Framing the future

ENTSO-E TYNDP SCENARIOS

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ACER workshop on scenarios and CBA methodology for assessing electricity infrastructure projects

10 May 2016

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Reliable Sustainable Connected

TYNDP2016 timeline

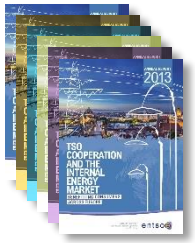
		2015				2016			
Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4

Scenario development

Scenario Development Report

Coordinated planning

Regional Investment Plans & draft list
TYNDP2016 Project Candidates



Project identification

CBA assessments

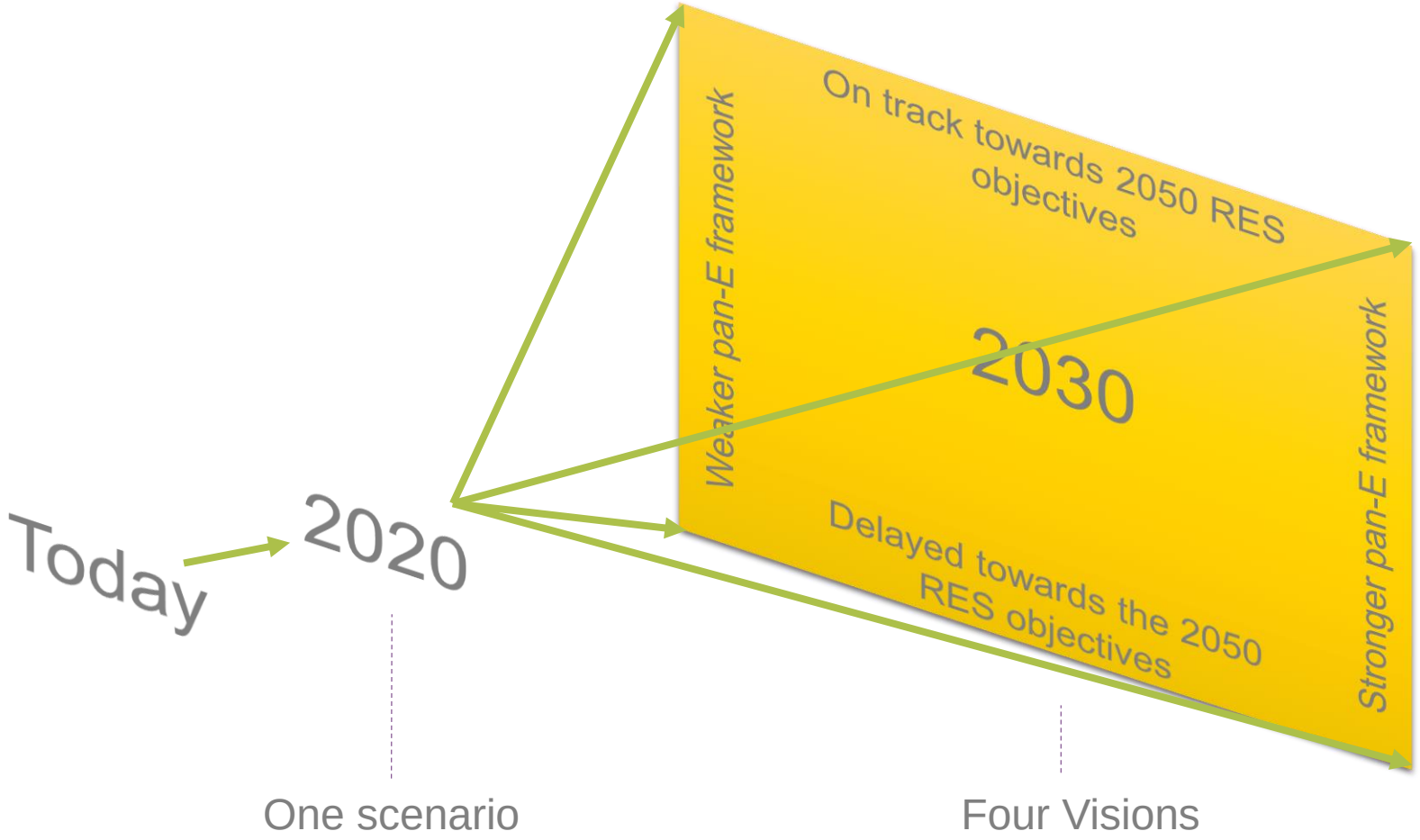
Final TYNDP2016

Public consultation

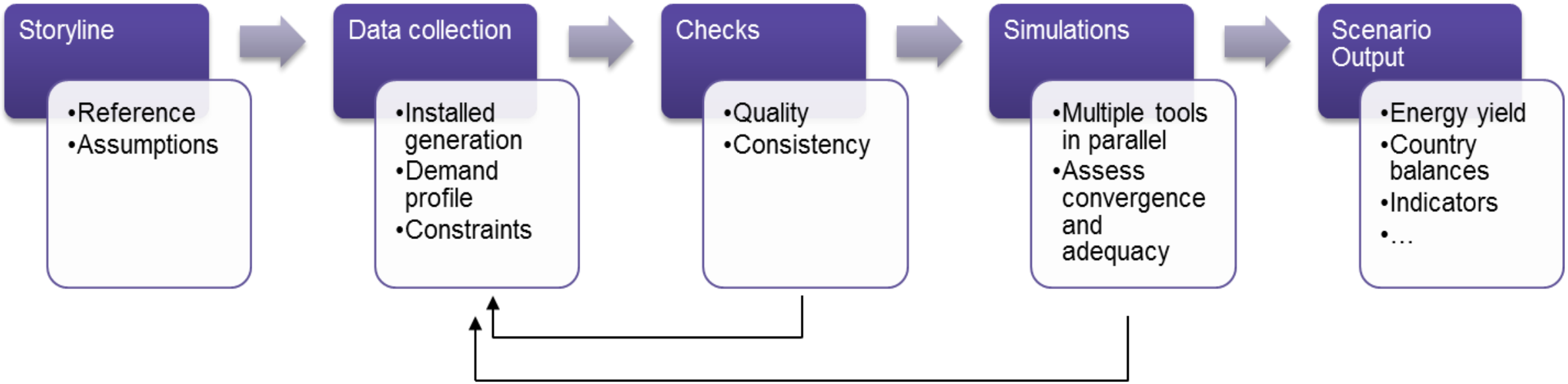
Scenario building – framing the uncertainty

- How will 2020 and 2030 look like?
- What parameters to consider (demand, technology, policies)?
- How to deal with inherent uncertainties?

The further you look, the more scenarios we need to ensure a robust study framework



Steps to build TYNDP scenarios



Steps to build TYNDP scenarios

For each Vision: create a storyline based on different parameters

Economy and Market

Economic and financial conditions
New market designs
National schemes regarding R&D expenses
Merit order : primary fuel pricing - carbon pricing

Demand

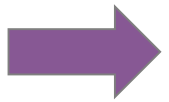
Energy efficiency developments
New usages (Heat pumps, Electric vehicles)
Demand response potential

Generation

RES (wind, solar, RoR, biomass)
Flexibility of generators
Back up capacity (nuclear, CCS)
Decentralized and centralized storage

Grid

smart grid and the impact on load & generation patterns



Information is gathered through workshops/consultations

Comments of different parties are taken into account

- Stakeholders
- National correspondents (LAC)
- Regional groups
- Team involved in previous TYNDP
- …

+

2050 roadmap

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Vision 3 "National Green Transition"

- Economic conditions being more favourable than in Vision 1 and 2. Member states having more financial means to reinforce existing energy policies.
- Loose European energy governance is a barrier to the introduction of fundamental new market designs that fully benefit from R&D developments.
- Demand is lower than Vision 1 as a balance between a stronger electrification of transportation and heating cooling with stronger developments in energy efficiency.
- CO2 prices lead to a shift of merit order with gas less expensive than coal-based power generation.

Vision 4 "European Green Revolution"

- financial conditions most favourable across all Visions.
- Significant investments in sustainable energy generation undertaken.
- Strong European framework makes the introduction of fundamental new market designs that fully benefit from R&D developments more likely.
- RES is located in Europe in an optimal way lowering the cost for society.
- Backup capacity to secure adequacy is handled on a European level.
- Large scale RES expansion drives the price of RES electricity production to a competitive level.

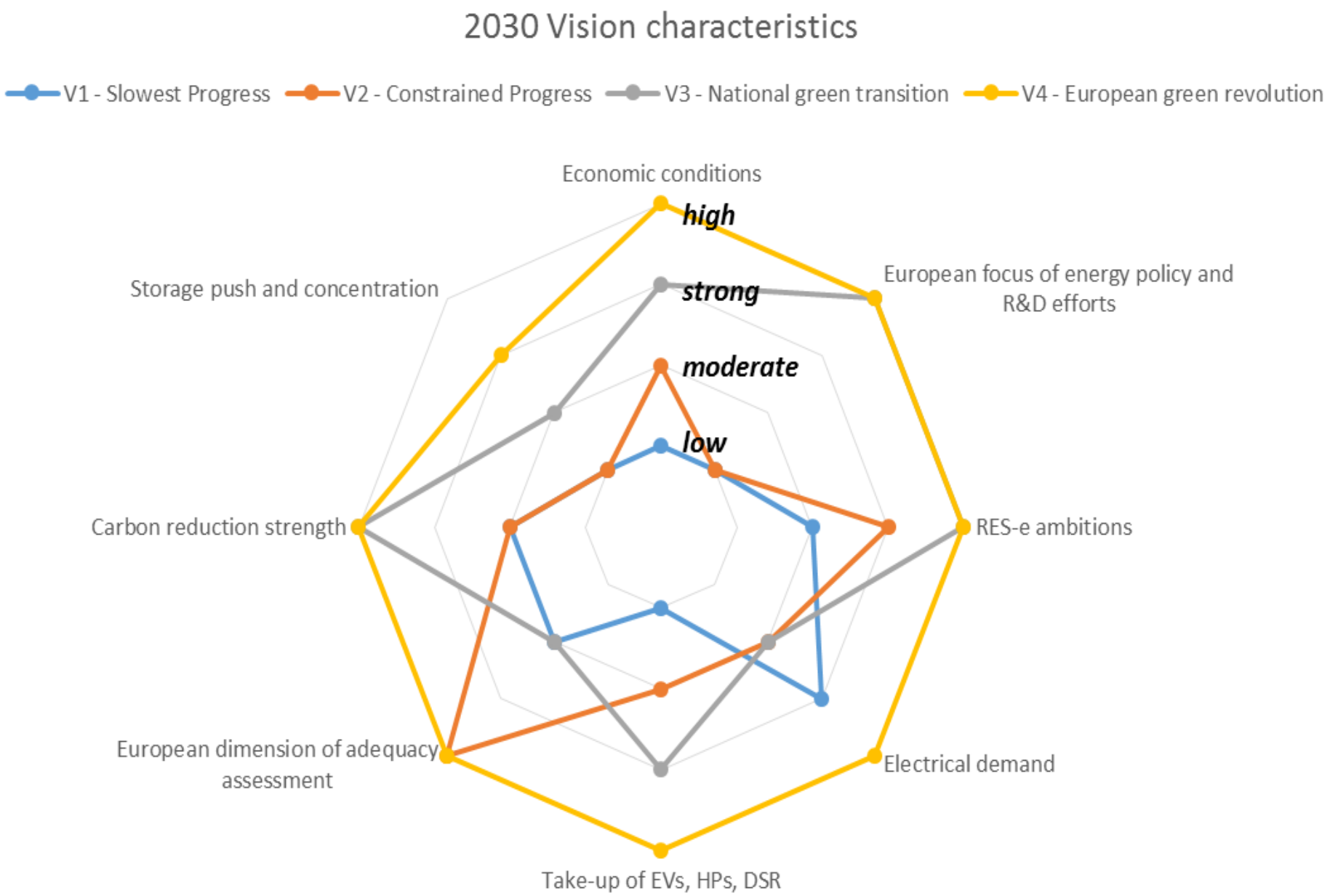
Vision 1 "Slowest Progress"

- No common European decisions regarding CO2 emission reductions nor future generation mix
- Economic conditions unfavourable, though still modest economic growth. Limited willingness to invest in either high carbon or low carbon emitting sources due to investment risks, low CO2-prices and lack of aligned support measures.
- Little new thermal capacity coming online except in the case for subsidized production or adequacy required peak capacity
- No major breakthrough in technological developments are expected.

Vision 2 "Constrained Progress"

- Economic and financial conditions are more favourable compared to Vision 1 providing more room to reinforce/enhance existing energy policies.
- Energy policies are more strongly coordinated across Europe; installation of additional RES more coordinated where the locations offer more resources.
- Electricity demand is lower than Vision 1 due to limited but stronger energy efficiency developments.

- European coordination +

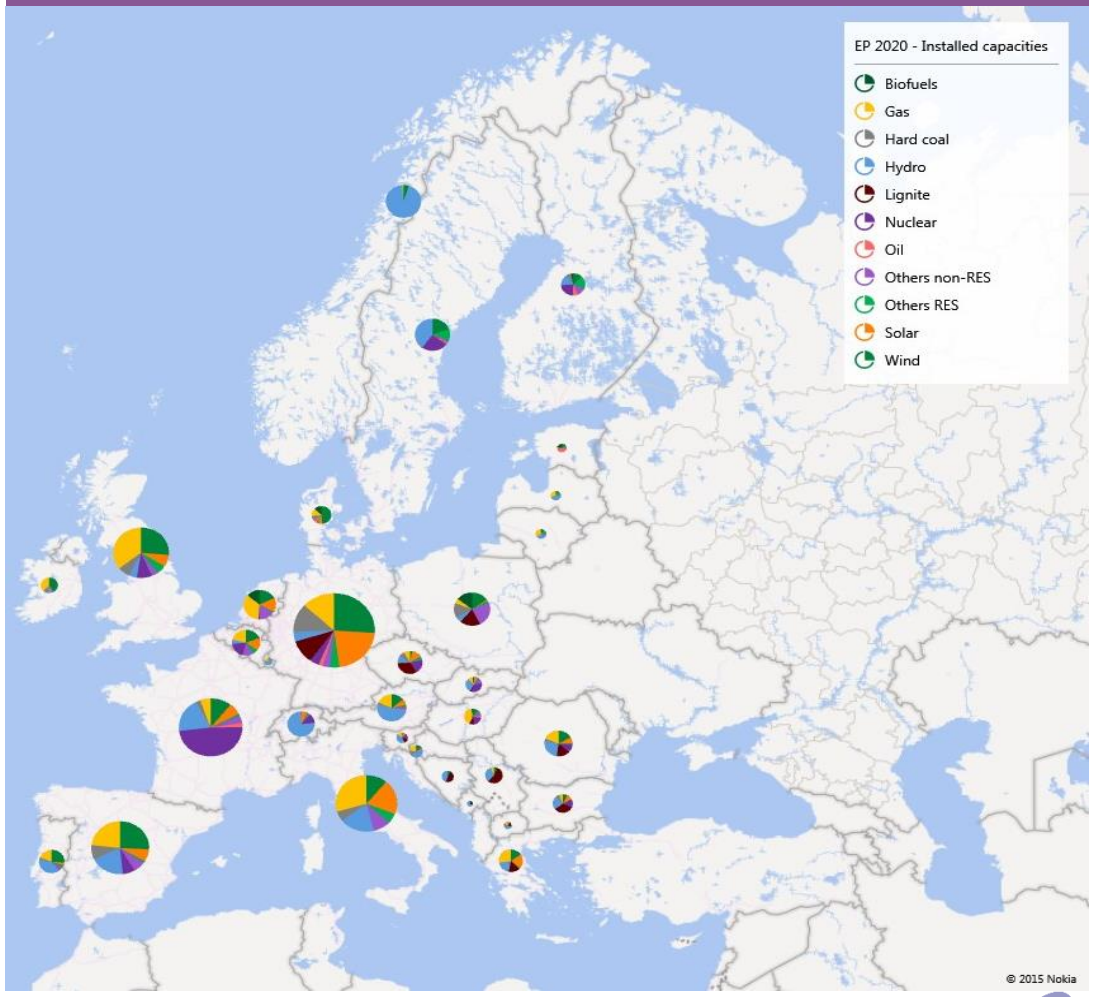

2030 Vision characteristics
V1 - Slowest Progress
V2 - Constrained Progress
V3 - National green transition
V4 - European green revolution
Economic conditions
high
strong
moderate
low
European focus of energy policy and R&D efforts
RES-e ambitions
Electrical demand
Take-up of EVs, HPs, DSR
European dimension of adequacy assessment
Carbon reduction strength
Storage push and concentration

Four main differences compared to TYNDP 2014 scenarios

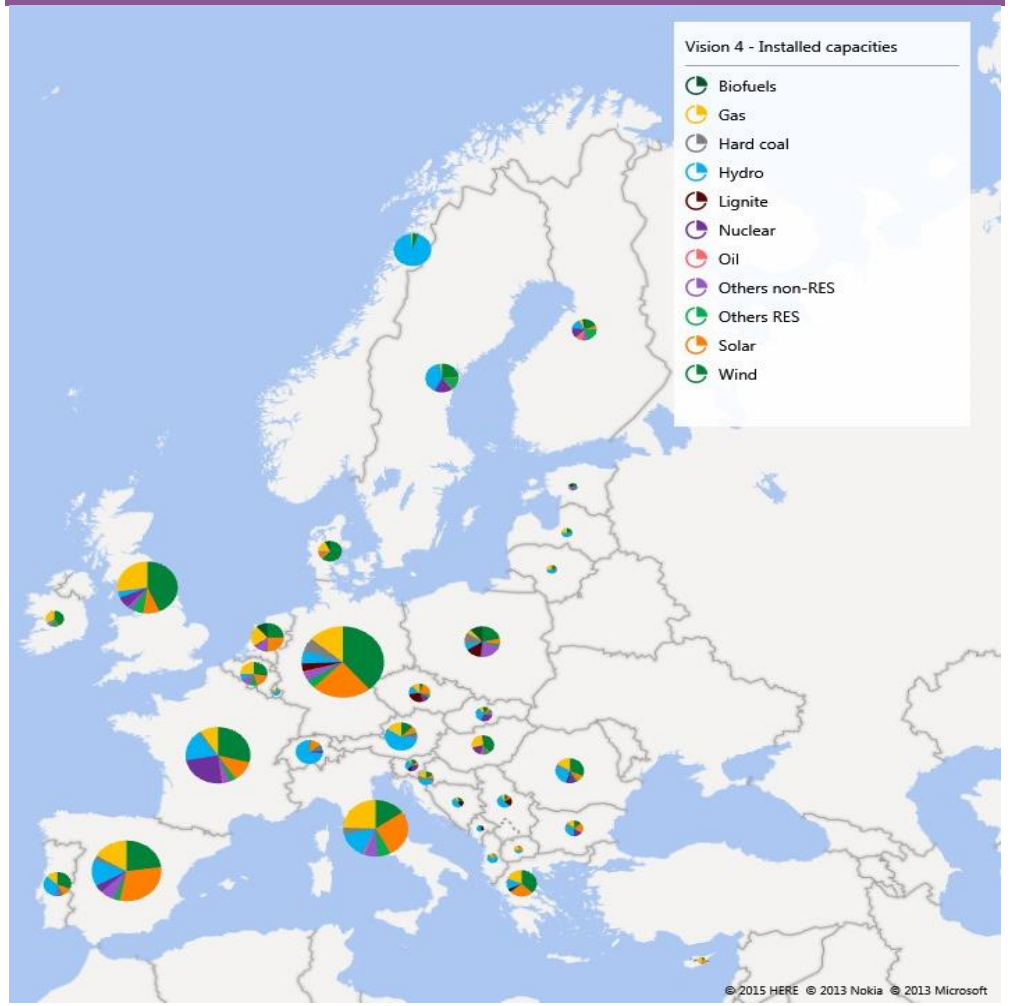
- Demand does not see a continues increase and is lower than in 2014 assumptions
- The adequacy level is explicitly described in the visions and a country can be no longer autonomous
- New RES optimization methodology (including re-allocates the RES over the different countries)
- New thermal optimization methodology based on economic criterion (trade-off between fixed costs and variable generation costs)

Scenario building – Examples of outputs (I)

Installed capacities EP 2020

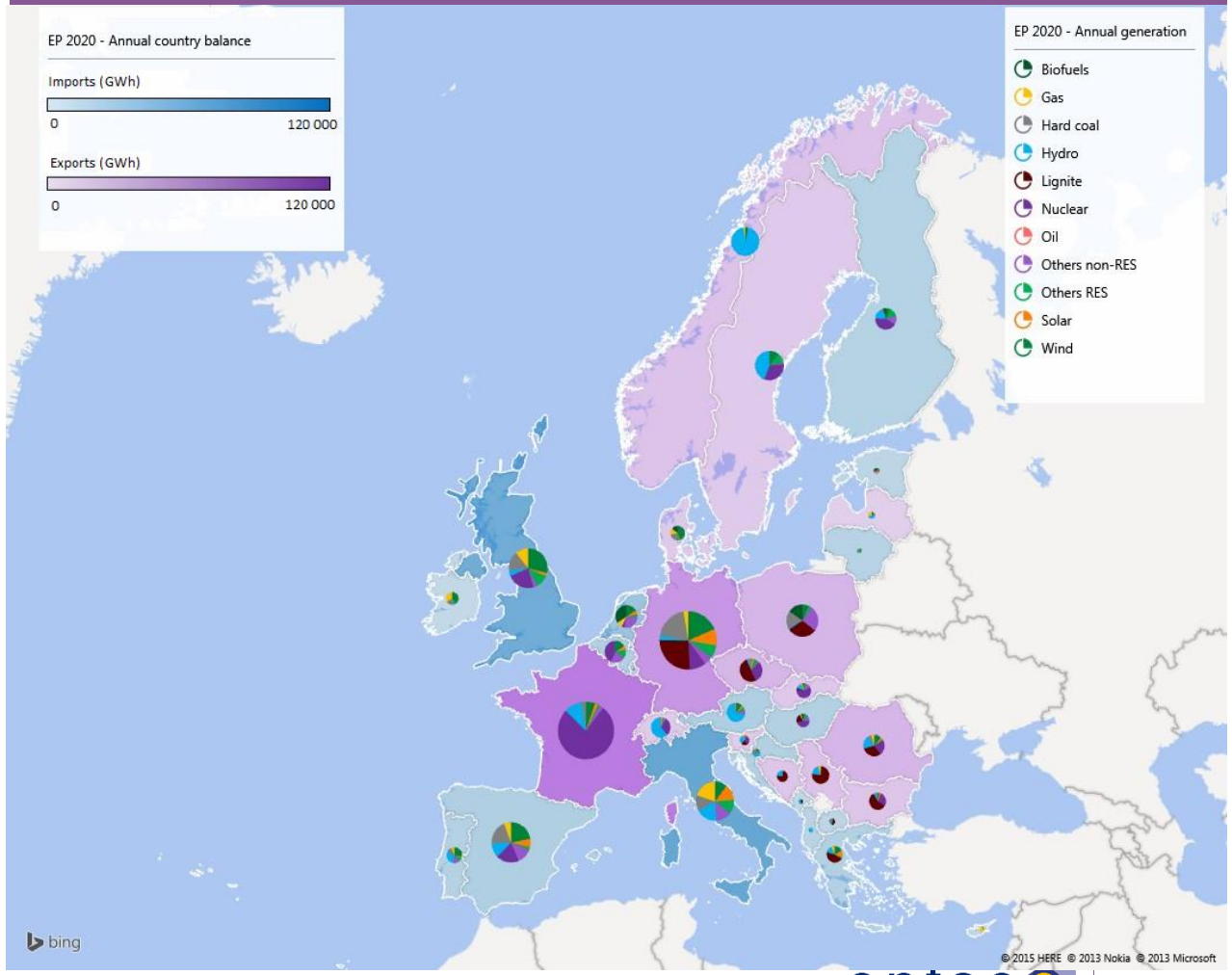


Installed capacities 2030 vision 4

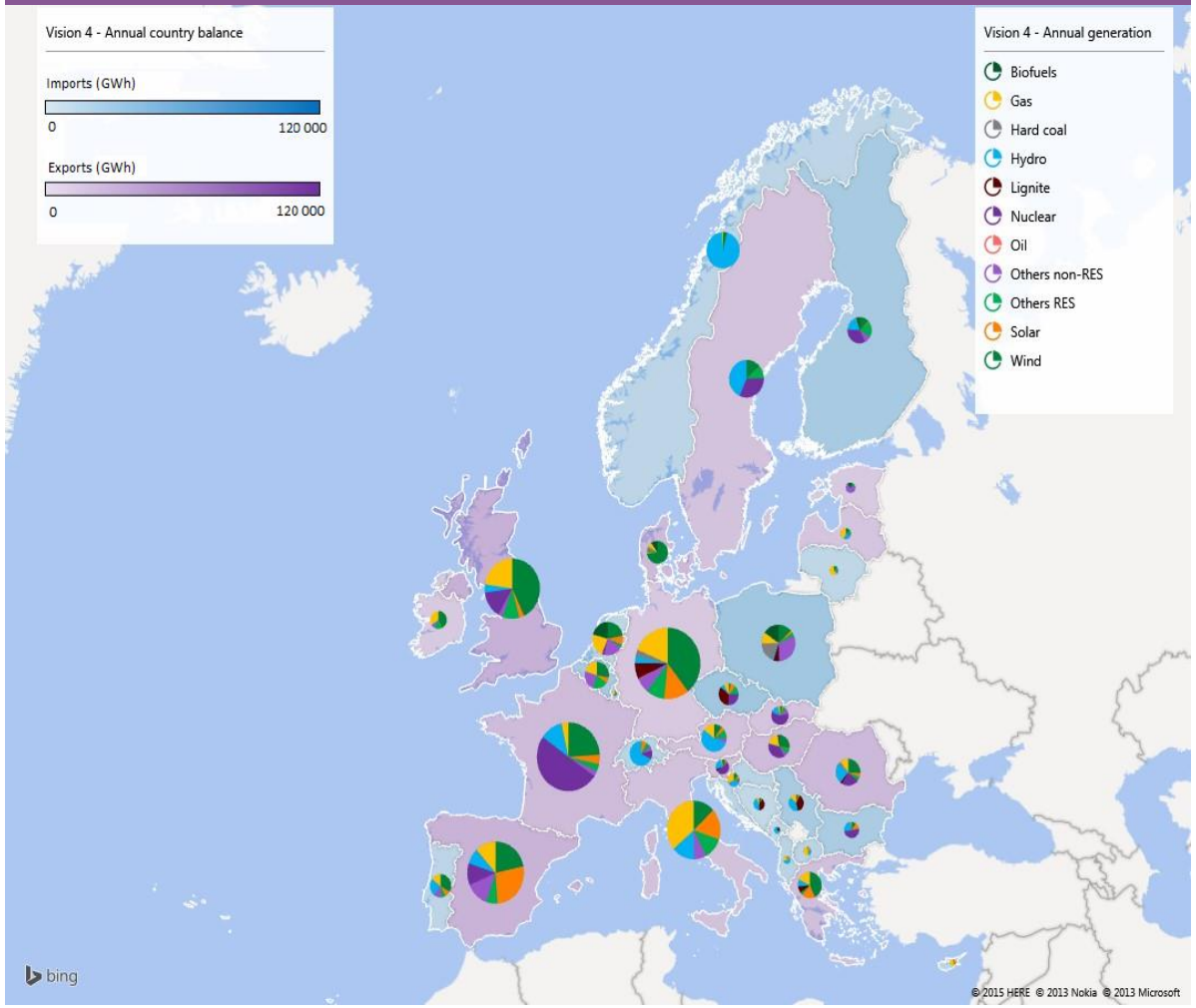


Scenario building – Examples of outputs (II)

Annual generation and country balances EP2020

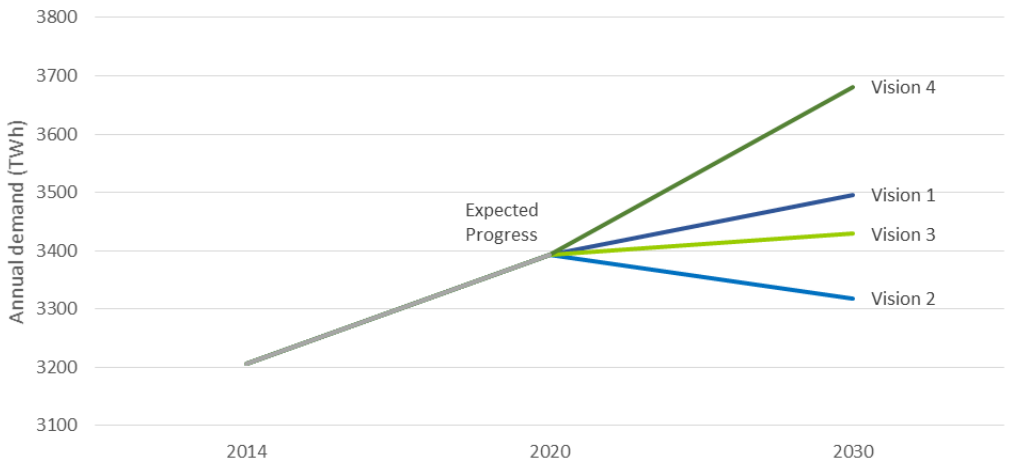


Annual generation and country balances -vision 4

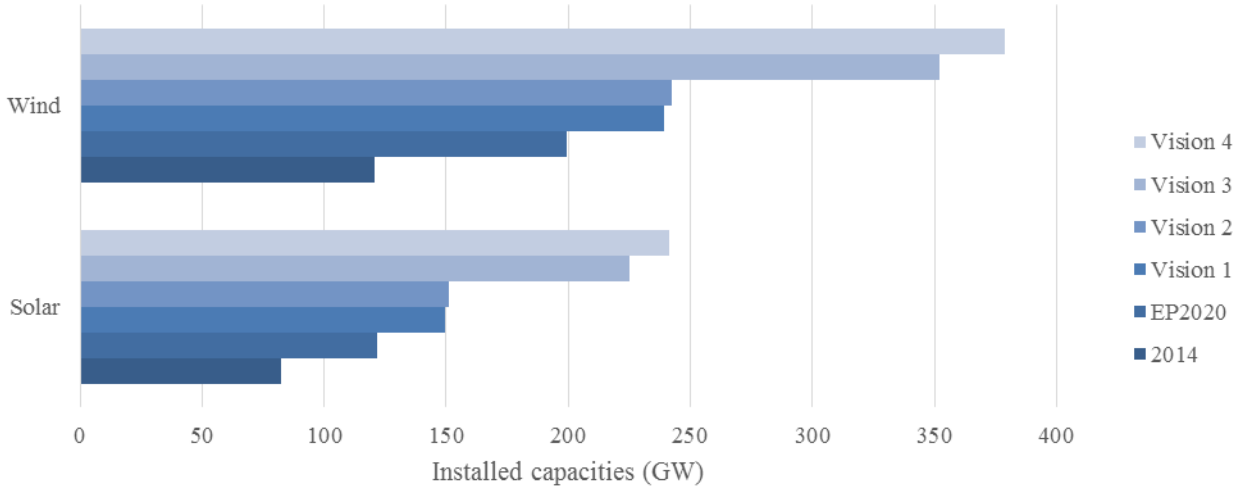


Scenario building – Examples of outputs (III)

Demand across all scenarios

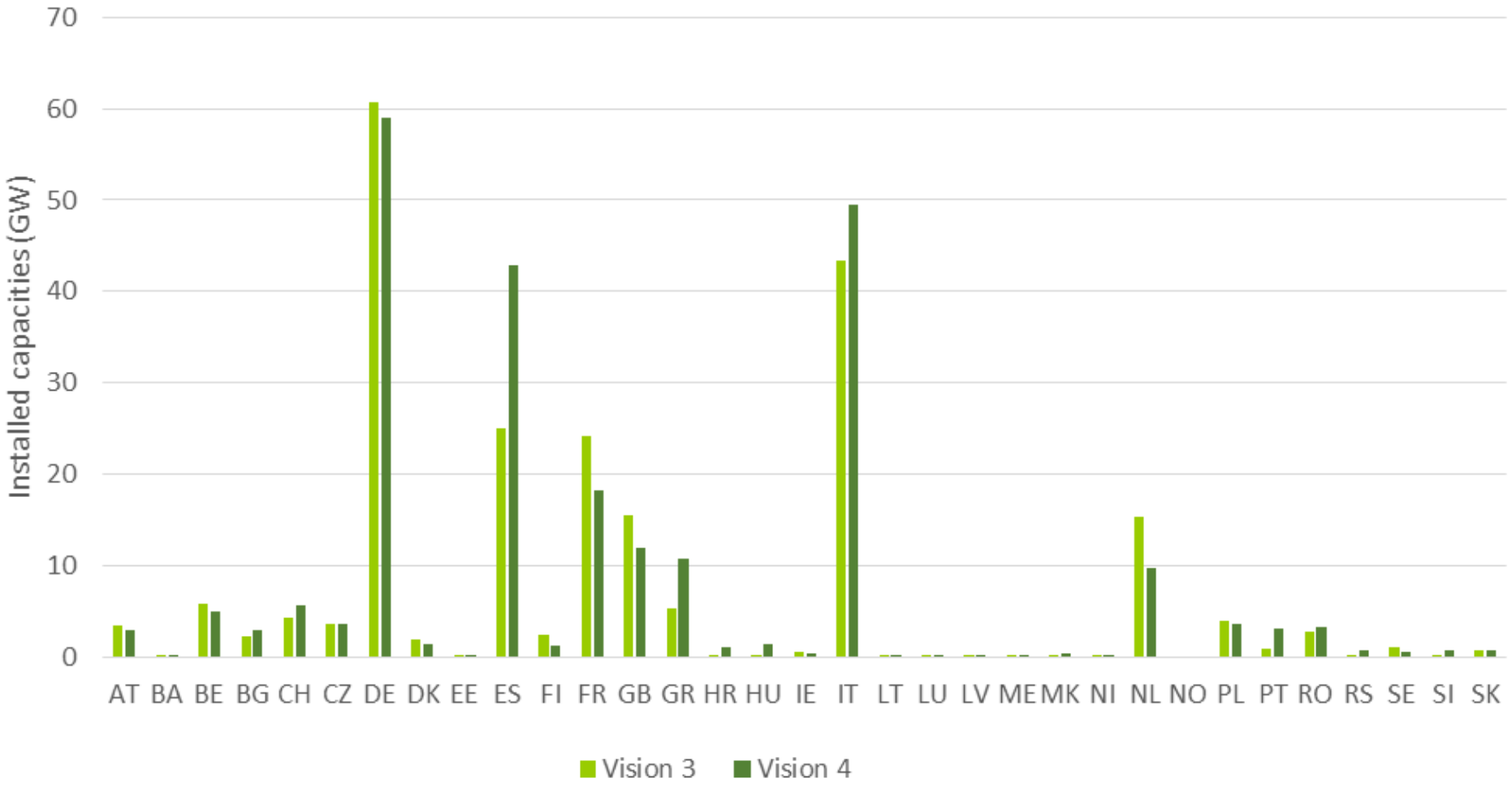


Wind/PV across all scenarios



Scenario building – Examples of outputs (IV)

PV re-allocation from Vision 3 to Vision 4



Back-up slides

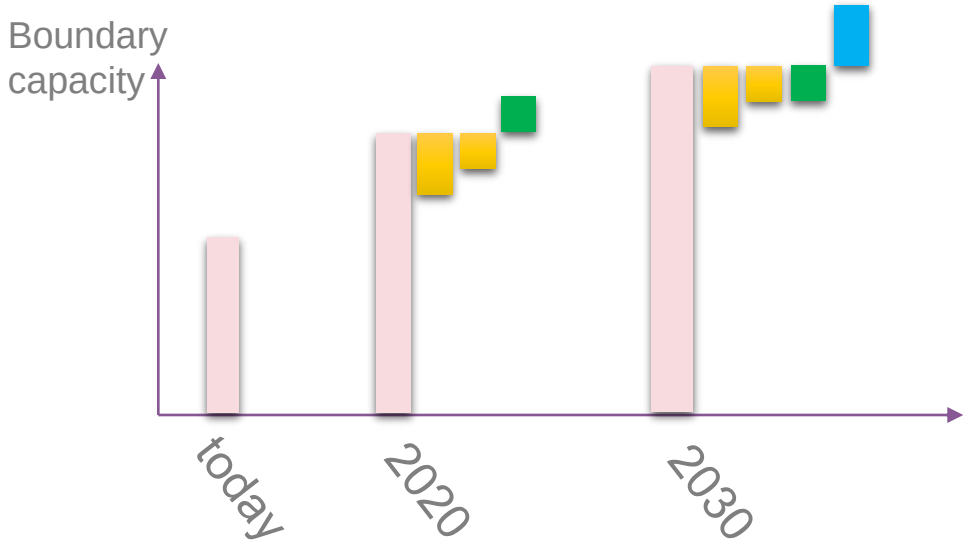
	Slowest progress	Constrained progress	National green transition	European green revolution
	V1	V2	V3	V4
Economic and financial conditions	Least favourable	Less favourable	More favourable	Most favourable
Focus of energy policies	National	European	National	European
Focus of R&D	National	European	National	European
CO_2 and primary fuel prices	low CO_2 price, high fuel price	low CO_2 price, high fuel price	high CO2 price, low fuel price	high CO2 price, low fuel price
RES	Low national RES (>= 2020 target)	Between V1 and V3	High national RES	On track to 2050
Electricity demand	Increase (stagnation to small growth)	Decrease compared to 2020 (small growth but higher energy efficiency)	stagnation compared to 2020(	Increase (growth demand)
Demand response (and smart grids)	As today	Partially used	Partially used	Fully used
Electric vehicles	0%	5%	5%	20%
	No commercial break through of electric plug-in vehicles	Electric plug-in vehicles (flexible charging)	Electric plug-in vehicles (flexible charging)	Electric plug-in vehicles (flexible charging and generating)
Heat pumps	0%	5%	5%	10%
	Minimum level	Intermediate level	Intermediate level	Maximum level
Adequacy	1%	5%	5%	9%
	National - not autonomous limited back-up capacity	European - less back-up capacity than V1	National - autonomous high back-up capacity	European - less back-up capacity than V3
Merit order	Coal before gas	Coal before gas	Gas before coal	Gas before coal
Storage	As planned today	As planned today	Decentralized	Centralized

Assessment of individual projects

- Reflect maturity of projects
- Assess at two time horizons

→ Classify projects & define reference capacities

Mid-term project		Long-term project		Future project
Planned	Commissioning =< 2022	Planned	2022 < Commissioning =< 2030	Others



Reference capacity

- Expected/planned development of the grid
- Parameter for market modelling tools
- Confirmed by network studies
- Possibly different values in either direction

TYNDP website

https://www.entsoe.eu/major-projects/ten-year-network-development-plan/Pages/index.html

Thank you for your attention

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