ENTSOG CONFERENCE

12 December 2018

entsog
european network
of transmission system operators
for gas

WELCOME

INTRODUCTION

Moderator: Sonja van Renssen, Energy Post

INTRODUCTION

Host: Stephan Kamphues, President ENTSOG

INTRODUCTION

Video message by Jerzy Buzek,
Chair or the ITRE Committee,
Member of the European Parliament

PROGRAMME

TIME:	AGENDA:
15:00-15:10	Welcome by Sonja van Renssen & Stephan Kamphues
15:10-16:30	Panel 1 – Sector coupling – how to make it work?
16:30-17:00	Coffee Break
17:00-17:20	Panel 2 – Decarbonise and innovate with gas
18:20-18:30	Wrap up of the day by Jan Ingwersen
18:30-21:00	Walking dinner, drinks & networking

WIFI & TWITTER

Wifi network: Event – Bibliothèque Solvay
Password: 80297-26185

TWITTER: #ENTSOGconf2018

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Panel 1: Sector coupling – how to make it work?

Project Presenters:

Bart Jan Hoevers,
GTS

Ben Voorhorst,
TenneT

Jörg Bergmann,
Open Grid Europe

Panelists:

Florian Ermacora,
European Commission

Bente Hagem,
ENTSOE

Andris Piebalgs,
FSR

Giles Dickson,
WindEurope

Marion Labatut,
Eurelectric

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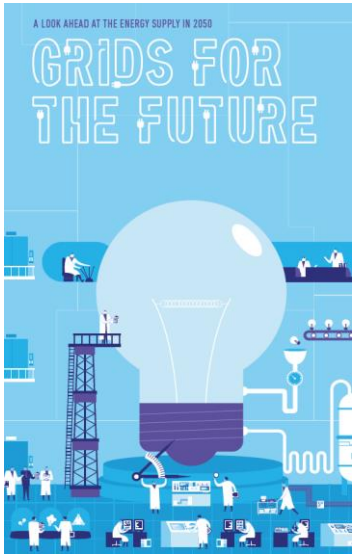
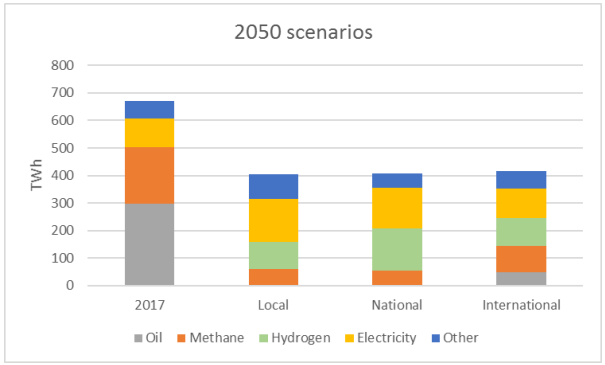
Infrastructure Outlook 2050

An analysis of transport and storage of electricity, hydrogen and methane in a future (Paris compliant) integrated energy system in the Netherlands

Ben Voorhorst & Bart Jan Hoevers

Outlook 2050 scenarios



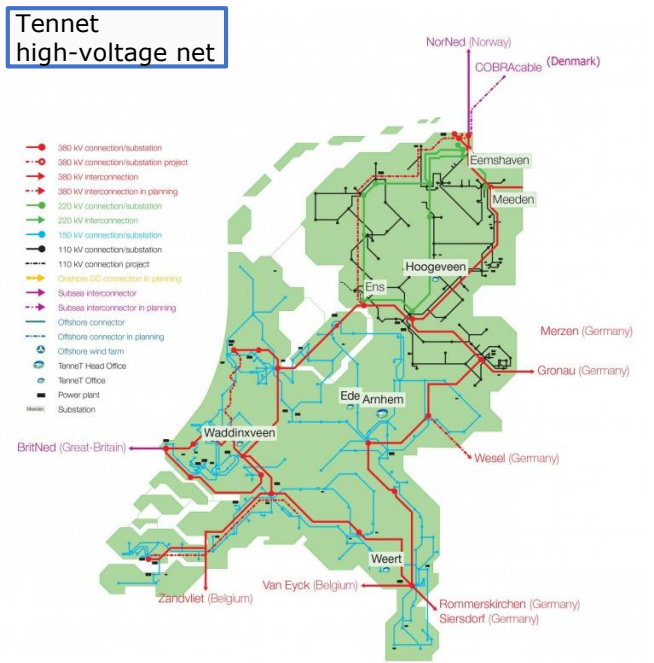


	Regional management	National management	International	Generic direction
Power and light	25% reduction minimum demand more efficient equipment. Furthermore a strong electrification industry.		25% reduction due to efficient equipment	25% reduction due to efficient equipment
Low temperature heat*	Many heat networks and all-electric. (Limiting green gas, no H_2 distribution). Reduction 23%	Many hybrid heat pumps on H_2 (and green gas) (Limiting on green gas). Reduction 16%	Many hybrid heat pumps on green gas and hydrogen (mild limiting of green gas) Reduction 12%	Mix of individual options (no large collective, no other limitations) Reduction 17%
High temperature & feedstock industry**	Circular industry and ambitious process innovation: 60% reduction; 55% electrification; CO_2-emission -97%.		Biomass-based industry and CCS: 55% reduction; 35% biomass; 14% electrification; CO_2 emission -95%	Gradual development, business as usual and CCS: 20% reduction; 12% electrification; CO_2 emission -85%.
Transport for people	100% electric	75% electric, 25% H_2 fuel cell	50% electric; 25% green gas; 25% H_2	50% electric; 25% green gas; 25% H_2
Transport of goods	50% green gas; 50% H_2		25% biomass; 25% green gas; 50% H_2	
Renewable generated in NL	84 GW solar 16 GW onshore wind 26 GW offshore wind	34 GW solar 14 GW onshore wind 53 GW offshore wind	16 GW solar 5 GW onshore wind 6 GW offshore wind	18 GW solar 5 GW onshore wind 5 GW offshore wind
Conversion and storage in NL	75 GW electrolysis 60 GW battery stored 9 bcm gas buffer	60 GW electrolysis 50 GW battery stored 11 bcm gas buffer	2 GW electrolysis 5 GW battery stored 10 bcm gas buffer	0 GW electrolysis 2 GW battery stored 10 bcm gas buffer

* Results cost effective option calculations made with the COMPOSE-model. ** Future scenarios for the industry from the Wuppertal Institute.

Outlook 2050: merging two national networks

Tennet
high-voltage net



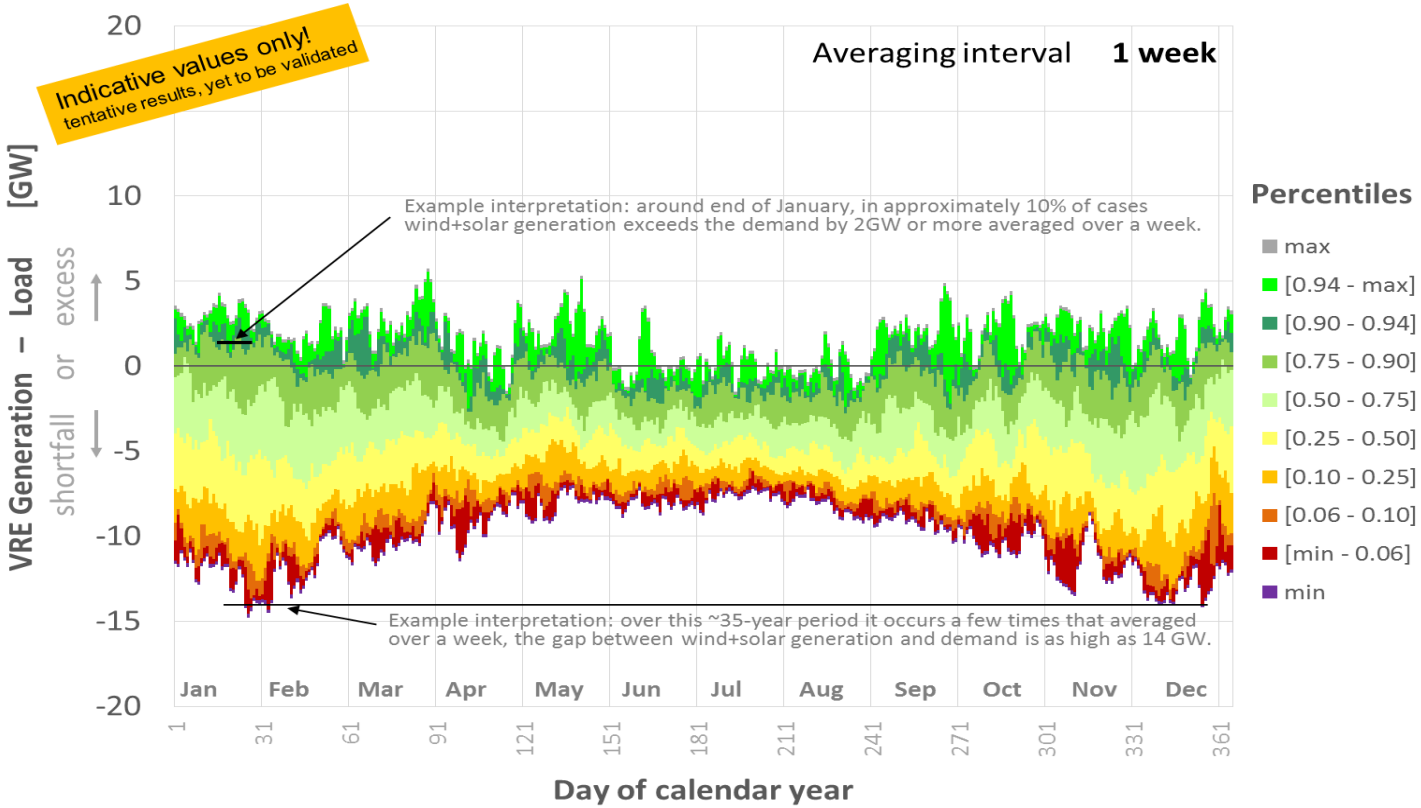
Gasunie
high-pressure net

Capacity: 20 GW

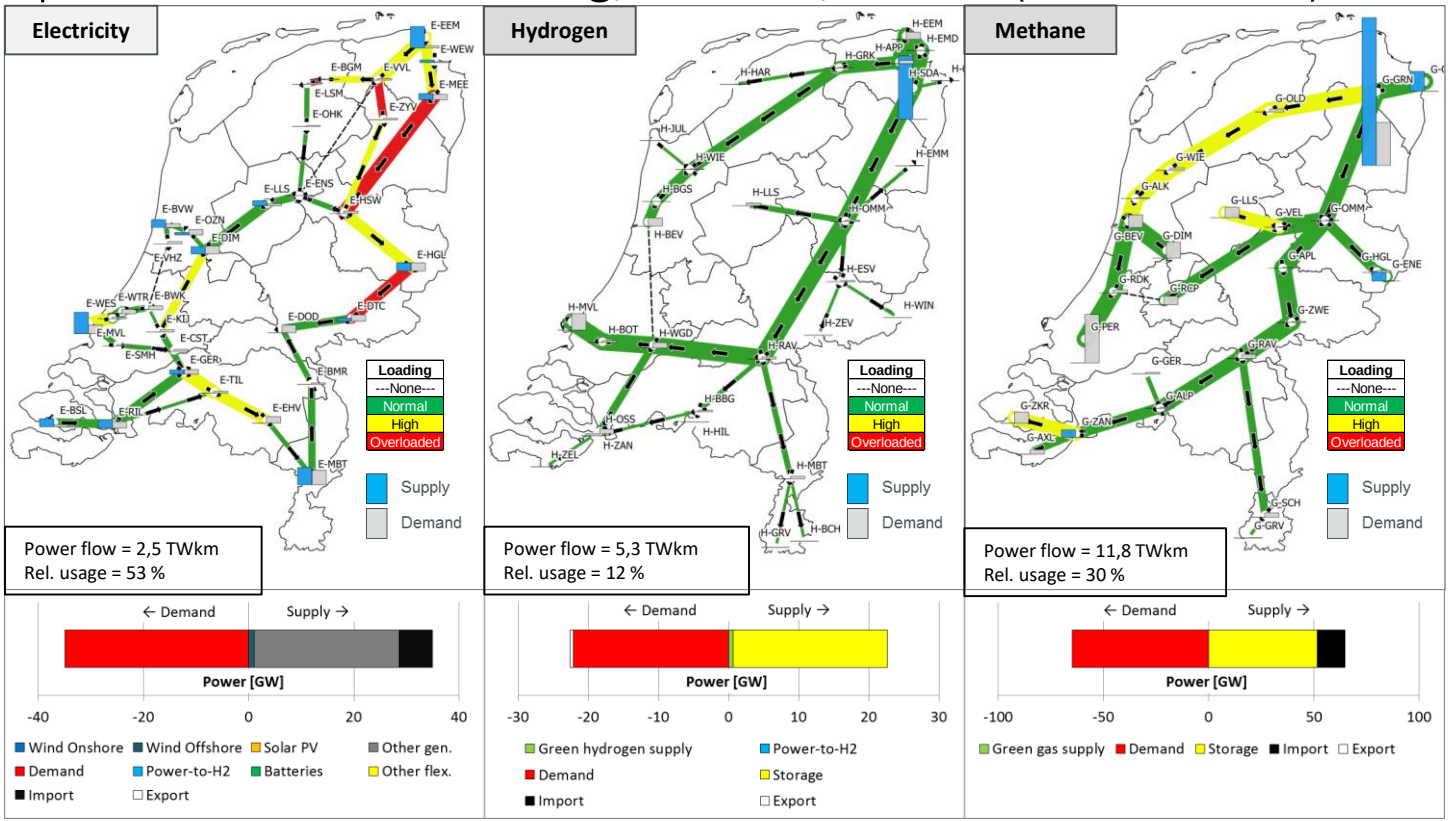
Capacity: 350 GW

Variability of residual load – Netherlands 2030

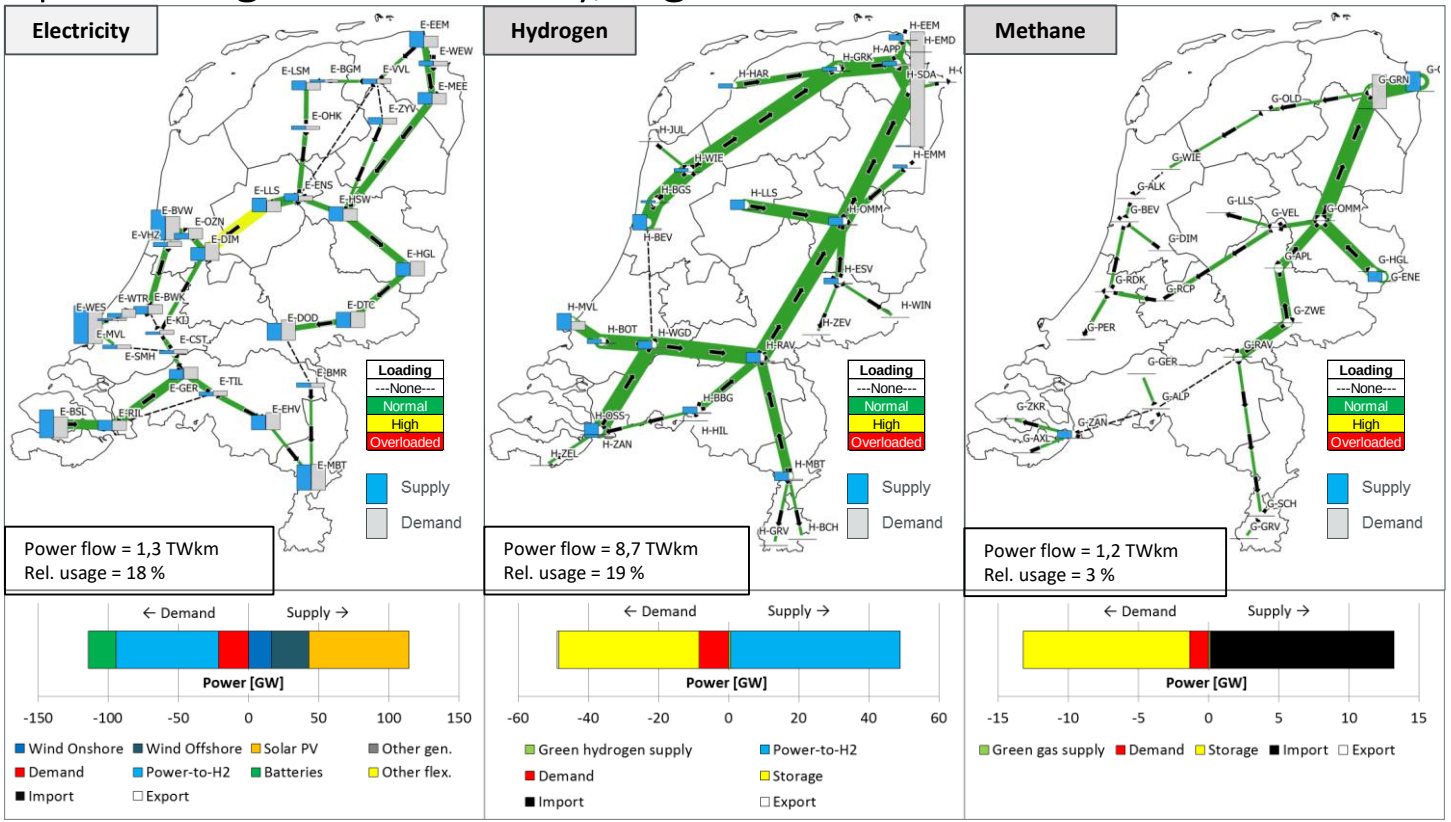
Sometimes weeks occur with a gap exceeding 10 GW between wind and solar generation and load. Also, a week with a few GW excess VRE generation can occur. In extreme years multi-week periods occur in which wind and solar generation only cover a small part of electricity demand



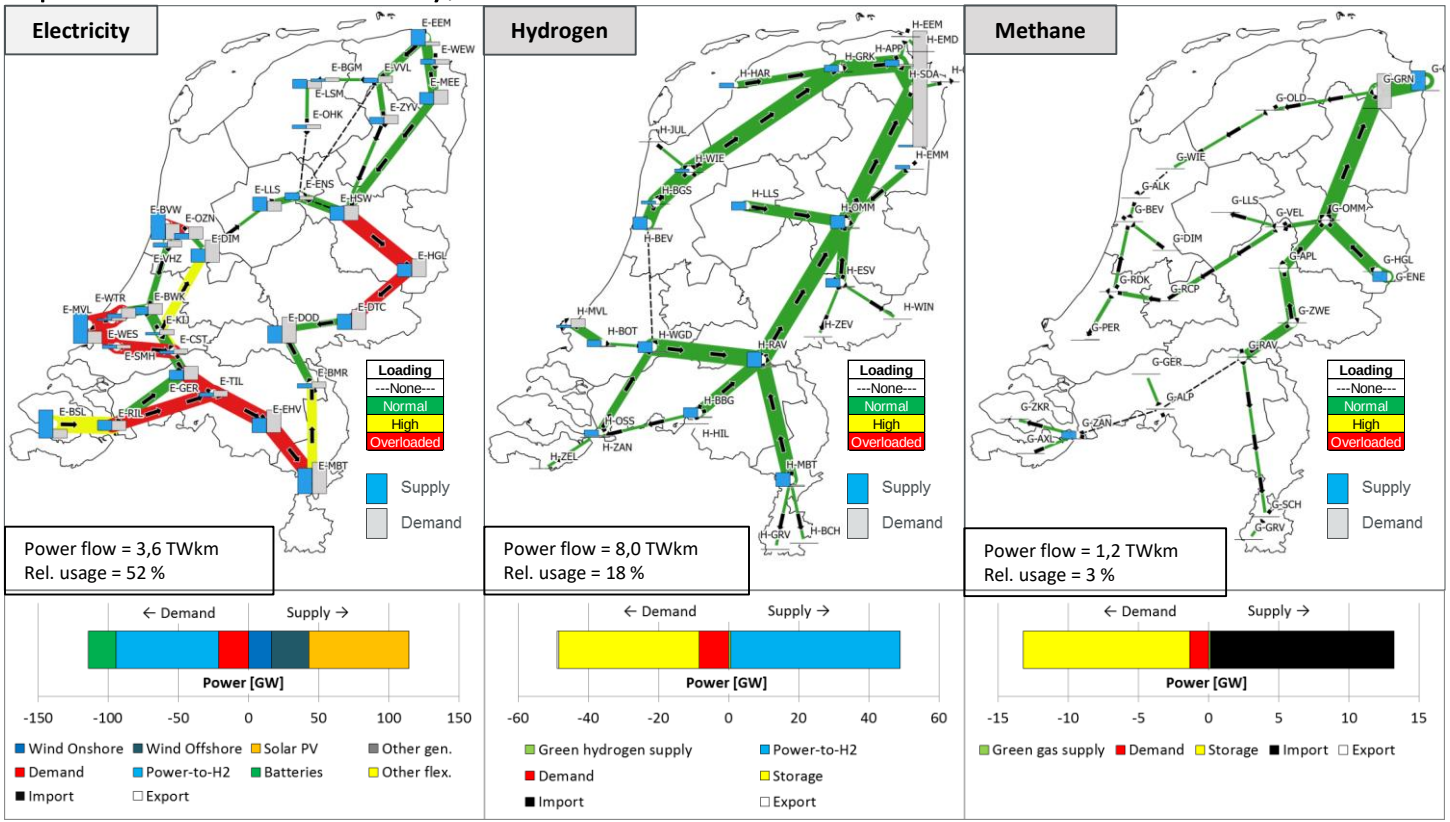
Example 1: cold winter evening, no wind, no sun (dunkelflaute)



Example 2: bright summer day, high winds



Example 3: summer day, P2G near market



Conclusions

1. All scenarios show that not only the electricity, but also the existing gas transport infrastructure will play a crucial role in the energy transition
   Significant share of RES will be wind and solar and there the primary carrier is electricity. Part of this energy will be used as molecules in industry (HT/LT heat and feedstock), space heating in built environment, mobility and power generation. The existing gas infrastructure has sufficient capacity for both green methane and hydrogen transport
2. Although additional electricity storage will be available by 2050 only gas storage provides a solution for seasonal storage
   Storage requirements exceed the quantities that can be provided with battery storage
3. Location, capacity and operation of P2G-installations are decisive factors and must be aligned with both electricity and gas TSOs
   Conversion of P2G (electrolysis) close to supply and G2P (power generation) close to the market relieves the electricity network
4. It is recommended that the investment plan processes for TSOs use the results of this study as guidance when considering alternative investment proposals on the shorter term

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SMART SECTOR COUPLING: BUSINESS CASE FOR P2G WITH OGE & AMPRION

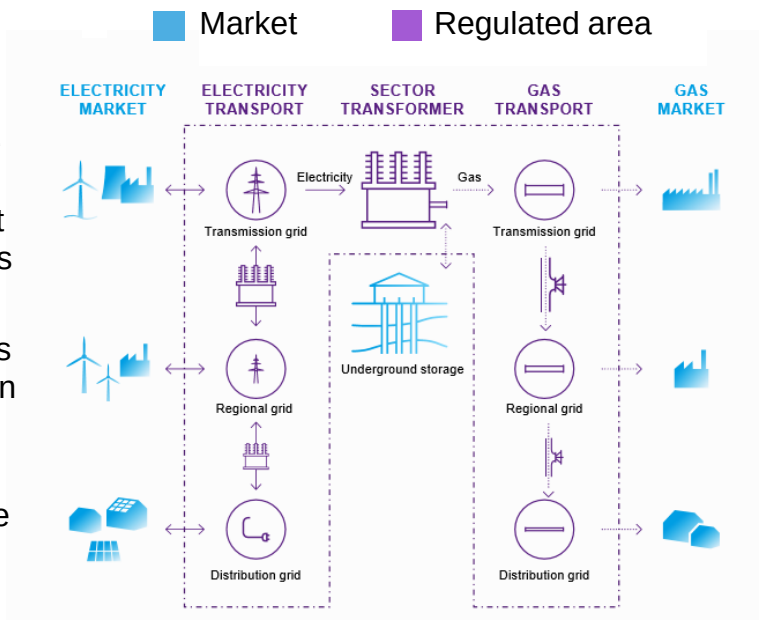
JÖRG BERGMANN, OPEN GRID EUROPE, GERALD KAENDLER, AMPRION

12TH DECEMBER 2018, BRUSSELS

POWER TO GAS PLANTS AS SECTOR TRANSFORMERS

Sector coupling on TSO level will create maximum economic benefit and sustainability

- **Right size:** Power-to-gas plants must be integrated in appropriate dimensions and at highest system level to make transport capacity of transmission systems and gas storage usable
- **Right location**: Installation of PtG plants at appropriate connection points between power and gas transmission systems
- **Right timing:** Through coordinated operation of the PtG plant the flows in the gas and the power transmission grid are considered as an integrated system



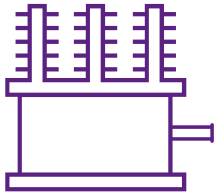
- **Right frame**: For systemic sector coupling gas and power TSO should be able to offer capacity to simultaneously convert power to gas in a non-discriminatory way

amprion

Open Grid Europe
The Gas Wheel

NEW TSO ENERGY CONVERSION INFRASTRUCTURE

SECTOR TRANSFORMER



Sector transformer fits into the regulatory framework

- New tool to couple power and gas infrastructure
- Unbundling maintained: TSO neither buy power nor sell gas
- Non-discriminatory third-party access: Auctioning of the capacities
- New business models for traders available
- PtG = Essential Facilities: TSO fulfill respective unbundling rules, others do not

PRISMA EUROPEAN CAPACITY PLATFORM

JAO Joint Allocation Office

Auction mechanism for conversion capacity

- Auction similar to disposal of EU transmission rights and capacities
- Comparable to Joint Allocation Office (JAO) and PRISMA

Further advantages

- For H2 customers accessible infrastructure
- No new apportionment mechanism
- Scalable PtG capacity build-up
- We can start today!

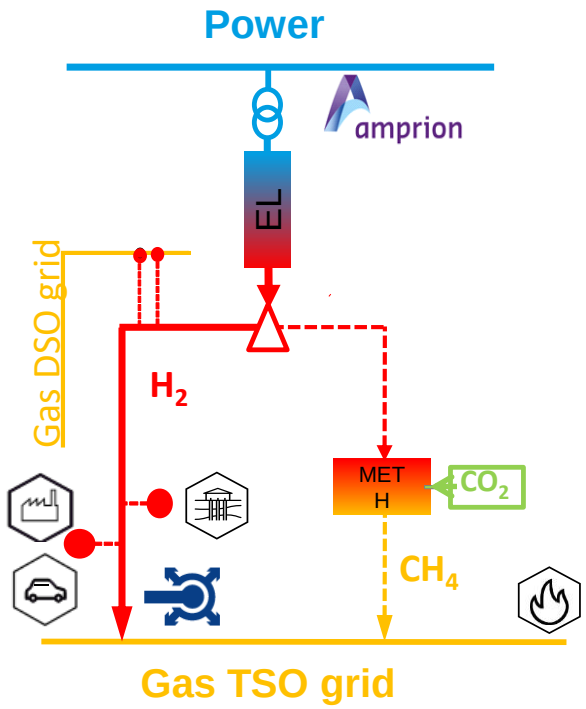
amprion

Open Grid Europe
The Gas Wheel

HYDROGEN INFRASTRUCTURE IN NORTHERN GERMANY

- 100 MW electrolyser near offshore connection point
- Pipeline refitted for transport of pure hydrogen connecting Lower Saxony with North Rhine-Westphalia
- Hydrogen consumer within 10km distance
  - Industry: chemical industries, refineries
  - Storage: repurposed underground storages
  - Distribution grids: Hydrogen blending
  - Mobility sector: hydrogen stations, trains
- Partial methanation with injection into the natural gas grid
- Total investment: € 150 million
- Commissioning: 2023

Decisive factor: NRA‘s support



amprion

Open Grid Europe
The Gas Wheel

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Panel 1: Sector coupling – how to make it work?

What could a Hybrid Energy System bring to the EU?

Electricity and gas synergies - which ones and how to achieve them?

How can business cases for P2G develop?

How to connect and digitalise the electricity and gas markets?

What's in it for the consumers?

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WRAP UP

Moderator: Sonja van Renssen, Energy Post

COFFEE BREAK

16:30-17:00

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Panel 2: Decarbonise and innovate with gas

Project Presenters:

Thierry Trouvé,
GRTGaz

Attila Kovács,
ERGaR

Panelists:

Beate Raabe,
Eurogas

Bart Biebuyck,
FCH JU

Dirk-Jan Mauzelaar,
USG

Torben Brabo,
Energinet

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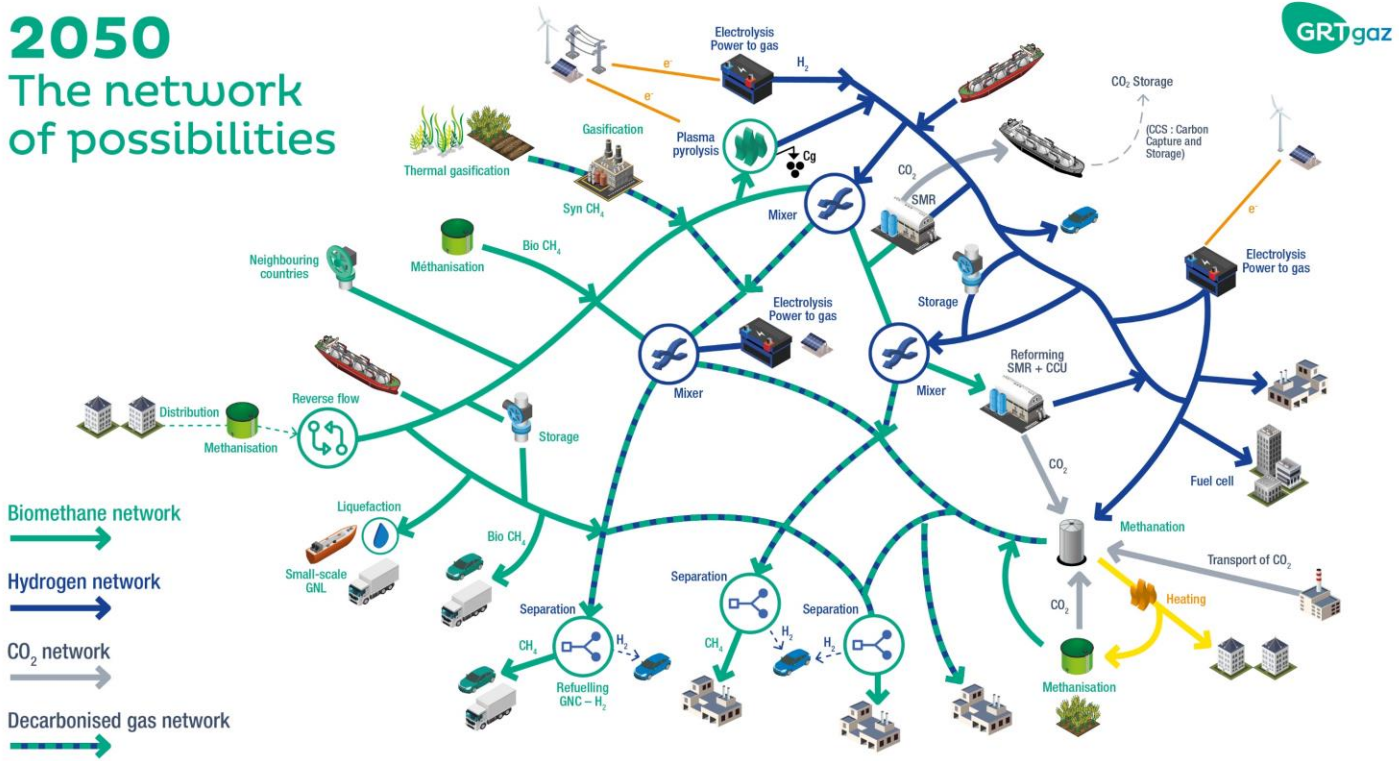
ENTSOG Annual Conference 2018

Panel 2: Decarbonise and Innovate with gas

Wednesday, 12th December 2018

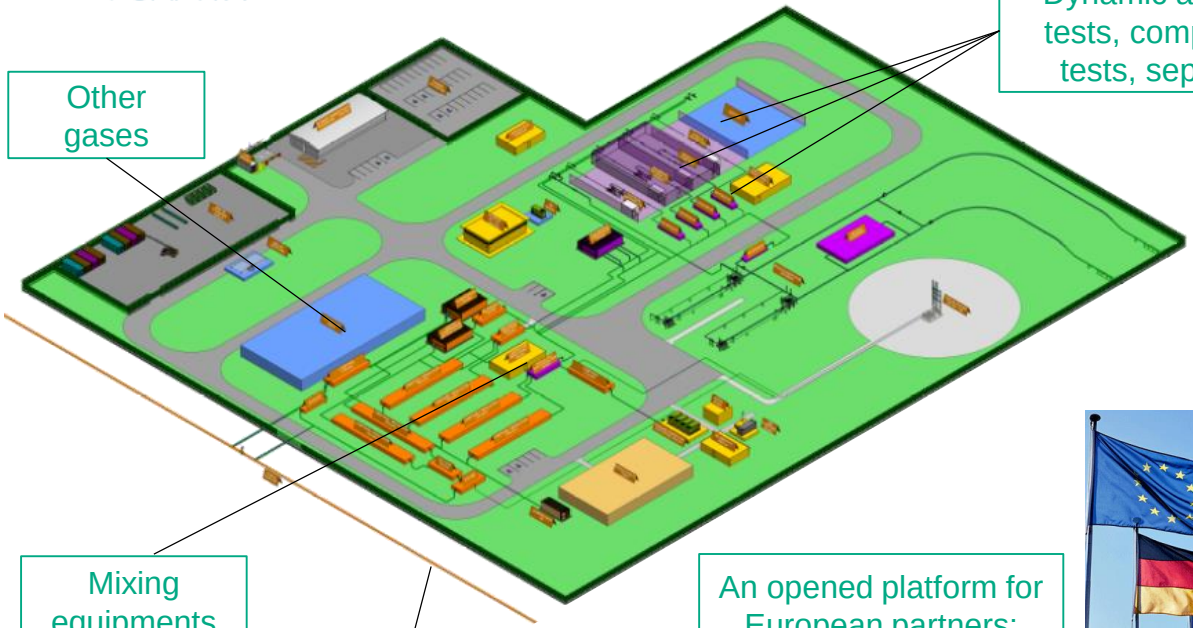
2050
The network of possibilities



Illustrative model of FenHYx

Future energy network for Hydrogen and mix

RICE
Research & Innovation Center for Energy



An opened platform for European partners: common R&D and standardisation activities

Key takeaways

- The clean energy transition is forcing a rethink of business models not only for traditional energy companies but also for those providing the backbone of energy infrastructure like pipelines.
- TSOs are adapting to the new reality: as part of our evolution we will no longer be merely acting as energy transporters but also as converters of energy.
- TSOs should have a general role in the organisation of the market for green gases and propose services to convert, store and transport energy vectors.
- Utilisation of the existing gas infrastructure together with electricity, in a hybrid system, provides a smart and cost efficient solution for achieving the EU decarbonisation and energy transition objectives.

"The role of gas in 2050 will not be the same as it is today."

Commissioner Cañete

EC Press Briefing on a "Clean Planet for All" Communication.

28th November 2018

"(P2x) projects need to be de-risked and need support from Horizon Europe"

"We need to manage investment in infrastructure cleverly to avoid stranded assets"

grtgaz.com

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ERGaR: Tool for cross-border transfer and mass balancing biomethane within the European natural gas network

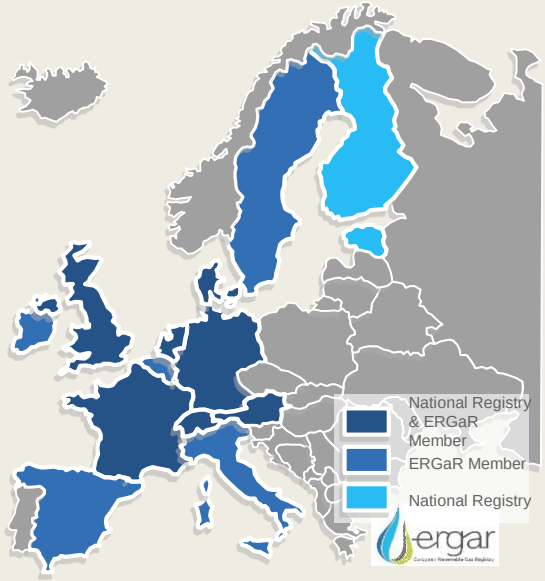
ERGaR is foreseen to

- ✓ be the Europe-wide recognised organisation for **administering and mass balancing volumes** of biomethane distributed along the European natural gas network
- ✓ **rely on the national biomethane registries** as primary source of documentation
- ✓ follow **jointly agreed procedures** for issuing and cancelling European Proofs (Guarantees) of Origin for consignments with export destinations
- ✓ provide for **cross-border transfer of sustainability claims** (GHG emission characteristics) related to the consignments

ergar
European Renewable Gas Registry

23 members from 12 countries

- ERGaR members are operators of biomethane registries and major stakeholders of the European biomethane market.
- *ERGaR welcomes new members:*
  national biomethane registries, national biogas associations, natural gas industry partners, gas TSOs and DSOs and other stakeholders active in the European natural gas and biomethane industries.



Find out more @
www.ergar.org

ergar
European Renewable Gas Registry

Cooperation between the natural gas and biogas industries

- **Common interests, common future**
- **Several TSOs and DSOs have already joined ERGaR:** Energinet.dk, ENAGAS, GRDF, Gasunie/Vertogas, NEDGIA, SWEDEGAS**,**
- **Other ERGaR members are closely linked to the natural gas industry**: AGCS, Gas.BE, RGFI, VSG,
- **The cooperation should ensure the most feasible conditions for connecting the biomethane plants to the natural gas grid,**
- **Existing natural gas systems (transportation, storage, distribution, marketing) should be fully engaged with biomethane,**
- **Marketing of biomethane-natural gas blends (having attractive GHG characteristics) is to be developed.**

THANKS FOR YOUR ATTENTION!

Attila Kovacs, Secretary General
kovacs@ergar.org

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Panel 2: Decarbonise and innovate with gas

What is decarbonised and renewable gas?

How can gas grids become enablers of decarbonisation?

How to facilitate gas decarbonisation?

Can hydrogen be matched to industrial clusters and biogas to agricultural areas?

How can decarbonised and renewable gas best address the needs of the electricity, heat, and transport sector?

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WRAP UP

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FINAL REMARKS

Jan Ingwersen, General Manager, ENTSOG

THANK YOU FOR YOUR ACTIVE PARTICIPATION!

INVITATION TO
WALKING DINNER

18:30-21:00