



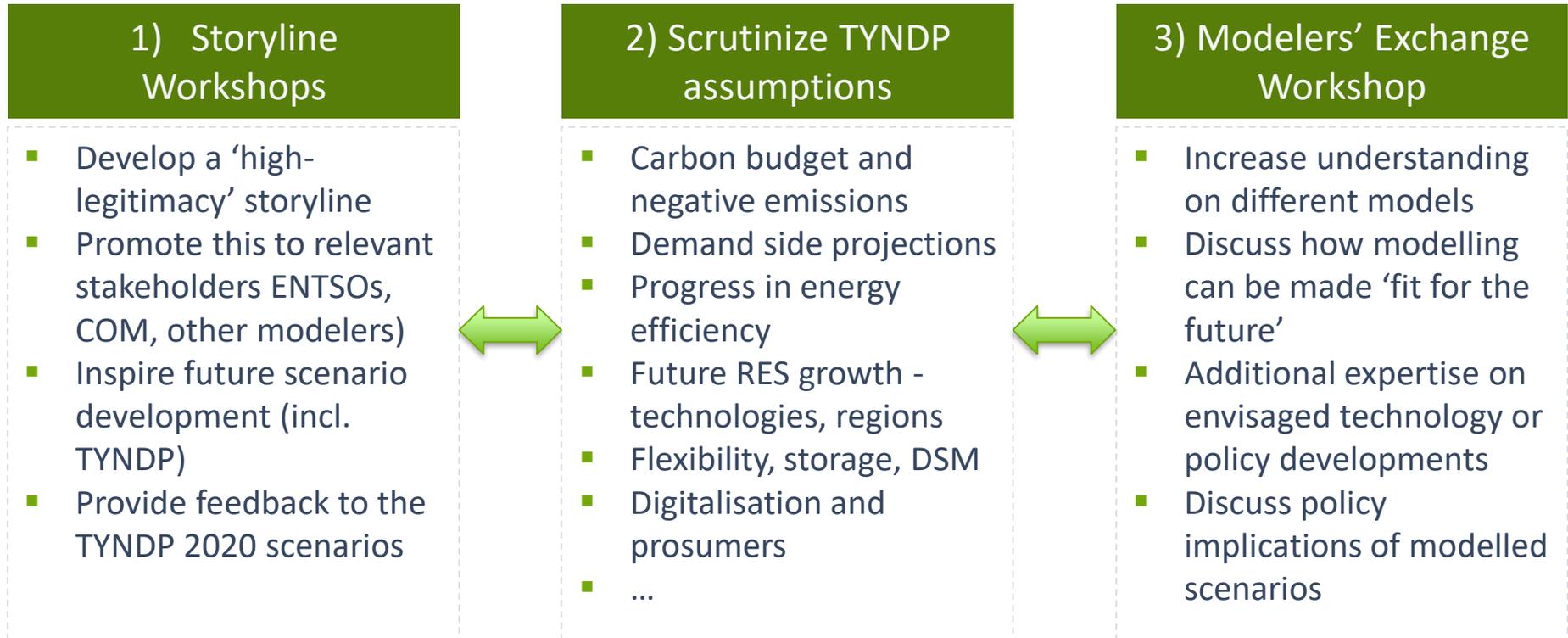
1st Modelers' Exchange Workshop

Focus topic power-to-x

Brussels, May 21 2019

How are we here today?

This workshop is part of a bigger collaboration to implement the Paris Agreement



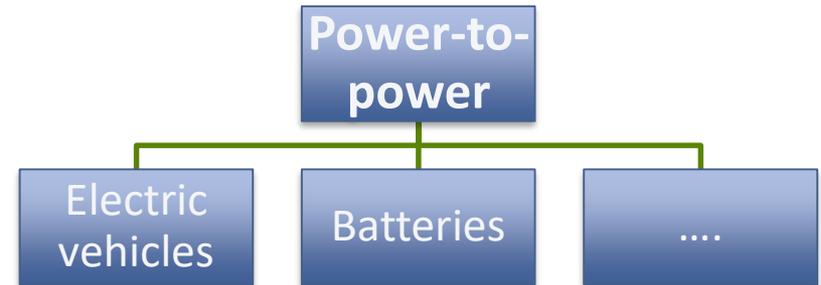
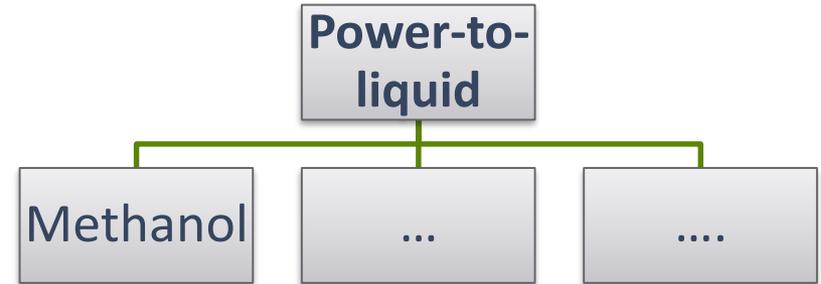
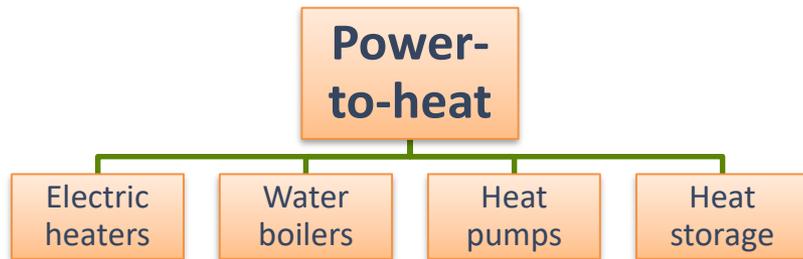
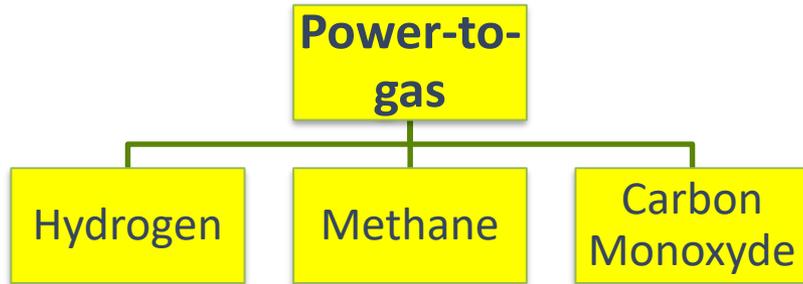
Involved at different levels:

CAN, EEB, ENTSO-E, ENTSO-G, REN21, RGI – and many stakeholders

Today's indicative agenda

10:00 – 10:40	Welcome, brief intro to collaboration, tour de table incl. 'relation to power-to-x'
10:40 – 12:30	Power-to-x in the modelling of ENTSO-E (Dante Powell)
	Power-to-x in the modelling of the German grid development plan (Dr. Paul Nahmmacher – 50Hertz)
	Discussion
12:30 – 13:15	Lunch
13:15 – 14:45	METIS project and tool, focus power-to-x modelling
14:45 – 15:45	Introduction of ENTSO-E idea for a new data platform First feedback
15:45 – 16:00	Closing/next steps

Power-to-X : what are we talking about?



+ power-to-chemicals ?

+ ?

Preparatory questions (I/III)

What do you think are the most important topics that need to be discussed/understood better in modeling power-to-x? (responses received to the open question)

- Potential of power-to-gas, power-to-liquids, power-to-heat
- Market conditions for power-to-x (electricity prices, market design, infrastructure needs)
- Modelling excess electricity and what triggers decision between grid or storage
- Hourly modelling of the electrolyser dispatch & allow for endogenous investments in electrolysers
- Economic viability and flexibility of electrolysers (full-load hours)
- Market coupling and operation of infrastructures
- Location of power-to-x installations, which grid level to inject in
- Distribution channels for hydrogen
- Source of CO₂ for synthetic methane

Preparatory questions (II/III)

Have you looked into power-to-x modelling in the past? If yes, how?

Antoine Bonduelle - E&E Consultant / Expert with Réseau Action Climat /CAN-France

- GRT-GRDF-ADEME reference study on power-to-gas

Robert Praet - ENECO

- P2X modelling through an estimate of the volumetric potential of P2X and the P/G price spread in different scenarios (varying in the amount of RES and commodity prices)

Daniel Fraile - windeurope

- Consultancy work on power-to-hydrogen for transport and industry; Long-term demand of H2

Santiago Peñate – AF consult

- Power system planning, long term, co-optimization

Behrang Shirizadeh – CIRED & TOTAL GRP

- Methanation from electrolysis of water and Sabatier reaction with green CO₂ as byproduct from methanization in EOLES dispatch and investment model for FR power network for long term storage

Clement Cabot – Mines Paristech

- Simplified model of P2H2 and P2CH4 in 2050 European assessment (simple linear programme, based on French TSO reports and models)

Sean Collins - IRENA

- Role of flexibility measures (incl. power-to-x) in better hydropower integration in BC, Canada (dispatch model for the region; simulated impact of differing bid prices on reduction in curtailment).

Preparatory questions (III/III)

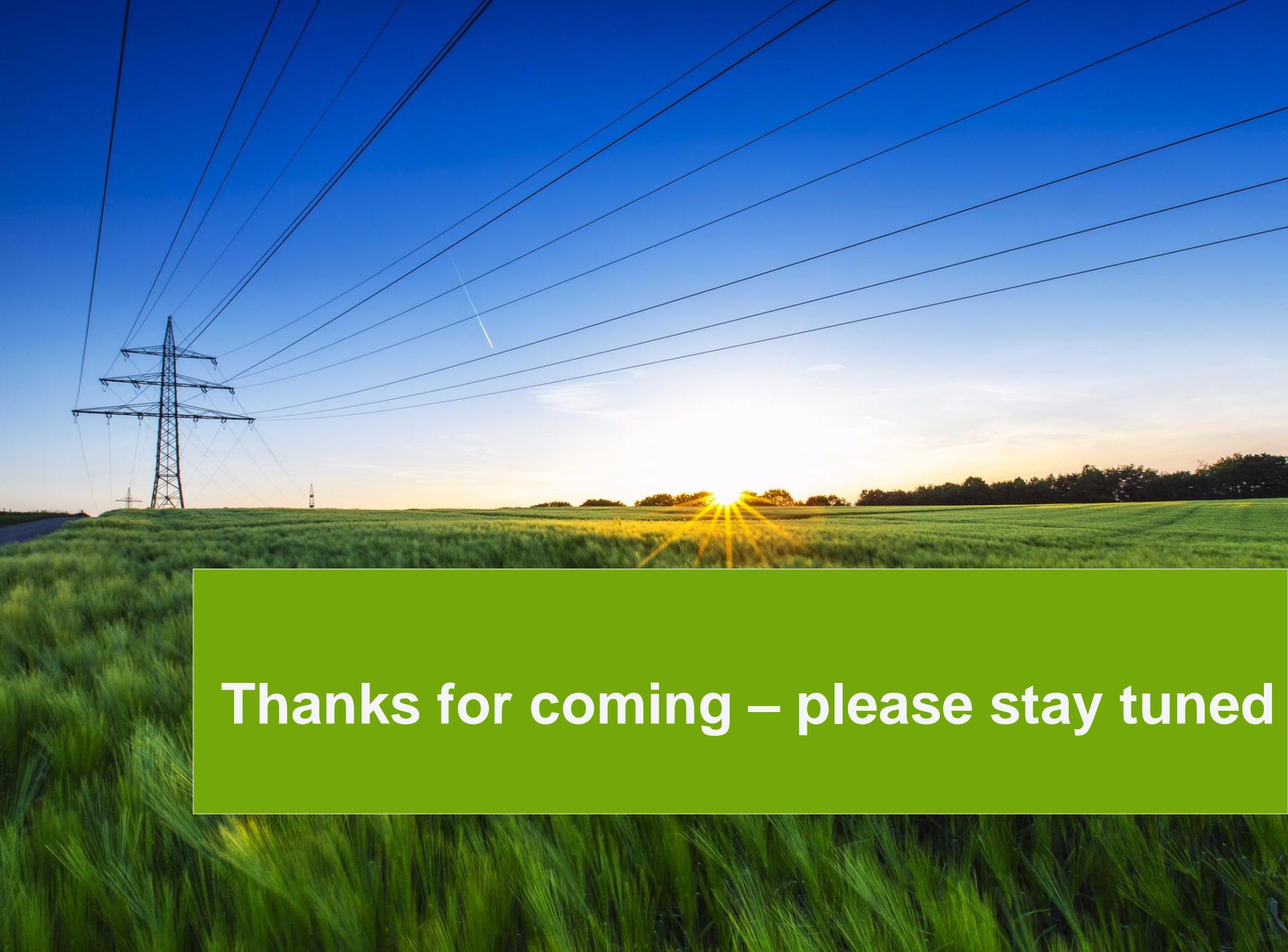
In your opinion, what would be the share of power-to-X in final energy demand by 2030? And by 2050? (responses received to the open question)

- 1% to 10% in 2030
- 10% to 40% in 2050
- Relevant role of power-to-gas as seasonal storage
- Strong electrification scenarios (50% in 2050) in IPCC report
- Electrification levels of 50% to 85% in recently published studies by Öko-Institut, Wind Europe, Eurelectric, Energy Watch Group
- Currently around 350 TWh of H₂ is fossil. By 2030, most of this could be converted to green H₂. Depending on in other sectors 1000 to 1500 TWh in total by 2050. Converting hydrogen on to methane has drawbacks due to the conversion losses, and value loss.

What else do we think we should discuss

Our current list of topics – please mark your interest, please comment

- How to close a scenario
- Demand side projections
- Future RES growth - technologies, regions
- Carbon budget and negative emissions
- Flexibility and storage and DSM
- TSO/DSO interaction
- Which progress in energy efficiency can be expected?
- How can digitalisation and prosumers' behaviour be better integrated in modelling of infrastructure?
- ...



Thanks for coming – please stay tuned