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## Integrating Circular Economy in the Education System Editor's note

It has been a few years now that 'circular economy' started to emerge as a core policy topic, promoted among others by the European Commission, towards a more sustainable society. At the same time, it is often unclear what is meant by it. In a recent study that JIN Climate and Sustainability coordinated, some of the interviewees linked a circular economy to waste management, while others referred to energy efficiency measures. Very few interviewed stakeholders described circular economy as a societal concept, focussed on efficient processes and recycling, reuse and useful utilisation of resources after being processed, limiting waste to a minimum.

A core element of the conceptual development of circular economy is education, which starts at primary school (first awareness building), continues during next educational stages (acquiring a circular economy toolbox), after which the knowledge can be applied in the labour market, and updated with help of concepts such as lifelong learning.

The study mentioned above (at the request of the Province of Fryslân) aimed at a stocktaking of the embedding of the circular economy in education (from primary schools to universities) in the northern Netherlands. While more and more initiatives are undertaken, these remain limited to ad hoc projects that very much depend on the enthusiasm of individual teachers. The circular economy is generally not part of any basic curriculum. Neither do schools set good examples as they, in their buildings and waste management, hardly apply circular processes themselves.

The conclusions of the stocktaking are: (1) teachers and students have insufficient awareness of circular economy, which makes it difficult to further the transition in the education system; (2) within regions, teachers and schools insufficiently collaborate so that good and bad practice is hardly exchanged; and (3) information that is already available – such as available teaching materials, inspiring guest lecturers, and supporting services – is difficult to find.

The final report of the inventory, titled in Dutch 'Parels zonder ketting' ('Pearls without a chain'; i.e. there are various good practices but an integrated approach towards a circular society is lacking), will be published in September 2017. A more extensive article in English on the results and recommendations will follow in the next issue of JIQ Magazine.

Wytze van der Gaast and Erwin Hofman

## Green Deal Signed for National Dutch Carbon Market

By Wytze van der Gaast\*

**On 11 May of this year, Deputy Minister of Infrastructure and Environment of the Netherlands, Mrs. Sharon Dijksma, signed the 'Green Deal National Carbon Market'. With the agreement activities will be undertaken to establish a market structure for certification of greenhouse gas emission reductions achieved via projects in sectors which are not covered by the EU Emissions Trading Scheme (ETS). The Green Deal has been co-signed by 16 private sector organisations which are potential project developers, potential buyers of certificates or otherwise stakeholders in emission reduction activities.**

The main reason for the agreement was to support emission reduction activities in non-ETS sectors in the Netherlands which up until now have not been stimulated by policies, and for which it is unlikely that such policies will be formulated at short notice. Signatory parties acknowledge that such projects, including the certification of the emission reductions,

were already possible via voluntary carbon markets, where project developers could sell carbon certificates to parties who voluntarily commit themselves to reducing their climate footprint. However, it was felt that certificates in the market vary in terms of quality with different treatment of baselines, additionality of emission reductions and double counting or double claiming of these.

### Transparency in voluntary carbon market

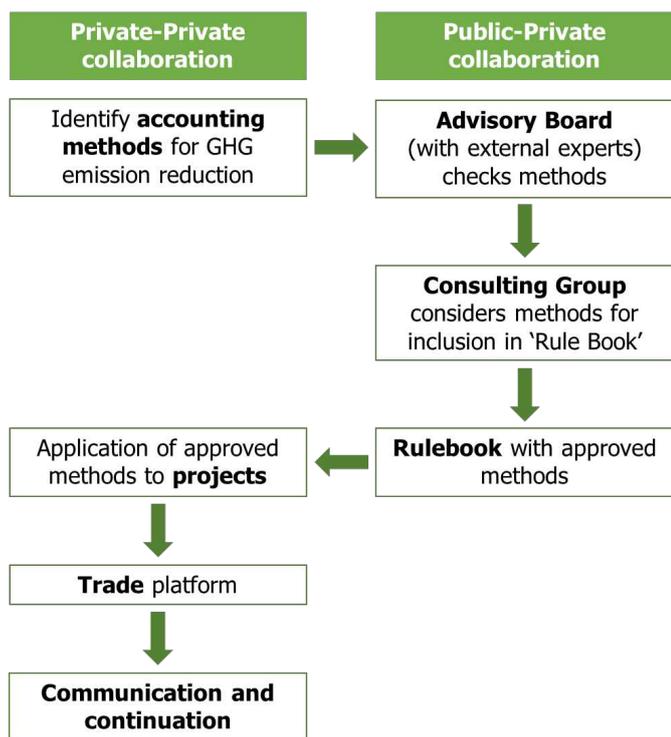
In order to create transparency in the Dutch voluntary carbon market and observe quality levels of traded emission reduction certificates, the Green Deal has been agreed. A Green Deal is a Dutch public-private collaboration where government and private sector entities collaborate on creating enabling environments for green economy transitions. Under the Green Deal National Carbon Market, four key activities will be carried out, which are organised in working groups.

In Working Group 1, Green Deal parties collect methodologies for calculating emission reductions for



**Figure 1.** Group photo after signing the Green Deal on the Dutch national carbon market, 11 May 2017. In the middle Deputy Minister Mrs. Sharon Dijksma of the Ministry of Infrastructure and the Environment.

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**Figure 2.** Schematic overview of the organisation of collaboration on the Green Deal for a national non-ETS carbon market in the Netherlands.

a range of project types. With these methodologies, which often already exist from the Kyoto Protocol mechanisms Joint Implementation and Clean Development or from other carbon crediting initiatives in the voluntary markets, emission reductions can be determined which are real and additional to existing and planned policies. Where needed, existing methodologies will be modified to adequately reflect the Dutch contexts, where possible methodologies will be simplified, e.g. with standardised procedures or benchmark values. Identified and modified methodologies will be considered by the Committee of Advisors and then established by a Green Deal Decision Board.

In Working Group 2, for different project types, such as land-use, transport, heat, and energy efficiency, portfolios will be prepared with projects that will use the established greenhouse gas accounting methodologies. Monitoring of the emission reductions will be done by project owners themselves after which verification and certification will be done by external parties, in order to have independent judgement of the emissions reduced. Under the Green Deal, parties will work on processes to streamline verification and certification steps so that transaction costs can be kept low.

### Supporting the certificate trading market

In Working Group 3, parties will organise the registration of the realised emission reductions by projects in Working Group 2 by listing the certificates, including information about the project type, location in the Netherlands and owner of the certificate. Such a registry supports potential buyers in finding the certificates that they are particularly interested in. For example, a company willing to invest in emission reduction certificates for reducing its carbon footprint, may have a particular interest in purchasing these from a green project in the own region.

Working Group 4 will focus on supporting the market structure for trading the certificates. Possible topics for this Working Group are: how to label the certificates given the robust accounting and registry procedures established under the Green Deal, what could be a reasonable price for trading the certificates, how to support the market place so that interested certificate buyers can efficiently search for certificates generated from the projects they prefer in the region that they prefer?

The signatory parties will collaborate under the Green Deal for a period of three years. The objective of the parties is that by 2020, during its third year, the Green Deal will result in certificates reflecting a total of 0,5 MtCO<sub>2</sub>-eq. emission reductions in non-ETS sectors in the Netherlands.

#### Box 1. Rulebook for Green Deal projects.

Parties to the Green Deal jointly work on a Rulebook for the accounting of greenhouse gas (GHG) emission reductions based on projects. These rules will be determined for:

- Additionality of emission reductions: check whether project activity is covered by ongoing or planned policy.
- Project system border: relevant GHG emission sources for the project.
- Baseline: reference scenario for GHG emissions in absence of a project during the project's certification timeline.
- Project-based GHG emissions: actual GHG emissions within the project's system border due to the project activity.
- GHG emission reduction: difference between baseline emissions and project emissions.
- Avoiding double counting, claiming: ensuring that an emission reduction project under the Green Deal does not lead to higher emissions elsewhere.

# Barriers to the Rapid Adoption of Solar Panels

By **Krisztina Szendrei\***

**According to current predictions, the Netherlands is going to miss its renewable energy target of 14% for 2020. Currently, only about 6% of the energy is generated from renewable sources and according to an analysis by the European Commission (2017) this share will grow to 13% by 2020 at most, if implementation of renewable technologies is not accelerated.<sup>1</sup> For that, a range of options can be utilised. This article focuses on the option to intensify the implementation of solar PV panels both on rooftops and on land.**

In 2016, a policy package was prepared by the Dutch Ministry of Economic Affairs with additional measures for reaching the 14%-target by 2020 (Intensivering Energieakkoord).<sup>2</sup> While, technically, the options in the package seem feasible, there could be several barriers (risks & uncertainties) to their implementation, such as costs, spatial planning issues and public acceptance. Based upon extensive literature review and interviews with relevant public and private stakeholders<sup>3</sup> in the Netherlands we have identified a series of existing/potential risks and uncertainties for both rooftop and land-based solar systems. This study has been undertaken within the framework of the EU-funded **TRANSrisk** project, which

focuses on uncertainties and risks related to pursuing low-emission transition pathways.

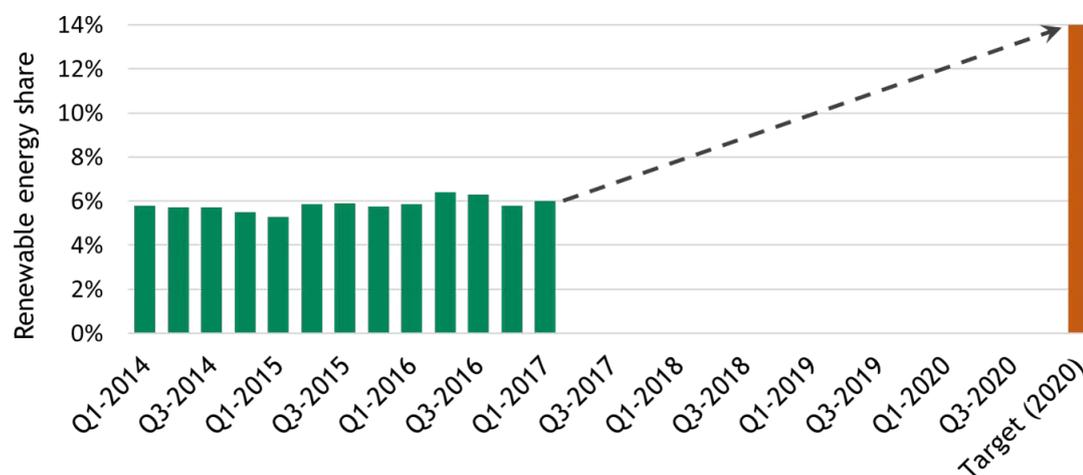
## Implementation risks and uncertainties

### Financial aspects

Rooftop solar panel installations are supported by the net-metering policy (in Dutch: salderingsregeling). As a result, households and small businesses with solar PV panels on their rooftop do not pay energy tax, VAT and the sustainable energy contribution levy over the self-generated and used electricity.

“While this policy has contributed to the diffusion of rooftop solar panel installation in the Netherlands, the success has a negative impact on the government’s fiscal revenues.”

For this reason, the government has raised the question whether net-metering is the most cost-effective option to stimulate the installation of rooftop solar PVs. It was announced in 2014 that the policy will be evaluated in 2017, which has created hesitance to invest among citizens as they were uncertain whether the current stimulation policy will continue to exist. In July 2017 the Ministry of Economic Affairs revealed that the policy will continue unchanged till



**Figure 3.** Renewable energy share in the Netherlands since the first quarter of 2014. Source: EnTranCe, Hanze University of Applied Sciences, Groningen, Netherlands

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<sup>1</sup> European Commission, 2017. Renewable Energy Progress Report - Com(2017) 57 final, Brussels ([pdf](#)).  
<sup>2</sup> Rijksoverheid, 2016. Kamerbrief Intensiveringspakket Energieakkoord ([link](#)).  
<sup>3</sup> To date, ten stakeholders were interviewed. This article reflects the combined views of these stakeholders.

2023 to provide investment security for consumers. After 2023, the policy would most probably will be replaced by a subsidy.

“Another issue is that not all home owners have sufficient finances to install solar panels on their rooftops.”

This is the case even with the support from the above-mentioned fiscal stimulation policy and the considerably shortened payback periods (and they cannot be forced to do so). Moreover, a large portion of households and small businesses are located in rental apartment buildings.

“Here it is not always clear who should pay for the purchase and installation of the solar panels and how to distribute the benefits (e.g. lower energy costs and fiscal exemptions).”

Is it the owner of the building envelope or the renter of the building, the one who pays for the electricity or someone else who intends to use the rooftop to install panels for his/her own financial benefit? These often legal complications discourage people and companies to invest in solar panels.

With respect to large-scale solar PV stimulation, solar parks are not eligible for net-metering but stimulated through the SDE+ feed-in programme (SDE+ is the extended subsidy programme for sustainable energy production). SDE+ is a tender scheme which first grants relatively cheap technologies, followed by more expensive and/or less efficient ones. As solar energy was not among the cheapest options till recently, very few projects were granted the subsidy. However, prospects for large-scale solar under SDE+ have become better. First, the costs of the technology have strongly decreased which is expected to continue. In addition the SDE+ subsidy for co-firing wood-pellets in power plants has reached its maximum, which means more opportunities in 2017 for other technologies such as solar and wind.<sup>5</sup>

“However, even with SDE+ subsidies, there is no guarantee that projects will actually be realised, as there are other obstacles to clear.”

Of the projects that were granted SDE+ subsidy in the past years, between one third and half were cancelled



**Figure 4.** Installation of rooftop solar PV.

or only partly realised, which means that hundreds of millions of Euros worth of subsidies were not utilised.<sup>4</sup> The reason for this is often the poor preparation of projects, including poor planning, unexpected costs, but also lack of or insufficient proper agreements with the municipality, land owners, contractors, and locals. At the same time, the case study analysis has shown that banks have been rather reluctant to provide funding to solar park projects, even if project plans were realistic and well developed. As RVO (the Netherlands Enterprise Agency) has recently implemented some important changes (including demanding a feasibility study for projects about 500kW), it is expected that banks will be less hesitant to invest in large solar projects. Increased familiarity with solar parks may further support both project developers to improve that business planning and banks to become less reluctant to offer loans.

#### **Suitability of rooftops for solar PV**

While complying with Dutch renewable energy goals would be strongly supported by having all rooftops equipped with solar PV systems, not all homes or buildings are suitable for that.

“Not every roof is strong enough to bear the weight of the solar panels, nor is favourably oriented towards the sun.”

Other roofs require regular maintenance which would require regularly removing the solar panels. Therefore, only part of the roofs can be used for rooftop solar PV. Suitability of rooftops can be

<sup>4</sup> The Solar Future NL, 2017. "Significant amount of SDE+ subsidies remain unused due to poor preparation" ([link](#)).

<sup>5</sup> In fact, about 2.6 GW worth of solar PV projects were submitted in the first subsidy round of 2017 ([source](#)).



**Figure 5.** Rendering of a planned solar park of 28,500 panels, with a nominal power of 7.8 MWp, near the village of Marum in the Netherlands. Source: Solarfields.

increased by integrating solar panels on rooftops and/or situate houses to make them more solar-friendly. Currently, there are no policies in the Netherlands to provide incentives to architects and building companies to work on solar PV-suitable building and dwelling design.

**Spatial planning and land use for solar parks**

“Since the Netherlands is a relatively small country, and most of the land has its designated purpose, not all land might be suitable locations for solar parks.”

Each province develops its own policy about where and how solar parks can be placed. For example, the province of Fryslân has a policy called 'Romte foar Sinne'<sup>6</sup> (English: 'space for solar') which acknowledges that solar energy is important but solar parks can only be installed in the vicinity of cities/villages and not at open land. For instance, this could lead to solar parks located near infrastructural systems (e.g. along railways, roads and highways, sound barriers, bike routes) and industrial development zones. As these locations are more acceptable for the development of large-scale projects than agricultural and nature areas from the public`s point of view (see below), this could accelerate PV implementation.

**Social perception and acceptance**

From a psychological perspective, it appears that people perceive renewables quite positively, however, general perception does not necessarily reflect on what people think about specific projects.

“Perception is strongly influenced by biospheric values. People with strong biospheric values are more

likely to support renewables even if it entails personal costs.”

For rooftop solar panels the perception of the public is generally positive, apart from the occasional individual differences. Naturally, there are always individual differences in how people perceive renewables (e.g. whether solar PVs look nice or not, whether wind mills are noisy or not). People with strong personal values and belief, e.g. find solar PVs expensive or they are simply against renewable energy for some reason, might even try to use other arguments such as panels are not pretty or they are actually not good for the environment to support their views. There might be people who oppose to rooftop panels due to financial or aesthetic reasons. In addition, there is still a lot of misconception about this technology (e.g. most people are unaware that solar panels have become affordable, it is a good investment and there are hardly any technical hurdles) which delays the adoption of this technology.

“For large-scale solar park projects, public acceptance is more complex as these are integrated into existing landscape and therefore might be considered as horizon pollutants (similar to how people perceive wind parks).”

Public resistance is usually enhanced by lack of familiarity with solar parks (as there are not many solar parks yet in the Netherlands) which may lead to unrealistic arguments and `wild` ideas. Learning from deployment of wind power parks (and dealing with the `not in my back yard` argument), an important step to increase acceptance is to involve local people and cooperatives in the development of large solar projects from the beginning.

<sup>6</sup> Gemeente Súdwest-Fryslân, 2016. Notitie "Ruimte voor de Zon".

## Building Blocks of Circular Business Models

Results of national circular economy research in the Netherlands

By Jan Jonker, Ivo Kothman, Niels Faber and Hans Stegeman\*

The issue of 'circular economy' is gaining traction. However, a significant gap remains between the concept and the business practice. For example: what does the circular economy mean for the organisation of processes or business models, or for the quality of recyclable materials? In this article, the first results of research on these issues are presented, along with an outline of the state of the circular economy in the Netherlands.

Based on a pilot research project on a regional level in Overijssel and Gelderland provinces, in the second half of 2016, a national research project on the nature and building blocks of circular business models was carried out. For the project, 900 questionnaires were completed, 39 in-depth interviews were held, and more than 4,800 businesses were analysed. The high response rate to the questionnaire shows that there is a lot of interest in the topic of circular economy, and so do the many articles and books published on the topic. Although this contributes to furthering the concept of circular economy, it does not provide information on how business may struggle with embedding circular practices in their daily activities.

This research project provides insights in how businesses progress towards a circular organisation, and what the building blocks of business models for a circular economy are. The overall conclusion of the research project is that we are still in the very early stages of organising the circular economy. To paraphrase Aristotle: "One swallow does not make a summer," but it is a very good sign.

### What is the circular economy?

The key characteristic of the circular economy is the closing of material loops. To this end, products, components and materials are reused or recycled as long as possible. The aim is to maintain the value of resources to a maximum extent. This also brings new



The results of the research project have been published (in Dutch) in the booklet 'Één zwaluw voorspelt veel goeds' ([link](#)).

business opportunities such as new ways of cooperation, new markets, and innovation of products and services.

'Circular' transcends recycling. In recycling, waste is converted into new materials. In a circular business model, the goal is to maximise value retention of raw materials and to minimise waste. The value chain becomes a value cycle. This leads to shifts of employment in organising the various forms of cycles that are created. At the same time, it also changes the core of the economy. Old business models based on selling 'stuff' are converted to new business models based on the provision of services and functionalities. This requires a new generation of business models and organisations.

Businesses are considered to be the main drivers of the circular economy. We have identified five 'building blocks' for business models for the circular economy. The five building blocks provide insight whether and to what extent companies are progressing towards such business models.

### Building blocks for circular business models

Businesses attempt to break free from the dominant linear economy, and explore how to organise their business in a circular way. An ideal circular business model consists of a configuration of five building blocks that have developed coherently.

\* The research project has been carried out by Stichting Our Common Future 2.0 (OCF 2.0) in collaboration with Radboud University, Nijmegen, Netherlands.

### 1) Closing the loops

The core of the circular economy is (contributing to) closing the (material) loops in the production process and the life cycle of a product. This entails reuse of resources, reduced use of raw materials and energy, and extending the lifespan of products by repairing, upcycling, or redesigning.

### 2) Value creation

In the circular economy value is created in multiple ways. The challenge is to simultaneously realise financial, ecological, and social value, while closing material loops.

### 3) Strategy

The circular economy requires a clear strategy aimed at the efficient use of resources, a shift from 'product' to 'service', and collaboration on the closing of loops.

### 4) Organisation model

The circular economy requires to collaborate with partners in value chains and networks to close loops. This type of organisation is at odds with the classic value chain model in which companies mainly consider their own business and compete with others.

### 5) Cost and revenue structure

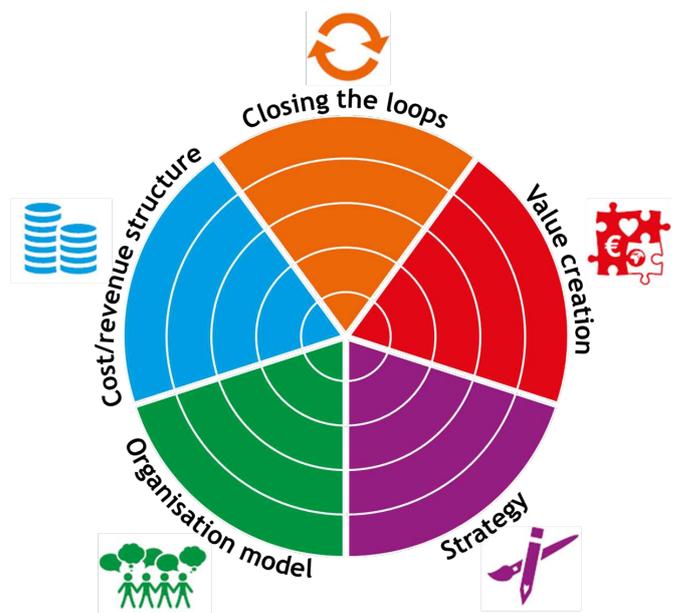
A circular organisation will lead to a changing structure of costs and revenues. Costs and revenues may have to be shared among parties that are involved in a value cycle. New questions may arise with regard to financing.

### Building a circular economy

The analysis in the Netherlands shows that there is a small group of leading businesses that already implement multiple building blocks simultaneously. Especially when it comes to 'closing the loops', these businesses have taken a lead on a large group of 'followers'. The group of followers mainly works on the circular economy based on the principle of recycling and eco-efficiency. This means that existing products are being improved, and existing processes are being refined and organised more efficiently.

Looking at the building block of 'closing the loops', the main aspect is recycling. For many businesses it remains unclear that this can also be economical – in fact, some businesses consider recycling as a cost leading to losses.

With regard to 'value creation' there is a similar situation. Most value is created in the form of ecological value, combined with reducing the use of



**Figure 6.** This radar chart can be used to indicate scores on the five building blocks of circular business models.

resources and energy. Given the nature of the circular economy (closing material loops), it is logical that social value is less prominent. The creation of multiple values appears to reinforce each other. Notable is that creating ecological and social values is not linked to making profit.

Concerning the building block 'strategy', the situation is less manifest. A truly circular strategy is not commonplace. Although in the research the choice of strategy was an explicit question, the results show that no clear 'set' of strategies is available yet. However, some case studies, which can be considered precursors, show emerging strategies leading towards a circular business model.

Currently, the organisation of the circular economy is mainly implemented within businesses' own organisations and with parties within their value chains. The leading businesses collaborate more intensively, encounter fewer challenges in their circular activities, and indicate to a much lesser extent than others that they lack the required knowledge. A striking outcome of the research is that there is only little collaboration with investors. This supports the assumption that (bank) financing of circular activities remains problematic.

With regard to expectations on revenues the results are indistinct. Compared to the 'followers', the leading businesses indicate they expect circular activities to significantly contribute to their revenues.

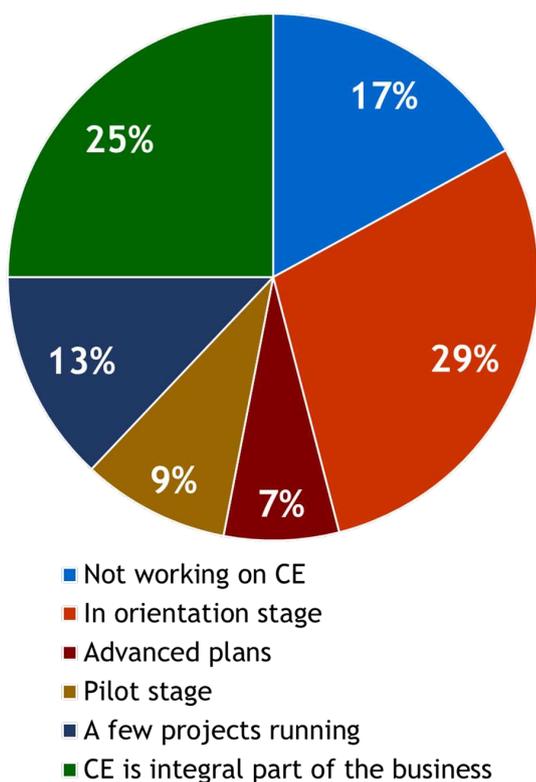
### Circular state of the country

The research project has clearly shown a number of motives for circular entrepreneurship:

1. Creation of ecological and social value;
2. Development of a sustainable business model;
3. Opportunities to innovate in the value chain, also related to process optimisation and value chain integration.

These results are in line with the earlier notion that businesses get involved in circular activities for reasons of reducing the use of resources and eco-efficiency. The assumption that this will simultaneously lead to social value creation cannot be confirmed.

About a quarter of the respondents have been working on circular business models for more than five years. They can be characterised as the 'circular economy die-hards'. For them, circular activities have been integrated into their business operations. In addition, there is a remarkably large number of companies that recently embraced circular business, for example through experiments on a project basis. A bright future may lie ahead for the circular economy!



**Figure 7.** Stages of circular organisation among businesses in the Netherlands (respondents in the survey).

### Challenges

The following three issues are mentioned as the main challenges for realising a circular economy: (1) counterproductive regulations; (2) other parties in the value chain are not ready for the circular economy; and (3) a lack of funding.

These challenges show that the institutional framework in many cases does not yet suit the circular economy. The government in particular could play a leading role in setting up supportive policies, and start by introducing circularity into its own purchasing and procurement systems. The government could also create fiscal instruments, such as taxing materials instead of taxing labour.

### Accelerating the transition

A key lesson is that 'the circular economy' does not yet exist. For some businesses, the circular economy is a minor part of their business model, while for others it is at the core of their value proposition.

Various actors in society, including companies, the government, and consumers/citizens, will need to take steps towards circularity. The research and the public debate show that it appears the consumer/citizen has not been assigned a role in the circular economy. In many value cycles the consumer would have to play a key role, but in practice this seems to be overlooked. This is reaffirmed by recent government policy in the form of seven solely business-oriented transition agendas. This leaves consumers out of the transition towards the circular economy, which in turn leads to the recurring argument that the consumer "does not ask for it" which would acquit businesses from the obligation to initiate circular activities. In other words: this creates a cycle of the wrong kind.

The premise remains that (business) organisations are the leading actors in the transition towards a circular economy. The research project shows many positive examples of this. However, the sobering reality is that many companies say that they are conducting circular business, but on closer inspection – with regard to the five building blocks – it turns out they are not. Despite a lively debate and some fine examples, the magnitude of the circular economy in the Netherlands remains limited.

The transition towards a circular economy still is in its infancy and shaped by its forerunners, by entrepreneurs who dare to take risks and lead us to a circular economy.

## Seminar on Climate Change and Sustainable Development in Chile

By Luis Edwin Gonzales\*

**On June 8<sup>th</sup> 2017, the Latin American Center for Economic and Social Policies at the Pontifical Catholic University of Chile (CLAPES UC) hosted a seminar on 'Climate Change and Sustainable Development in Chile'. The seminar was well attended by over 130 stakeholders including policy makers, researchers, and market actors from different sectors. The main aim of the seminar was to inform and discuss with the audience ways in which climate change mitigation policies could be better harmonised with sustainable development objectives. During this seminar (preliminary) findings of research were presented and discussed. Several presentations focused specifically on the Chilean economy and context, while other presentations brought in findings and experiences from abroad in different countries and sectors.**

Climate change is a worldwide reality and scientific facts support this. For the last 45 years, global surface temperatures rose at an average rate of about 0.17°C per decade — more than twice as fast as the increase observed per decade of 0.07°C for 1880-2015 (NOAA, 2017). Chile has witnessed, particularly in recent years, natural alterations such as droughts (that have affected the crop cycle and the energy sources), heat waves (that were great determinants of atypical forest fires), and intense rains in areas of low rainfall. These phenomena cannot go without relation to climate change, and hence, must be studied in the scope of sustainable development and faced with appropriate public policy responses — duly expected from a nation that seeks progress with economic opportunities, justice and respect for the environment, such as Chile.

By organising this seminar CLAPES UC seeks to contribute to the ongoing public debate on linking climate change mitigation actions and sustainable development, with empirical and comparative evidence. In this occasion, we brought together the



Figure 8. The author presenting at the seminar.

opinion and experience on this matter of representatives of the Ministry of Environment, with local and international academics in representation of a few partners of the EU co-funded project TRANSrisk.

### Complementarity of climate change and other development policies

In this seminar, we began by analysing Chile's institutional framework and the current barriers that impede a more effective battle against climate change. Ricardo Irarrázabal, former Deputy Secretary of Environment, concluded that, under the current institutional framework, not much complementarity exists in public policies related to local pollutants and global emissions. Moreover, a legal modification is required where prevention and adaptation plans should be embraced, and an adequate control of plans and their efficient implementation, enabled.

### Air quality and associated local social and economic impacts

Carmen Gloria Contreras, Chief of the Standards Department of the Air Quality Division of the Ministry of the Environment, focused on the evidence on air quality and its social and economic impacts from the Chilean government's perspective. She highlighted the relevant role of black carbon among local pollutants

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and as a determinant of global pollutants and climate change. In the past years, the greatest reductions in pollution have been accomplished by the means of structural public policies especially concentrated on fuels and transport: policies aimed at the use of fuels low in sulphur, introduction of emission norms that push for the entrance of better technologies, incentives for cleaner and more efficient vehicles, among other initiatives.

### **A carbon tax and the potential impact on household income in Chile**

Luis Gonzales and Rodrigo Cerda from CLAPES UC analysed the energy costs (measured as expenditure on electricity, natural gas, LPG, paraffin, kerosene, carbon, and firewood) for Chilean households and their potential states of vulnerability to climate change (measured by simulating scenarios where the impacts of climate change policy such as the carbon tax would represent changes in people's budgets). The proportion of income that households spend on energy varies by income level: the first income decile spends on average almost 10% of their income on energy, and, on a national scale, energy expenditure represents approximately 5% of household income. While electricity is the main source of expenditure for all income levels, natural gas is a more significant determinant of energy expenditure in higher income deciles, and liquefied petroleum gas represents a higher portion of energy expenditure for lower income deciles.

### **Low emission developments in Chinese cities**

To provide comparative evidence on these issues, first, Jenny Lieu of the University of Sussex, presented her study on risks and uncertainties of low carbon policies in cities, applied to Shanghai and Beijing. Being China's main metropolises and located in different climate zones, she posed ideas on how they can potentially opt for a low-carbon development. This presented particularly interesting results for Chile where, although urban population is already almost 90% of total population, it is fundamental to look for ways to improve adaptation to climate change and mitigation of pollutants in the main Chilean cities, where the main sources of pollution are transport and residential sectors.

### **Co-effects of low-emission transition pathways in the livestock sector in the Netherlands**

We then hosted Eise Spijker of JIN Climate and Sustainability and Annela Anger-Kraavi of Cambridge

Econometrics and the University of Cambridge (also Vice-Chair of the UNFCCC Subsidiary Body on Scientific and Technological Advice SBSTA). Their research team modelled and analysed the co-effects of two different low-emission transition paths in the livestock sector in the Netherlands. Preliminary results from their work suggest that opting for integrated manure management will benefit the national economy while meeting the required reductions in greenhouse gases and other atmospheric pollutant emissions. They also signalled the potential challenges for linking mitigation policy and sustainable development for Chile, where the livestock industry has not (yet) intensified and industrialised as in the Netherlands. Although the contribution of Chile's livestock sector to national greenhouse gas emissions is still modest, within agricultural emissions it is the most polluting subsector.

### **Concluding**

The topics and sectors covered in this seminar are part of a wider array of themes that linking climate change mitigation and adaptation strategies and sustainable development entail. This seminar showed that there is plentiful scope for policy makers and markets to find synergies between climate change mitigation actions and more local socio-economic and environmental development objectives. But the seminar also highlighted some risks, as there might not always be a perfect win-win strategy. The Paris Agreement, once more confirmed the urgency of this debate, but also stimulates a pro-active approach signatory countries, policy makers and the market actors to initiate real actions. With the recent announcement of the United States to abandon the Paris Agreement, the world has been reminded of the importance of continued international and national collaboration on Climate Change, and of the challenge this represents for humanity.

Felipe Larraín, Director of CLAPES UC, and member of the Council of Leaders for Sustainable Development of the United Nations, pointed out the need for global cooperation to achieve growth with lower emissions, notwithstanding the difficulties this implies –including technological barriers, or even the lack of cooperation from other parties.

With this seminar, we hope to have motivated and contributed to the forecast of the future challenges of our country Chile in terms of climate change and sustainable development.

## Global Research and Innovation Cooperation in Climate Technologies: Opportunities and Challenges

To keep global warming well below 2°C and reach a near-zero emission society, research and innovation (R&I) in climate-related fields, as well as dissemination of findings will be needed. Research can, for instance, focus on development and demonstration of new technologies for mitigation. Innovation supports the processes of these technologies entering the mainstream. Such research and innovation can be supported international collaboration on R&I, including between developed and developing countries, as this offers the opportunity for trust building, knowledge sharing and allows all parties to influence the decision-making process of technology development. This is emphasised in the Paris Agreement (2015) which calls upon international collaboration between Parties on technology development and transfer at different stages of the technology cycle ('learning curve').

The CARISMA project has analysed several existing international collaboration activities between the EU and emerging economies on R&I for development and transfer of technologies for mitigation. These include activities initiated by governments, industries, and regions.

### Mapping of R&I initiatives

There are many R&I initiatives based on collaborative programmes involving organisations from multiple countries around the world. However, as most of these initiatives take place independently without overall coordination of the analytical approach and planned outputs, there is a risk of duplication on some topics while, on the other hand, there may be a lack of focus on other topics. In order to support policy makers with key information from these initiatives, CARISMA has mapped a wide set of international R&I collaboration initiatives between governments, between industries, and between regions. From this large pool, about 30 initiatives were selected for analysis in more detail, including identification of aspects which complicate or facilitate international collaboration on research and innovation.

Among the initiatives analysed are those based on government collaboration. CARISMA has analysed ten **government-to-government initiatives**, such as the Indonesian-Swedish Initiative for Sustainable Energy Solutions, which aims to promote knowledge



This article covers the work on international R&I cooperation by the CARISMA project. CARISMA is an EU-funded project (February 2015 - July 2018) aimed at supporting the development and diffusion of options for climate change mitigation. Information on the CARISMA project is available at the project website via [carisma-project.eu](http://carisma-project.eu).

exchange and strategic energy planning via research, innovation, and pilot projects. Government-to-government initiatives are funded through government channels and usually have goals of climate change mitigation, adaptation, capacity-building and technology transfer. In practice, such initiatives are often government-led with involvement too of private sector entities. In sharing comparable climate-related objectives, governments often have different interpretations of what to gain from collaborative initiatives, which could range from promotion of European exports to encouraging knowledge exchange and strategic energy planning. National government-to-government initiatives, unless purely academic, tend to promote domestic technologies into new markets, a feature they do not share with multilateral approaches.

CARISMA has analysed 11 **industrial collaboration initiatives** on mitigation, including for example the Low-Carbon Technology Partnership Initiative. Next to contributing to knowledge building on climate change mitigation, these initiatives often aim at increasing firm reputation, creating new market opportunities and/or securing a leading position on a market.

Finally, CARISMA analysed ten **regional collaboration initiatives**, between mostly the EU on one side and Brazil, China, India, or African countries on the other side. Example of regional collaborations include the B.BICE+ project on science and technology cooperation between the EU and Brazil and the CAAST-Net Plus programme on science, technology and innovation cooperation between the EU and Sub-Saharan Africa.

Based on the mapping and analysis of R&I collaboration initiatives, CARISMA has identified three key areas of recommendations which are discussed below.

### 1. Alignment of roles and objectives

The main factor influencing the outcomes of collaborations is the interactions between actors. This includes willingness to collaborate, trust, and communication. An important factor for success in a collaboration is how careful parties' roles and tasks within the collaboration have been designed and agreed, in line with interests and competences. The latter is also important from the perspective of understanding what actually drives the involvement of actors in a collaboration initiative. While climate change mitigation may often be the overarching goal of climate technology collaboration initiatives, it may well be that individual actors have different motivations to participate. Such differences in motivations are not necessarily bad, as long as they are explicitly clear, and not counterproductive. It is therefore important that in the process of designing a collaboration project the different motivations of partners are clearly understood and aligned with the overall project goal.

Therefore, in order to create an environment of trust, project managers should not only identify individual partners' drivers and motivations, but also set a framework to make these transparent and check and balance them.

### 2. Monitoring and evaluation for impact

In order to analyse collaboration initiatives and ensure successful outcomes and impacts, it is important to understand what 'success' means. Currently, monitoring and evaluation processes are focussed mainly on outputs achieved within the timeframe of the project. However, output (e.g. a technology action plan) does not necessarily mean that the project has an impact beyond the project (e.g. measurable reduction of GHG emissions because of deployment and diffusion of the technology based on the technology action plan). It is therefore recommended that in the project design stage the link between output (during the project) and impact (beyond the project) is clearly defined, and that there are tools in place to measure both.

### 3. Standardisation and reporting

A third issue identified from the analysis of collaboration initiatives is a lack of 'institutional memory', i.e. past collaboration projects are

insufficiently used for building new project initiatives. Enabling new initiatives to learn from past results also allows for better possibilities to develop a follow-up and to create synergies with other initiatives. Especially for government-led initiatives, it is recommended that a user-friendly tool is developed to register initiatives in a common database. The database should be open and allow access to information for a large audience. It could include search options by type of collaboration, area of research, technologies covered, geographical areas, outcomes, and documentation created. For such a database, there should be a standardisation of definitions, requirements, and monitoring systems. Currently, mapping and analysing collaboration initiatives is hampered because there is no common terminology and there are no clear guidelines on project design.

### Conclusions

International R&I collaboration initiatives can help to increase the productivity of research on technology development and foster innovation for technology transfer, as it supports knowledge exchange and creation. From the detailed analysis of initiative by CARISMA it can be concluded that motivations of collaboration partners can be diverse, despite a common overall climate-focused objective. For the private sector, for example, motivations to enter into a climate-focussed collaboration project are the opportunity to develop new products, create opportunities to enter new markets, or to influence political agendas.

The key recommendations are to: ensure transparency of participant roles and drivers in order to build mutual trust; to strengthen the monitoring and evaluation systems of initiatives and focus not only on project outputs but also on longer-term outcomes and impacts; and to standardise terminology and requirements in order to enable the development of a common database of initiatives, which would help to foster institutional memory. This could also stimulate the prolonging of regional collaborations beyond individual projects.

### Read more

- [Working Document 5](#): background report including mapping of initiatives and analysis.
- [Policy Brief 7.1](#): How should international institutions promote R&I collaboration?
- [Policy Brief 7.2](#): Government-led international R&I collaboration in climate change mitigation: practical guidance for policy-makers

## 2<sup>nd</sup> International Workshop on Sustainability and Resilience of Bioenergy for Climate Change (Bali, Indonesia)

By Cynthia Juwita Ismail\*

**The 2nd Bioenergy International Workshop was held in Bali, Indonesia on 22nd – 24th May 2017 as a continued event of 1st Bioenergy International Workshop in 2016. This event is a collaboration between two European Commission co-funded projects: GREENWIN and TRANSrisk engaging with local partners, Sustainability & Resilience Co, Udayana University and Indonesia Climate Change Trust Fund (ICCTF).**

The main goal of 2nd bioenergy workshop is to shed further light on the opportunities of biogas in Indonesia with critical reflections on the associated risks and barriers. This objective is based on the findings of 1st Bioenergy Workshop. During the first workshop, the stakeholders from national to regency levels were invited (particularly from Bali and East Java) to explore potential feedstock and technology of bioenergy. Based on the input from stakeholders, 4 bioenergy options were selected: Rice residues for pellet, large scale biomass gasification, small scale biogas and bioethanol. Then, a multi criteria assessment was performed to evaluate all four options against 5 dimensions, social, technology, economic, environmental and project interest and synergies. As a result, small scale biogas was selected

as a priority technology. Small-scale biogas has potential for rapid technology diffusion, while there also is existing financial support. Moreover, it is in line with the development programme of Bali local government. This finding thus led to main topic for 2nd Bioenergy International Workshop: "Scaling the Potential of Biogas whilst Lifting Barriers".

In accordance with the topic of the workshop, the risks and barriers of biogas deployment were identified through stakeholder consultation focusing in Bali and East Nusa Tenggara (NTT). At the same time, other business opportunities linked to biogas implementation were also explored by the GREENWIN team together with the stakeholders. During the discussion, participants shared interesting ideas, such as fruit-jam production and selling packaged organic fertilizer. Finally, an interactive discussion in different groups in an effort to formulate a strategic plan for enhancing biogas deployment was conducted at the end of the workshop. The group of policy makers, researchers/engineers and farmers successfully identified a set of strategies to foster biogas diffusion. As a follow-up, the findings of the second workshop will be used to shape scenarios to foster biogas deployment in Indonesia and to be reported in the next bioenergy workshop.



**Figure 9.** Stakeholder consultation: identifying risks and barriers of biogas deployment.



**Figure 10.** Focus group of policy-makers: formulating a strategic plan for biogas diffusion in Indonesia.

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## Energy Efficiency 'Good Practices' in Industry

**In the EU-MERCI project, a 'Good Practice' (GP) is defined as "a technique or methodology that, through experience and research, has been proven to reliably lead to a desired result with a minimum use of resources." GPs have been selected from a database of about 3,000 records describing energy efficiency measures and projects put in place in EU Member States.**

Proposed GPs shall satisfy the following criteria:

- It is efficient;
- It is technically feasible;
- It is economically affordable;
- It is replicable in different EU Member States;

In addition to applying these criteria, a statistical analysis of the database has been undertaken, in addition to an engineering expert assessment and the use of key performance indicators (KPIs) to objectively quantify the benefits of the practice. The KPIs take into account aspects such as energy performances, environmental performances, and economic performances.

### Example in the pulp and paper sector

An example of a GP in the pulp and paper sector is that of improved 'mechanical pulping grinding plate teeth'. The intervention consists of a new grinding plate with a teathed surface, with improved cutting qualities thanks to a new geometry that allows the pulp to be distributed on the sides of the grinder. The reduction of electricity consumption is linked to the reduction in the regrinding phenomenon, that is the permanence of the pulp on the grinder surface. The GP leads to an energy consumption improvement of 20%. It is an example of a technically simple project, allowing to obtain high primary energy savings, while investment costs are relatively low and the payback time short (0.5 years).

### Validation of GPs in the food industry

Within the food & beverage sector, a group of European food and drink federations (belonging to SPES GEIE) run a validation of the GPs identified in the EU-MERCI project. The agrifood industry is strategic all over Europe, and offers wide opportunities for efficiency improvement. The sector is one of the most represented in energy efficiency obligation schemes under Article 7 of the EU Energy Efficiency Directive (EED), many of the technologies used are also applicable to other sectors, and the




The EU-MERCI project has received funding from the the European Union's Horizon 2020 research and innovation programme.

The overarching objective of the EU-MERCI project is to support energy efficiency in the European industry sector. It will develop methods and tools for assisting industry in implementing effective energy efficiency improvements and monitoring of energy savings, and assist policy makers in the assessment of the effectiveness and transparency of energy efficiency mechanisms.

sector accounts for both large corporations and SMEs. The sector is therefore representative of European industry and suitable for the validation exercise.

The rationalisation of energy consumption in the food and beverage industry can represent an opportunity for the industrial system to reduce costs in the production process, but it requires a stable regulatory framework, a strategy of incentives covering the medium and long term (such as a white certificate scheme), and structural funding of research and development. The validation, using surveys and national round-table 'consensus meetings', will take place in Italy, France, Portugal, Czechia, Spain and Turkey. The final result will be a consolidated report with EU-level recommendations.

### Online good practices database

The EU-MERCI project has launched an online platform dedicated to the identified GPs in the main industrial sectors in Europe. The main goal is to facilitate investments in energy efficiency projects among industrial stakeholders, with benefits in terms of competitiveness, environment, and social impact. The web platform offers both a library of solutions divided by process phase and a searchable database based on real project data. The GPs were primarily selected through the analysis of thousands of real projects at European level in the aluminium, ammonia, cement, ceramics, petroleum, copper, food & beverage, glass, iron & steel, machinery, and pulp & paper sectors. The database is available via [www.eumerci-portal.eu](http://www.eumerci-portal.eu).

## Reports

 Open access / free of charge

 Bais-Moleman, A.L, Sikkema, R., Vis, M., Reumerman, P., Theurl, M.C. and Erb, K.-H., 2017. **Assessing wood use efficiency and greenhouse gas emissions of wood product cascading in the European Union**, *Journal of Cleaner Production*.

Cascading use of biomass is a recognised strategy contributing to an efficient development of the bioeconomy and for mitigating climate change. This explorative study highlights the potential of cascading use of woody biomass in the wood production chains to contribute to a reduction of environmental impacts related to wood resource and energy use, but it also reveals trade-offs in terms of GHG emissions reduction, relevant especially in meeting short-term (2020–2030) renewable energy targets.

 Cames, M., Harthan, R.O., Füssler, J., Lazarus, M., Lee, C.M., Erickson, P. and Spalding-Fecher, R., 2017. **How additional is the Clean Development Mechanism? Analysis of the application of current tools and proposed alternatives**, *Öko-Institut, Freiburg, Germany*.

With the adoption of the Paris Agreement, the Clean Development Mechanism (CDM) under the Kyoto Protocol will end. However, in terms of its standards, procedures, and institutional arrangements, the CDM forms an important basis for the design of future international crediting mechanisms. This study analyses the opportunities and limits of the current CDM framework for ensuring environmental integrity, i.e. that projects are additional and that emission reductions are not overestimated. In addition, it provides lessons learned and recommendations for improving additionality assessment that can be applied to crediting mechanisms generally, including to mechanisms to be implemented under Article 6 of the Paris Agreement.

 Carbon Pricing Leadership Coalition, 2017. **2016-2017 Carbon Pricing Leadership Report**.

To harness the full potential of carbon pricing to reduce global emissions, governments, business and civil society need to work together to address the key challenges. The Carbon Pricing Leadership Coalition (CPLC) was established to provide a forum for collaborative leadership on carbon pricing. This report highlights the action that CPLC Partners have taken to drive carbon pricing, and outlines the many ways that Coalition Partners can, and will, continue to lead in the fight against climate change.

 G20 Energy Efficiency Finance Task Group, 2017. **G20 Energy Efficiency Investment Toolkit (2017)**, *International Energy Agency, UN Environment Finance Initiative and International Partnership for Energy Efficiency Collaboration*.

This Toolkit offers a new perspective on the challenge of scaling-up energy efficiency investments by defining and separating 'core' and 'integral' energy efficiency investments. It also provides insights into national policy developments, showcasing good practices, as well as an insight into policy tracking databases, using the Voluntary Energy Efficiency Investment Principles as a frame for their comparison. Finally, it is revealed how public and private sector financial institutions are tackling the energy efficiency investment challenge, through their commitments, approaches, tools and by sharing the areas that they identify for further joint development.

 Howard, A., T. Chagas, J. Hoogzaad, and S. Hoch, 2017. **Features and implications of NDCs for carbon markets**, *Climate Focus, Amsterdam, Netherlands*.

The report maps out issues that need to be resolved to engage voluntary cooperation under Article 6.2 of the Paris Agreement. It identifies features and implications of countries' nationally determined contributions (NDCs) that are particularly relevant to the design and use of carbon markets in the context of Article 6.2. The report is structured around the relationship of three key factors: NDC features, accounting for NDCs and internationally transferred mitigation outcomes, and generation of mitigation outcomes. Possible directions that may be taken in the CMA guidance are discussed, and areas where reaching an early understanding among countries could help unlock further negotiations are suggested.

 Marcu, A., 2017. **Governance of Article 6 of the Paris Agreement and Lessons Learned from the Kyoto Protocol**, *Fixing Climate Governance Series, Paper No. 4, Centre for International Governance Innovation, Waterloo, ON, Canada*.

Article 6 under the Paris Agreement provides a framework that allows for the creation of an international carbon market. The Paris Agreement has broadly sketched the outlines of such a market but given few details on how it might be made operational. This paper identifies the governance challenges, and choices available, in operationalising

article 6, based on the lessons learned from the international carbon market serving the Kyoto Protocol. It focuses among others on the level of centralisation, independence of the regulator, and conditions for robust accounting.

**6** **Nett, K. and Wolters, S., 2017. Leveraging domestic offset projects for a climate-neutral world: Regulatory conditions and options, German Emissions Trading Authority (DEHSt) at the German Environment Agency, Berlin, Germany.**

Voluntary domestic offset schemes offer great potential as instruments for advancing ambitious climate action. However, their possible scope of action is limited, as mitigation commitments from the Kyoto Protocol, the EU ETS and (sub)national compliance mechanisms enhance the risk of double counting. The study identifies challenges and opportunities and develops recommendations for advancing the development of a domestic voluntary market, including official government endorsement of voluntary offset mechanisms, in order to increase credibility and avoid creating parallel structures.

**6** **Partnership for Market Readiness., 2017. A Guide to Greenhouse Gas benchmarking for Climate Policy Instruments, The World Bank, Washington, United States.**

Benchmarks have been used in climate policy instruments to set targets and thresholds for environmental performance, and to determine the distribution of instrument benefits and obligations. Benchmarks can be used when comparing peers against each other or against a certain reference level, such as best available technology (BAT). By setting a common basis for comparison through benchmarks, entities are treated in a similar way under the rules of a policy instrument. This guide is intended to provide policymakers with structured guidance on the development of benchmarks. It is based on global experiences covering practices in 16 jurisdictions that are already using or are in the process of developing a benchmarking approach.

**6** **Rizos, V., Tuokko, K. and Behrens, A., 2017. The Circular Economy: A review of definitions, processes and impacts, Research report No. 2017/08, Centre for European Policy Studies, Brussels, Belgium.**

The major transformation from a linear to a circular economy will have significant impact on the economy, the environment, and society. Understanding these impacts requires developing an in-depth knowledge of

the concept of the circular economy, its processes, and their expected effects on sectors and value chains. The paper reviews the literature on circular economy with the aim of improving our understanding of the concept as well as its various dimensions and expected impacts. It is suggested that research on the circular economy is currently fragmented across various disciplines and there are often different perspectives and interpretations of the concept.

**6** **World Bank and Ecofys, 2017. Carbon Pricing Watch 2017, The World Bank, Washington, United States.**

The Carbon Pricing Watch is an advance brief from the 'state and trends of carbon pricing 2017' report, which will be released by the end of 2017. The brief notes that Parties stating in their NDCs that they are considering the use of carbon pricing cover 58 percent of global greenhouse gas (GHG) emissions. Also, over 40 national and 25 subnational jurisdictions are putting a price on carbon. Since January 2016, eight new carbon pricing initiatives have been implemented, in British Columbia, Alberta and Ontario (Canada), Australia, Fujian (China), Chile, Colombia, and Washington State (United States). The Chinese national ETS is planned to be launched in the second half of 2017.

**Box 2.** Climate Change Mitigation portal.

**Online portal highlighting EU-funded research on reducing emissions**



The [ClimateChangeMitigation.eu](https://climatechangemitigation.eu) portal highlights information from different EU-funded research and coordination projects emission reduction. The portal covers a range of mitigation-related topics, including mitigation technologies and practices, scenarios and models, links to relevant data sources, case studies, policy information, and stakeholder engagement. **13 EU-funded projects** have joined the portal, and additional projects are invited to become involved!

Linked to the online portal, updates on mitigation research are shared on Twitter using the [#mitigationEU](https://twitter.com/mitigationEU) hashtag.

## JIQ Meeting Planner

### 6-8 Sept 2017, Coimbra, Portugal

2nd World Symposium on Climate Change Adaptation (WSCCA-2017)

[climasouth.eu/en/node/356](http://climasouth.eu/en/node/356)

### 19-20 Sept 2017, New York, United States

Carbon Forum North America 2017: New market forces for transformation in the Americas

[ieta.org/event-2362440](http://ieta.org/event-2362440)

### 25-29 Sept 2017, Amsterdam, Netherlands

33rd European Photovoltaic Solar Energy Conference and Exhibition

[photovoltaic-conference.com](http://photovoltaic-conference.com)

### 9-11 October 2017, Amsterdam, Netherlands

Offshore Energy 2017 Exhibition & Conference: oil & gas, wind, and marine energy

[offshore-energy.biz](http://offshore-energy.biz)

### 6-17 November 2017, Bonn, Germany

2017 UN Climate Change Conference: 23<sup>rd</sup> Conference of the Parties (COP23) under the Presidency of Fiji

[cop23.com.fj](http://cop23.com.fj)

### 8-9 November 2017, Aarhus, Denmark

7th Annual European Biomass to Power

[wplgroup.com/aci/event/european-biomass-to-power](http://wplgroup.com/aci/event/european-biomass-to-power)

### 27-29 November 2017, Eindhoven, Netherlands

3rd ManuREsource conference on manure management and valorization

[manuresource2017.org](http://manuresource2017.org)

### 6-8 December 2017, Bangkok, Thailand

Asia Pacific Carbon Forum 2017

[ieta.org/event-2362447](http://ieta.org/event-2362447)



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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