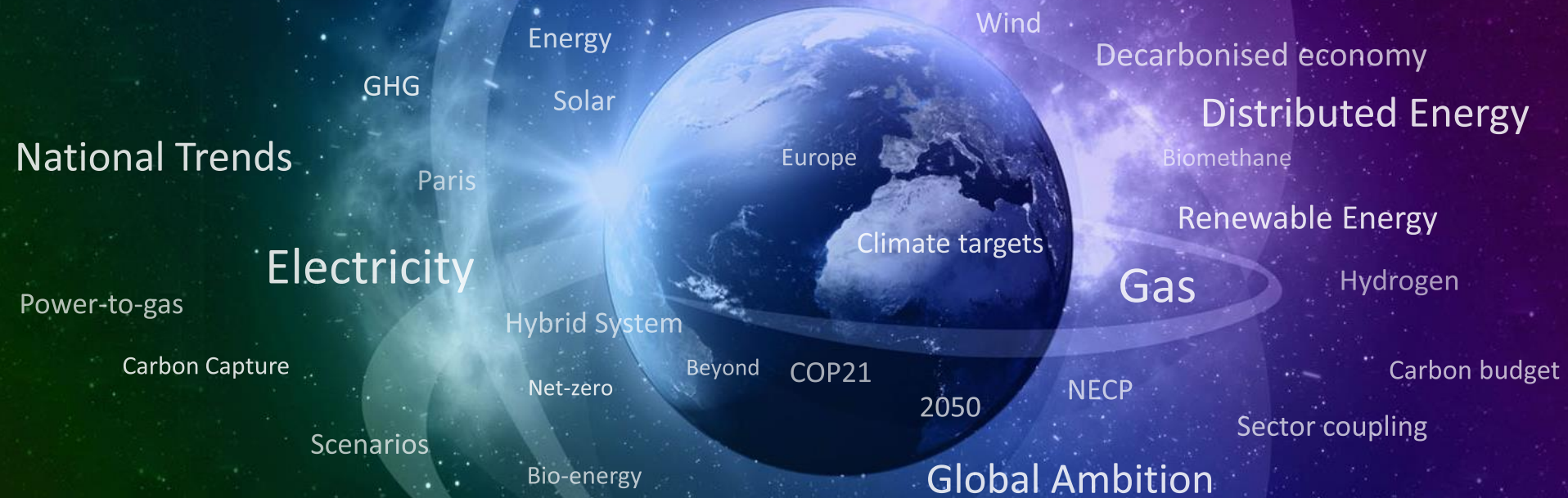


TYNDP 2020 & 2022



ENTSO-E & ENTSG Webinars on TYNDP Scenarios: Closing 2020 Edition, Kicking-Off 2022 Cycle

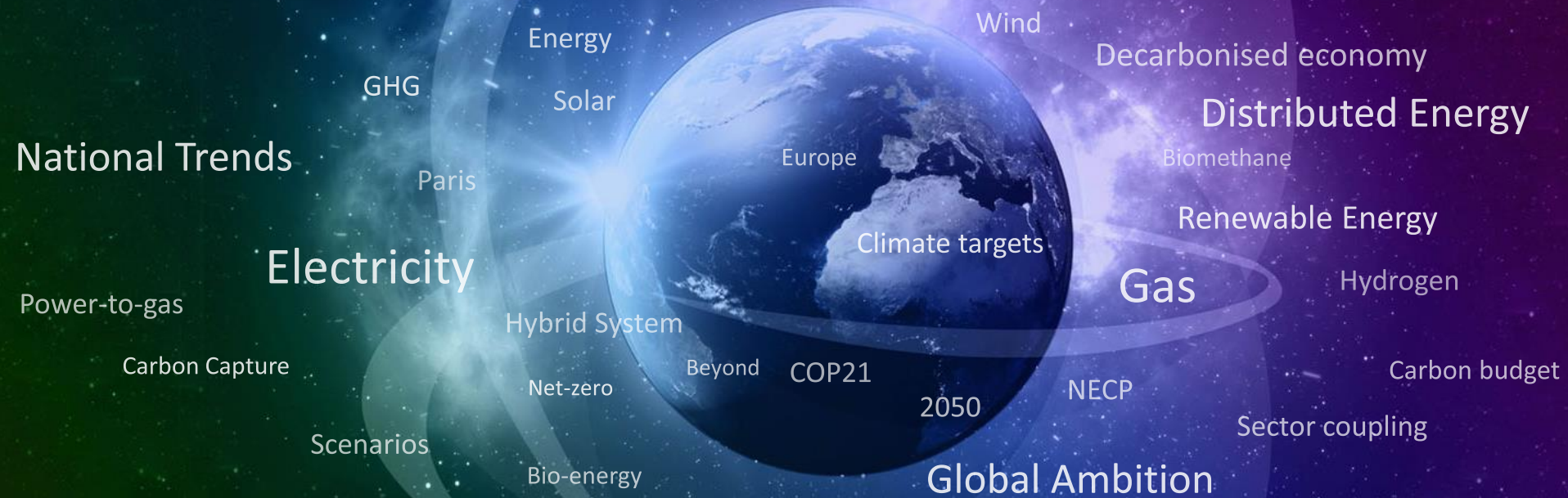


Web conference – 3 July 2020
ENTSG's and ENTSO-E's Joint Working Group Scenario Building



Agenda

Agenda Point	Timeslot	Presenters
Welcome	10:00 – 10:10	Gideon Saunders, Lead Stakeholder Engagement
TYNDP 2020 Scenarios	10.10 – 11:00	Dante Powell, Scenario Manager Cihan Sönmez, Scenario Manager
Short Break	11:00 – 11:10	
TYNDP 2022 Lessons learned from previous cycle, Kick-off and Timeline	11:10 – 11:50	Olivier Lebois, Convener Joint Scenario Building
TYNDP 2022 Scenario Storylines	11:50 – 12:50	Pieter Boersma, Convener Joint Scenario Building
Closing Remarks	12:50 – 13:00	Gideon Saunders, Lead Stakeholder Engagement



TYNDP 2020 Scenarios

Final Scenario Report

Web conference – 3 July 2020

ENTSOG's and ENTSO-E's Joint Working Group Scenario Building

Go to www.menti.com and use the code 37 63 87

Purpose of TYNDP scenarios

TYNDP scenarios are designed for TYNDP infrastructure assessment

Will energy production develop centralized or de-centralized?

How be sure that infrastructure supports development?

Is it ready for the Green Deal development?

Can it deliver in terms of Security of Supply, Market Integration and Competition?

TYNDP scenarios are meant for analysis and information
- rather than for predictions/forecasting

TYNDP scenarios complementary to EC's **Long-Term Strategy**
scenarios – with focus on assessment of infrastructure
readiness vis-à-vis possible - **contrasted** - futures

Rationale for ENTSO-G and ENTSO-E

SCENARIO DEVELOPMENT TEAM

90 gas and electricity European TSOs
+30 regional teams (gas & electricity) working together to achieve common EU targets

Ethics

Commitment to EU Social Economic Welfare

National Relevance

Combining national commitments with EU targets

Innovation

Full-energy scenarios with country-specific data based on an EU Carbon Budget

Expertise

- Operating X-border infrastructure 24/7
- Security of Supply and Infrastructure Planning
- Interacting daily with producers (RES and conventional), DSOs, LNG and Storage operators
- Peer-review by TSOs

Stakeholder Engagement

9 Public Workshops and Consultations with
+100 Stakeholders over 2 years

Full Transparency: Report, Data Set, Process



How have ENTSO-G and ENTSO-E consider stakeholder consultation feedback?

TYNDP 2020 Storylines


National Trends

- Policy Scenario based on member states' National Energy and Climate Plans (NECPs)
- EU 2030 Energy and Climate Framework (-40% CO₂, 32 % RES, 32.5 % energy efficiency)
- EC 2050 Long-Term Strategy: 80 – 95 % CO₂ reduction



2 x COP 21 scenarios

+1.5°C target with 66.7 % probability
Carbon neutrality by 2050

Benchmarked with
EC Long-Term Strategy 

Distributed Energy

De-centralised approach to the energy transition:
active customers, small-scale solutions, circular
approach

Global Ambition

Centralised approach to the energy transition:
large-scale renewables, imports and
decarbonisation

Comment relating to 2020 Process



Many stakeholders believe the scenarios are not diverse enough and speed of decarbonization is too slow



Bioenergy may have been overstated



High volume of gas, notably fossil gas, in all scenarios



Considering the high number of EVs and Heat pumps, peak electricity demand is too low.



Some stakeholders believe that direct electrification is too low and demand flexibility has been understated



The scenarios all rely heavily on unproven technologies such as H₂, CCS, and Biomethane

Updates to scenarios

Update of alignment of National Trends with final NECPs for gas data (freeze date: March 2020)

Re-run of Market models including German Coal Phase Out

Reduction of Biomass in Distributed Energy

- Energy shifted to Power to liquid and direct electrification

Reduction of Gas Demand in Distributed Energy 2050

Further transparency:

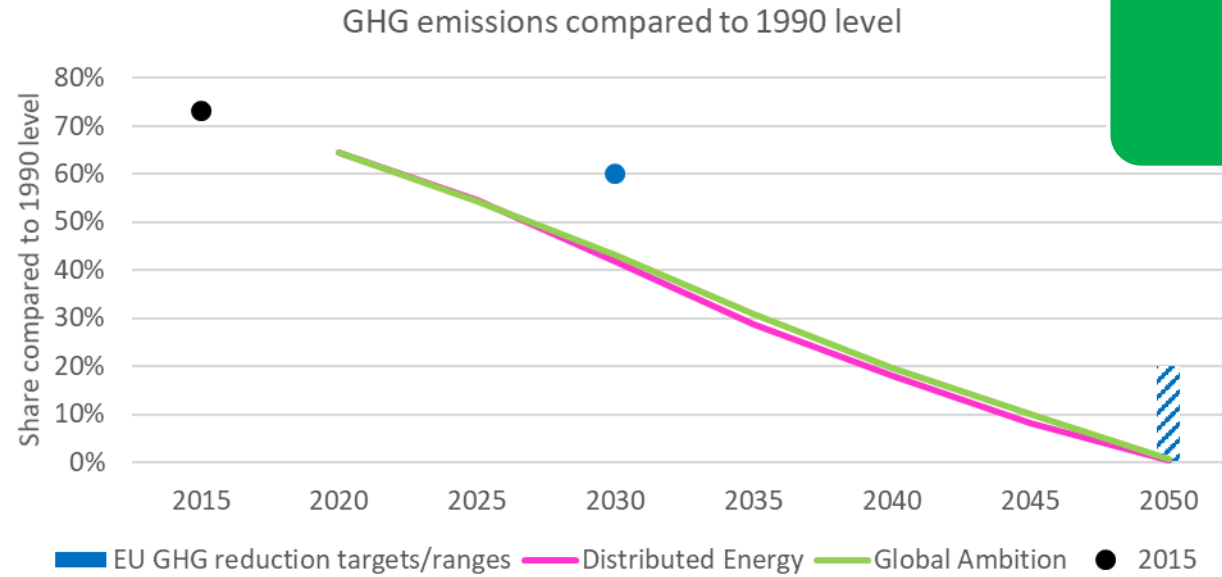
- publication of sectoral demand figures for DE and GA
- Increased granularity of data availability on all scenarios
- Open Data Licence

Improved explanations and further benchmarks to address some concerns



Storylines, Targets and Decarbonisation

EU Climate Neutrality by 2050



TYNDP National Trends Scenario
- aligned with NECPs

TYNDP COP21 Scenarios have assessed all GHG emissions on the path to 2050 - targeting net zero by 2050!

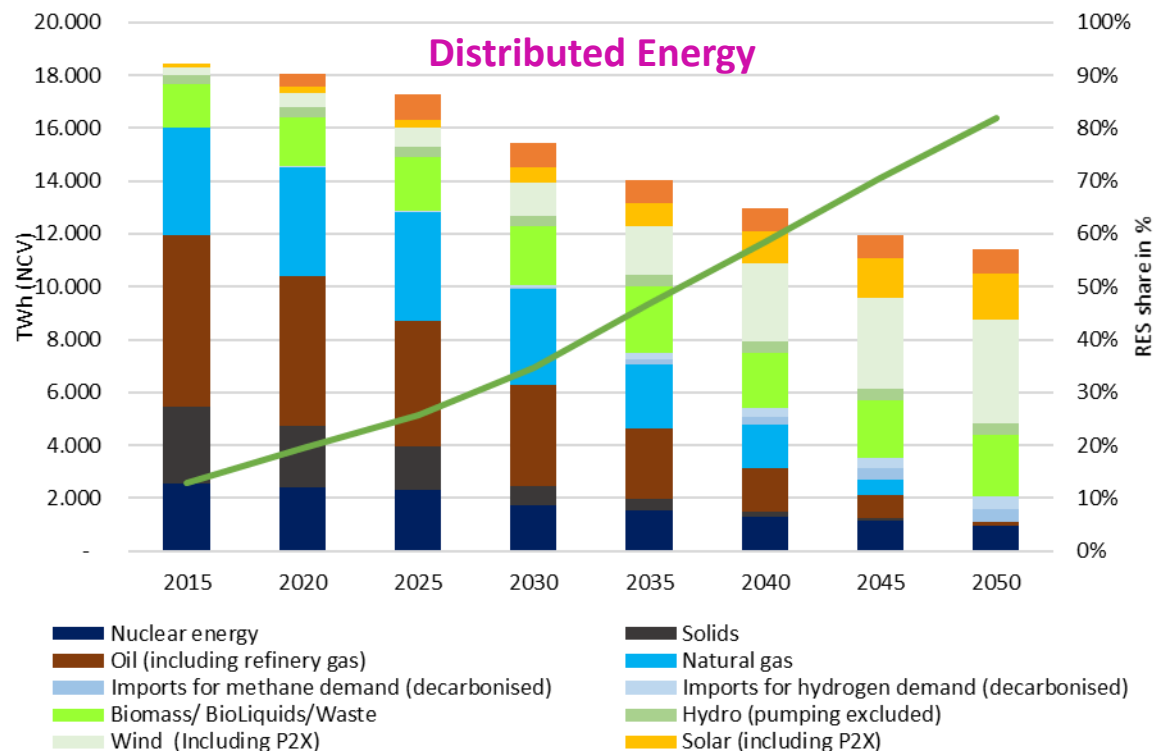
COP21 Scenarios reach >55% GHG emissions reduction by 2030

Cumulative GHG emissions in 2050 confirms EC LTS 1.5TECH/LIFE calculations (63.5 vs 65 GtCO₂)

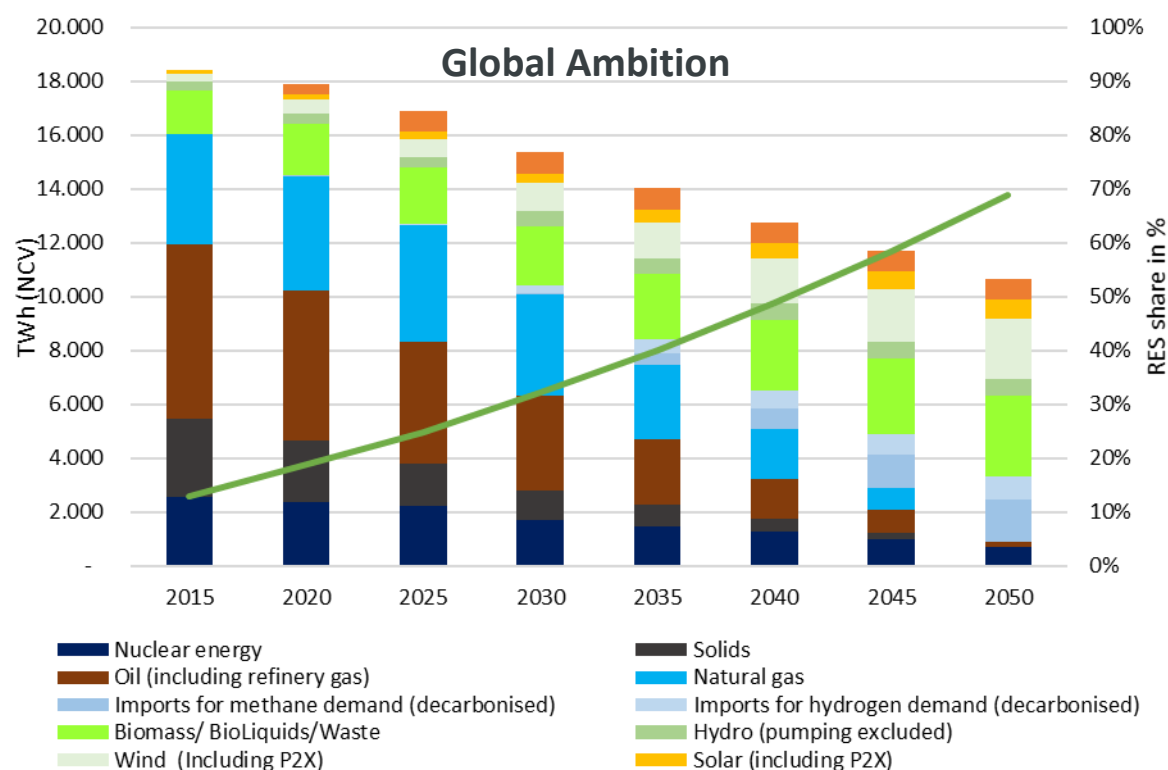
	<2050	2050	>2050
Energy and non-energy related CO ₂ emissions	57.1		
Non-CO ₂ GHG emissions (including methane and Fluorinated gases)*	17.7		
Carbon sinks**	-13.4	Carbon-Neutrality	Additional measures needed, e.g.: LULUCF, BECCS, CCS, DAC
Net cumulative emissions	61.4		-13

Renewables in Primary Energy

RES share reaches 82% in Distributed Energy by 2050



RES share reaches 69 % in Global Ambition by 2050

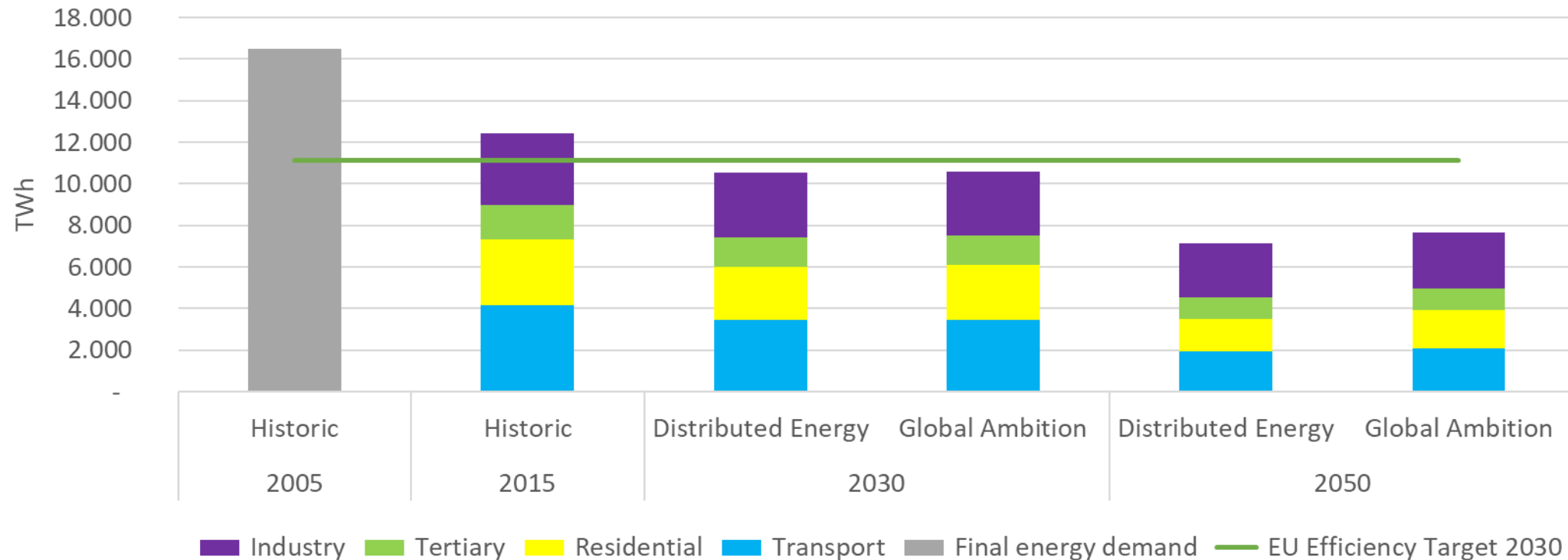


COP21 Scenarios are in line with EU's 32% target for Renewables in 2030



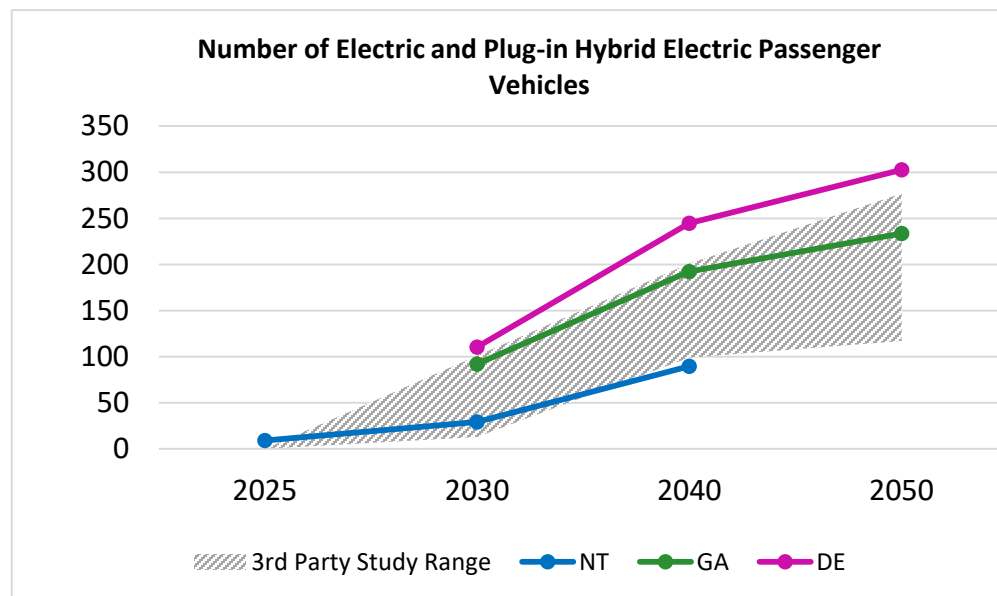
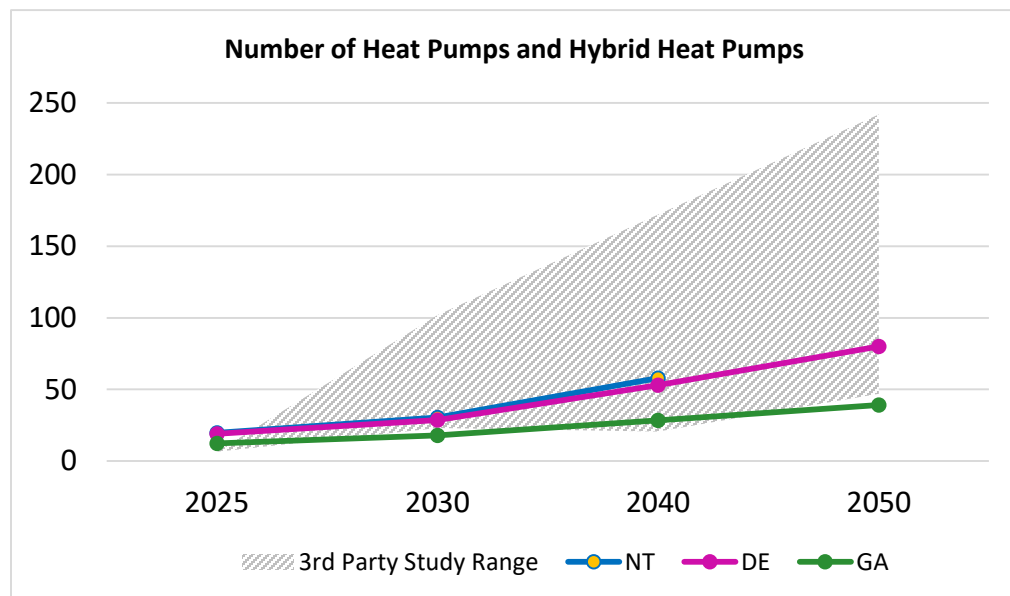
Electricity and Gas

Energy Efficiency



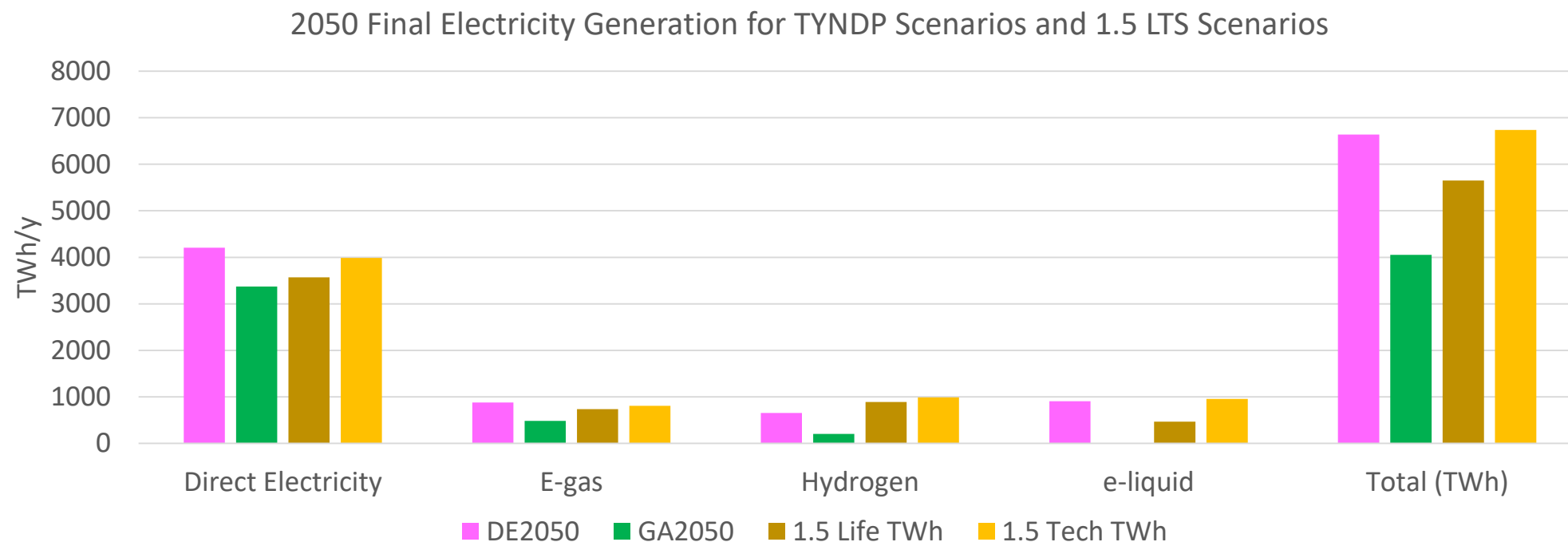
**COP21 Scenario Storylines engineered energy efficiency driven by technology improvements per sector.
COP21 Scenarios reach higher efficiency in 2030 - max. 10.600 TWh of final demand**

Heat Pumps (normal/hybrid) and Evs



% Hybrid Heat Pumps	2030	2040	2050
Distributed Energy	26%	22%	22%
Global Ambition	46%	51%	47
National Trends	24%	18%	-

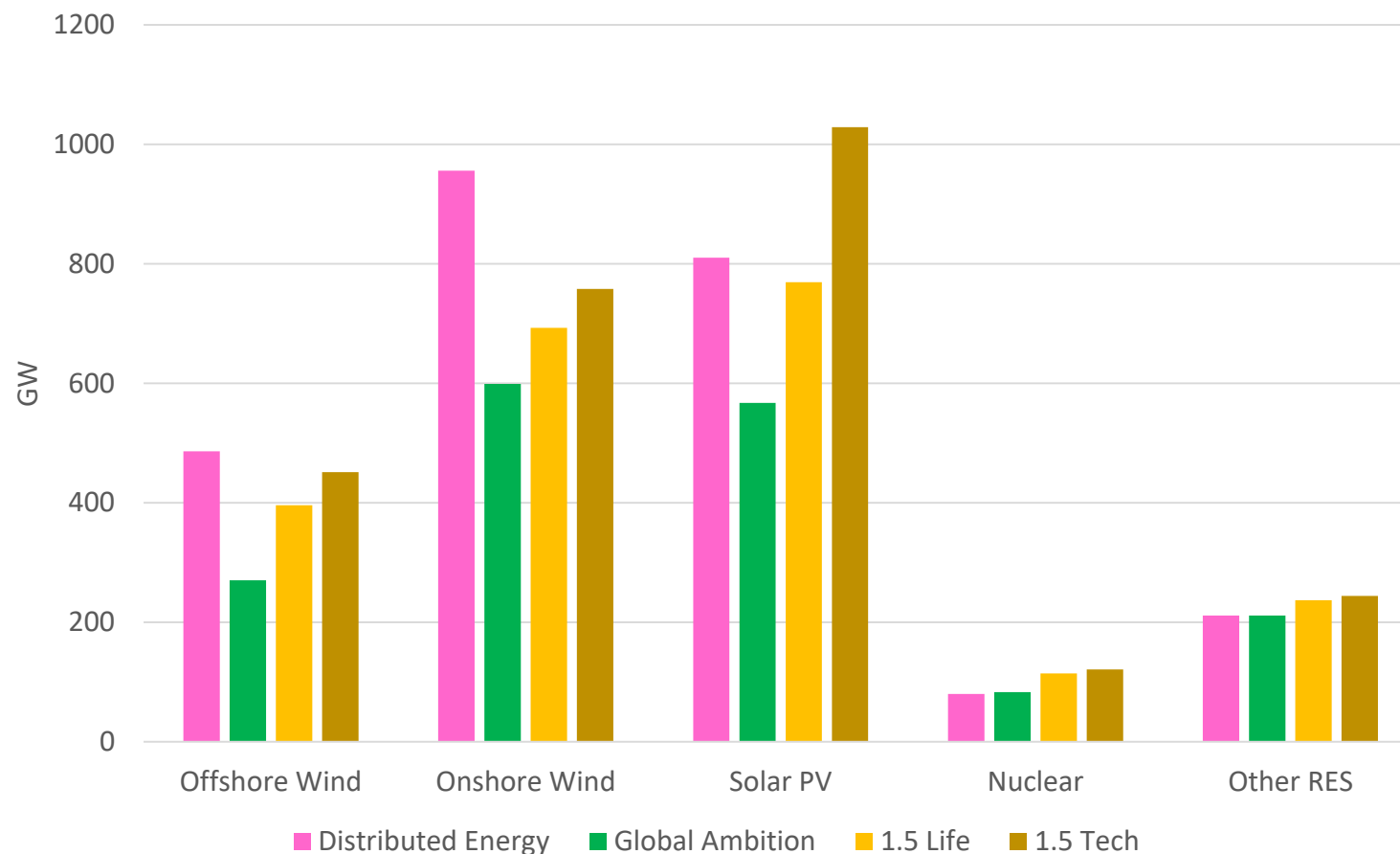
2050 Final Electricity Generation



**Distributed Energy well aligned with 1.5 Tech - only 1% difference in Final energy consumption.
P2x similar in both scenarios.**

2050 Generation Capacities: 1.5 Scenarios

2050 All Generation Capacities for TYNDP Scenarios and 1.5 LTS Scenarios

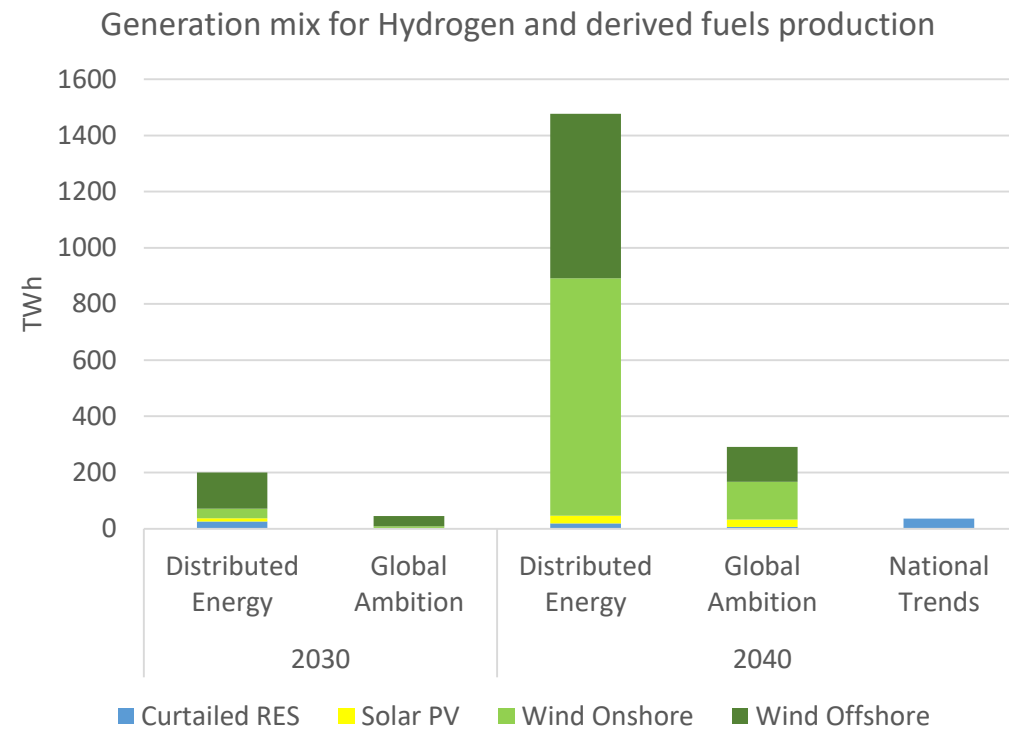
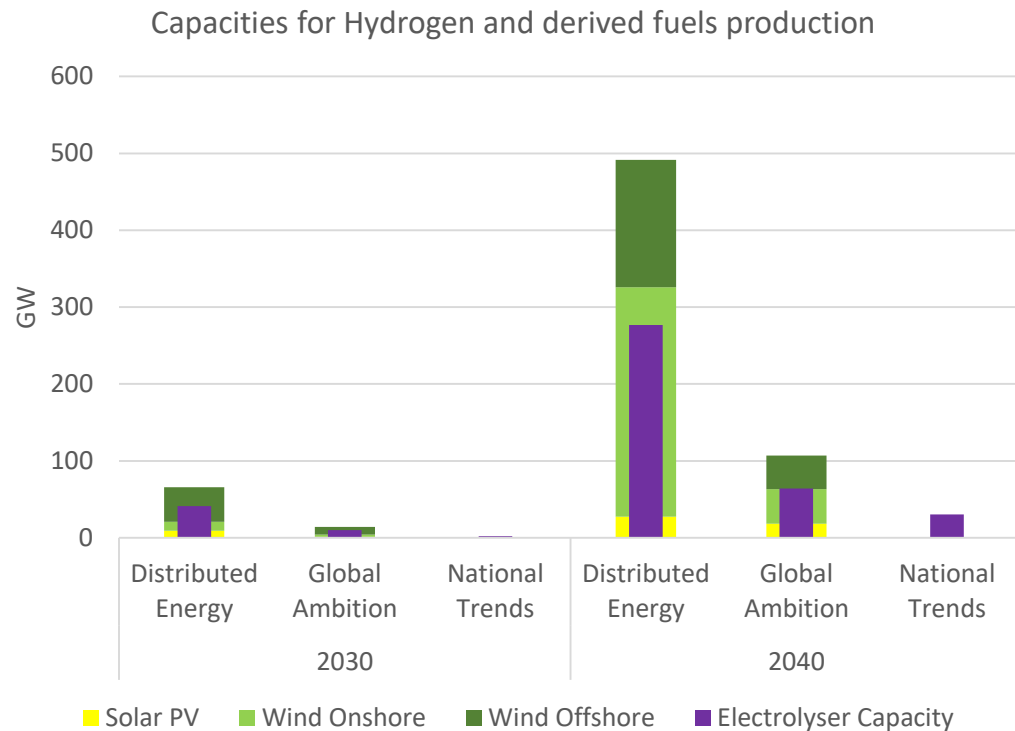


1.5 Tech and *Distributed Energy* - same order of magnitude for all technologies except onshore wind, where DE is higher.

Global Ambition - lower renewable capacities due to lower demand.

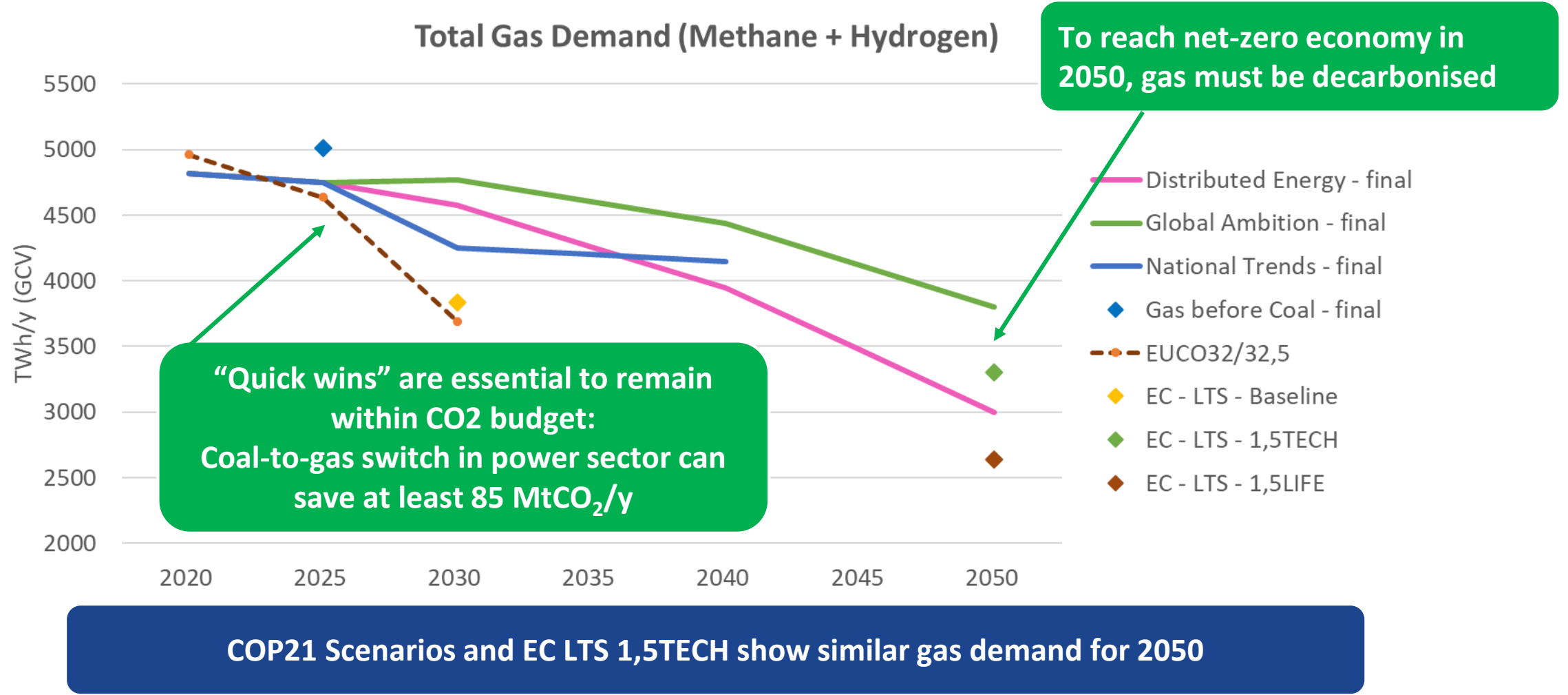
For TYNDP assessment the 2 scenarios show a good bandwidth of possibilities, whilst aligned with Paris and Green Deal targets.

Capacities for P2X



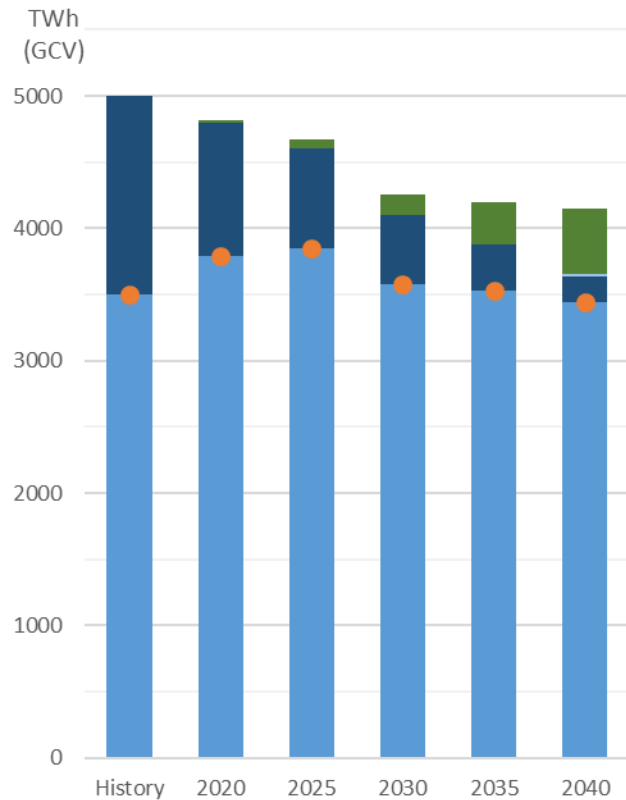
Sector Coupling enables a link between energy carriers and sectors, thus it becomes key in contributing to achieving the decarbonisation target. In the long-term, Power-to-Gas will play a key role in both the integration of excess electricity from variable renewables and decarbonising the gas supply.

Gas Demand

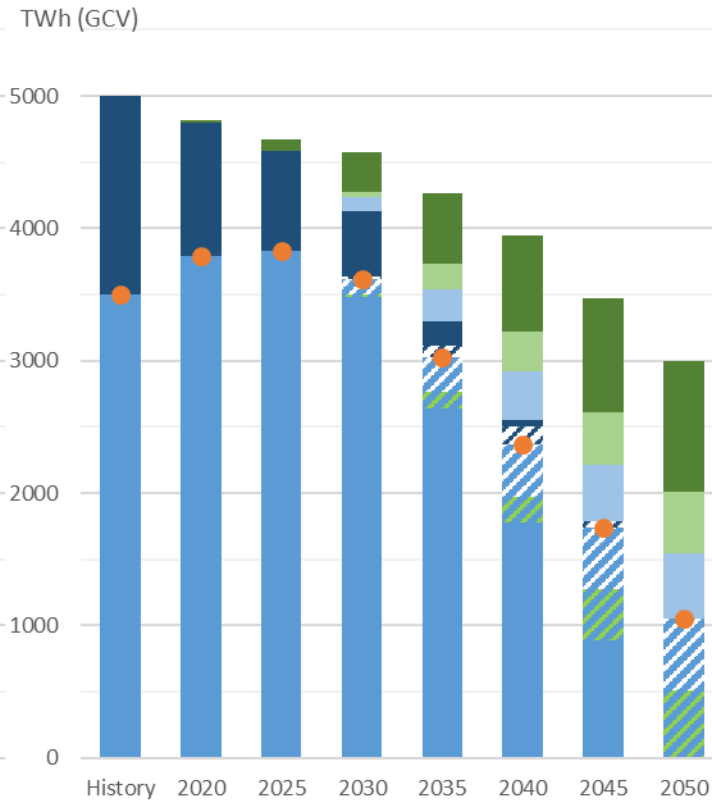


Gas supply mix

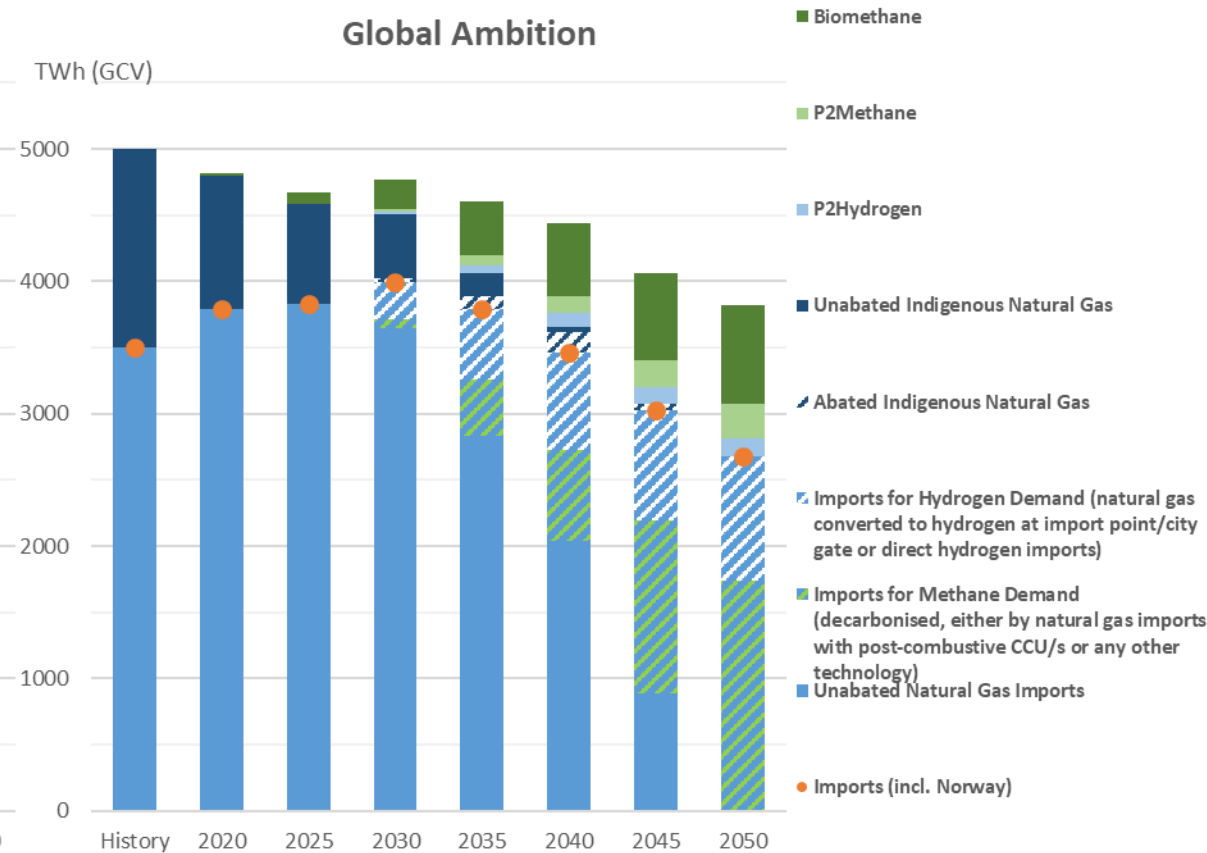
National Trends



Distributed Energy



Global Ambition



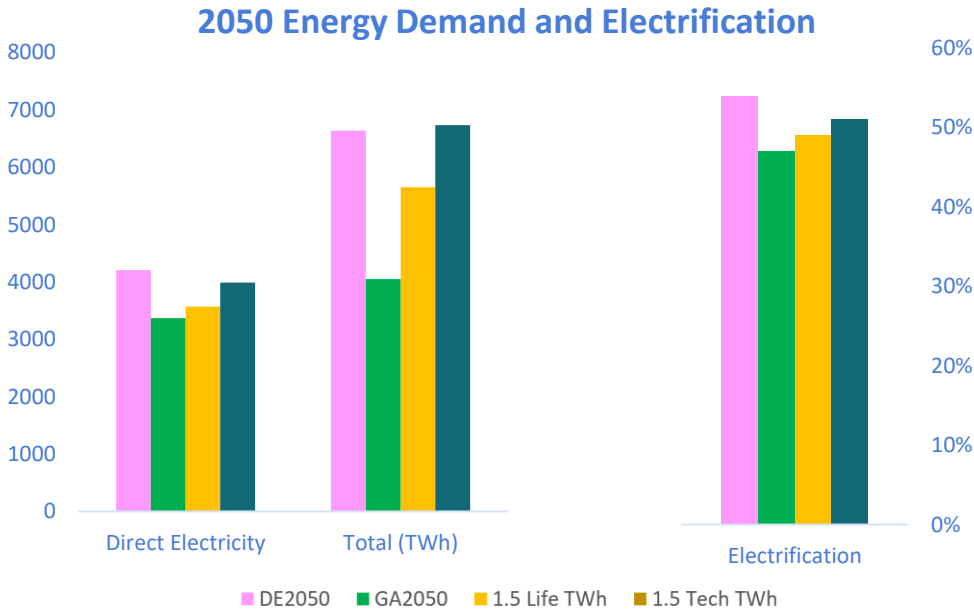
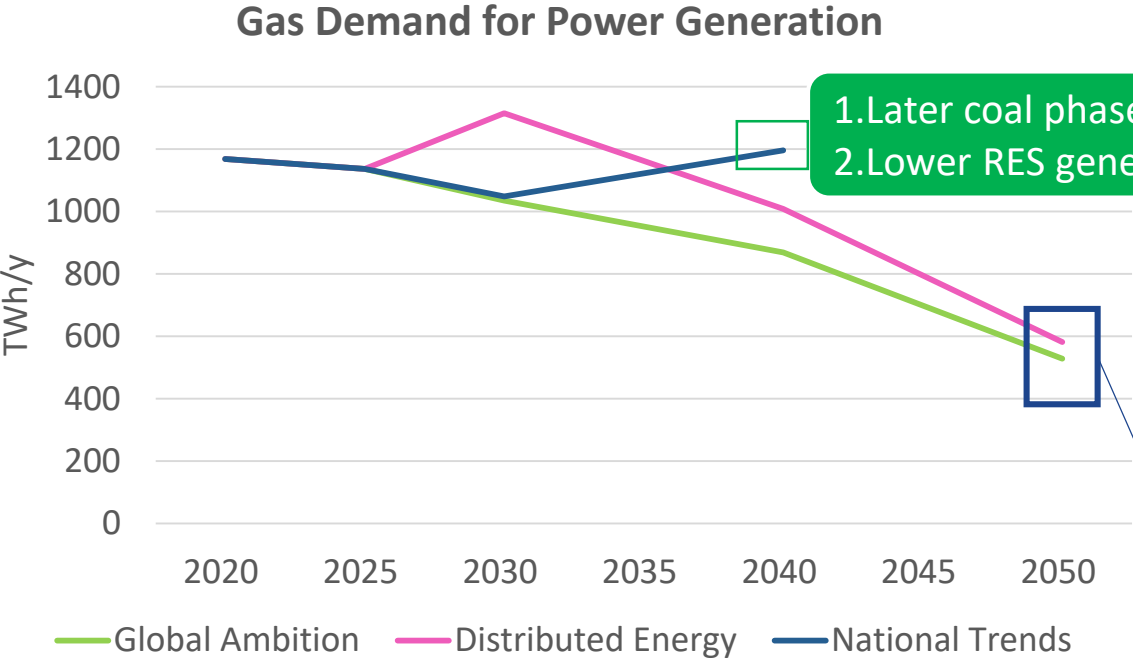
Gas supply needs different technologies and sources to fully decarbonize. P2G, Biomethane & CCS can play important roles in decarbonising the gas supply.

+70% of gas demand is currently supplied by imports – infrastructure assessments needs to take this into account.

An Interlinked Energy System

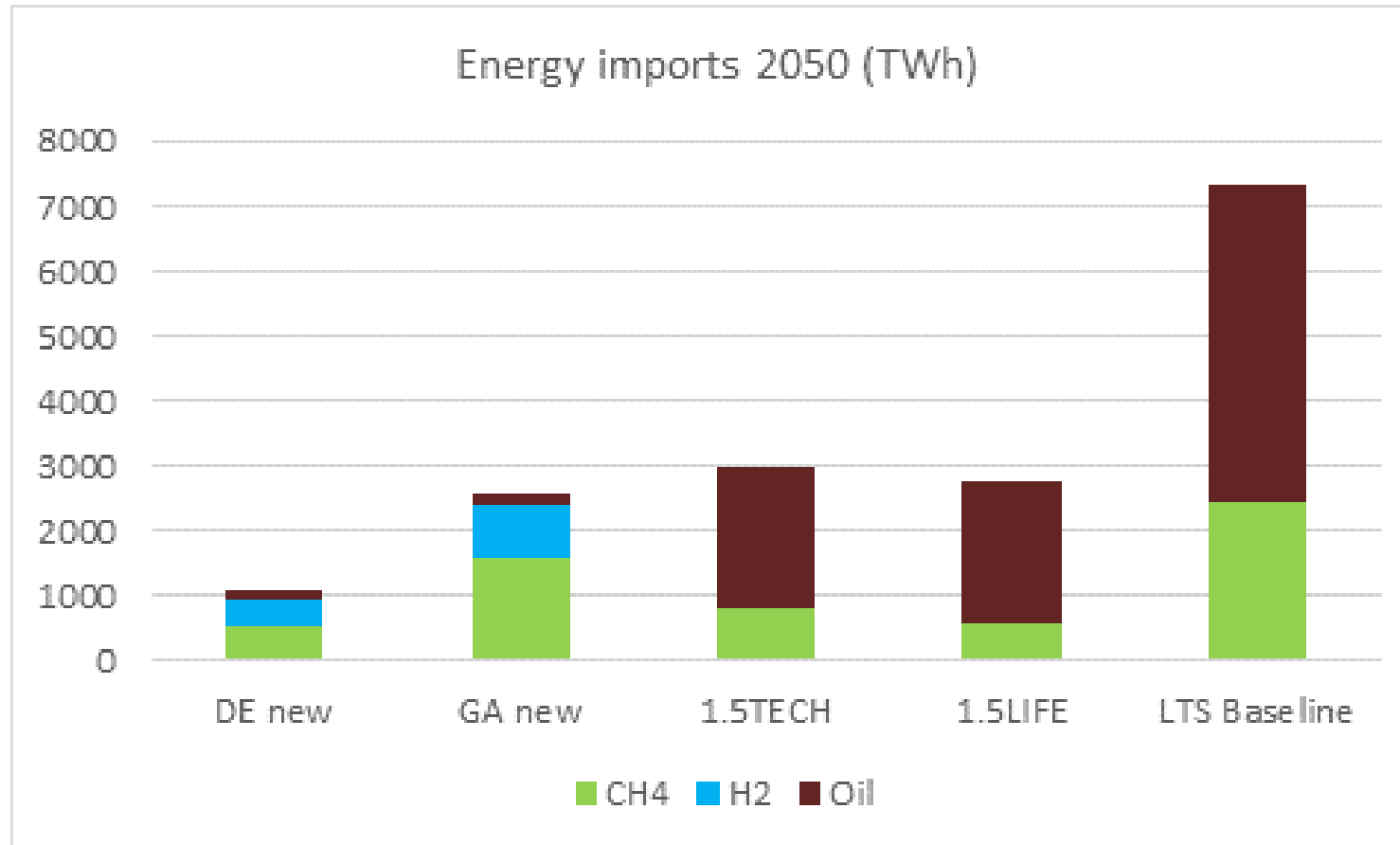
Gas will need decarbonised electricity & Electricity will need decarbonised gas

Direct/indirect electrification in DE2050 scenario in line with EC 1.5 TECH and 1.5 LIFE 2050 scenarios



Higher Electricity Demand comes with higher gas demand for power generation - also for peak and “dunkelflaute” situations

Energy Imports

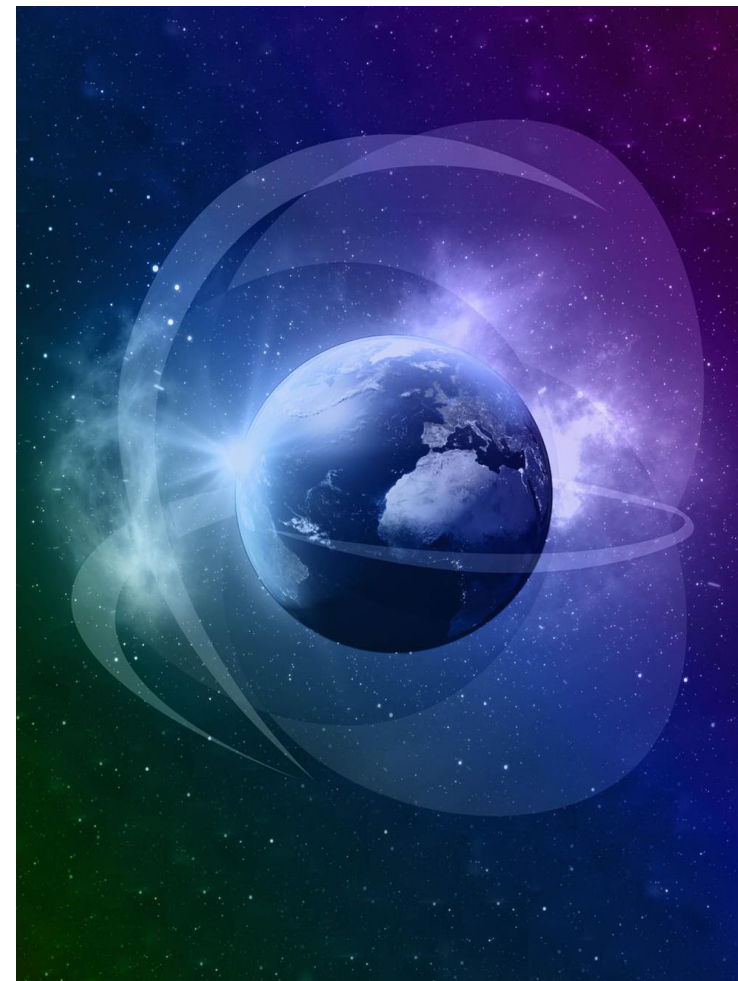


Current EU28 import share of primary energy is ca. 55 %

Decarbonisation and RES development can reduce import dependency to ca. 20 % to 36 %

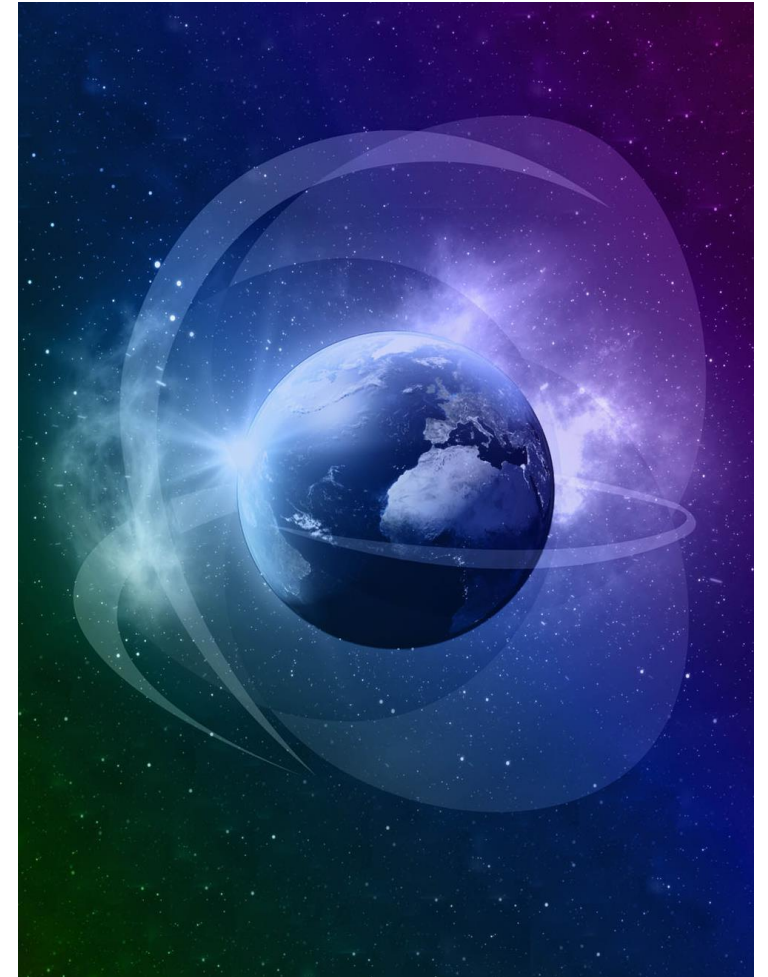
**Imports will remain important in future energy supply
- making use of competitive natural resources outside EU**

Questions & Answers & Short break



Final TYNDP 2020 Scenarios including the methodology report and all data sets are published now:

<https://www.entsos-tyndp2020-scenarios.eu/>





TYNDP Scenario Report 2022

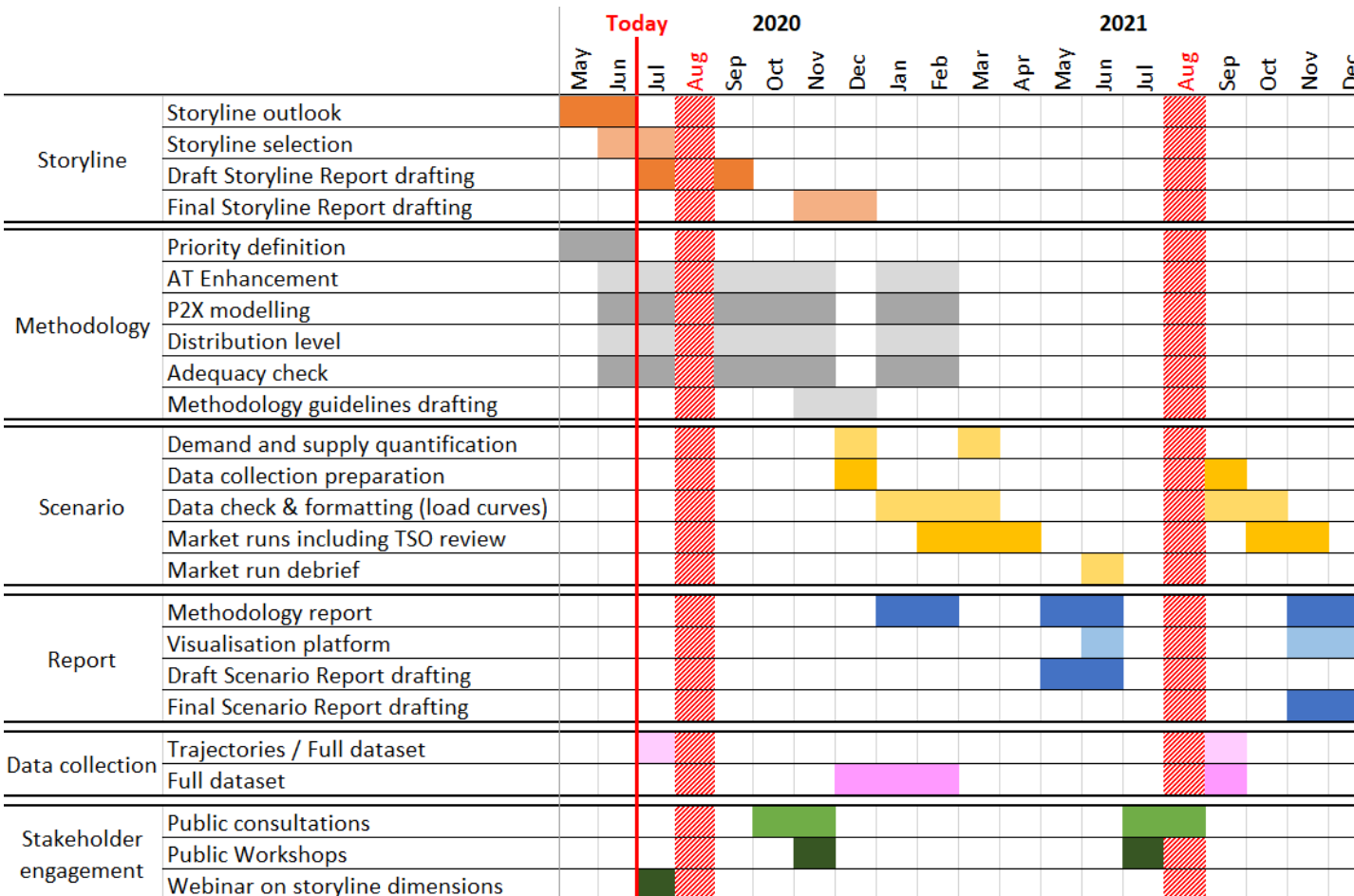
Kicking-off 2022 cycle

Go to www.menti.com and use the code 59 41 64



Overall scenario building timeline

The Scenario Building process 2022 at a glimpse



- **2020, a year of inclusive enhancement**
 - Storyline definition through an iterative process
 - Methodology development at the service of sector coupling
- **2021, a year of agile and robust implementation**
 - Converting storylines in fully-fledged scenario fitting infrastructure assessment
 - Adjusting scenarios according up-to-date dataset and consultation feedback

An inclusive and streamlined process at the service of TYNDP and PCI selection

- A shorter scenario building process to give more time to subsequent processes (TYNDP, PCI selection...) to make full use of enhanced scenarios and publish nearly 5 months sooner than the 2020 edition
- An earlier, wider and even more transparent stakeholder engagement process :
 - to gather knowledge, expectations and opinions ahead of storylines definition
 - to put sector coupling at the core of the scenario building process
 - to strengthen the interlinkage between DSOs and TSOs systems
- An iterative process in order to provide visibility to stakeholders and foster their feedback and build consensus around scenarios

Establishing consensus on storylines

- Previous edition has shown that storyline definition:
 - Is the most important step in the scenario building process from stakeholder perspective
 - Needs to a gradual convergence towards the final storylines
 - Requires some degree of quantification in order to ensure visibility to stakeholders and to foster their feedback
- The 2022 scenario building aims at answering these expectations through an early, result-oriented and iterative stakeholder engagement process



Methodology development

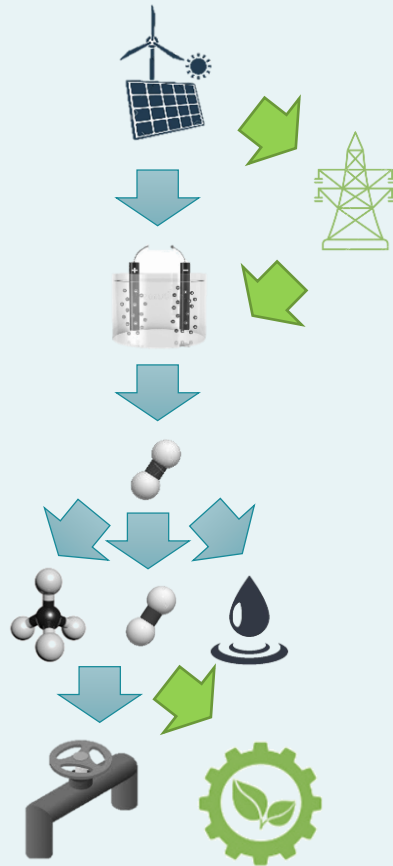
Scenario building is a 2 year cycle and it is critical that we continue to improve our modelling expertise and processes. Key areas for improvement are:

- Sector coupling and decentralisation have an increasing impact on the energy system. Beyond storyline development, such evolutions need to be taken into account in scenario quantification.
- We will aim to implement a number of new concepts into investment loop and the system adequacy modelling
- For the 2022 Scenario Building process, priority will be given to pragmatic solutions to be described in the “Methodology guidelines” while longer term work will be initiated for subsequent editions

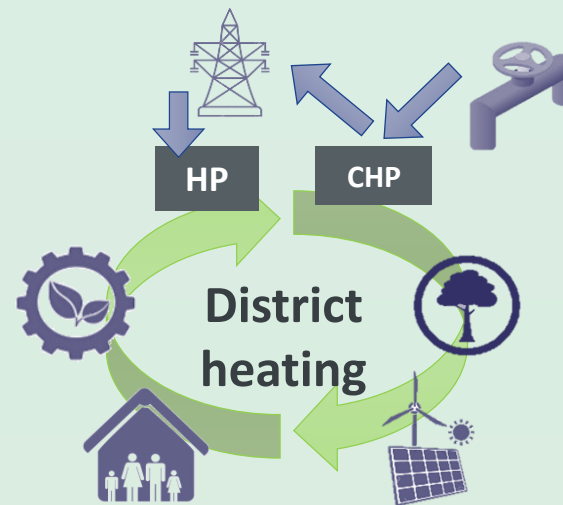
Priority developments

Sector coupling

- Enlarging the range of P2G/L configurations by adding electrolysis connection to the grid and electrolysis at consumer facility level
- Hybrid system adequacy check (e.g. Dunkelflaute)

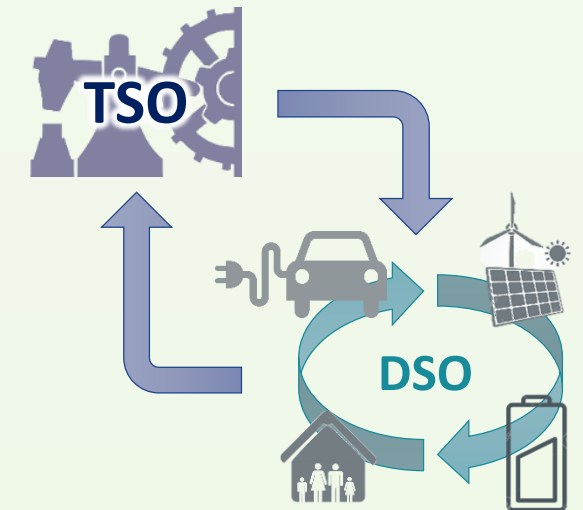


Power-to-Heat & CHP
(including H2) at the
crossroad of sector
coupling and TSO/DSO
interaction



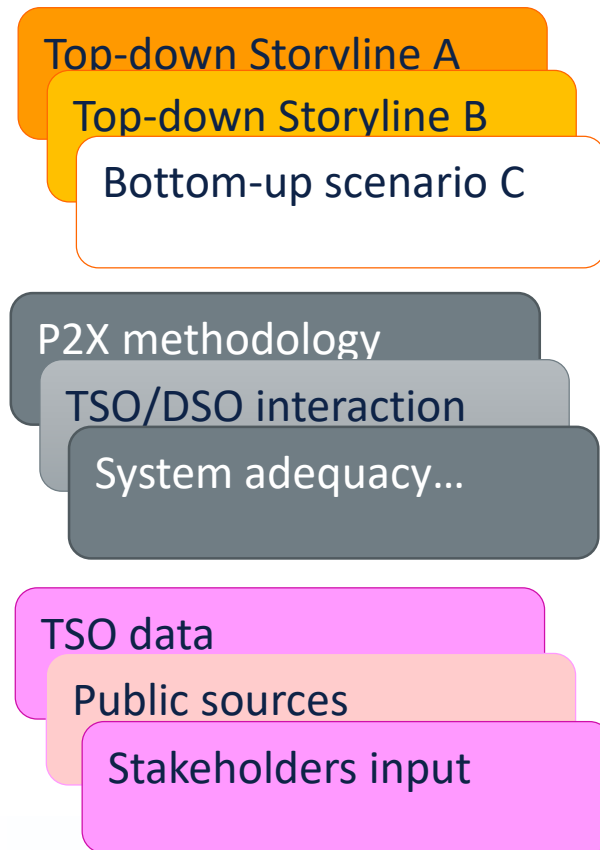
Distribution scale

Capturing Solar / Battery / EV /
self-consumption / DSR at
distribution scale



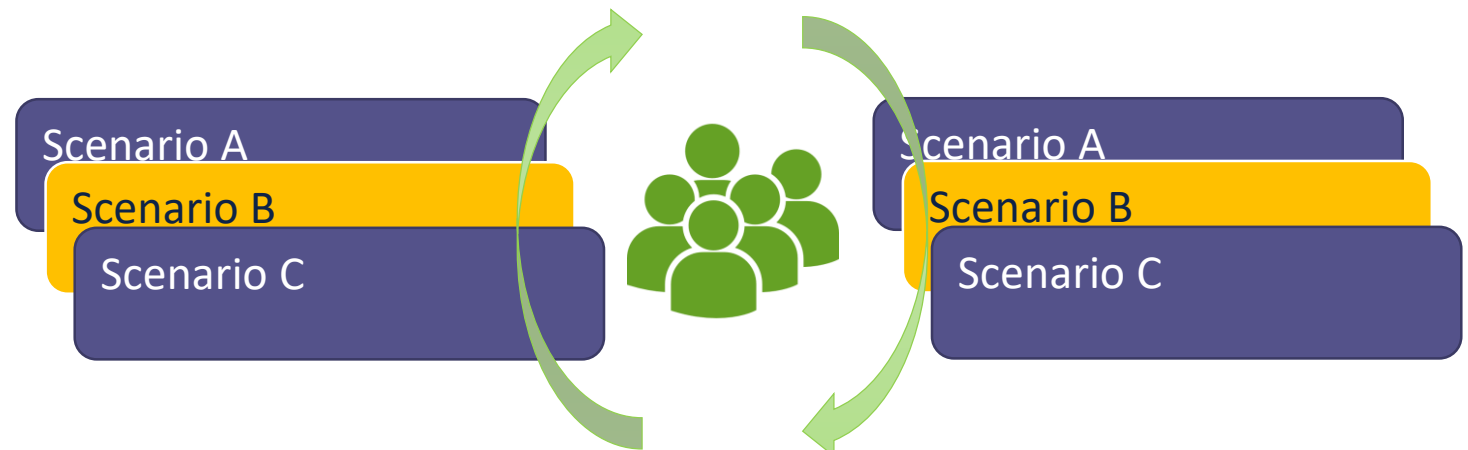
Translating storylines into scenarios

2020 Storyline & Methodology processes



1st half 2021 Draft scenario quantification

2nd half 2021 Final scenario quantification



Workshop and public consultation on draft scenario mid-2021

Finalizing scenarios

- The TYNDP Scenario Report is composed of several deliverables:

Final Scenario Report 2022

- Required by TEN-E regulation
- Multi-energy scenario description
- Gas and electricity focus
- Benchmark against other scenarios

Dataset

- User-friendly dataset for use by stakeholder in their own analyses
- Open licence setting the framework of data use

Visualisation platform

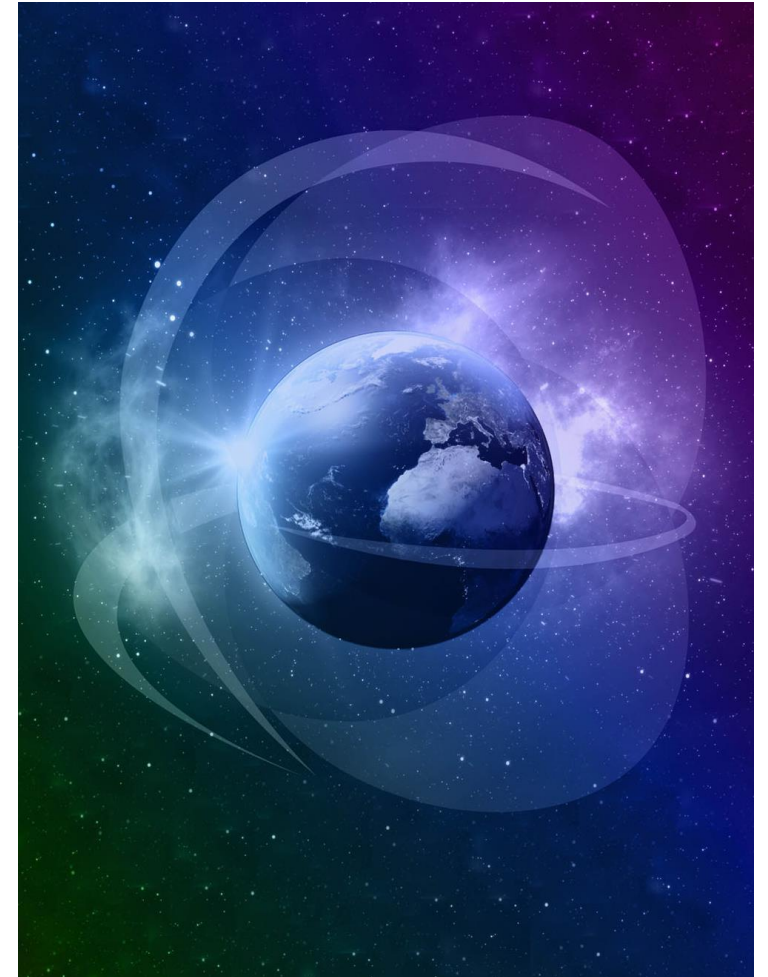
- Scenarios at a glance

Transparent methodology

- Making explicit scenario quantification
- Published Guidelines

- Stakeholder engagement is key to ensure consensus on scenarios and thereafter on TYNDPs and PCI selection process

Questions & Answers

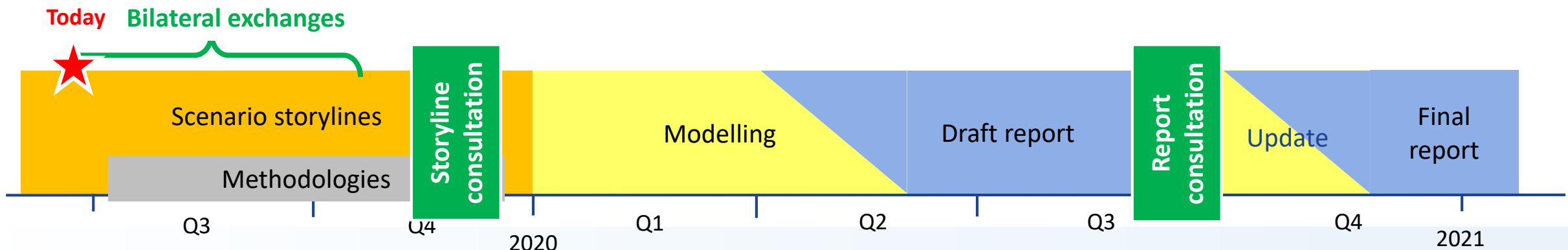




Focus on storyline development

Storyline development as the first and critical step towards scenarios

- We have just initiated the scenario building process for TYNDP 2022 to be delivered by the end of 2021. Today we kick-off storyline development:
 - ➔ In the upcoming months we will continue to (bilaterally) consult with stakeholders on storylines design
- Main questions in storyline development (we start discussing today):
 - What is the intended purpose for our Scenarios?
 - Which scenario drivers should we explore in the storylines?
 - How can the drivers be combined into consistent storylines?



Lessons Learned from the TYNDP 2020 Scenario Report

- Scenario Building Team conducted a thorough review process at the end of the 2020 Scenario Building Cycle
- Results of the internal review were combined with feedback from external stakeholders (largely) received via the public consultation of the Draft Final Report in winter 2019 and the TYNDP Platform between the EC, ACER, ENTSOE and ENTSG.
 - Current Stakeholder feedback has to a large extent been considered in the Final TYNDP 2020 Scenario Report

What did our team learn from the last process?

Modelling and Methodology

- Show more sectorial data
- Consider how to align with NECPs and EUCO
- Deeper integration of P2X in electricity model
- Improve adequacy check
- Challenge high and low trajectories regarding investment
- Enhanced tools to share data with stakeholders at storyline level

Done as part of Final Scenario Report 2020

Objective for the Scenario Report 2022

Planning and Stakeholder Engagement

- Clearly communicate purpose and scope of the scenarios (what they are and what they are not)
- Earlier engagement of stakeholders
- Focus on agreement for key parameters earlier in the process
- Improve transparency of stakeholder involvement
- Improve presentation of Methodology Report

What did we learn from the external stakeholders?

Modelling and Methodology

- Greater explanation of P2X modelling required
- Concerns about divergence from EU LTS scenarios
- Greater transparency about use of CCUS and LULUCFs
- Higher ambition regarding GHG-emissions*
- Lack of differentiation between top-down scenarios
- Requests for greater inclusion of societal factors (protection of animal species, indirect land use)

(*) will depend on Green Deal ambition

Planning and Stakeholder Engagement

- Access to underlying data requested
- Some stakeholders were unaware of certain parts of the engagement process
- Frustration at lack of inclusion in development of key parameters
- Greater bilateral engagement with DSOs

Done as part of Final Scenario Report 2020

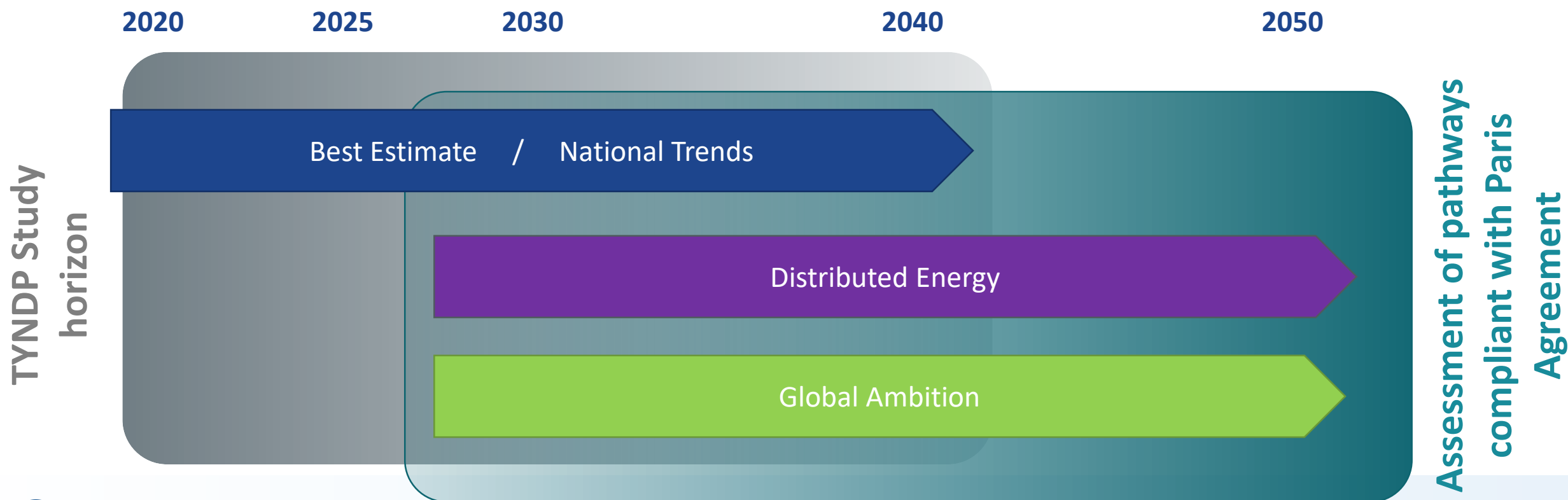
Objective for the Scenario Report 2022

Level of consideration depending on stakeholder inputs

Purpose of the scenarios depend on the time horizon

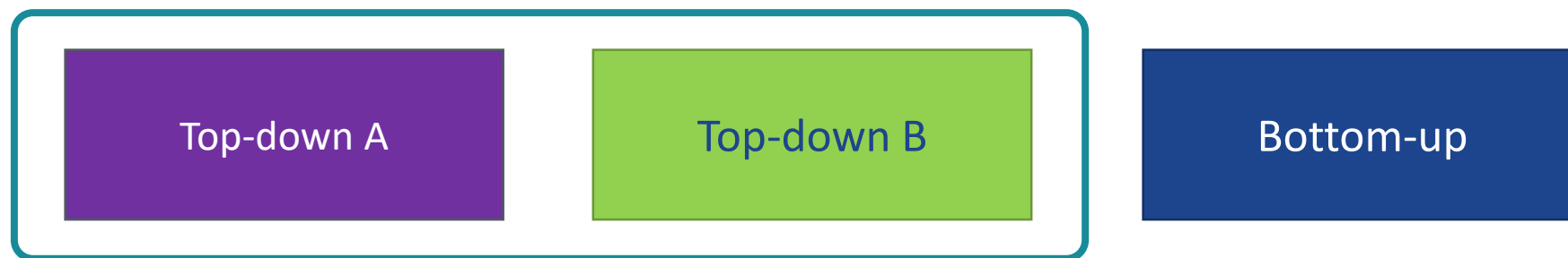
TYNDP 2020 process has shown that scenarios have to combine different expectations along their time horizon trying to tackle the following challenge:

“Combining long term ambition and meaningful short term planning”

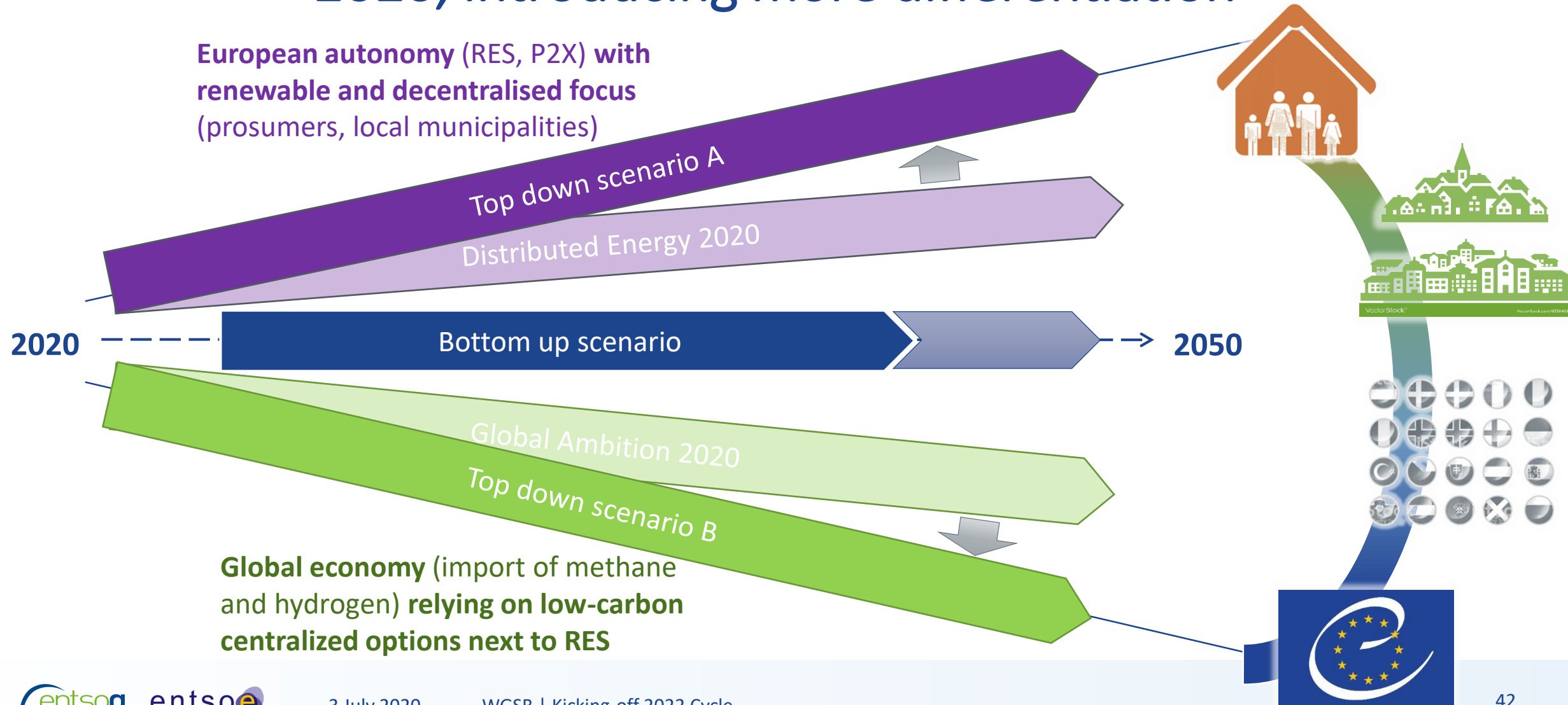


The proposed scenario development framework

- The joint ENTSO-E/ENTSOG Scenario Report will include:
 - 2 top-down scenarios compliant with the Green Deal and Paris Agreement(1,5°C)
 - 1 bottom-up scenario based on national policies and consistent between gas and electricity
- Creating more than 3 quantified storylines will sacrifice ambitious modelling enhancements, reduced output detail or quality and/or impact on the timely delivery for TYNDP and PCI processes
- The stakeholder engagement process will focus on the 2 top-down scenario



First proposal: Keeping high level philosophies of TYNDP 2020, introducing more differentiation



An introduction of relevant high-level scenario drivers

Green transition

climate ambitions

Scale of energy transition

Decentralised vs centralised

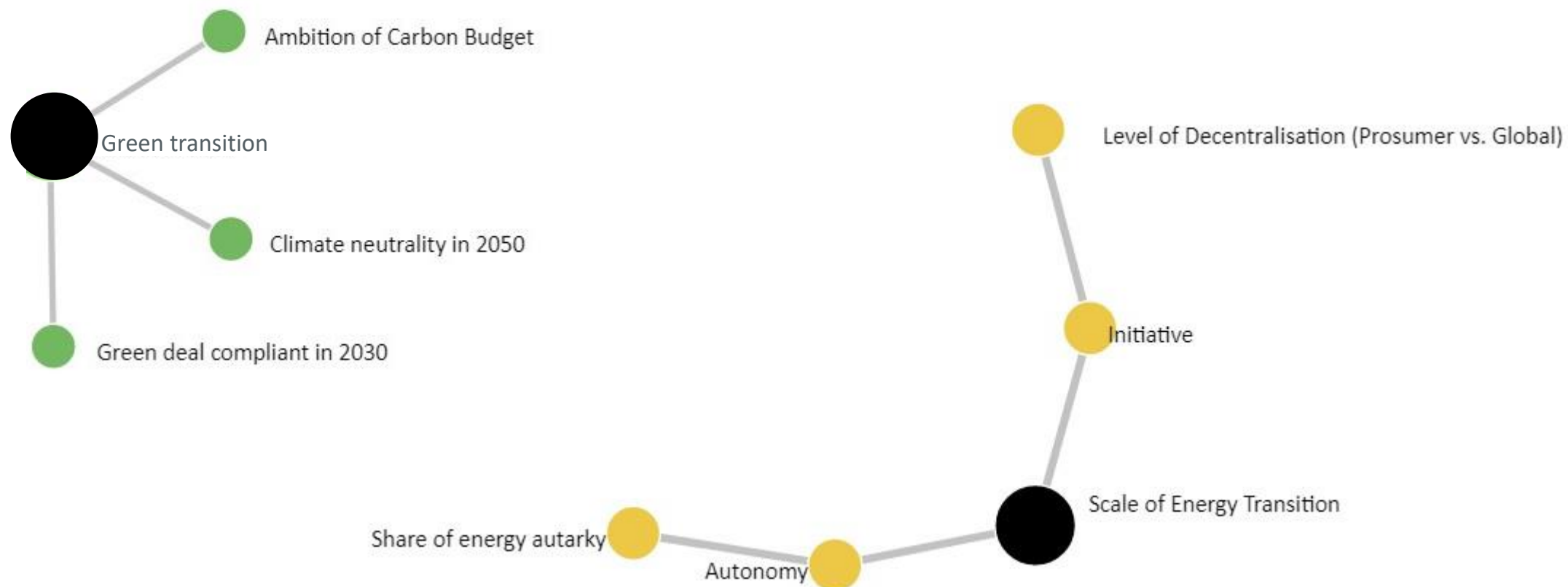
Energy intensity

Circularity vs comfort

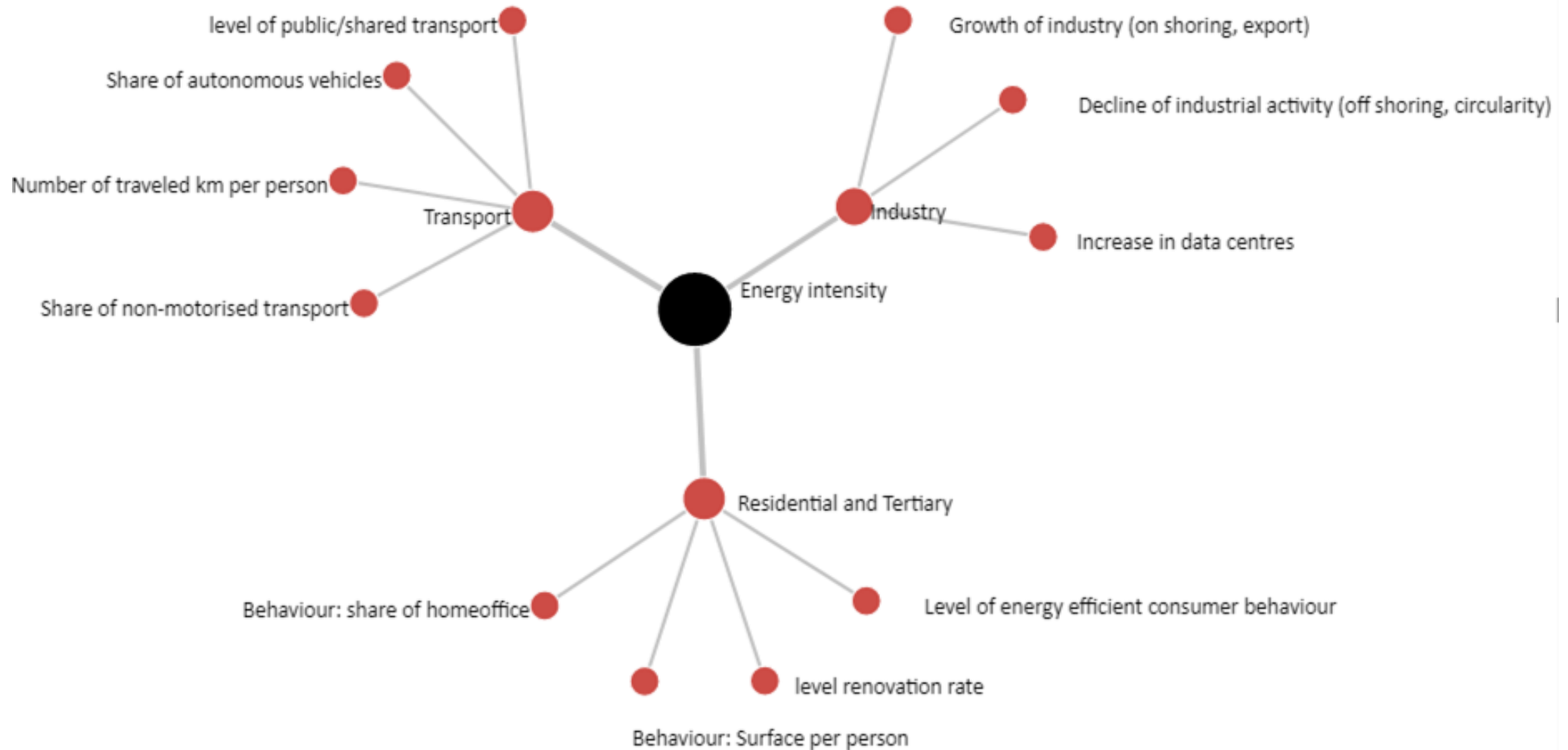
Technologies

Supply, Demand, Sector Coupling (incl. hydrogen), E&G Flexibilities

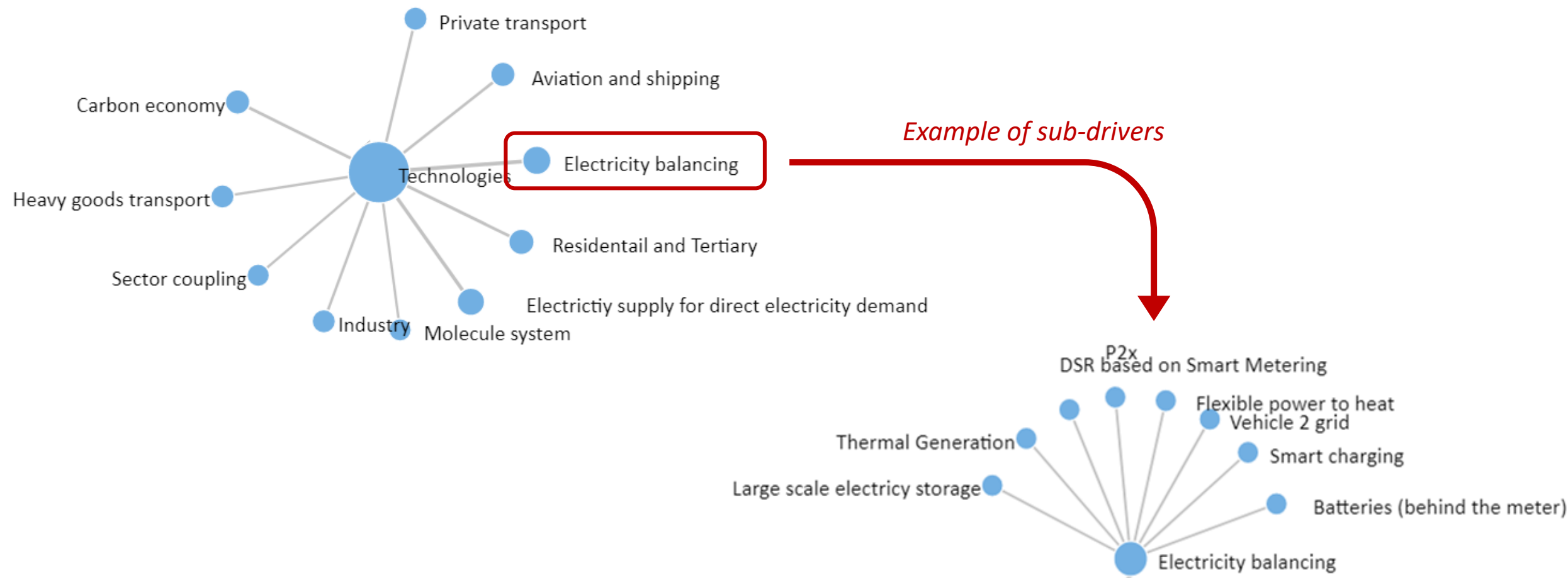
Drivers 1 & 2 : Green transition and Scale of Energy Transition



Driver 3: Energy Intensity



Driver 4: Technologies



First proposal for qualitative TYNDP 2022 storylines

Top down scenario A

European autonomy with renewable and decentralised focus

- Climate neutral in 2050
- Transition initiated on local/national level (prosumers)
- Higher degree of EU energy self-sufficiency
- Circularity
- Focus of decentralised technologies (PV, batteries, etc)
- High RES and P2x
- Focus on electric HP and district heating
- Higher share of EV
- Limited CCS

Top down scenario B

Global economy relying on low-carbon centralized options next to RES

- Climate neutral in 2050
- Transition initiated on a European/international level
- EU import dependency (CH₄, H₂)
- Global economy
- Focus on large scale technologies (offshore wind, large storage)
- Less RES in Europe, more biomethane
- Focus on hybrid heating technology
- Hydrogen and biofuels in mobility
- Room for CCS (industry, power)

Bottom-up scenario

- In line with national policies and national long-term strategies
- Strong country-specific narrative that provides insight into the evolving policies and market for each area
- High quality datasets available from TSO national processes and extensively consulted on national level
- A joint submission from Gas and Electricity from a national level based on best knowledge from the TSOs

Expected feedback on drivers

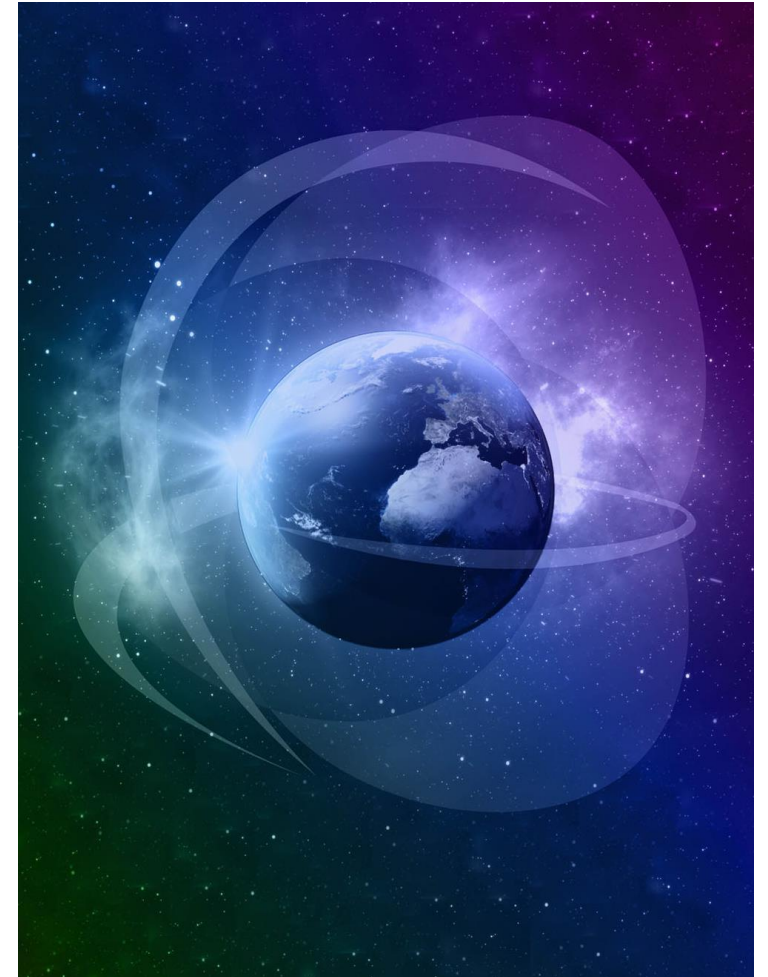
Stakeholders are invited to send us feedback by July 17th about:

- Is there any missing driver that may have an impact on electricity and gas infrastructure assessment?
- How to differentiate scenarios in term of energy intensity when there is possible conflict between EU independency in terms of energy, technology, industrial activity and scarce resources?

		Top-down scenario A	Top-down scenario B	Other options
Main focus of the EU industrial sector		Recycling	Export	?
Reliance on imports of...	Energy	Lower	Higher	?
	Energy technologies (PV, batteries...)	Higher	Intermediate	?
	Scarce resources	Higher	Intermediate	?

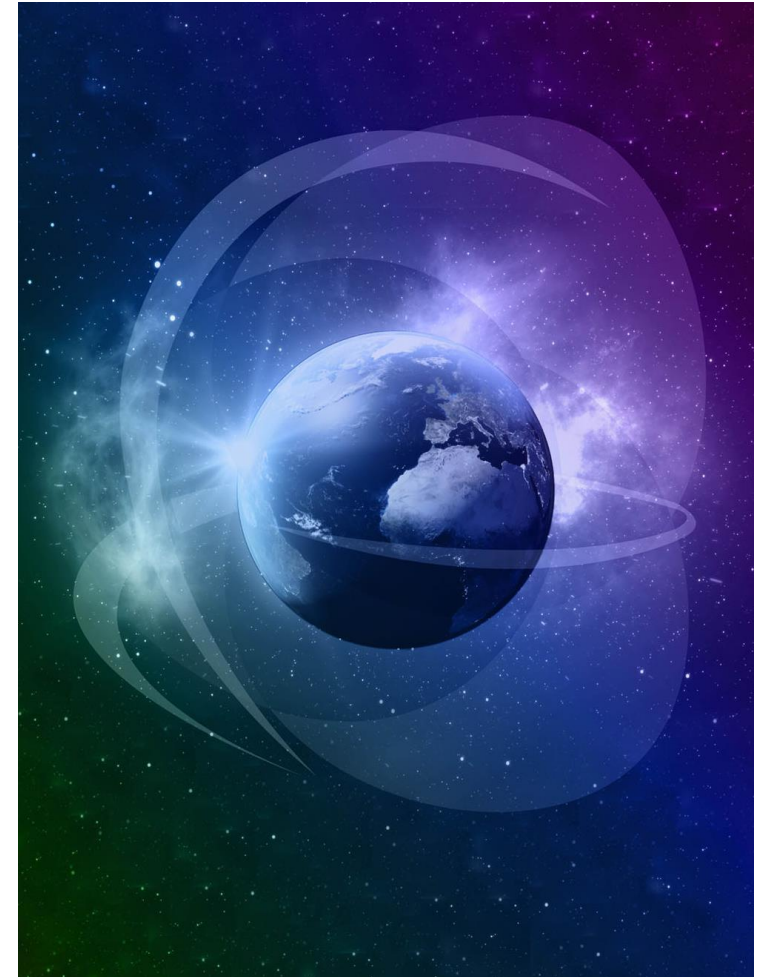
- Do you have further feedback on the storyline definition?

Questions & Answers



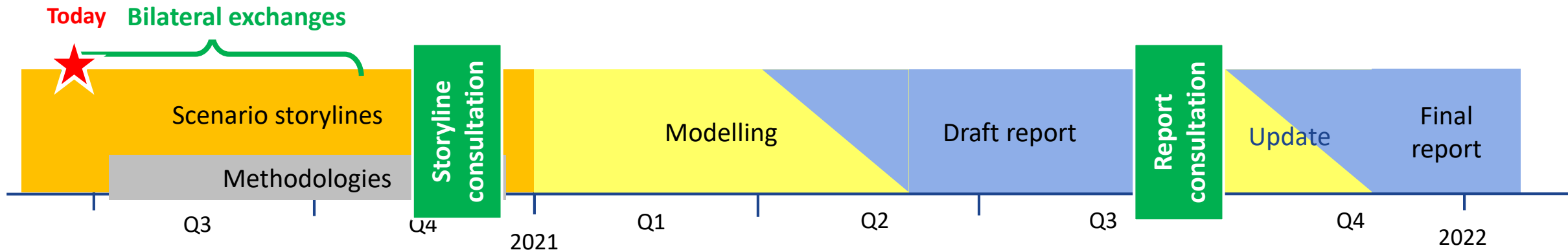
For any feedback, please contact the Scenario Building Core Team by July 17th:

- Dante Powell Dante.Powell@sec.entsoe.eu
- Cihan Soenmez Cihan.Soenmez@entsog.eu
- Pieter Boersma P.j.boersma@gasunie.nl
- Olivier Lebois Olivier.lebois@rte-france.com



Next steps

- Over the summer ENTSOE and ENTSG will continue to engage with stakeholders on the design the storylines and key parameters
- In autumn draft storylines, including key quantified parameters, will be submitted to public consultation
- Next year, finalized storylines will be modelled into the scenarios. Draft scenarios will be submitted to public consultation in summer 2021.



Thank you for your attention

Location:

Date: 3 July 2020

