

CROSS-BORDER HYDROGEN VALUE CHAIN IN THE BENELUX AND ITS NEIGHBOURING REGIONS

IDENTIFYING AND CONNECTING RENEWABLE HYDROGEN DEMAND AND SUPPLY
VIA THE CROSS-BORDER HYDROGEN BACKBONE

Summary
Slide deck



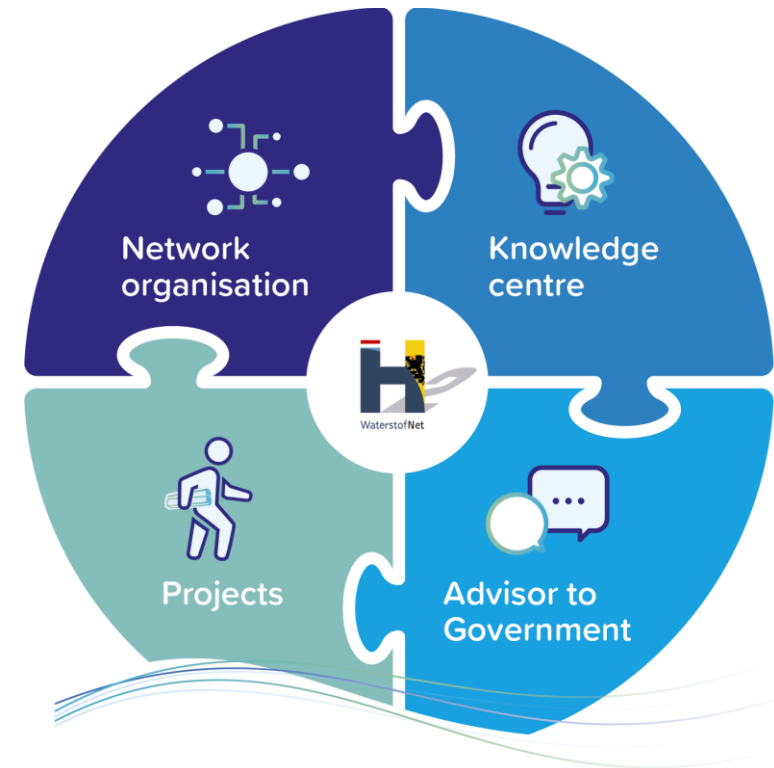
Dr. ir. Samira Farahani
samira.farahani@waterstofnet.eu

Ir. Michel Honselaar
michel.honselaar@waterstofnet.eu

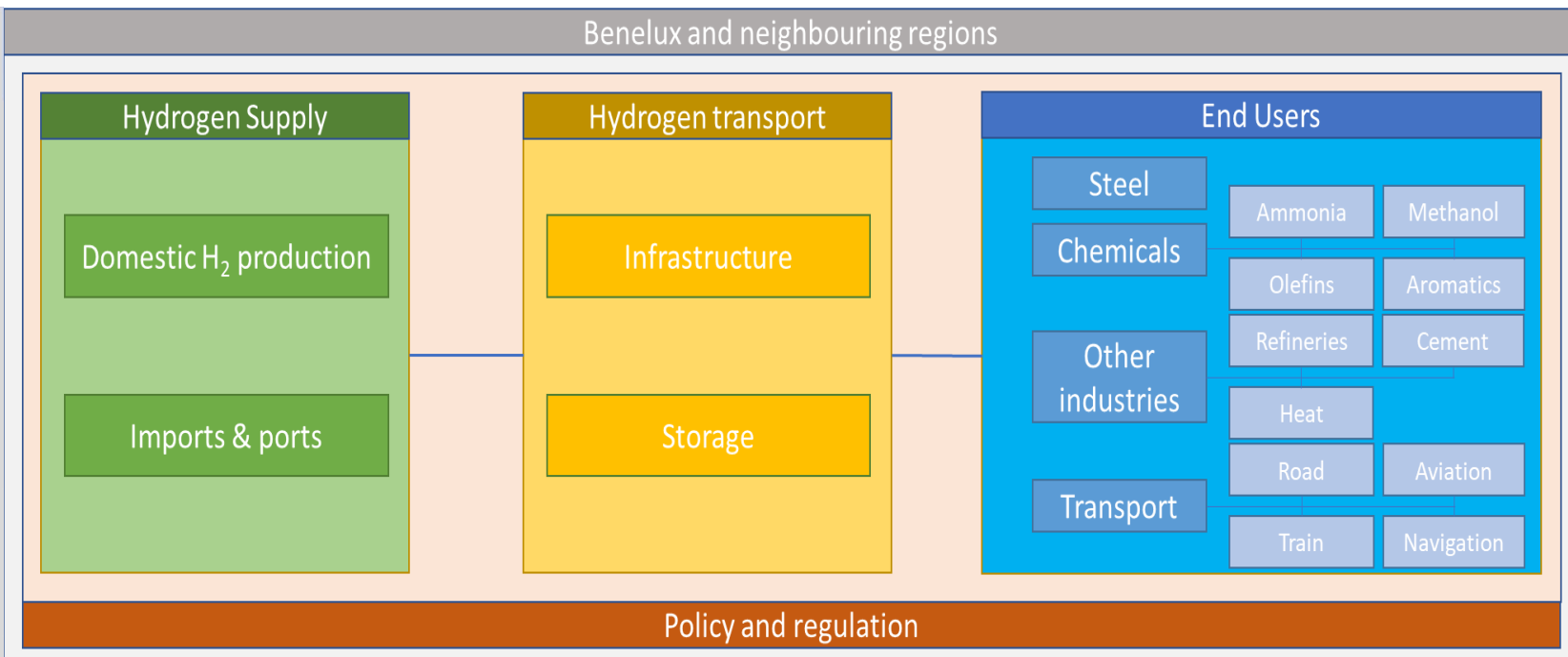
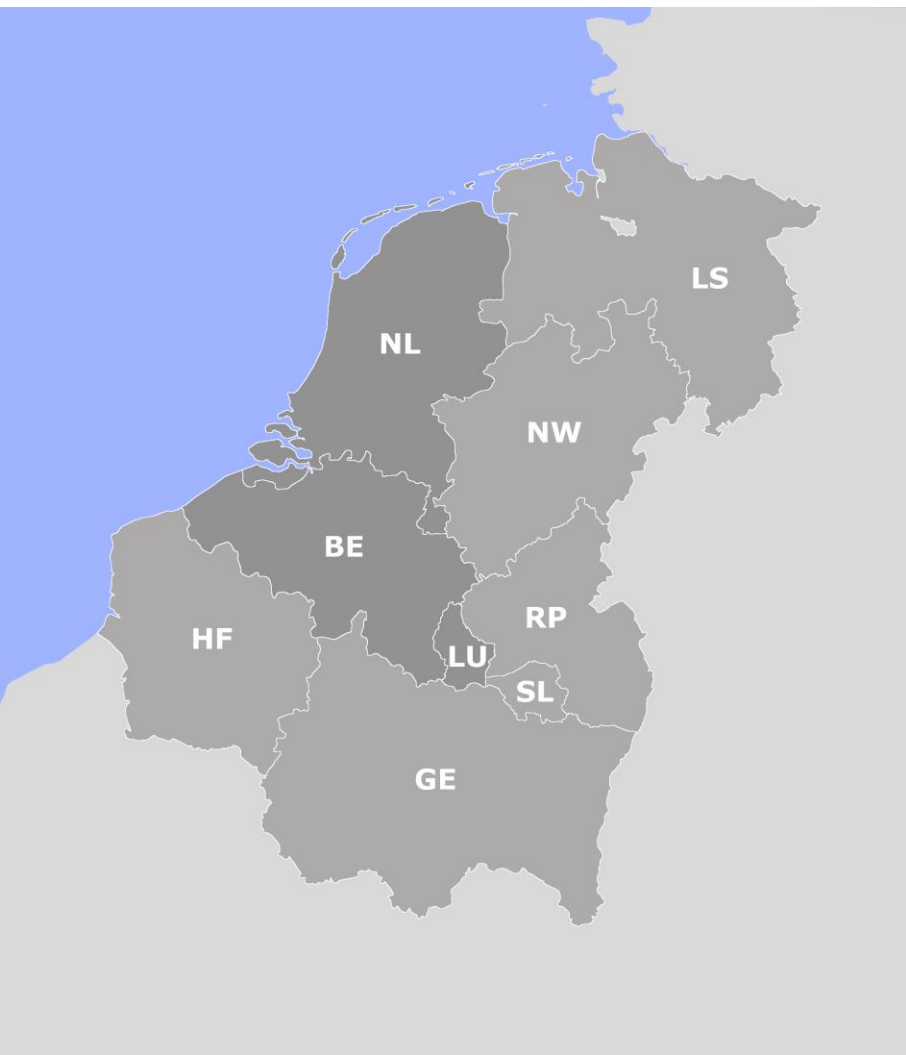
WaterstofNet



- 2009, non-profit, 13 personnel
- Offices in Turnhout (BE) and Helmond (NL)
- 4 pillars
 - ✓ Industrial cluster with > 150 members
 - ✓ Project executer > 20 projects
 - ✓ Advisor of governments
 - ✓ Knowledge, analyses, hydrogen academy



Project's scope



LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Énergie et de
l'Aménagement du territoire



Ministry of Economic Affairs
and Climate Policy



FPS Economy, S.M.E.s, Self-employed and Energy



Methodology

Data analysis

1. Analysis of hydrogen demand/supply in national/regional hydrogen implementation strategies and analyses
2. 2030 estimate of hydrogen demand in National Energy and Climate Plans (Trinomics)
3. 2030-2050 projects' plannings and companies' strategies
4. Assessment of relevant literature sources for long-term demand projections
 - European Hydrogen Backbone, Materials Economics CLIMACT, Jülich, IEA, Hydrogen Council, Etc.
5. Development of minimum and maximum hydrogen uptake scenarios
6. Data and scenario validation through workshops



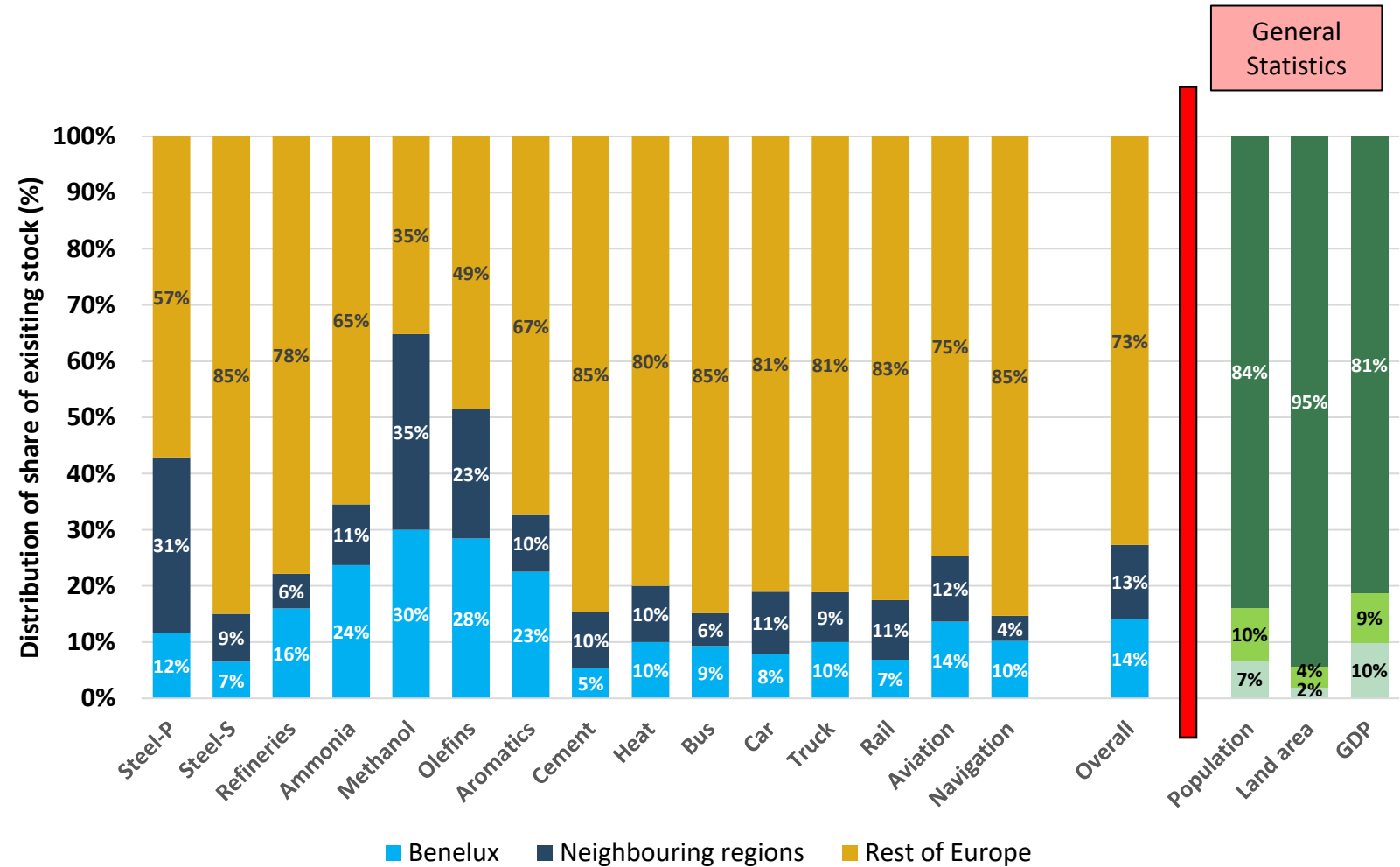
Benelux & its neighbouring regions –

Energy demand in current industrial stock & transport sector

The Benelux and its neighbouring regions have a dominant position with regards to:

- Steel production
- Chemicals production
- Transport

especially in comparison to general statistics (e.g. population, land area, GDP) relevant for the area.



Benelux & its neighbouring regions –

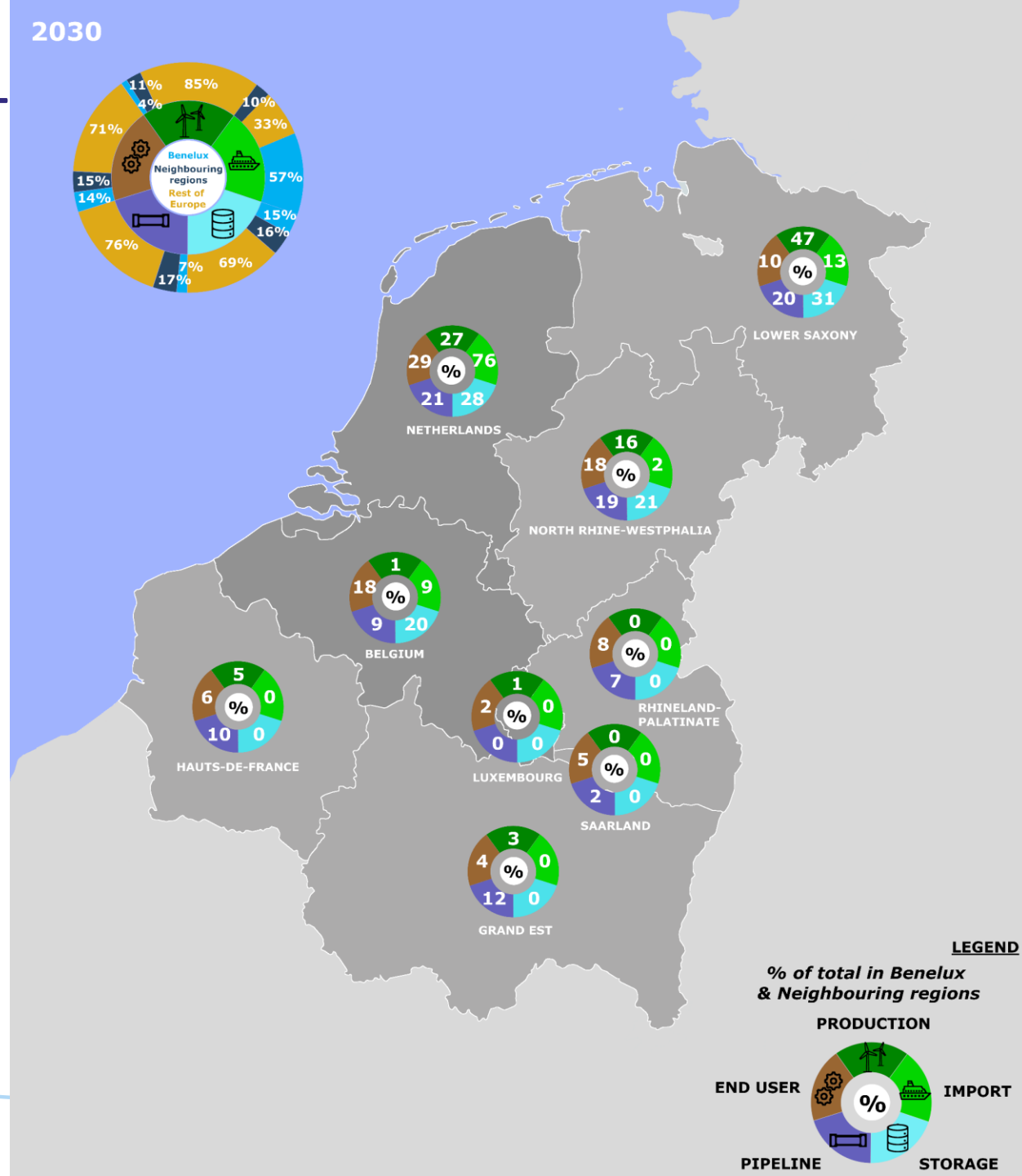
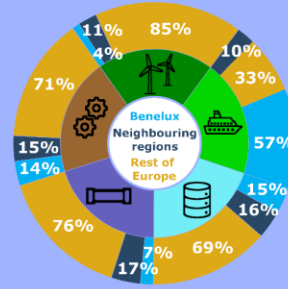
Europe's beating hydrogen heart as a major demand cluster in 2030

The Benelux and its neighbouring regions cover

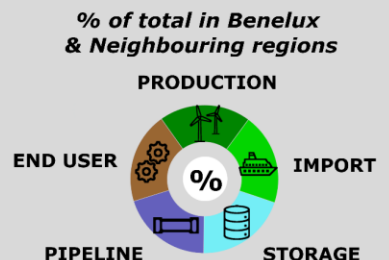
- 15% of the hydrogen production capacity
 - 67% of the import capacity,
 - 16% of the storage capacity and
 - between 19% and 41% of the hydrogen demand
- in Europe in 2030.

Note: The values are based on announced targets by all the national and regional governments as well as by the European Commission.

2030



LEGEND



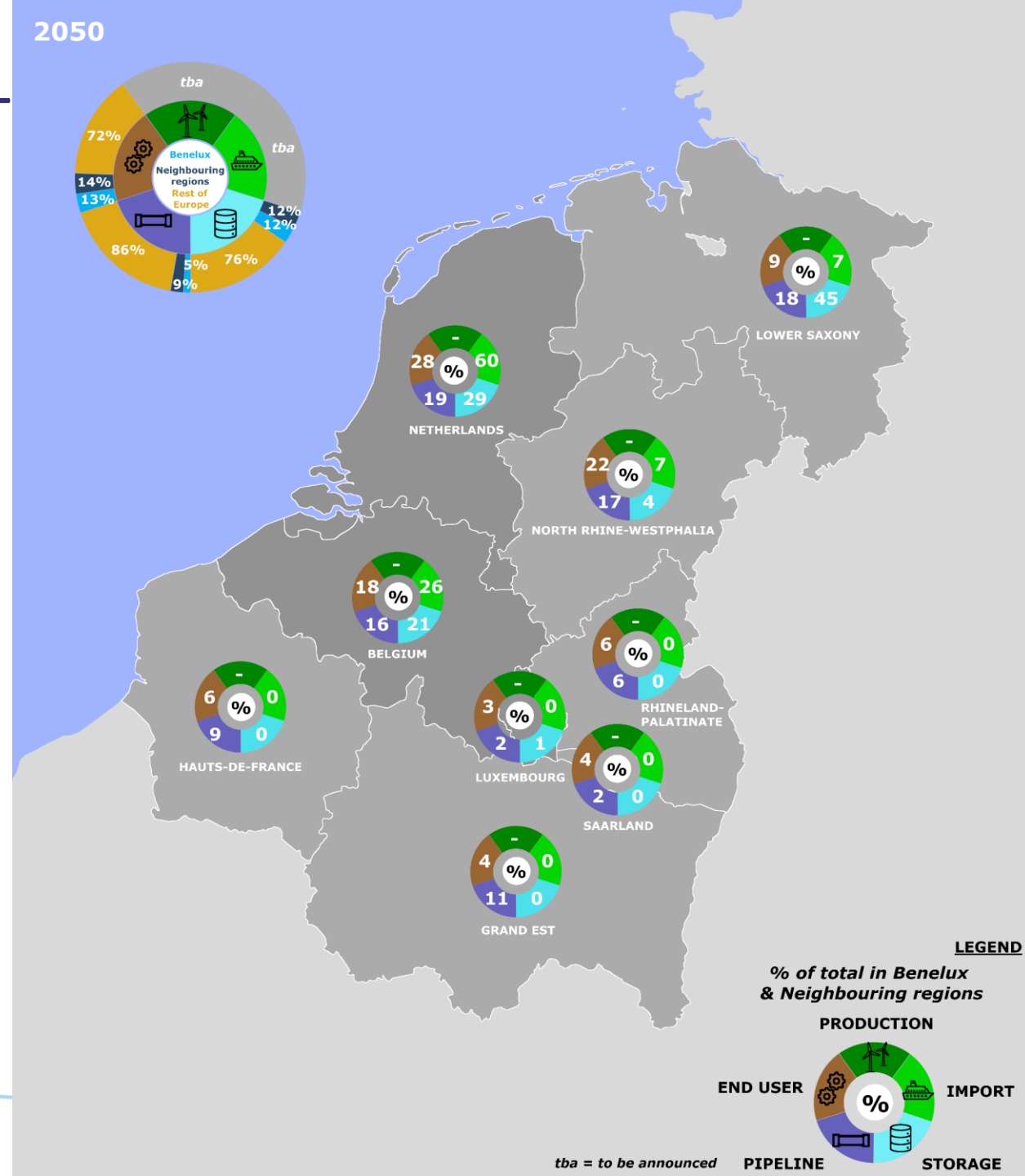
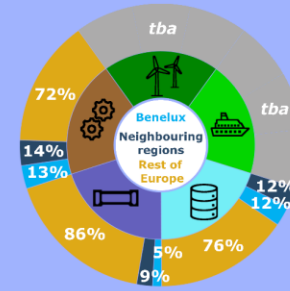
Benelux & its neighbouring regions –

Europe's beating hydrogen heart as a major demand cluster in 2050

- The Netherlands, Belgium and Lower Saxony foresee significant amounts of hydrogen imports (4 to 5 times more than their hydrogen demand)
- All countries and neighbouring regions foresee the development of an interconnected hydrogen pipeline system between now and 2050
- A great amount of undersupply of hydrogen storage capacity may exist in 2050.

Note: Production and import plans for 2050 are not yet announced by majority of the national and regional governments as well as by the EC.

2050



LEGEND

% of total in Benelux & Neighbouring regions

PRODUCTION

END USER

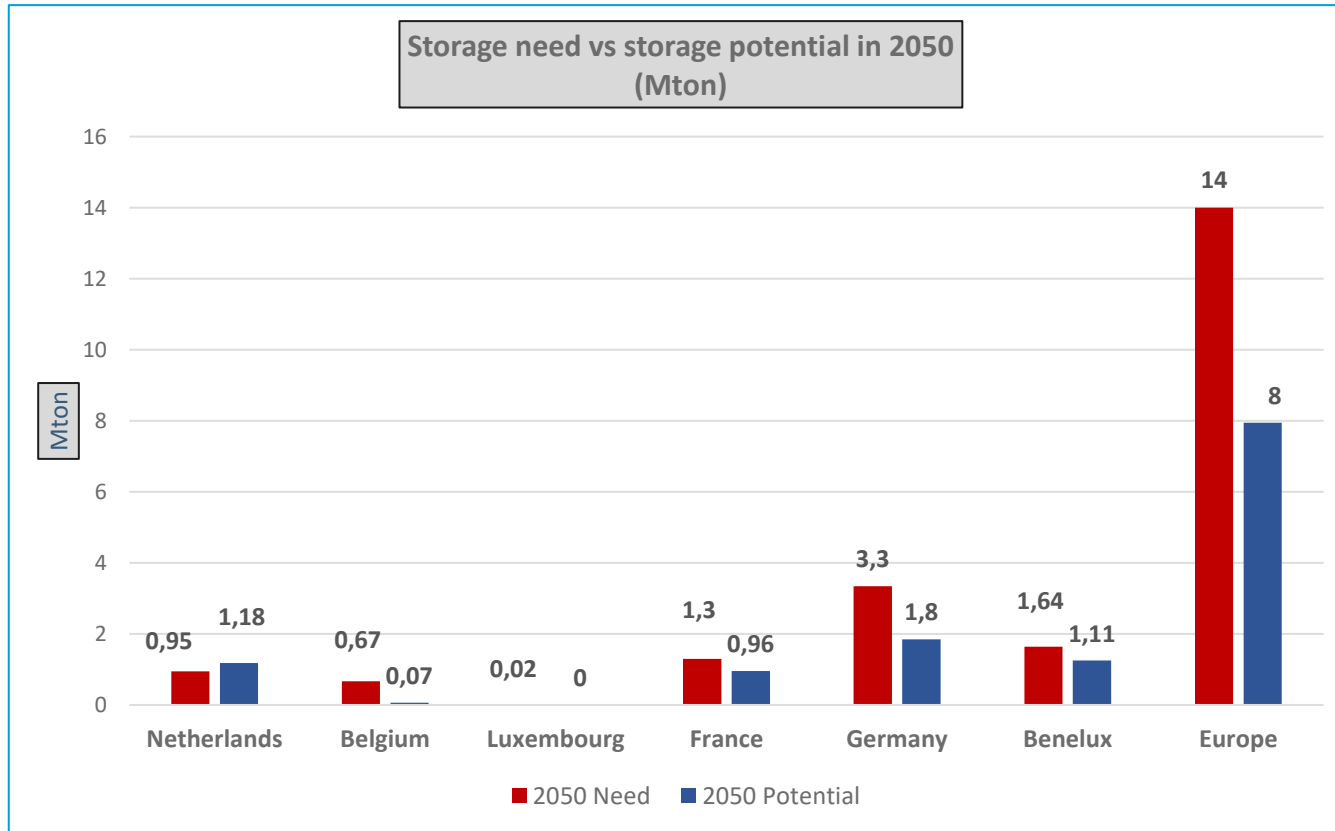
IMPORT

PIPELINE

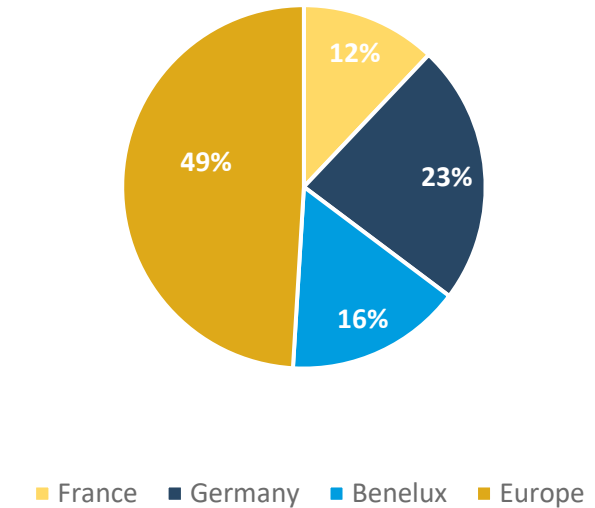
STORAGE

tba = to be announced

Hydrogen Storage



Share of potential storage for Benelux and its neighbouring countries vs Europe in 2050

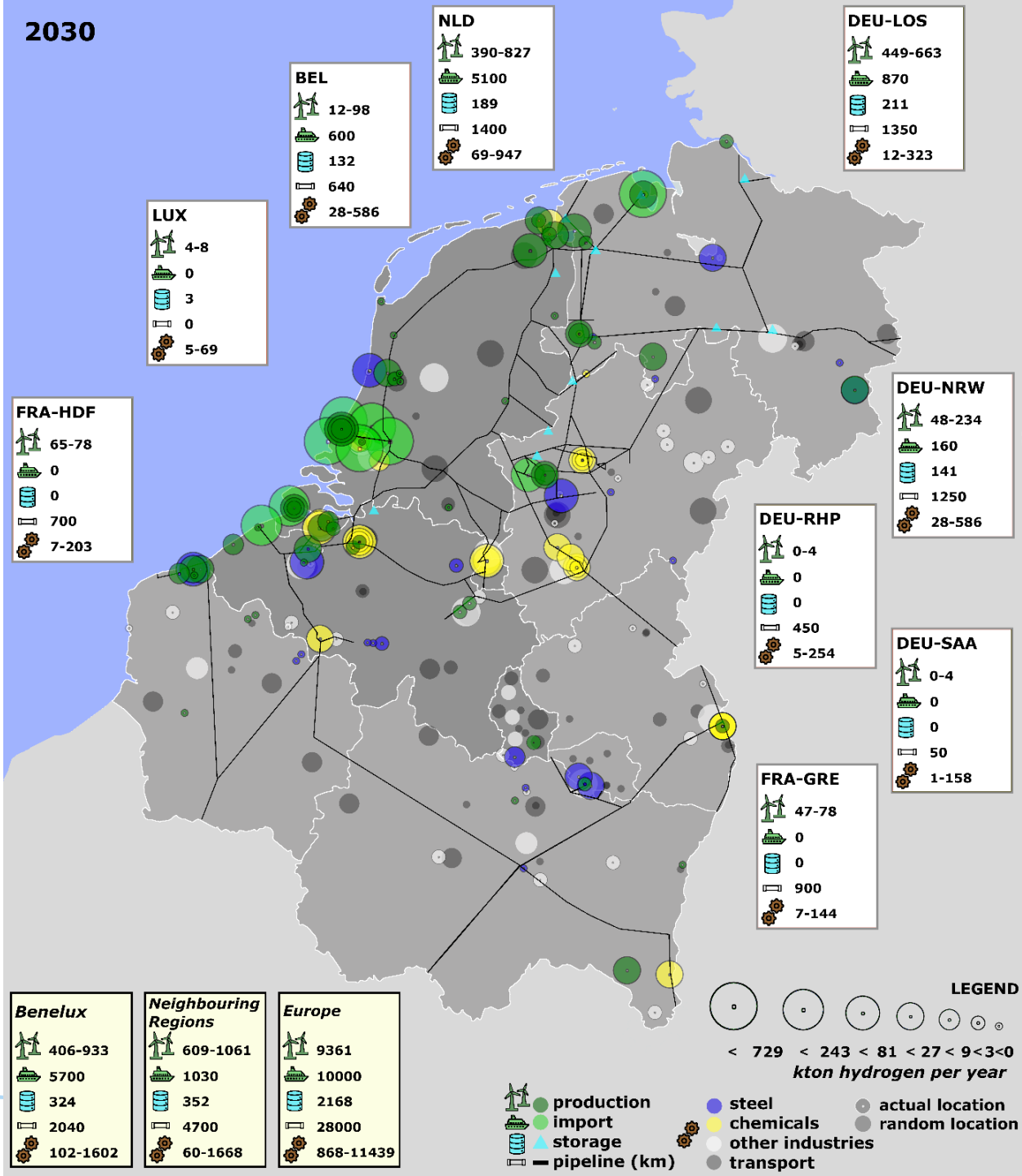


Benelux & its neighbouring regions –

locations of hydrogen demand, supply, storage, pipelines in 2030

- Hydrogen imports should take the perceived sense of hydrogen scarcity away in 2030 and further
- A large share of hydrogen production locations and big hydrogen demand centres are located near or at the hydrogen pipeline network
- For high temperature heat and transport, hydrogen demand may need to be supplied through alternative means too
- A large part of the hydrogen pipeline network in the Benelux and the neighbouring regions is already foreseen to be established by 2030
- An interconnected hydrogen pipeline system between almost all Benelux countries and neighbouring will exist in 2030
- *For Luxembourg such public planning for H2 backbone is not yet available; however, Luxembourg has a non-negligible domestic demand potential and may offer an interesting transit potential helping to connect demand and supply centres in its neighbouring countries*

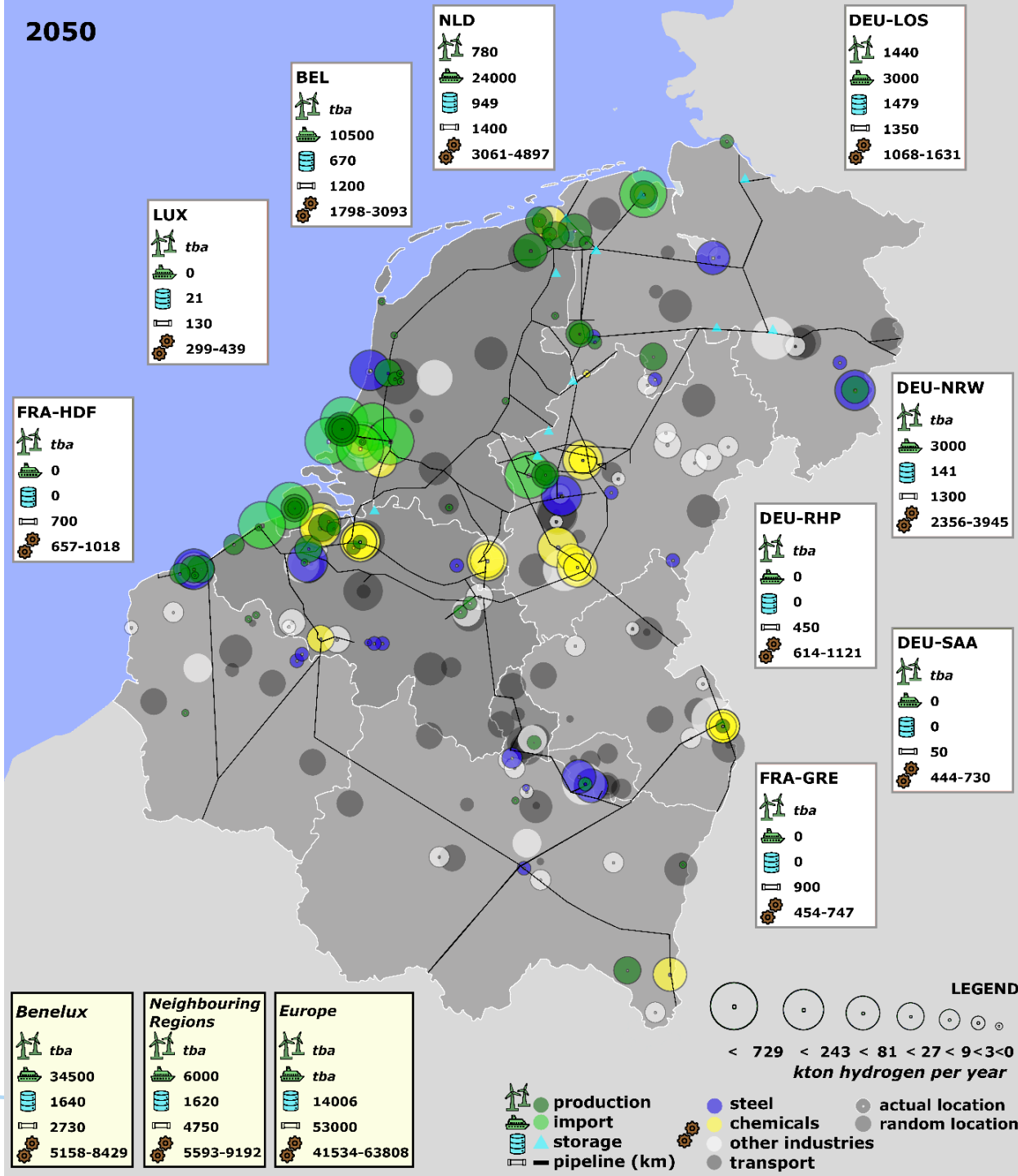
2030



Benelux & its neighbouring regions –

locations of hydrogen demand, supply, storage, pipelines in 2050

- For the backbone, the only real expansion after 2030 is a second east-west corridor that connect the Belgian harbour with North Rhine-Westphalia and Luxembourg;
- The Benelux and its neighbouring regions keeps their pioneering role in hydrogen demand and import within EU;
- To satisfy the demand, yet large production plants and imported volumes are needed;
- Significant growth in demand (x 4/5 vs 2030); some demand sectors (e.g., steel, chemicals) grow linearly but some grow exponentially (e.g. transport) compared to 2030



Stakeholders workshops – validation of results & identification of challenges and obstacles

- 6 workshops were organized between September 15th and October 14th, 2023
 1. Workshop: Steel
 2. Workshop: Chemicals, refineries, cement, plastics and heat
 3. Workshop: Transport
 4. Workshop: Import, domestic production and seaports
 5. Workshop: Infrastructure and storage
 6. Workshop: Policy and regulations
- Participants were main stakeholders (around 40 in total) in each area, Benelux Secretariat, Benelux H2 working group and authorities of the neighbouring regions



Stakeholder's perspective – Technological & regulatory barriers

1. Research & development needs for hydrogen technologies
2. Hydrogen supply challenges through the entire value chain
3. European policy & regulation
4. Permitting procedures
5. Hydrogen refuelling infrastructure
6. Insufficient or absence of transnational coordination



Stakeholder's perspective – Facilitating role of the Benelux Union

1. Integrated regulation for hydrogen production, import and transport within the Benelux and its neighbouring regions
2. Harmonisation of permitting rules, especially for hydrogen refuelling infrastructure
3. Geographical and time alignment of the development of hydrogen refuelling infrastructure
4. Harmonisation of technical specifications for hydrogen refuelling including interoperability
5. Common payment and certification systems for hydrogen refuelling
6. Harmonisation of approval/homologation requirements for HRS
7. Harmonisation of refuelling requirements for waterborne and airborne applications



Stakeholder's perspective – Facilitating role of the Benelux Union

8. Promote/motivate exchange of information of lessons learned and use similar protocols
9. IP issues and patents regarding the new technologies
10. Creating more competition instead of subsidies
11. Promoting new economic activities related to hydrogen development
12. Tailored regulatory framework for short-term period to kick-start the hydrogen market
13. Supporting mechanisms within the Benelux and its neighbouring regions
14. Education & training activities
15. One voice towards influencing EU legislation and promoting the region



Recommendations



Policy recommendations short-term (2023-2026)

To the Benelux Union and the neighbouring regions



1. Strengthened, collective voice towards influencing EU legislation and promoting the region by

- strengthening the leading position of the Benelux-countries and neighbouring regions by leveraging their pioneering role as privileged interlocutors to shape EU legislation, with regards to large chemical and steel industries, H2 import via seaports, H2 backbone, transport sector, H2 valleys;
- boosting more visibility for the Benelux and its neighbouring regions in Europe and attracting more resources and funding to the region.



2. Promoting collaboration along the hydrogen value chain by

- setting up a regular dialogue and promoting institutional and regional collaboration between different public and private actors of the H2 value chain and relevant Benelux authorities;
- promoting closer collaboration, share of expertise and lessons learned and deepening the dialogue between stakeholders (TSOs of gas and electricity, HRS developers, technology developers, etc.) of the Benelux-countries and its neighbouring regions;
- ensuring the security of supply by coordinating the plannings for the electricity and hydrogen infrastructure development including electrolyser plants and the repurposing of the existing gas network into dedicated hydrogen networks.

Policy recommendations short-term (2023-2026)

To the Benelux Union and the neighbouring regions



3. Streamlined and fast-track procedures by

- speeding up the permitting process to increase renewable energy and electrolyser capacity for both new and existing projects to go hand in hand with the deployment of new renewable electricity capacity;
- exploring harmonisation possibilities of permitting rules;
- facilitating fast-track procedure for IP & patenting within the Benelux and its neighbouring regions.




4. Paving the transition path by

- accelerating deployment of a cross border hydrogen backbone to facilitate hydrogen supply for hard-to-abate industries and to satisfy rising hydrogen demand;
- allowing for an innovative and flexible regulatory framework for the emerging interconnected hydrogen market to accommodate the transition towards green hydrogen;
- stimulating the development of education and training programmes to have skilled labour force.

Policy recommendations short-term (2023-2026)

To the Benelux Union and the neighbouring regions



5. Kick-start the development of an integrated hydrogen market by

- harmonising system requirements, safety protocols, standards and hydrogen quality for hydrogen transport and consumption;
- ensuring interoperability and exchanges between certification schemes and registers and integrating and hosting a trading market for hydrogen production and import;
- developing a common hydrogen storage strategy;
- working with combined forces at EU level to push for the clear and tailored tax and funding schemes to avoid displacement of the investment and industrial production from the EU to Asia or the US;
- encouraging a joint call of the Benelux-countries and neighbouring regions for development of the supporting schemes such as European Hydrogen Bank and H2Global, and maximising the use of other EU supporting mechanisms.



6. Uniform approach for establishing hydrogen refuelling infrastructure by

- harmonising payment systems, HRS interoperability, homologation requirements, permitting rules as well as bunkering specifications and rules for waterborne and airborne applications;
- aligning HRS implementation plan and technical specifications (quality, interfaces, protocols).

Policy recommendations mid-term (2026-2030)

To the Benelux Union and the neighbouring regions



1. Advance the development of an integrated hydrogen market by

- providing the means for barrier-free flow of hydrogen from production point to the end-user location through the use of Benelux legal instruments, with extension to and alignment with the neighbouring regions by harmonising regulations for hydrogen production, import and transport;
- facilitating the market transition from a subsidy dominated system towards a competition driven system.



2. Economic activities & education by

- promoting new economic activities related to hydrogen development;
- implementing diplomas and certificates that are accepted and recognized across the Benelux region.

WaterstofNet

Open Manufacturing Campus
Slachthuisstraat 112 bus 1
2300 Turnhout
België

T +32 (0)14 40 12 19

Kantoor Nederland

Automotive Campus
Automotive Campus 30
5708 JZ Helmond
Nederland

 WaterstofNet

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WaterstofNet.eu

Bedankt voor uw aandacht!
Thank you for your attention!
Merci pour votre attention!
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WaterstofNet

Project coordinator: Dr. ir. Samira Farahani

Email: samira.farahani@waterstofnet.eu