the Energy Efficiency Directive.
The policy brief 'Energy efficiency policy mixes under Article 7', published in July 2016, was written by Vlasis Oikonomou (JIN) and Jan Rosenow, Tina Fawcett, and Nick Eyre (University of Oxford).

- **Minimum standards** are obligatory energy efficiency levels as set by regulations. These should not be combined with financial incentives, as these could then be used to fund investments that are required by the regulation.
- **Underpinning measurement standards** are foundational for other policy instruments to function. They help to increase transparency and reliability, and to ensure that the quality of technologies adopted is high.

Use of instruments based on technology cost and complexity

In general, the analysis shows (Figure 4) that loans focus on the most complex and costly technologies, which is in line with the evidence on loans being able to achieve higher leverage effects than direct subsidies. Loans are closely followed by grants and EEOs. Information, advice, billing feedback, and smart metering are located within the low cost/complexity category. However, such instruments also helps to facilitate implementation of other policy instruments focused on more costly and complex technologies.

Policy mix by sector

ENSPOL has analysed the policy instruments for the purpose of complying with Article 7 of the EED in 14 EU Member States,[1] with four sectors distinguished: residential, non-residential buildings, industrial, and transport. In the residential sector the most frequently used instrument is grants, followed by regulations and loans. Most policy instruments in the residential sector

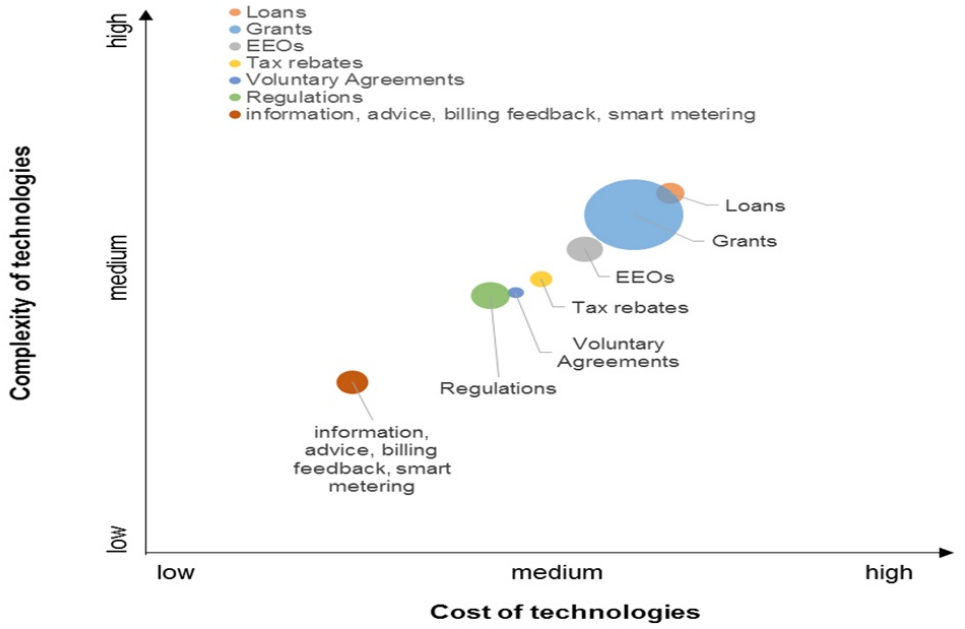

Figure 4. Use of policy instruments based on technology cost and complexity.

focus on the medium cost and medium complexity segment. The focus of policy instruments used in the non-residential sector is very similar, but loans are used to target more complex and costly technologies.

Policy instruments used in the industry sector focus on more complex and capital-intensive technologies compared to other sectors. Rather than loans, in this sector voluntary agreements are commonly used to target the most costly measures. The transport sector can be characterised by a relatively small number of policy instruments and types (there are no loans and energy taxes). Finally, energy and CO_2 taxes and EEO schemes are mostly used in a cross-cutting way, targeting not one sector but a range of sectors.

Discussion and conclusions

Using empirical evidence (alone) to measure the effectiveness of policy mixes is generally understood to be problematic, given a lack of sufficient monitoring and evaluation of individual policies. It is particularly difficult in this case, as most policy mixes considered have only recently been put into place. Therefore the analysis has been made with reference to literature, and using expert judgement across the ENSPOL team.

The analysis suggests that some policy instruments only interact with others in a positive way, meaning that their inclusion within a policy mix should always be encouraged in terms of effectiveness. The universally complementary policies, with the exception of taxation, are in most cases already in place at the EU level for energy-using products, buildings and building components. This includes energy labelling schemes, a requirement to introduce smart meters, and test standards and procedures. The policies which tend to be neutral in their interactions, such as regulations and voluntary agreements, also have a strong place in the EU as well as on national level policy. Where these policies are missing for sectors or sub-sectors, their introduction should be considered.

While theoretical analysis suggests carbon or energy taxation would be complementary with all other policy types, countries take very different approaches on energy taxation across different types and sectors. Some countries, such as Sweden, have high rates of taxation, while others are as low as EU legislation allows. Theoretically useful policies can be politically unacceptable, or not fit with other policy goals. This illustrates one weakness of this method, which is that it can only consider the effect of a policy mix on a single goal (effectiveness), whereas policy is usually required to deliver multiple goals simultaneously.

Given the many simplifications which were made to carry out this analysis, particularly the need to look at one success criterion only and to disregard many important contextual factors, it would be wrong to over-claim its potential usefulness to policy makers. However, it does offer a very clear way of thinking about policy combinations as well as identifying areas of potential under-performance, and last but not least, highlights policy instruments which can always make a positive contribution to a policy mix.

[1] Austria, Belgium, Bulgaria, Denmark, Estonia, France, Germany, Greece, Italy, Netherlands, Poland, Spain, Sweden and the United Kingdom.

"Cows and Pigs For Sale?" Assessing the Side-Effects of Low-Carbon Transition Pathways in Livestock Farming

Within the TRANSrisk project one of the Dutch case studies focuses on low-carbon transitions in the livestock sector. The first transition pathway considers IMM (Integrated Manure Management). IMM combines a set of technologies including stable and floor systems, manure handling-storage systems, anaerobic digesters and manure/digestate treatment (a possible configuration is shown in Figure 5). IMM results in the production of biogas and organic fertilisers, while reducing emissions of methane (CH_4) and ammonia (NH_3). An alternative to IMM is a reduction of animal numbers in the sector. This second transition pathway could achieve a similar (not identical) environmental performance as IMM.

TRANSrisk

Co-funded by the European Union

The objective of the TRANSrisk project is to explore low emission transition pathways and analyse the possible associated risks. The project brings together quantitative techniques (such as models) and qualitative approaches (such as participatory consultations with stakeholders). This combined approach enables identification of possible low emission transition pathways which are technically and economically feasible, and acceptable from a social and environmental viewpoint.

While deliberately decreasing or limiting the size of the important livestock sector in the Netherlands (≈3% of GDP) may seem odd, there are clear signals that a decline of livestock farming is upcoming. In recent years, societal concerns and environmental impacts have increased in parallel with the growth and industrialisation of the sector. This occurred in an extremely livestock-dense region (Figure 6). Limiting further growth of the sector to mitigate the existing health, safety and/or environmental risks hardly seems sufficient, knowing that a substantial reduction of various impacts is needed. In this case study a reduction of livestock (RL) is considered to be a realistic alternative low carbon transition pathway.

Environmental targets

Table 1 shows key environmental targets relevant for the livestock sector. It also shows the current status of achievement for the 2020 and 2030 targets. As agriculture is the sector with the highest emissions of CH_4 and NH_3 (resp. 67% and 87% of the national total) it is to be expected that a significant share of the required mitigation burden will fall on its

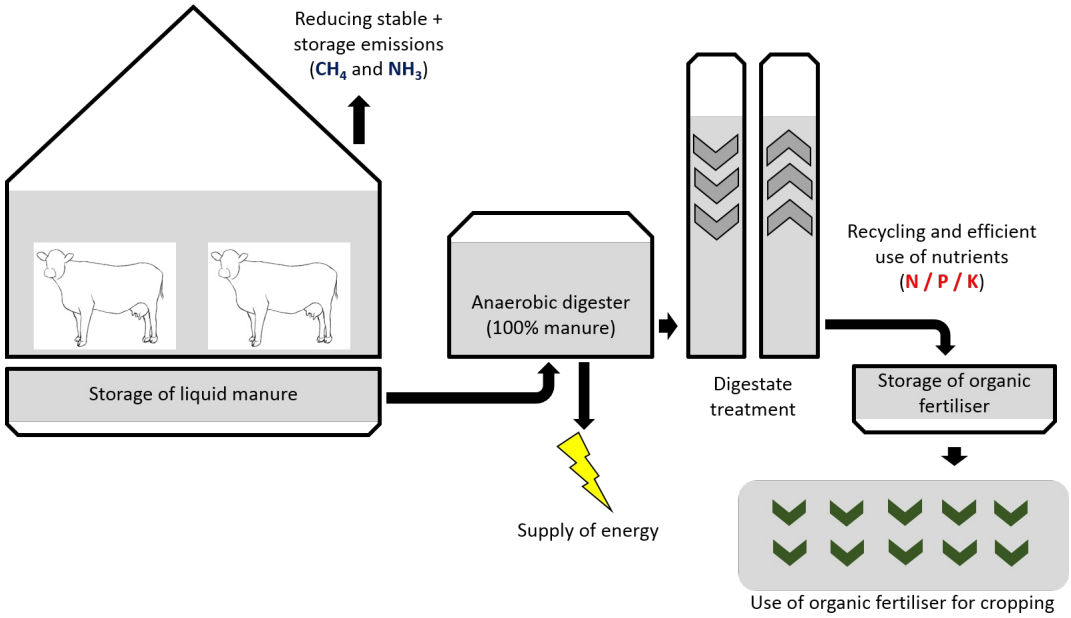

Figure 5. IMM as a low-carbon transition pathway in the livestock sector.

Table 1. An overview of key national/sectoral environmental targets relevant for the agricultural sector in the Netherlands.

Target	Current (year)	2020	2030	Unit	Policy framework
Renewable energy	5.80% (2015)	14%	27% *	Gross final energy	EU Climate & Energy Framework
Non-ETS	98.1 (2014)	111.6	-40% #	Mt CO_2-eq.	Effort Sharing Decision
Non CO_2-in agriculture	19 (2014)	16	-	Mt CO_2-eq.	Agro Covenant
Air – ammonia (national)	134 (2014)	128	120	kt	Clean Air Policy Package
Phosphates (national)	176.3 (2015)	172.9	-	million kg	Nitrates Directive
Phosphates (dairy sector)	86.1 (2014)	84.9	-	million kg	Dairy sector Covenant

* At the EU level. National targets are not foreseen. # EU level target for GHG is -40%, but an effort sharing decision with national targets for the Non-ETS sectors at the Member State level is foreseen.

subsector: livestock. With regards to phosphate excretion, the Dutch livestock sector is producing considerably more manure (i.e. nutrients) than is allowed to be spread on agricultural soils under the EU Nitrates Directive. On the short term (2020), meeting the NH_3 emissions and phosphate excretion targets appear to be most problematic. In the run up to 2030, it is also likely that reducing CH_4 emissions from livestock will become more urgent. On the positive side, manure digestion can significantly contribute to the production of renewable energy.

Scoring of pathways

Both low-carbon transition pathways (IMM and RL) can be 'scored' in terms of their contribution to meeting these environmental targets. The IMM pathway positively contributes to reducing CH_4, CO_2 and NH_3 emissions, and increases the production of renewable energy, while it has a neutral effect on the excretion of nutrients. The RL pathway results in reduced emissions of CH_4, NH_3, as well as reduced excretion of phosphates and nitrogen. On top of these environmental effects both pathways also have a number of other socio-economic and environmental side-effects. The RL pathway would result in a direct loss of GDP as meat and dairy output decreases substantially, while the IMM pathway could be considered more suitable for animal health as the in-stable climate improves due to shorter manure storage times. The RL pathway could also lead to a lower level of international cost-competitiveness of the Dutch agricultural sector (i.e. cropping), as at some point a shortage of cheap soil nutrients might arise. This could result in higher use of fossil fertilisers and cover crops. Also in terms of domestic employment both pathways have a different impact.

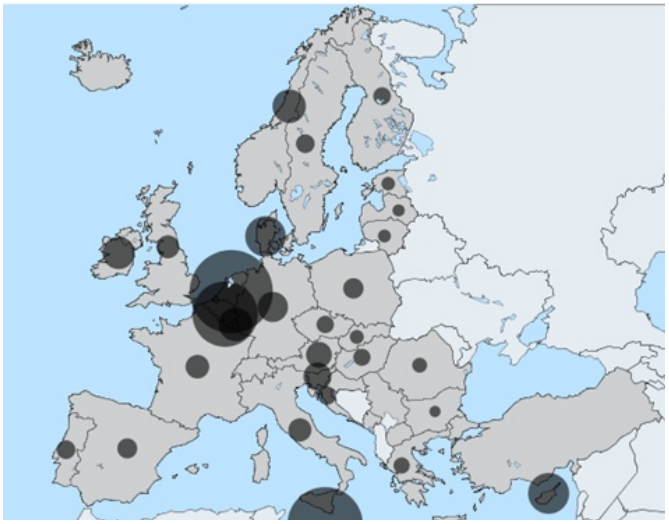

Figure 6. Livestock density in the EU-28 in 2013 (Eurostat).

For a more detailed overview of the effects and side-effects of the transition pathways, see the table in the recently published JIQ Special with an elaborated version of this article, that can be published from the JIN.ngo publications section (also in Dutch).

Next steps

The next step within the TRANSrisk project is to quantify these (and other) effects in Table 2with the help (macro-)economic models and to further explore the relative importance of these side-effects when it comes to implementing a certain low-carbon transition pathway. With a better understanding of the key side-effects of alternative pathways it will be easier to develop a more robust and integrated policy framework to foster a low-carbon transitions in the livestock sector.

Involvement of stakeholders

Are you a stakeholder involved in agriculture, livestock, manure management, or bioenergy? Feel free to join the discussion and share your thoughts and insights with the TRANSrisk project. For more information, please contact Eise Spijker of JIN Climate and Sustainability (eise@jin.ngo).

Decarbonising the EU Economy by 2050: The Contribution of Small Businesses

In Europe, there are about 23 million small and medium-sized enterprises (SMEs). They comprise 99% of all businesses, providing two-thirds of private-sector employment, more than two-third of new jobs in the last five years, and more than 50% of the gross value added. This important role in the economy also leads to a significant contribution to environmental pollution and greenhouse gas emissions. However, SMEs are often exempted from emission reduction policies, which means that the potential contribution of SMEs to decarbonisation pathways is underexploited.

The EU aims to decarbonise its economy by 2050, reducing greenhouse gas emissions by 80-95% below 1990 levels. This has a widespread impact on the economy, and would require contributions by all sectors to implement low-carbon solutions. This article identifies how SMEs can contribute to the decarbonisation of the EU (specifically in the transport sector), the barriers that SMEs face in this, and how this could be overcome.

European policy framework

The EU policy framework covering transport decarbonisation is composed of a wide range of initiatives and policy measures which are intertwined with Member States national level mechanisms. A set of 11 of the key policy measures have been analysed and scored with an 'SME support rating', describing the level of support offered to SMEs in contributing to decarbonisation of the EU transport sector (e.g. by developing, providing, adopting, or promoting low-carbon solutions).

None of the 11 policy measures that have been analysed could be rated 'Excellent', as they do not include specific targets and policy support aimed at transport SME decarbonisation and relevant exemptions recognising the special importance and circumstances of SMEs. Two policy measures could however be rated 'Good', as they include some policy support and exemptions for SMEs: the 'Regulation Reducing CO2 from New Cars' and 'Regulation on CO2 from Vans'. All other measures analysed, including the Fuel Quality Directive and emissions limits regulations, did not specifically refer to SMEs and decarbonisation and covered SMEs within the broad transport sector, and were rated 'Acceptable', 'Minimal', or 'None' for SME support.

This article is a summary of the fourth policy brief of the GreenEcoNet project. GreenEcoNet was an EU-funded project (June 2013 - May 2016) that aimed to connect small and medium-sized enterprises for a green economy. Key output has been the GreenEcoNet.eu online platform.
The policy brief 'Decarbonising the EU economy by 2050: the contribution of SMEs to the decarbonisation of the transport sector', published in May 2016, was written by Corrado Topi, Chris Neale, Roberto Rinaldi, José Manuel Vega Barbero (SEI at University of York), Danai Manoli (University of Piraeus), and Chris Hopkins (Green Economy Coalition).

The analysis of the policy measures suggests that the current level of policy support for SMEs in Europe in regard to their contribution to the decarbonisation of the transport sector is inadequate. In particular, this support does not seem to keep into account the real world barriers SMEs face when attempting to contribute to the decarbonisation of the transport sector or the economy at large.

Barriers

Although the contribution of SMEs is essential to the national economy of each country by providing jobs, opportunities and creating wealth, the attention which is paid to them in terms of the environmental management might not be commensurate with its importance. As discussed above, there are currently very few regulations that directly impose guidelines on EU SMEs in relation to decarbonisation in the transport sector. In addition to this lack of government guidance, SMEs are often reluctant to implement 'green solutions' as a result of several 'barriers'.

In fact "most SMEs lack the understanding that higher environmental performance can be a competitive

Box 3. Example of a 'green solution' by an SME.

Reducing CO_2 emission by improving through driving behaviour

The Dutch SME GreenStar Statistics enables organisations to achieve significant savings on fuel and CO_2 emissions. By installing a device in vehicles, data is collected about driving behaviour, which enables continuous feedback to drivers via real-time alerting, gamification or training, resulting in structural improvement of driving behaviour. The device immediately leads ot about 5% fuel savings, but in the longer term this increases to 10-20%, because the data can be analysed, and for example used to create personalised training courses.

advantage" (OECD, 2015, p. 9) and so little effort is made to ensure compliance in decarbonisation. Moreover, "even when they are aware of the potential of better environmental performance to improve a firm's competitiveness", lack of expertise combined with lack of financial incentives "often leads to SMEs being risk-averse and less willing to invest" (OECD, 2015, p. 3).

Another issue for consideration is the influence that other companies in the supply chain have on SMEs. To ensure the efficiency of the procedure it is vital that all the players in the supply chain contribute to the transition, because the SMEs both depend on input by their suppliers and requirements of their customers.

Solutions

Nevertheless, there are also various SMEs that have succeeded in implementing green solutions, and have thus overcome the barriers. The GreenEcoNet online platform (www.greeneconet.eu) allows SMEs to publish case studies of the green solutions they have developed or implemented. 14 of the case studies on the platform concern solutions related to the decarbonisation of the transport sector, such as the use of natural gas vehicles at a transport company, or the implementation of flex-parking for bicycles and cars.

Aiming to overcome the barriers, SMEs must take advantage of the benefits offered to them and recognise the "potential for improvements" particularly in the "area of green collaboration in buyer and supplier relationship" (Evangelista, et al., 2012, p. 9). As the case studies show, the implementation of green solutions often leads to advantages such as reduced costs or marketing opportunities. It is therefore essential for the government to facilitate the implementation of such solutions and help SMEs to overcome key barriers including the lack of understanding of the benefits and the lack of expertise.

Conclusions

Based on the research in the GreenEcoNet project, a key conclusion is that there strong incentives for SMEs to implement green solutions. However, in many cases the barriers are stronger. Governments can support SMEs to overcome these barriers, which are often related to a lack of knowledge and expertise and a lack of resources. Obviously, these barriers can also be overcome without government support. One of the methods for this is through networking among SMEs, so that companies can support each other and ensure mutual learning. See the article 'The Importance of Networking for SME Innovation in a Green Economy' in the previous issue of JIQ Magazine for more details on this.

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Evangelista, P., Huge-Brodin, M., Isaksson, K. & Sweeney, E., 2012. Purchasing Green Transport and Logistics Services: Implications for Small Business. Small Business, Issue 2, pp. 43-62.

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Reports

Open access / free of charge

Andresen, S., J.B. Skjærseth, T. Jevnaker, and J. Wettestad, 2016. The Paris Agreement: Consequences for the EU and Carbon Markets?, Politics and Governance, vol. 4, no. 3, pp. 188-196.
Although the Paris Agreement is a strong signal of growing international commitment, it remains to be seen whether the good intentions will translate into actual emissions reductions. The article discusses the potential effect of the agreement on the EU and international carbon markets, with specific attention for the EU ETS. The article concludes that the dynamic structure of the agreement may trigger a follow-up process in the EU that could lead to greater ambitions beyond 2030, and increase the pressure on laggards within the EU. In addition, the authors expect that 'Paris' can create momentum for actors favouring carbon market instruments.

Brewer, T.L., H. Derwent, and A. Błachowicz, 2016. Carbon Market Clubs and the New Paris Regime: Paper fro the World Bank Group's Networked Carbon Markets Initiative, Climate Strategies.
The paper looks at climate clubs that bring together groups of governments and business organisations in pursuit of joing plans for climate change mitigation, and considers how these clubs might adopt emissions trading or develop into carbon markets. Preliminary analysis suggests that key aspects of the Paris Agreement can be seen as fostering new opportunities for the creation of novel international institutional modalities such as carbon market clubs (CMCs). The paper analyses how these CMCs can be compatible with, and could assist the development of, climate clubs.

Brink, C., H.R.J. Vollebergh, and E. van der Werff, 2016. Carbon pricing in the EU: Evaluation of different EU ETS reform options, Energy Policy, vol. 97, pp. 603-617.
The paper studies various options to support allowance prices in the EU Emissions Trading System, such as adjusting the cap, an auction reserve price, and fixed and variable carbon taxes in addition to the EU ETS. It is found that tightening the cap provides an ad hoc solution to the fundamental issue of the robustness of the effective carbon price, while introducing a price component to the ETS brings structural carbon price support in times of negative demand shocks for emission allowances. Furthermore, introducing a carbon tax in addition to the EU ETS decreases the price of allowances, resulting in welfare gains for net buyers of allowances while net sellers are worse off.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, 2016. Impact Evaluation Guidebook for Climate Change Adaptation Projects, GIZ, Bonn and Eschborn, Germany.
This guidebook supports project managers by providing an overview of various impact evaluation methods, and explaining how these can be applied specifically to climate change adaptation projects. According to the guidebook, one of the crucial aspects of impact assessments is the establishment of causality: can observed changes be linked to the project? The guidebook covers five evaluation designs for climate change adaptation projects: experimental, quasi-experimental, regression discontinuity, the pipeline approach, and panel design. An adaptation project in Bangladesh has been used throughout the guidebook to illustrate the application of the evaluation designs.

Drews, S., and J.C.J.M. van den Bergh, 2016. What explains public support for climate policies? A review of empirical and experimental studies, Climate Policy, vol. 16, no. 7, pp. 855-876.
The lack of broad public support prevents the implementation of effective climate policies. The article aims to examine why citizens support or reject climate policies, and divides factors influencing policy support into three general categories: (1) social-psychological factors and climate change perception; (2) the perception of climate policy and its design; and (3) contextual factors. The acquired insights can assist in improving policy design and communication with the overarching objective to garner more public support for effective climate policy.

IEA Bioenergy, 2016. IEA Bioenergy Countries' Report: Bioenergy policies and status of implementation, IEA Bioenergy and IEA Energy Technology Network.
The report provides current bioenergy data on the 22 member countries of the IEA Bioenergy group, as well as the EU. For each of the countries, the report gives

a short (5-page) overview of national renewable energy targets and relevant legislation, bioenergy statistics including the contribution of different biofuels, the research focus related to bioeenergy such as relevant funding programmes, and major recent bioenergy developments.

Marchiori, C., S. Dietz, and A. Tavoni, 2016. Domestic politics and the formation of international environmental agreements, Journal of Environmental Economics and Management.
In the article, the effect of domestic politics on reaching international environmental agreements is investigated. The results of the study suggest that governments make decisions not only based on a single set of public-interest motivations, but are also influenced by lobbying. It is also shown that things change radically when lobbying bears directly on the membership decisions, suggesting that both the object and timing of lobbying matter for the way in which membership decisions, emissions and welfare are affected.

Mikolajczyk, S., D. Brescia, H. Galt, F. Le Saché, T. Hunzai, S. Greiner, and S. Hoch, 2016. Linking the Clean Development Mechanism with the Green Climate Fund: Models for scaling up mitigation action, Climate Focus, Perspectives, and Aera Group.
The report contributes to the debate of how linkages between the Clean Development Mechanism (CDM) and Green Climate Fund (GCF) can be achieved, and why this should be considered. The report suggests six engagement models of how the two institutions can be linked: grant financing, debt funding, green bond financing, equity financing, guarantees, and a non-financial engagement model where CDM methodologies are used to streamline MRV activities within GCF-funded activities. According to the authors, formal discussions should be initiated between the CDM Executive Board and the GCF Board to show commitment and communicate confidence towards the market participants that progress can be made.

Sandbrand-Nisipeanu, J., 2016. Media Coverage on Climate Change: An Analysis of the Relationship between Newspaper and Government Frames, PhD thesis submitted to the University of Kent, Canterbury, UK.
The thesis compares newspaper and government frames in the UK, Germany, the US, and India, suing qualitative content analysis. The study finds that rather than based on 'political parallelism', newspapers (in all four countries) seem to follow national loyalty when covering international climate negotiations. This national focus stays in contrast with the global character of the issue of climate change. The results also shed a negative light on the fulfilment of the normative duties of the media, as climate change coverage seemingly depends on the amount of government communication on the issue, rather than covering the global scale of the issue.

Witjes, S., and R. Lozano, 2016. Towards a more Circular Economy: Proposing a framework linking sustainable public procurement and sustainable business models, Resources, Conservation and Recycling, vol. 112, pp. 37-44.
The paper proposes a framework to include technical and non-technical specifications of product/service combinations that improve resource usage efficiency through recovery in public procurement processes. The framework proposed is based on collaboration between procurers and suppliers, in improving their contribution to the ciruclar economy. The research shows that collaboration between procurers and suppliers throughout the procurement process can lead to reductions in raw material utilisation and waste generation, whilst promoting the development of new, more sustainable, business models.

ZhongXiang Zhang, 2016. Are China's climate commitments in a post-Paris agreement sufficiently ambitious?, Centre for Climate Economics and Policy Working Paper 1607, Crawford School of Public Policy, Australian National University, Canberra, Australia.
China's role in the international climate negotiations has evolved from playing a peripheral role to the centre stage. The article discusses the evolution of China's stance in the lead-up to and at the Paris Conference, and post-Paris issues in China's context. With a legally-binding international agreement, including hard commitments for China, the Chinese central government can pressure local governments and enterprises to meet their energy and environmental goals in name of fulfilling national commitments to the international agreement. Nevertheless, the author argues that China's commitment is not sufficiently ambitious to meet the 2°C target, and suggests two ways for China to increase ambition: to indicate a CO_2 peaking level (in addition to the pledged peaking time), and to set emissions targets for 2025, to avoid the risk of locking in insufficient actions.

JIQ Meeting Planner

18-21 October 2016, Baku, Azerbaijan
Seventh International Forum on Energy for Sustainable Development
Info: www.unece.org/index.php?id=42643

26 October 2016, Rotterdam, Netherlands
Dutch National Climate Summit
Info: www.klimaattop2016.nl

2-4 November 2016, Marrakesh, Morocco
Indigenous knowledge and climate change
Contact: peoples@climatefrontlines.org

7-18 November 2016, Marrakesh, Morocco
COP-22, CMP-12, SBI-45, SBSTA-45
Info: UNFCCC meeting planner and www.cop22.ma

10-11 November 2016, London, UK
Communicating Climate Change: Connecting Cognitive Science and Climate Science
Info: www.climatesciencecognition.com

15-17 November 2016, Barcelona, Spain
Circular Economy European Summit: Cities, Industry, and Citizens
Info: www.circulareconomysummit.com

24-25 November 2016, Utrecht, Netherlands
Climate change interventions as a source of conflict, competing claims and new mobilities: Increasing the resilience of communiites and cities in the South
Contact: landac.geo@uu.nl

30 November - 2 December 2016, Mexico City
C40 Mayors Summit on a low-carbon and resilient urban future
Info: mayorssummit2016.c40.org

JiQ Magazine

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