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In this issue

Climate Fatigue

Editor's note by Wytze van der Gaast

This month, the Netherlands held elections at the provincial level. These elections, dubbed 'climate elections', came at a time of decision making on Prime Minister Rutte's ambition to reduce GHG emissions by 49% by 2030 (below 1990 levels). Rutte used to proudly call his cabinet the greenest government coalition in the Netherland ever.

In order to formulate a policy package to bring the country on track for the minus 49% target, Rutte's climate minister Eric Wiebes organised sector-level participatory discussions. At these 'climate tables', sector stakeholders strived for widely accepted climate portfolios with technologies and measures. Rutte and Wiebes progressed on a wave of climate optimism over the past two years, fuelled by continued economic growth and pressure in parliament from the green party.

Yet, progress got stuck when environmental NGOs left the climate tables as they felt that the business community was left off the hook. Then, early this year, the energy bill for households turned out to be higher than anticipated. A week before the elections, the Netherlands Bureau for Economic Policy Analysis (CPB) and the Environmental Assessment Agency (PBL) presented economic impacts of the agreed packages at the tables, showing relatively high costs for households. The same day, Rutte and Wiebes announced an emission tax for large emitting companies in an attempt to show that the costs of climate policy should not mainly be paid from household budgets.

In a few weeks' time, the climate optimism was lost. During the campaigns, the green party stood by their demand for ambitious climate measures. However, Rutte and Wiebes' liberal party VVD, by voice of their party leader, cooled down on climate positions: "Don't push it." A third move came from the far right with the Forum for Democracy (FvD), whose leader Thierry Baudet is an outspoken climate change denier.

FvD won the elections sensationally and people who were interviewed on tv and by newspapers said that they were bored with climate change, relieved as they seemed with a politician who tells them not to worry. It shows clearly that despite progress with climate modelling, technology development and economic assessments, we don't have enough viable approaches for engaging the wider public in climate decision making.

People don't like change and climate policies require big changes. Therefore, the psychology of climate change has never been more important.

Integration of Participative and Modelling Tools for Assessing Scaled-Up Climate Options

By Wytze van der Gaast and Erwin Hofman*

Through the concept of Nationally Determined Contributions (NDCs), as included in the Paris Agreement, countries have an opportunity to embed actions for climate change mitigation and adaptation in their national goals for society, the environment, and the economy. With that, NDCs become plans that enable countries to realise their national goals with low emissions and strong climate resilience. This may also enhance societal acceptance of climate actions as these also support other national non-climate goals.

Establishing a link between climate and non-climate national goals is the prerogative of countries themselves, as the Paris Agreement does not provide guidance for that, nor for identifying climate measures and policies. In other processes, such as technology needs assessment (TNA), nationally appropriate mitigation actions (NAMA) and national adaptation plans (NAP), countries often relied on stakeholder consultation for identification of options for mitigation and adaptation and co-designing action plans for these. This can be an effective approach as it mobilises the practical knowledge of stakeholders and specifies their preferences. However, the scale of deployment and diffusion of climate actions within a sector or an entire country is often much larger than an individual stakeholder will be able to assess.

Models, on the other hand, are proven tools to quantify such sector or economy impacts of scaled up options for mitigation and adaptation, as they support an integrated assessment of economy, social and environmental impacts. However, models can mainly assess aspects that can be quantified, so that non-quantifiable aspects are often left out of modelled assessments As a result, issues such as societal resistance against certain options may be overlooked.

Ideally, therefore, a combination is sought between modelling techniques, to assess larger scale impacts, and qualitative, participative tools to assess social and political preferences and concerns about these. In this article, we elaborate on what integrated qualitative and quantitative assessments may look like for different types of countries, also considering capacity and data needs for that.

TRANSrisk

Co-funded by the European Union

The objective of the TRANSrisk project was to explore low-emission transition pathways and analyse the possible associated risks. A key feature of TRANSrisk is that it 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.

Linking participative and modelling tools

In the TRANSrisk project, a method has been developed to combine stakeholder engagement with modelling tools, which has been applied in the project's case studies. With that, the project has explored how quantitative and qualitative tools can enhance each other's effectiveness and result in a better understanding of where a country or sector would like to go in terms of low-emission development, what (drastic) change it is willing to undertake and how it perceives associated risks.

The workflow for combining tools in TRANSrisk case studies consists of two main steps. First, the case study context is assessed to understand the past and describe the present context (social, economic, political, policy, and environment). Based on that, possible projections for the future development for the country or sector can be made, both using models and stakeholder consultation.

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In the second step, a wider, more detailed analysis is done for reaching the desired future(s). At this stage, stakeholder preferences can be included in model-based scenarios in order to support formulation of pathways that, next to technologically feasible, are also economically feasible and socially acceptable. This can be done by modelling possible impacts of a low-emission pathway to the rest of the economy in a country, such as employment effects, costs and productivity, when implemented at a larger scale for realising climate benefits, and sharing these impacts with country stakeholders. For them, a potentially negative impact of a pathway (which could be considered a risk) may, for example, be offset by a potentially positive impact and therefore become acceptable. Modelling can also help assess the likelihood of these impacts by making different assumptions of parameter values and see how these lead to different scenario outcomes with different impacts of low-emission pathways. Using stakeholder (including policy experts) knowledge, these uncertainties can then be interpreted in terms of how risky an investment in a low-emission option or pursuing a low-emission pathway can be.

Based on the TRANSrisk case study analysis, it could be concluded that:

- While including non-quantifiable information in models is complex if not impossible, using this information in scenario building is considered to make low-emission pathways more socially robust. Not only does a pathway then optimise again costs and resources, a pathway also avoids planning scaled up technology options in areas where there is public resistance to these.
- Scenario building also provides critical future interdependencies between the decarbonisation in different sectors, that were not fully represented in the chosen models.
- Regular communication between scientists and stakeholders facilitates a better mutual understanding of each other's preferences and concerns, leading to better (tacit) practitioners' knowledge available for researchers and better informed stakeholders about models and underlying assumptions (in the 'black box' of the model).
- In practice, iterations between stakeholder discussions and model runs are complicated by the time that a model needs to complete a run based on research questions formulated by stakeholders. In order to facilitate a 'real time' response by a modelling tool to stakeholders' questions and inputs, TRANSrisk has developed an emulator tool that uses machine learning to approximate model runs in a much shorter time frame than the much heavier model itself can achieve. With the emulator, quantified feedback to stakeholder questions can be provided at the same workshop, while a regular model run would require a few weeks of work.
- Data requirements for model runs are high, both in terms of quantity and quality, while there also needs to be capacity to calibrate a model for reflecting country circumstances well. Within the TRANSrisk project, resources were available to provide such capacity requirements, but in practice in several developing countries, lack of capacity due to lack of resources could be a significant bottleneck when striving for an integrated approach of stakeholder engagement and quantitative modelling for low-emission pathway development.

Capacity needs for integrated qualitative and quantitative climate policy research

Ideally, as described above, formulating low-emission pathways as inputs for NDCs takes place in iterative processes where information and preferences provided by stakeholders are combined with modelling tools to calculate the impact of scaled-up climate options for a country's society, environment and economy. In countries where high-quality data and advanced (integrated assessment) models are available, this 'ideal' process can be pursued. However, in many countries, including (low-income) developing countries, these conditions are often not met. In these countries, lack of modelling and data capacity require pathway formulation to rely strongly on stakeholder inputs.

This observation is illustrated in Figure 1, which was also introduced in the previous issue of JIQ Magazine (vol. 24, no. 2, pp. 4-6). It groups countries broadly into three categories, with one group of countries (e.g. least developed countries) facing capacity limitations in terms of lack or limited availability of data and modelling tools, another group which has already developed a stronger capacity base, including modelling (such as, for instance, emerging countries), and finally group countries with advanced data bases and modelling capacity (e.g. industrialised countries).

Countries that are in the first category are likely to rely mostly on qualitative data, such as provided by stakeholders based on their knowledge of the past, a clear understanding of the present and what this may entail for the future. The TNA process , with its strong

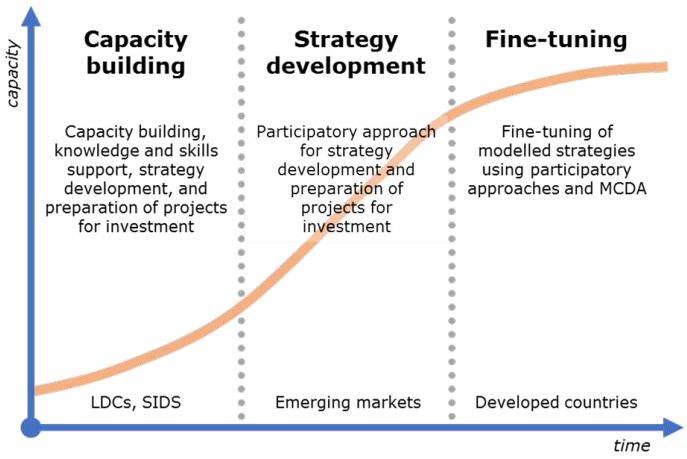


Figure 1. Grouping of countries in terms of available capacity for application of quantitative research tools and extent to which lack thereof can be compensated by participatory approaches.

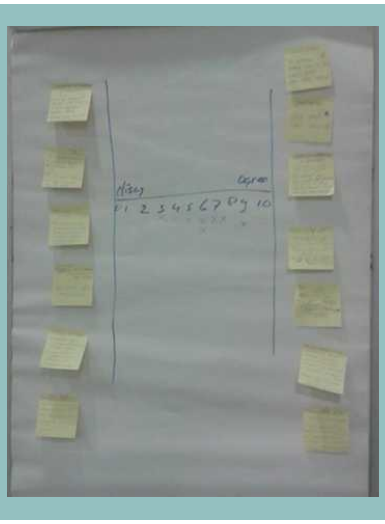
focus on detailed and active stakeholder engagement and consultation, therefore targets only developing countries and focusses, in its current round, mainly on least development countries (LCDs) and Small Island Development States (SIDS). The 'intermediate' countries in Figure 1 are those that have more experience with strategy and policy development and implementation. These are generally newly-industrialised countries and emerging markets. Nevertheless, also in these countries, models are not always fully developed and reliable data insufficiently available. Therefore, a qualitative analytical process is suitable for strategy development, and engaging stakeholders to ensure acceptance and a sense of ownership of policies and measures.

Most developed countries have the availability of advanced models for scenario development, high-quality data, and human capacity for strategy and policy development. For these countries, a full-scale participatory process is therefore commonly redundant. Nevertheless, stakeholder inputs are in many cases indispensable for successful design and implementation of climate policy packages. Stakeholder preferences and concerns inform modellers (see Box 1 for an example of a stakeholders-modellers dialogue) and modelled impacts of low-emission transition pathways can be discussed with stakeholders in terms of what impacts they find acceptable and where further finetuning is required for effective climate policy.

Conclusion

TRANSrisk has applied a combined methodology for mobilising stakeholders' practitioners' knowledge, priorities and concerns as inputs for modelled scenarios for low-emission climate pathways. This methodology has been tested and applied in 14 worldwide case studies. While the approach has clear advantages, as it enables consideration of non-quantifiable information in modelling environments and communicating modelled outcomes with stakeholders in the form of clear climate policy risk profiles for society, environment and the economy, it is also clear that it requires capacity, especially for collecting data and running detailed, complex modelling tools.

Therefore, in practice, the TRANSrisk methodology can be applied in different settings: more participative-dominated in countries with limited capacity in terms of data availability and model runs towards detailed modelled scenarios which are then checked with and fine-tuned with stakeholders for technical feasible, economically affordable and socially realistic low-emission pathways.



Box 1. Example of a stakeholders-modellers dialogue

H-diagram as input for research questions for modellers

H-diagram is used to organise a participative discussion based on a statement. Stakeholders indicate on a scale from 0-10 to what extent they agree, and why. These rationales are grouped to the left (disagreements) and right of the paper (agreements). Based on these, a discussion takes place which leads to research questions for the modelling team. Partly, and preferably, these questions are formulated in consultation with the modellers. For example, in case stakeholders are concerned about employment losses in a carbon-intensive sectors and express this concern in a research question 'how many jobs move from sector A to B', the modeller will then be able to explain that the model cannot project such labour mobility between two specific sectors, but it can estimate labour mobility impacts in general.

Local Energy Initiatives — Five Years of Experience with a Revolving Energy Fund in Loenen, the Netherlands

By Andre Zeijseink and Eise Spijker*

In 2013, a group of committed residents from the village of Loenen won a contest for the best regional innovative idea for 'energetic villages'. Loenen is rural village in the centre of the Netherlands and has a little over 3000 inhabitants. By winning this contest the Loenen Energy Fund (LEF) was established in 2014. The fund received a EUR 200.000 grant from the INTERREG North West Europe program, and after five years still operates as a revolving fund.

This fund provides permanent residents of the village of Loenen access to a funding mechanism for renewable energy and insulation in buildings. There are loans for double glazing, roof, floor and wall insulation, as well as for solar pv, heat pumps, heat recovery ventilation, LED lighting and a loan for solar boilers is currently under development. The fund provides three to five year zero interest rate loans that can be used in combination with some other national support schemes. The receiver can easily pay back the loan through the savings on the monthly energy bills. The loan repayments are then used again to fund energy savings in other buildings (Figure 2). Besides the loan, also a small subsidy (approximately 10%) is part of the arrangement.

Performance

To date the revolving fund has contributed to around 175 successful local projects, and supported citizens, local companies and other local entities to invest solar power, building insulation, and other energy (saving) measures. Figure 3 shows the cumulative investments, electricity generation, gas consumption savings, as well as deemed savings on energy expenditure as a result of all those investments in the 2014-18 period. The entire portfolio of projects is deemed to have resulted in a cumulative CO_2 savings of around 1.4 kton CO_2.

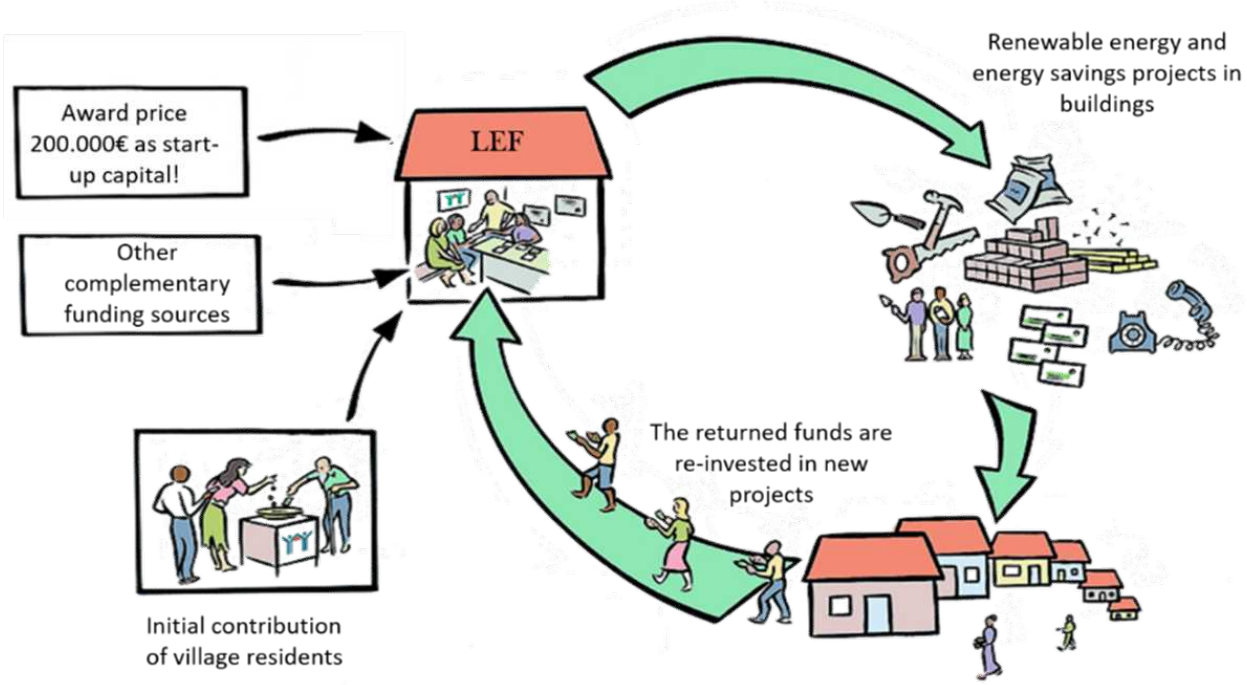


Figure 2. The revolving fund in Loenen village.

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1 LEF funding can be combined with other existing loan and support schemes for energy saving measures, so it is difficult to estimate exactly which portion of the deemed savings can be attributed to the fund itself. However the LEF contribution is estimated to be larger than 90% of total support.

Key success factors and main challenges

Setting up and managing a local energy fund, especially in the first few years was quite time consuming for the volunteers. The time and resources it took to get from a prize winning concept to an operating organisation took a lot of effort. Also setting up the right communications infrastructure both with local citizens as well as municipality and province required were challenging. When asked about the key success factors and main challenges of managing, the members of the board of the Fund – comprising of a small group of volunteers - were keen to share their experiences which are summed up in Table 1.

To date, solar pv projects have been the most popular category, followed by (cavity) wall insulation. These measures are relatively easy to implement when compared to comprehensive renovation projects. Lately the number of such 'deep energy renovation' projects that applied for funding via the LEF fund is gradually increasing. Such projects typically include multiple energy measures (e.g. heat pump, solar boiler and insulating measures) and therefore are larger in size. In some cases the standardised loans schemes for single measure projects, are not always fitting for these more complex projects (e.g. in order to avoid double funding of specific installation components, such as a heat buffer). In those cases a more tailor-made loan scheme needs to be developed in order to avoid any double-counting.

A quick look into the future

With the energy transition picking up speed in the Netherlands it is interesting to look what the future of a revolving fund would look like. Especially considering that the Dutch government has announced a phase-out of natural gas in the built environment by 2030, many buildings in the Netherlands will be seeking and implementing solutions for alternative heating systems. With project, and loan sizes increasing, and LEF funds' total reserves gradually decreasing, it is expected that the Fund at some point will not be able to support the ongoing energy transition in the built environment at the anticipated speed and scale. However, the local-for-local character and the strong linkages with relevant local social structures, make funds, like the LEF, an interesting partner for developing smart combinations with other public and private support schemes as well as for initiating new local initiatives.

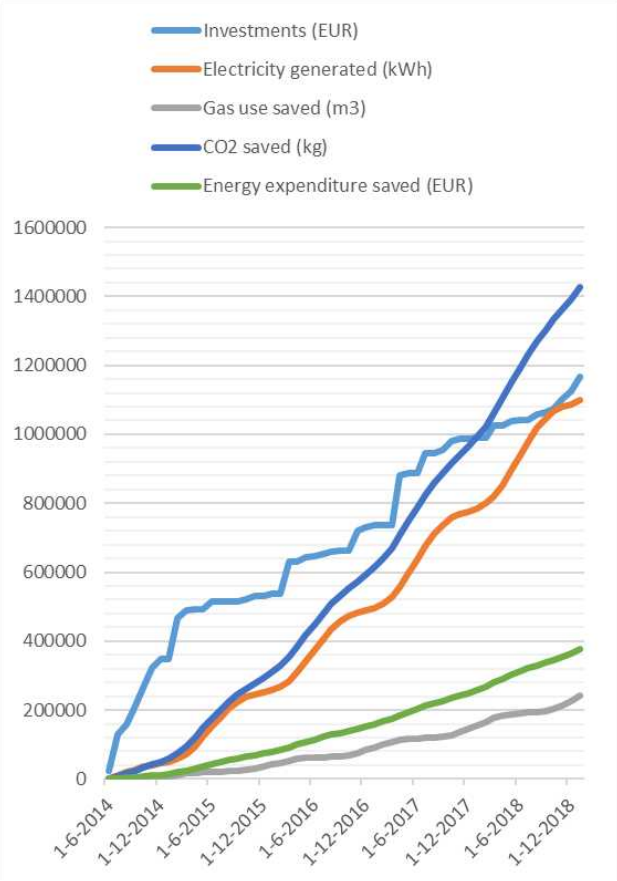

Figure 3. Cumulative performance data LEF fund (01-06-2014 until 31-12-2018).

Success factors	Challenges
Enthusiasm from villagers and volunteer team	Legal framework and time it takes to get organised
Sufficient knowhow, not only about energy and energy technologies, but also other social and institutional aspects	Fiscal rules
Proper linking with existing social structures in the local community	Coordination of communication and synchronising planning of actions with local governments
A clear funding concept and proposition	The time it took between winning the contest and getting set up the LEF fund
Reliability = credibility = trust	Communication activities
Visibility and communication	Time expenditure of volunteers, especially in the early years
Enthusiastic participants, serve as ambassador for their own neighbours (snowball-effect)	Ensuring and facilitating continuity of the Fund and its board members

Table 1. Success factors and challenges.

Dutch Green Deal Approves Methodology for Determining Emission Reduction at Peat Meadows

By Arnoud de Vries*

Since mid-2017, around 20 private entities have been working with the Netherlands Ministry of Economic Affairs and Climate on the Green Deal Pilot National Carbon Market to develop methodologies for calculating greenhouse gas emission reductions based on projects. The focus of the Green Deal is on emission sources that are not covered by the EU emissions trading scheme (ETS). The goal is to establish an institute for issuing emission reduction certificates, based on methodologies and rules agreed by the Green Deal partners. An important milestone of the Green Deal was on 19 December 2018 when it approved its first methodology, designed for calculating emission reductions in peat meadows in the Netherlands.

The approved methodology is aimed at projects that increase ground water levels in peat meadows, in order to avoid deterioration of the peat layer and thus emissions of CO_2 that is stored in peat. Over the years, reduction of ground water levels, in order to increase agricultural productivity, has been an important source of CO_2 emissions from Dutch peatlands, resulting in annual emissions of 7 $MtCO_2$ (comparable with the emission of around 500,000 Dutch households together). About a quarter of these emissions take place in the province of Friesland (24%), followed by 22% in Drenthe and 15% in South Holland. Currently, management of ground water levels in regions with peatland is not mandatory by law.

Therefore, the Frisian Federation for Environmental Protection has taken the initiative for the project called 'Valuta voor Veen' (valuing peat), in order to collaborate with farmers or other land owners on increasing ground water levels at peat meadows and thus reducing CO_2 emissions. Through a methodology agreed under the Green Deal, these emission reductions will be calculated which then forms the basis for project implementation and eventually verification of realised reductions and issuance of carbon certificates. These certificates can be traded in the market, which creates additional monetary value to the project and contributes to compensating the farmers for reduced agricultural productivity due to the higher groundwater levels.

The methodology developed under the Green Deal is applicable at meadows with sufficiently thick peat layers ('pure peat'), where the project can increase groundwater levels for either continued use of the meadow's agricultural function, or a shift to cultivation of different crops (paludiculture) or functions (e.g. nature development).

How does it work?

Under oxygen-free circumstances, plant remains do not fully digest but pile up resulting in layers of peat, possibly several meters thick. This growth rate is approximately a few millimetres per year. In case of lower ground water levels, these oxygen-free circumstances no longer exist, resulting in peat oxidation (at a rate ten times faster than that of building up the peat). A consequence of peat oxidation is that stored carbon is released into the atmosphere as CO_2.

Oxidation rates can be reduced by increasing the ground water levels of a peat area, which is the main purpose of the Valuta voor Veen project. Flooding a meadow would even stop oxidation of peat, but this creates the risk of methane emissions due to rotting plants under water. Therefore, the climate benefits of ground water level increases need to be balanced between on the one hand lower release of carbon as CO_2 and on the other hand extra emissions of methane and possibly nitrous oxide. These effects are shown in Figure 4 (as the figure shows, greenhouse gas emissions decrease with increasing water levels, but when water rises above ground level, emissions increase slightly again).

Baseline

In the Valuta voor Veen project, the baseline is determined by measuring the groundwater level in a

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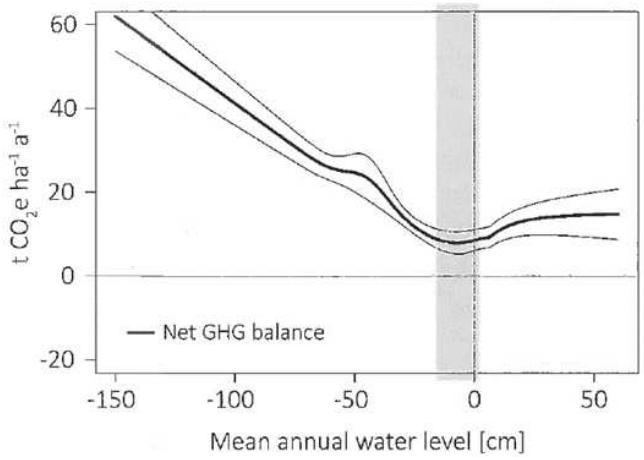

Figure 4. Relation between groundwater levels and CO_2-eq. emissions.

project area before the project starts, i.e. before the groundwater level is increased. Alternatively, the groundwater levels of adjacent areas can be measured for comparison and baseline determination. The relation between groundwater levels and CO^2 emissions, both in the baseline and during the project, is determined using data from research projects.

In the project, a number of assumptions need to be made about knock-on effects. For instance, increasing ground water levels can lead to lower agricultural production for the farmer, which may lead to purchase of additional forage from elsewhere. However, this impact has been estimated and is considered negligible for this project. Also leakage effects may occur if elsewhere peatland is transferred into agricultural land, e.g. for increased production. However, this effect is not likely to happen as in the Netherlands all peatland is in use and it is unlikely that peat areas already in use for nature conservation are changed (back) into agricultural land. Finally, farmers may decide to use extra chemical fertilisers to compensate for the reduced productivity due to increased groundwater. This impact has been estimated at an extra emission of 0.4 ton CO_2-eq./ha. In order to avoid that these impacts lead to actual net emission reductions that are lower than claimed reductions for carbon certificates, the project applies a risk margin of 10%. This implies that from the determined emission reductions 10% will be subtracted before issuing the certificates.

Issuing of carbon certificates

After the adoption of the methodology under the Green Deal National Carbon Markets, the Frisian Federation for Environmental Protection started the preparations for a first project stage under Valuta voor Veen. The aim is to receive the first certificates before the end of this year. Part of the methodology is the provision that certificates can be issued on the basis of a validated project plan. Validation means that the project partners have correctly applied the Green Deal rules for emissions accounting such as those for additionality and baseline determination and that the estimated annual emission reductions can be seen as reasonable. The project duration of a 'Valuta voor Veen' project is ten years at least, after which the landowner can decide to continue the project or stop.

According to the proposed rule for ex ante issuance of certificates under the Green Deal, 85% of the certificates will be eligible for trading; 15% will be kept in a buffer. These buffered certificates will only become available for sale once the actual emission reductions have been verified. Ex ante issuing of certificates enables project investors to receive income at the project start when most of the investment costs need to be covered. The time for which certificates will be issued depends on the project type, but it could be five years, after which the verification of project results will take place.

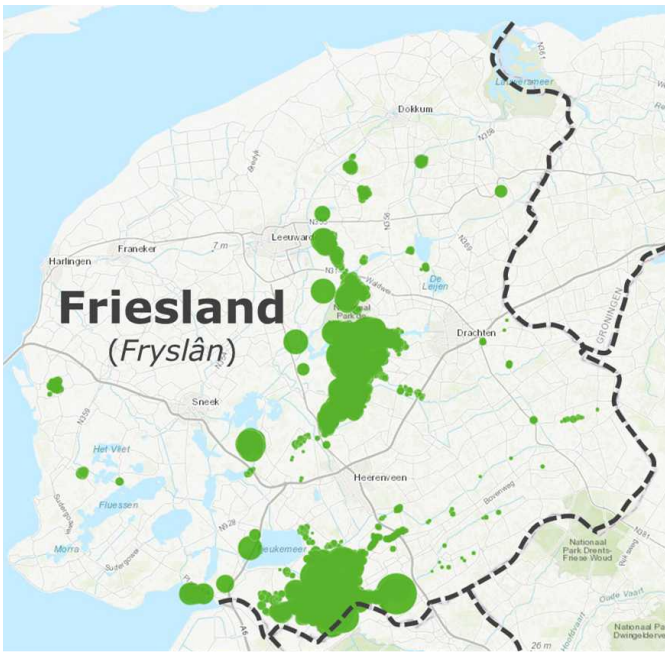

Figure 5. Peatland areas in the Province of Friesland that are considered most suitable for Valuta voor Veen-projects. In these areas, the peat layer is permeable and at least 90 cm without a layer of clay op top of it. The green areas contain 4137 hectare of peat. Based on research by Radboud University, increasing the groundwater level to 30 cm below the ground level would avoid CO_2 emissions by 120 kilo tonnes per year (www.koolstofbank.nl/kaart).

Energy Efficiency Policy Implementation Across Europe Supported by the PUBLENEF Project

By Erwin Hofman and Vlasis Oikonomou*

The full title of the EU-funded PUBLENEF project was "Supporting Public Authorities for Implementing Energy Efficiency Policies", and that is exactly what has been done during the project lifetime (2016 – 2019). The project partners have engaged with energy efficiency policymakers at Member State, regional, and local levels across the EU to provide them with credible information, insights, and tools, in order to make the policy processes more efficient and effective and to improve the overall quality of decision-making and policy implementation.

JIN Climate and Sustainability coordinated the EU-funded PUBLENEF project (2016-2019). The project aimed to assist EU Member States in implementing effective and efficient sustainable energy policies, with a focus on energy efficiency, and empower them to make use of the best practices and policy processes implemented in other Member States at the national, regional, and/or local level.

The PUBLENEF partners supported specific regions and municipalitiesin 12 EU Member States on energy efficiency-related policy challenges. In the Netherlands, JIN supported the municipality of Midden-Drenthe on issues related to its energy strategy and citizen engagement.

Needs assessment for energy efficiency policy-making

In the early stages of the PUBLENEF project, a detailed needs assessment in energy efficiency policy making was completed. It was completed in the methodology of a SWOT analysis, and reviewed key strengths, weaknesses, opportunities, and threats with reference to specific articles of the Energy Efficiency Directive (EED). The EED articles considered include 3 (energy efficiency targets), 4 (building renovation), 5 (exemplary role of public bodies' buildings), 6 (purchasing by public bodies), 8 (energy audits and energy management systems), 14 (promotion of efficiency in heating and cooling), 16 (availability of qualification, accreditation and certification schemes), 17 (information and training), 18 (energy services), 19 (other measures), 20 (national fund, financing and technical support), and 24 (review and monitoring of implementation). This exercise was carried out at both the subnational (local and regional) and the national (Member State) levels.

Based on the analysis, the three main challenges as identified among policy makers include:

- **Skilled resources**: although policy makers in many public bodies have noted that they have sufficient knowledge and skills on for example technical and legal aspects for energy efficiency policies to be implemented, acquiring adequate skilled resources remains an issue. Considering that in many public bodies there is a lack of staff and/or lack of time, external skills will need to be obtained. If a public body needs to implement a task (and is ahead of the market), there is a difficulty in securing the external consultant, or training courses to build skills within the public body.
- **Willingness to change:** in many instances, there is a lack of political willpower to enable a transition. Many staff in public bodies feel also that the legislation is weak or unenforced. In addition to the lack of willpower at the political level, it is also often challenging for policy makers to mobilise and engage with the relevant stakeholders, either because of a lack of willingness, a lack of time, simply insufficient awareness of the issue, or a lack of suitable methods and tools for stakeholder engagement.
- **Lack of available financial resources and instruments:** a lack of financial resources remains a challenge for policy making, because this often also results in a lack of staff and a

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difficulty in acquiring external skilled resources. A specific challenge identified is also the lack of, or difficulty of devising, financial instruments. Policy makers frequently indicate that there should be more instruments such as subsidies or carbon taxes, that make energy investments sufficiently attractive. For existing programmes, there are often challenging administrative barriers, hampering their implementation or use.

In addition to the needs, also a range of 'good practices' and 'tools' have been identified. A good practice has been defined as a policy implementation practice that can act as a good example for other policy makers, for example because of its innovative or interdisciplinary approach, because it offers a good return on investment, because it provides learning opportunities, or in general for its high energy savings potential. In addition to 54 such good practices in energy efficiency policy design and implementation, the PUBLENEF project has also put an effort in collecting an inventory of 'tools' as used by implementing bodies across the EU. The 146 collected tools include software, guidelines, presentations, protocols, templates, and other materials for use in energy efficiency policy implementation.

Following on the results of these inventories, the collected good practices and tools were 'matched' to the expressed needs. Since both the good practices and the needs are classified using the main related EED articles, a 'matching matrix' has been created with these articles as common identifiers.

Roadmaps

One of the key activities of the PUBLENEF project, and a practical approach to ensure more in-depth involvement and practical learning on energy efficiency policy implementation issues, has been the process of roadmap development. In 15 roadmaps at the national, regional, and/or local levels in 11 EU Member States, the project partners have worked with policymakers on implementing energy efficiency pathways. Apart from having led to direct energy savings in the involved regions, the roadmaps provide useful lessons for policymakers across Europe.

Based on the overall objectives of the PUBLENEF project, a monitoring process had been designed for the fifteen roadmaps to measure their progress towards five specific impacts: capacity enhancement among public authorities; networking opportunities; policy creation; increased skills and knowledge on energy issues among market stakeholders; and finally energy savings as triggered by the roadmaps.

The PUBLENEF roadmaps have led to capacity enhancement among a wide range of policy makers and other stakeholders, and through the networking opportunities and future collaborations, it is expected that the roadmaps will have a lasting and growing impact.

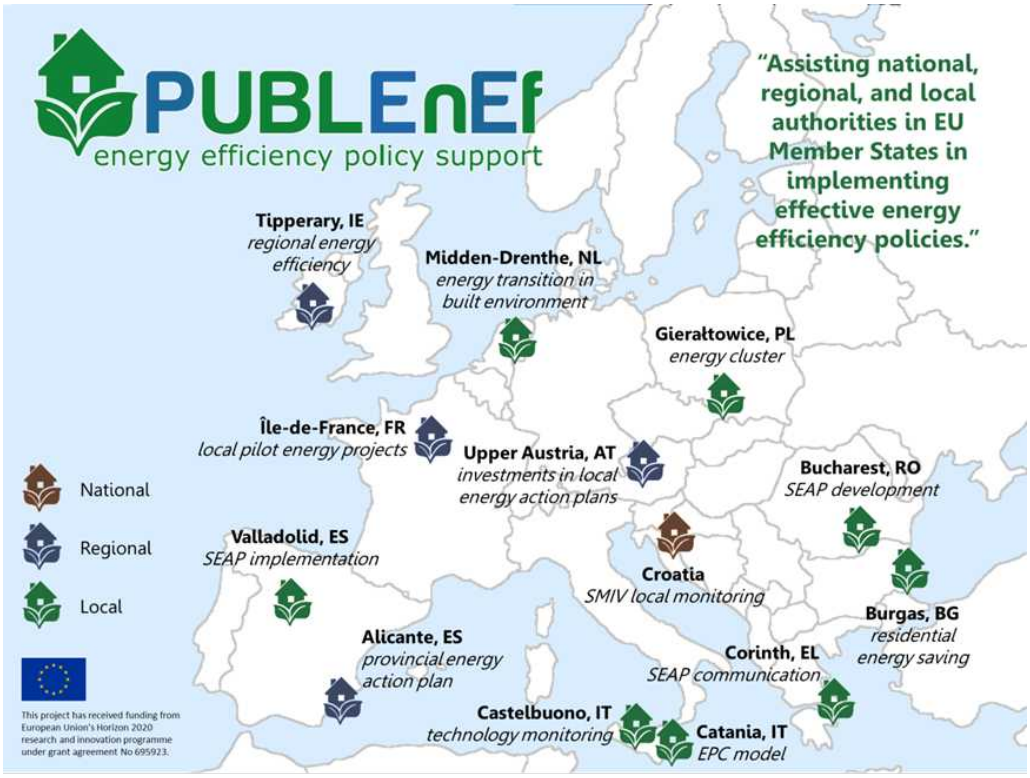

Figure 6. Map of the PUBLENEF roadmaps.

Box 2. Examples of PUBLENEF roadmaps.

Austria: 'Municipality Energy Programme'

ESV's regional level roadmap consisted of the development and implementation of the "Gemeinde-Energie-Programm" (GEP), a programme that aims to trigger energy-related investments in Upper Austrian municipalities. It is based on the principles of activation, motivation, and provision of technical advice, and supports municipalities in preparing concrete investments. The GEP programme supported projects totalling investments of over € 6 million, including advice and support services for streetlight refurbishment projects with energy contracting. By helping to increase energy-related investments, the roadmap is contributing to the local energy transition in the region of Upper Austria.

Netherlands: market party involvement

In one of the Dutch roadmaps, JIN collaborated with the Municipality of Midden-Drenthe to identify and analyse possibilities for accelerating the energy transition in the built environment, with a focus on the residential sector. The main challenge lies with upgrading the existing housing stock to become energy neutral. With several market parties, including construction and installation companies, mortgage advisors, real estate agents, and energy consultants, it was explored how the building refurbishment process can be simplified. This has led to three possible future organisational modalities, in which local authorities and market parties can streamline the energy transition in buildings.

Based on the information in the various monitoring reports, at least 50 events have been organised with in total more than 900 participants. Apart from the opportunities to share the outcomes of PUBLENEF and collect input on the roadmap work, the events as organised for the PUBLENEF roadmaps have created opportunities for key stakeholders in the various regions to get together.

For each of the roadmaps, it has been identified how total energy savings have been considered and calculated. If the roadmap implementation led to a real investment on energy efficiency in a municipality or a region during the PUBLENEF project lifetime, then the energy savings generated from this investment could be counted in full as a result of the roadmap. If the roadmap implementation led to the preparation of the launching of an investment (for instance a tender procurement document or a subsidy or grant application), or a general awareness raising or significant administrative changes in the energy efficiency policy implementation, then the energy savings claimed by the roadmap were set at an estimated 1% of the expected savings from these actions. This is a fairly conservative attribution, considering that some roadmaps would not at all occur without PUBLENEF.

Figure 7. The PUBLENEF final conference was held in the Academy Palace in Brussels in October 2018.

PUBLENEF has shown that social interventions such as implemented in the various roadmaps are sufficient to increase energy savings significantly. In total, the fifteen roadmaps have led to estimated savings of 26.64 GWh per year. Indirectly, this figure can increase substantially, as the lessons from the roadmaps can be replicated, and in many cases the established institutions and networking opportunities lead to more initiatives in the coming years.

Read more

More information on the PUBLENEF project, and all policy briefs and other publications, are available on the project website, publenef-project.eu.

The PUBLENEF toolbox is available via publenef-toolbox.eu. This online resource enhances the exchange of information and provides a large variety of supporting tools and resources for energy efficiency policy planning, development, implementation and evaluation.

Closing the Loop Opens New Opportunities for Renewable Power
A New World Record to Help the Planet

By Scott Jones*

The sustainability challenges facing Europe and the whole world are often defined by what society lacks rather than what we waste. Rightly, policy makers and campaigners focus on what could well be in short supply or even extinction by 2020 or 2050, but there is also much to be gained from exploring what we have but waste right now.

Every day, large amounts of primary energy are wasted in the form of low temperature heat. This overlooked but valuable resource is simply discarded into the environment – indirectly, or via cooling facilities at industrial plants across the European continent. Turning this lost heat – this lost opportunity - into a new, clean source of energy was the driving force behind the RED Heat-to-Power project.

Established in 2015 and funded by the European Commission, the RED Heat-to-Power project brings together a partnership of corporates, academics and small, innovative businesses from across Europe; including FujiFilm which is bringing its membrane technology to the energy sector, RED Stack from Holland and the universities of Palermo, Edinburgh and Catalunya. The project is managed by WIP, a trail-blazing consultancy based in Munich which has been working on renewable energy projects for the last 50 years.

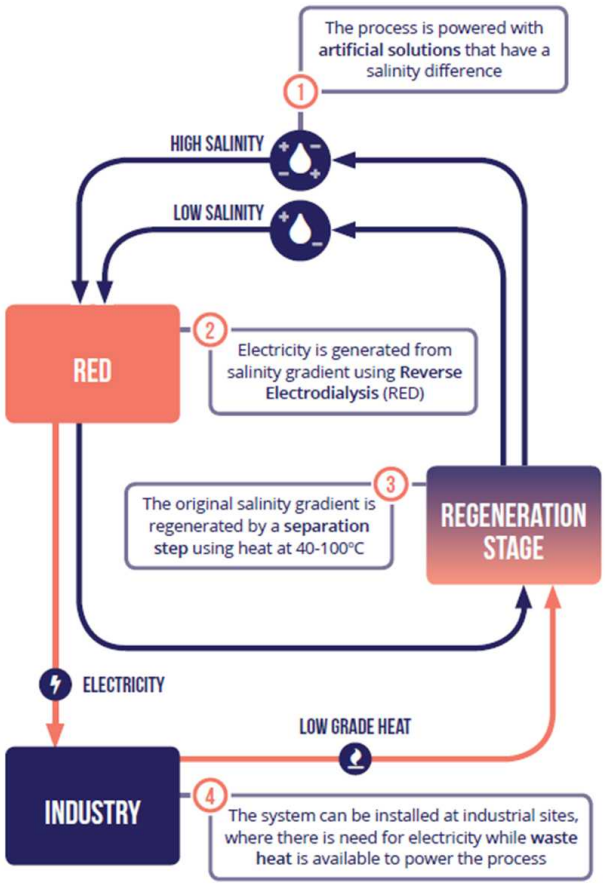

Figure 8. RES Heat-to-Power project process.

Together, the consortium has developed a game-changing approach to this waste of primary energy, leading to a new world record and the generation of electricity from low-grade heat. As the graphic below shows, in the RED Heat-to-Power project electricity is generated from salinity gradients using Reverse Electrodialysis (RED) in a closed-loop system, with artificial saline solutions being used as working fluids. The solutions which exit the RED unit are then regenerated using the low-temperature heat to restore the original salinity gradient, and inspiring the system's name; the RED Heat Engine.

Michael Papapetrou from WIP said: "The RED Heat-to-Power project has developed the materials, components and know-how required to turn low grade heat into power, to the point where we now have several prototypes operating in the lab. We have successfully gone through the proof of concept phase and are now moving towards being market ready, which means the RED Heat Engine has great potential to contribute to the mix that will form the backbone of the future energy system."

From the last three years, four things stand out about this exciting new project:

1) **Competitive electricity generation**: The use of artificial solutions provides the flexibility to choose the salts and the conditions that maximise the productivity of the Reverse

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Electrodialysis process, making it possible to drive costs down.

2) **Exploiting widely available low-grade heat**: The system can be installed practically anywhere in the world as low-grade heat can come from renewable sources like solar or geothermal while most industrial sites also have waste heat availability.
3) **Offering flexibility to the power system**: The technology is a fully controllable source of electricity. This flexibility is a distinctive advantage over variable renewable energy, but also against conventional thermal technologies, which are not very flexible.
4) **A safe and clean source of energy**: The technology involves only simple circulation pumps and any noise will be minimal, while it is modular and can be housed in any kind of building raising no visual or aesthetic issues. There are very low operation and maintenance requirements.

Reflecting on the project's progress since 2015, the partners have much to be upbeat about – especially two world record performance milestones: Record power density in the RED system of 39 W per m^2 of cell pair; and record specific thermal energy consumption of Membrane Distillation: 46.1 kWh_{th}/m^3.

In a new video about RED Heat-to-Power's achievements so far Andrea Cipollina of the University of Palermo said: "We started working three years ago from scratch. We started building new knowledge based on experimental and modelling activities and based on this we developed a process that enabled us to build the first operating pilot system."

Sebastian Mortier, from the European Commission, said: "We are glad to have projects like RED Heat-to-Power to show that we are confronting real issues in a sound manner and that innovation can happen wherever in Europe. Good collaboration, and cross-border collaboration, are very important to us this project is a good showcase for that."

Kristan Goeting, from REDstack, said: "This project is needed in the current environment. With energy consumption up and up every year, the demand for energy is getting even higher. This project is part of the mix of alternative energy sources."

The next step is taking the RED Heat Engine to scale. From detailed modelling and simulation, results show the most efficient regeneration technology is multiple effect distillation (MED). When MED is used, efficiencies of conversion close to 10% can be achieved for waste heat at 100 oC, while levelised cost of electricity below 0.10 Euro per kWh is possible, reaching values as low as 0.05 over the next two decades.

Analysis shows there are large amounts of heat available to power the heat engine across Europe and beyond. These resources are mostly in the form of industrial waste heat. The most applicable sources of heat are:

- Industrial sector. It includes various segments with different characteristics of waste heat (temperature, heat capacity, and thermal carrier).
- Decentralized power plants based on biogas engines. Biogas plants reject large amounts of waste heat, with a fraction already utilized for CHP operation or even for the biogas production. The remaining can be recovered by the proposed technology for electricity production.
- Marine sector. Ships are using low/medium speed internal combustion engines for their propulsion, which are already equipped with heat recovery systems for seam production in most cases. However, in the auxiliary engines onboard with typical size of 500 kWe only their exhaust gases are exploited, with large amounts of waste heat in their cooling circuit (cooled by seawater) readily available.
- Gas compression stations. For the supply of natural gas in the long piping networks, gas compression stations are used, which usually operate with gas turbines fuelled with natural gas. These reject large amounts of waste heat in their exhaust gases, which can be available for recovery and additional power production by the RED Heat-to-Power.

Michael Papapetrou said: "We have analysed the potential environmental impacts which shows the substitution of grid electricity with electricity generated by the RED Heat Engine would lead to reduced environmental impacts in terms of global warming, eutrophication and acidification. All the partners are inspired and excited by the potential of the RED Heat-to-Power project."

More information

For further information on the RED Heat-to-Power project (EU H2020 grant agreement 640667), please visit www.red-heat-to-power.eu or contact Michael Papapetrou (michael.papapetrou@wip-munich.de)

Reports

Open access / free of charge

Charlery, L and Trærup, S.L.M., 2019, The nexus between nationally determined contributions and technology needs assessments: a global analysiss, Climate Policy, vol. 19, no. 2, pp. 189-205.
The role of technology in combatting climate change has been acknowledged and highlighted by the Parties to the UNFCCC. In the developing world, this has received particular attention through the technology needs assessment (TNA) process. This study presents an assessment of the TNA process and its linkages to the nationally determined contributions (NDCs) under the Paris Agreement. The conclusions stem from an assessment of the TNAs completed to date, as well as 71 NDCs from developing countries at various stages of the TNA process. The analyses show that further developing the TNAs could play a vital role in filling gaps in the existing NDCs, specifically those relating to identifying appropriate technologies, their required enabling framework conditions and preparing implementation plans for their transfer and diffusion.

Fawcett, T. and Killip, G., 2019, Re-thinking energy efficiency in European policy: Practitioners' use of 'multiple benefits' arguments, Journal of Cleaner Production, vol. 210, pp. 1171-1179.
There is increasing interest in the idea that energy efficiency has economic, environmental and social impacts beyond energy and cost saving - a 'multiple benefits' perspective. However, present EU-decision making on energy efficiency is based on assessment of a very narrow range of costs and benefits. This paper investigates whether and how advocates of energy efficiency have used multiple benefits to frame their interactions with policy-makers at EU and UK level, and to broaden the appeal of energy efficiency.

Graedel, T.E., Reck, B.K., Ciacci, L. and Passarini, F., 2019, On the Spatial Dimension of the Circular Economy, Resources, vol. 8, no 32.
The primary motivations for supporting a circular economy include a reduction of environmental impacts and conservation of natural resources. Australia is a vivid example of a country whose large metal extraction capacity is not balanced as it has neither an extensive product manufacturing capability nor a large domestic market. Consequently, Australia must rely on the global resource network to achieve circularity and carbon neutrality. This work illustrates this situation with quantitative material flow cycles for Australian aluminum, nickel, copper, zinc, and stainless steel, and comments on the implications of the results for Australia and for circular economy prospects more generally.

Gulbrandsen, L.H., Wettestad, J., Victor, D.G. and Underdal, A., 2019, The political roots of divergence in carbon market design: implications for linking, Climate Policy, vol. 19, no. 4, pp. 427-438.
This article looks at the political economy of the diffusion of emissions trading system (ETS) designs and explores the implications for carbon-market linking. Contrary to expectations of convergence, as has been observed in many areas where economic policy diffuses across markets, the article found substantial divergence in design and implementation of ETS. The architects of these systems are aware of other designs, but they have purposely adjusted designs to reflect local political and administrative goals. Divergence has sobering implications for visions of ubiquitous linkages and the emergence of a global carbon market that, to date, have been predicated on the assumption that designs would converge.

Hermwille, L. and Kreibich, N., 2018, Article 6 and the Global Stocktake, JIKO Policy Paper, No. 05/2018.
This paper explores the relationship between Article 6 and the Global Stocktake (Art. 14) of the Paris Agreement, both of which shall contribute to a raising of ambition over time. It analyses cross-references from the two Articles to other elements of the Agreement, and vice-versa; it discusses how Article 6 could support (or undermine) the functions of the Global Stocktake; and concludes by recommending that a strong exchange process between the Global Stocktake and Article 6 be established. This would not only be of utmost importance to allow for the Global Stocktake to properly perform its functions (in particular its accountability function), but could also assist the development of Article 6 activities.

Mohan, A. and Wehnert, T., 2019, Is India pulling its weight? India's nationally determined contribution and future energy plans in global climate policy, Climate Policy, vol. 19, no. 3, pp. 275-282.
This paper assesses India's progress on its nationally determined contribution (NDC) targets and future energy plans. Although India is well on track to meet

its NDC pledges, these targets were extremely modest given previous context. Also, there is considerable uncertainty around India's energy policy post 2030 and if current plans for energy futures materialise, the Paris Agreement's 2 degrees goal will be almost certainly unachievable. India's role in international climate politics has shifted from obstructionism to leadership particularly following the announcement of withdrawal by the United States from the Paris Agreement, but analysis reveals that India's 'hard' actions on the domestic front are inconsistent with its 'soft' actions in the international climate policy arena.

Obergassel, W., Arens, C., Hermwille, L., Kreibich, N., Ott, H.E. and Wang-Helmreich, H., 2019, Paris Agreement: Ship Moves Out of the Drydock, Wuppertal Institut, Wuppertal, Germany.
The climate conference in Katowice in December 2018 had two main objectives: operationalising the Paris Agreement by adopting detailed rules for its implementation, and starting the process of strengthening Parties' climate contributions. This report covers the negotiations on these two sets of issues and includes a discussion of other recent climate activities by Parties and non-Party actors. The conference fell short on the first objective, none of the major emitting countries was ready to step up its climate ambition. The most important aspect of the Katowice outcome is therefore that it has brought the wrangling about implementation procedures to a close, making way for the true task at hand: the strengthening of activities to protect the climate and the implementation of the existing pledges.

Schneider, L. and La Hoz Theuer, S., 2019, Environmental integrity of international carbon market mechanisms under the Paris Agreement, Climate Policy, vol. 19, no. 3, pp. 386-400.
Environmental integrity is a key principle for using international carbon market mechanisms under the Paris Agreement. This paper identifies and categorises issues and options to achieve environmental integrity, including how it could be defined, what influences it, and what approaches could mitigate environmental integrity risks. Four factors are identified that influence environmental integrity: the accounting for international transfers; the quality of units generated, i.e. whether the mechanism ensures that the issuance or transfer of units leads to emission reductions in the transferring country; the ambition and scope of the mitigation target of the transferring country; and incentives or disincentives for future mitigation action.

Van Valkengoed, A.M. and Steg, L. 2019, Meta-analyses of factors motivating climate change adaptation behaviour, Nature Climate Change, vol. 9, pp. 158-163.
This study conducts a series of meta-analyses using data from 106 studies (90 papers) conducted in 23 different countries to examine how 13 motivational factors relate to various adaptation behaviours. Descriptive norms, negative affect, perceived self-efficacy and outcome efficacy of adaptive actions were most strongly associated with adaptive behaviour. In contrast, knowledge and experience, which are often assumed to be key barriers to adaptation, were relatively weakly related to adaptation. Research has disproportionally focused on studying experience and risk perception, flooding and hurricanes, and preparedness behaviours, while other motivational factors, hazards and adaptive behaviours have been understudied. These results point to important avenues for future research.

Von Unger, M., 2018, Host Country Auhorizations under Article 6 Paris Agreement: Conceptual Considerations and Models, Atlas ELA, Brussels, Belgium (pdf).
Building on the experience with mechanisms under the Kyoto Protocol, this briefing note examines the different types of host country approvals necessary for a transaction under Article 6.2 and Article 6.4 Paris Agreement (PA). It discusses the differing scopes of authorizations and contextualizes the Article 6 PA instruments with respect to their position under the nationally determined contributions (NDCs) of the host country and the investor country.

World Bank, 2018, Carbon Markets for Greenhouse Gas Emission Reduction in a Warming World, Independent Evaluation Group, Washington DC, United States.
This evaluation aims to answer the following overarching question: What has been the strategic objective, nature of engagement and contribution of the World Bank Group in supporting Carbon Finance? And going forward, what lessons can be drawn from this to inform the World Bank Group's strategic direction in supporting the next generation of market-based carbon mitigation activities given its potential comparative advantage? The evaluation identifies six major findings from past performance of World Bank Group carbon finance activities, including that the emission reductions declined significantly after the expiration of the first commitment period of the KP in 2012, continuing the trend of prior years.

JIQ Meeting Planner

9-10 April 2019, Berlin, Germany
Berlin Energy Transition Dialogue 2019: Energiewende - New Horizons
2019.energydialogue.berlin

28-31 May 2019, Lisbon, Portugal
4th European Climate Change Adaptation conference: Working together to prepare for change
ecca2019.eu

17-21 June 2019, Brussels, Belgium
EU Sustainable Energy Week: Shaping Europe's energy future
eusew.eu

17-27 June 2019, Bonn, Germany
Bonn Climate Change Conference - June 2019
unfccc.int/SB-50

24 June 2019, Dublin, Ireland
4th Annual Global Conference on Energy Efficiency
iea.org/newsroom/events

23 September 2019, New York, United States
UN Climate Summit 2019
un.org/climatechange

8-10 October 2019, Jimbaran (Bali), Indonesia
5th Global Science Conference on Climate-Smart Agriculture 2019: Transforming food systems under a changing climate
globalcsaconference.org

JiQ Magazine

JIQ Magazine (Joint Implementation Quarterly) is an independent magazine with background information about the Kyoto mechanisms, emissions trading, and other climate policy and sustainability issues.

JIQ is of special interest to policy makers, representatives from business, science and non-governmental organisations, and staff of international organisations involved in climate policy negotiations and operationalisation of climate policy instruments.

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