



Benelux: An Energy Transition Hub for Europe

FOREWORD

The Benelux region, with a population of ~30 million and a total gross domestic product of around 1.2 trillion Euros in 2017, is among the most advanced regions in Europe. Average GDP per capita in the region was ~41'000 Euros in 2017, about 30% higher than the European Union average in the same year. The region saw year-on-year GDP growth of about 5.5% compared to 2016, 2.5 times higher than the EU average over the same period.¹ One major challenge in the years ahead is to maintain and advance the region's economic and social prosperity while dramatically reducing greenhouse gas emissions and navigating through the energy transition. This will have a profound impact on the way we produce, use and store energy, and on the ways we transport goods and feed our industries. The time has come to think through a blueprint for the future energy systems of the Benelux.

The Benelux region boasts many unique features, such as its large network of cities and harbors, world-class education and research institutes, a combined ~550² kilometers of access to the North Sea and its vast wind resources, global industrial players from a wide range of sectors including chemicals, basic materials, and off-shore industries. All of these factors could allow Benelux to become an “Energy Transition hub for Europe”.

Our long-term vision is for this hub to become the European benchmark on climate goal achievement. We ultimately want to provide Benelux with one voice on all Energy Transition matters across all forums featuring external stakeholders. This will provide the impetus required for the vital, large-scale investments needed to deliver affordable - and thus sustainable – renewable energy to all. This vision will benefit the entire Benelux community and indeed all of Europe.

BBR firmly believes that a coordinated effort across governments, industries and research institutes in the entire region will allow for navigating forward in a more effective and optimal manner; such a concerted move could unlock massive opportunities that would remain untapped if countries were to optimize within their national borders. On multiple previous occasions the Benelux countries have demonstrated their ability to reach such powerful deals allowing for a multiplication of benefits.

This report makes the case for such a collaboration, urging policy-makers to take action towards further harmonizing the efforts in the region via two key enablers:

- **An Energy union for Benelux** that harmonizes energy policy and regulations, promotes further interconnection of infrastructure, and establishes a common market through the following actions:
 - Establishing a task force to conduct the due diligence necessary to defining the scope and boundaries of a Benelux Energy Union

¹ World Data Atlas, IEA

² World fact book

- Encouraging cooperation among Benelux TSOs (electricity and gas) and requiring a minimum level of coordination on grid-development plans as well as on market coupling; a further step could be the establishment of a Benelux Coordination Center (RCC) as envisioned by the EU "Clean Energy Package"³
- Supporting the implementation of joint support schemes for renewables development, and joint capacity mechanisms
- **Enable Benelux Sector Coupling** by ensuring a crucial role for the Benelux harbors and grasping the momentum through the following two actions:
 - Developing a cross-border blueprint that includes the required infrastructure for renewable energy production; CO₂ capture, storage and utilization; power-to-X; and the key industrial sectors
 - Creating a common Benelux position on key regulations with high impact on sector coupling, in particular the REDII-directive on the definition of renewable fuels and the regulation on the transport of waste products

We would like to thank all those who have contributed to this white paper, especially the members of the BBR Energy working group. It is our aim that this document provides the governments and the business with a solid basis to engage in meaningful discussions on a Benelux Energy Transition Hub.

Benelux Business Roundtable

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³ <https://www.emissions-euets.com/internal-electricity-market-glossary/1440-regional-operational-centres>

1. AN ENERGY UNION FOR BENELUX

A regional Benelux collaboration within the common EU framework could be an ideal first step toward the ultimate ambition of a European Energy Union. This regionalization will not be about creating new borders around Benelux, but about strengthening the relationship between the European and national levels; it will be fully in line with previous and current efforts such as the Pentalateral Energy Forum; and it will be about leveraging the vast advantages of neighborhood, conducting pilot projects, and testing new solutions on regional grounds in order to facilitate the delivery of the European Energy Union.

We believe a “Benelux Energy Union” is an essential step forward for our energy system towards delivering on climate goals and renewables commitments while maintaining security of supply at affordable costs to consumers and industries. This union should be established on 3 pillars:

Harmonization of energy policy and regulation:

The energy policies and priorities across Benelux are far from being aligned. The mandates of policymakers and regulators are currently at the national level resulting in projects being screened and developed within national boundaries. We believe, however, that the most cost-effective policies and regulations require a collaboration between the neighboring countries.

For instance, earlier this year, Belgium requested European Commission approval for its national capacity remuneration mechanism. Meanwhile, no capacity mechanisms are implemented in the Netherlands or Luxembourg. Research has shown that unilateral market design in the specific case of capacity mechanisms can lead to negative effects on social welfare⁴ (e.g. distortions that unilateral market design can lead to), whereas a joint approach could mitigate these adverse impacts through fostering competition across all potential providers in the region, thus leading to more efficient investment allocations.⁵

A joint support scheme is another potential use case for a cross-border approach, with the advantage of redirecting subsidies to a more efficient utilization of renewables sources in the region, while creating clear and stable incentives for the private sector.

Further interconnection of the infrastructure:

All three nations in the region have ambitious plans to decarbonize their power portfolios; for instance, both the Netherlands and Belgium plan to phase out ~40-50% of their current domestic power supply by 2030 (coal and nuclear installations, respectively). As per the recently agreed EU framework, a considerable share of this supply will be replaced by renewables, mostly in the form of offshore wind. Belgium is planning on increasing its offshore wind capacity to 4 GW by 2030, while the Netherlands has a target of adding 7 GW of new offshore wind capacity between 2023 and 2030. In the overall North Sea region

⁴ Meyer, R., & Gore, O. (2015). Cross-border effects of capacity mechanisms; Do uncoordinated market design changes contradict the goals of the European market integration? *Energy Economics*, 51, 9-20

⁵ Meyer, R., & Gore, O. (2015). Cross-border effects of capacity mechanisms

(i.e. Germany, France, the Netherlands, Belgium, and Denmark) the pipeline of confirmed projects would result in the addition of more than 59 GW of offshore capacity by 2030, meaning that the installed offshore capacity in the region will grow 5-fold in the next decade, compared to the 15 GW market of the early 2018. Moreover, by some estimates⁶, meeting the COP21 goal of a fully decarbonized electricity system by 2045, would entail (the equivalent of) ~180 GW of offshore wind capacity being deployed in the North Sea. Integrating such large volumes of intermittent wind capacity will require immense investments, a strong supply chain to ensure grid connections are developed in a timely manner, and a solid spatial planning strategy that ensures the most effective use of the resources in the North Sea – one that is fully aligned with the offshore and onshore grid developments⁷. It is with this context that we'd like to highlight the need for increased interconnectivity across the Benelux to ensure security of supply and cost-optimal integration of the renewables.

Furthermore, the need for additional storage/flexibility measures - pumped hydro in the short term and hydrogen or power-to-methane in the longer term - is going to be crucial. We believe that a coordinated regional approach in assessing and planning the upcoming renewables, central storage and grid infrastructure projects will be more cost-effective than making and acting on decisions in silos.

In order to facilitate this, a remuneration scheme for the projects that are of a regulated nature (certainly grid elements, and potentially also storage) has to be agreed by the governments and the regulating authorities.

A union of the markets:

The proposed Benelux Energy Union should also address the way in which the wholesale market is operated, through market coupling and increased interconnection of power exchanges. This will result in increased competition and transparency, possibly leading to reduced market prices which would benefit the consumers and increase the competitiveness of the industries in the region. The Benelux Energy Union could also be a frontrunner and testbed for the implementation of new market mechanisms that stimulate investments in adequate capacity, or address deterioration in wholesale market prices – likely to be caused by increasing penetration of zero-marginal renewables. These new mechanisms should also reflect the additional costs that rise from the need for flexibility due to the intermittent nature of renewable, e.g. address the costs of capacity markets.

These three pillars will be necessary to ensure a well-functioning and reliable electricity system in the region – with adequate investments in generation and transmission capacity to ensure security of supply; and with competitive and transparent price formation for better distribution of costs & benefits of the energy transition across the region, resulting in reduced prices to end-users.

⁶ Translate COP21, Ecofys

⁷ ibid

In the short term, we propose 3 key actions to enable the Benelux Energy Union:

- Establishing a task force to conduct the due diligence necessary to defining the scope and boundaries of a Benelux Energy Union
- Encouraging cooperation among Benelux TSOs (electricity and gas) and requiring a minimum level of coordination on grid-development plans as well as on market coupling; a further step could be the establishment of a Benelux Coordination Center (RCC) as envisioned by the EU "Clean Energy Package"⁸
- Supporting the implementation of joint support schemes for renewables development, and joint capacity mechanisms; requiring the regulators to conduct the necessary steps

⁸ <https://www.emissions-euets.com/internal-electricity-market-glossary/1440-regional-operational-centres>

2. ENABLE BENELUX SECTOR COUPLING: A CONCEPT TO FUEL THE TRANSITION

“Sector coupling” refers to the vast opportunity that is created by multi-lateral convergence of the energy sector with other industrial sectors such as chemicals, steel and building materials through storable energy carriers, circular value streams and relevant infrastructure. The ultimate ambition is to develop innovative industrial processes with new routes of energy supply and a minimal need for additional fossil carbon. This means for example:

- Utilizing waste or byproducts such as CO/CO₂ from one sector/company in another; for instance, CO₂ can serve as feedstock for processes that allow storage of intermittent renewable energy into chemical energy; CO₂ could be captured and stored in a process referred to as Carbon Capture and Storage (CCS), or re-used as carbon source for creating innovative industrial products – Carbon Capture and Utilization (CCU)
- Transferring carbon free electricity into other sectors, also known as electrification or Power-to-X (e.g. power to cooling/heat, power to hydrogen, power to gas/products/fuels)

Benefits of a coordinated approach for sector coupling across Benelux are twofold: first and foremost, *scale* is a key factor in improving the business case for many of the CCS/U or P2X applications. Second, the vicinity and variety of process industries (especially closer to the border) creates the value chain circularity that is often required to create an optimal ecosystem for such a convergence or industrial symbiosis.

We believe Sector Coupling could strengthen the competitive position of Benelux industries and help achieve the region’s ambitious climate goals by 2050. We therefore would like to argue for developing a cross border blueprint and a common position on relevant key regulations.

The Benelux blueprint for sector coupling will encompass:

- A fact-based comparison of the alternative cross-border value chains including energy and CO₂ sources, energy carriers such as hydrogen, transport options, conversion technologies, end-products, etc., as well as an impact analysis on the future requirements of the Benelux energy system
- A thorough analysis of the existing, planned and required backbone infrastructure in the Benelux region, e.g. pipelines for CO₂ or H₂ transport (required capacities, lengths and corresponding investment needs, taking into account the private and public ownership conditions)
- A competitive analysis on the position of Benelux with regards to producing new and innovative energy carriers/products in-region versus importing them

This blueprint would serve as a platform to merge current or planned national initiatives, e.g. the Dutch hydrogen roadmap and “Klimaattafels”, the PROCURA project in Belgium (a proposal submitted to the federal Energy Transition Fund) and the initiatives of the Benelux ports. Leading knowledge institutes in the region are also well positioned to support the creation of such a blueprint. This will form a strong basis to set up ambitious Benelux projects. In addition, it will allow the Benelux countries to act jointly in the

upcoming EU financing forums, such as the European ETS innovation fund, with direct opportunities for the support of ambitious CCU and CCS projects. These enhanced research and pilot projects will enable both Benelux industries and research institutes to develop and implement new technologies at large scale.

For a harmonization of the relevant regulatory framework in Benelux, we should initially focus on addressing two barriers. First, the cross-border transport of CO₂ is currently difficult, as compliance with waste transport regulations is required. In order to unlock the full potential of industrial symbiosis, a common Benelux approach regarding transport of products from one company to another - especially in a cross-border - context is required.

Secondly, a common position on the definition of renewable fuels is necessary. The EU REDII has recently (in 2018) been revised, mandating Member States to require fuel suppliers to supply a minimum of 14% of the energy consumed in road and rail transport from renewable energy sources by 2030. A common Benelux position, on how to translate this EU directive into national/regional legislation is paramount to supporting sector coupling in new potential markets.

A crucial role for the Benelux harbors

In this context, we believe that the region's harbors are well-positioned to play an important role as frontrunners and facilitators of sector coupling. In 2017, the emissions of the ports of Rotterdam, Antwerp and North Sea Port alone accounted for ~25% of the total annual emissions of the Netherlands and Belgium combined. Harbors are thus in a unique position to become leading actors in emissions reduction. This is already illustrated by initiation of the first cross-border industrial symbiosis initiative in North Sea Port known as the Smart Delta Resources project.

In addition, our harbors are important connection points to the vast offshore wind potential of the North Sea and other offshore energy infrastructure. This central position is expected to further strengthen as the ports will continue to be major nodes for transport e.g. of CO₂, H₂, gas, electricity, etc. within the Benelux and to the outside world.

Grasping the momentum

Sector coupling, as described above, is one of key the topics currently debated in national energy & climate policy plans. In the Netherlands, "Integraal Nationaal Energie- en Klimaatplan"⁹ refers to Carbon Capture Storage & Utilization as a topic best to be addressed in collaboration with neighboring countries.

The cross-border relevance of this field is also illustrated by the trilateral initiative between North Rhein-Westphalia, the Netherlands and the Flanders region of Belgium, in which a broader common strategy for the future of the chemical industry has been developed. As such, the momentum to establish a strong initiative between the Benelux

⁹ <https://www.rijksoverheid.nl/documenten/jaarplannen/2018/11/06/concept-integraal-nationaal-energie-en-klimaatplan-2021-2030>

partners in order to reinforce their national climate and energy ambitions is clearly present.

In summary, we propose 2 near term actions to enable sector coupling in Benelux:

- Developing a cross-border blueprint that includes the required infrastructure for renewable energy production; CO₂ capture, storage and utilization; power-to-X; and the key industrial sectors
- Creating a common Benelux position on key regulations with high impact on sector coupling, in particular the REDII-directive on the definition of renewable fuels and the regulation on the transport of waste products