

A sunset scene with a blue sky transitioning to orange and yellow near the horizon. Silhouettes of trees and power lines are visible against the bright sky.

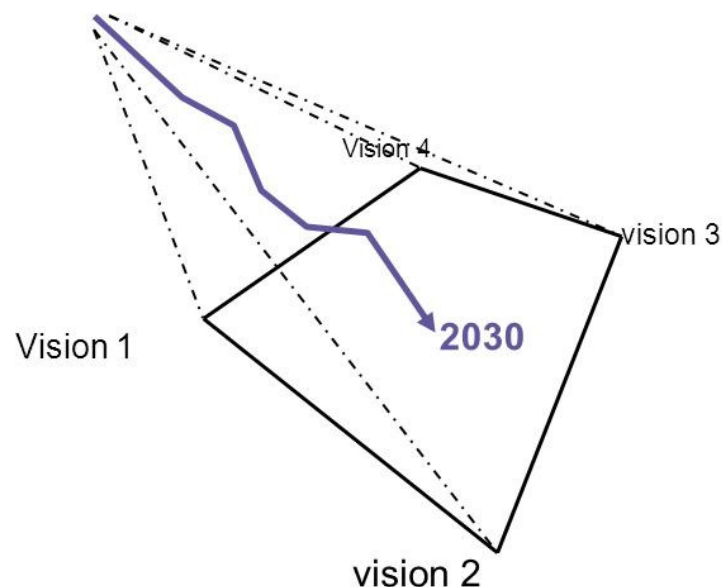
Workshop on Visions for the TYNDP 2016

Brainstorm with stakeholders 16-09-2014

Convener Task Force Scenario Building
Cindy Bastiaensen

TYNDP14: 4 Visions for 2030

2030 Visions: a bridge between the European energy targets for 2020 and 2050



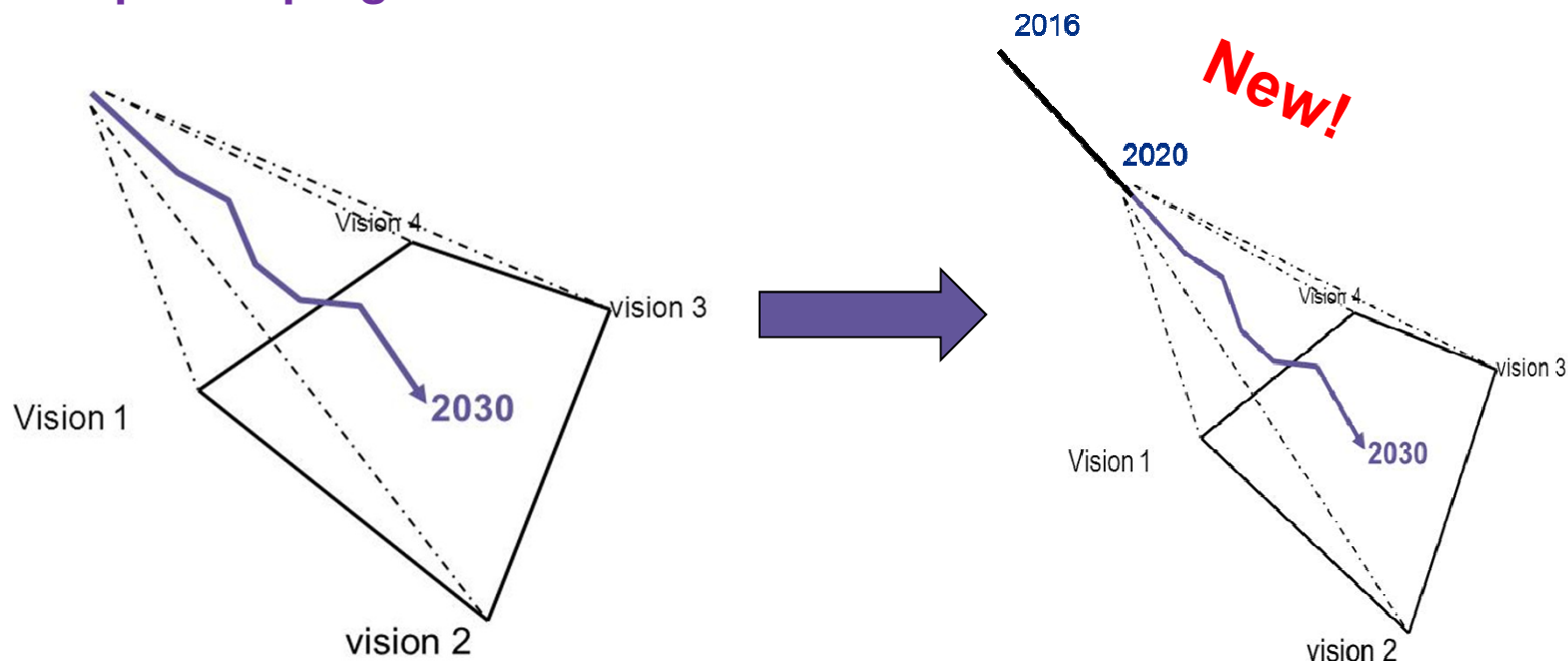
Objectives for the visions:

- Look beyond 2020
- Differ enough from each other
- The visions are not forecasts (no probability attached to the visions).

2030: the pathway realised in the future falls with a high level of certainty in the range described by the four visions

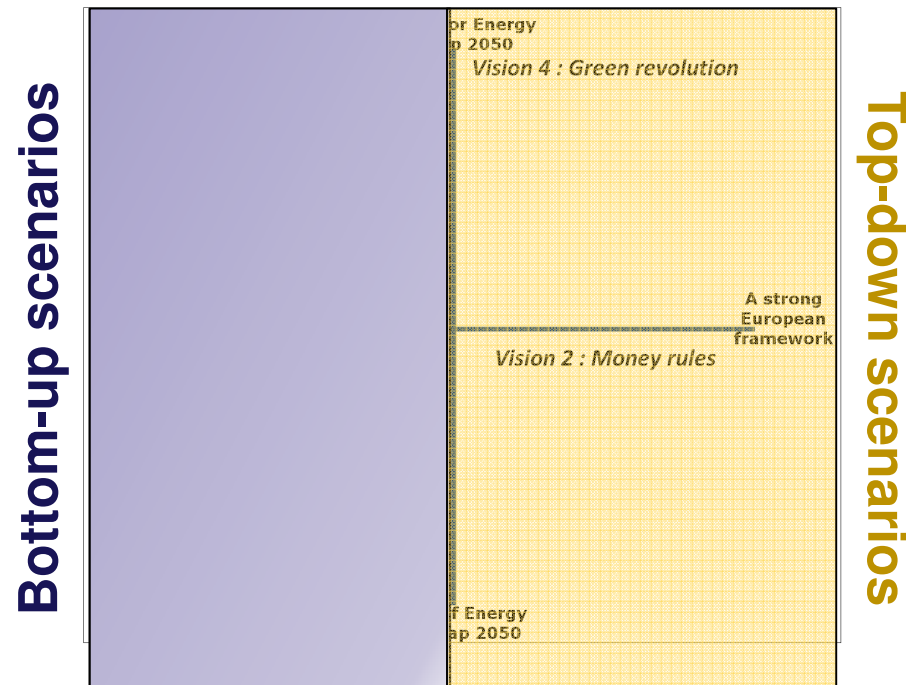
TYNDP16: 4 Visions for 2030 + 1 for 2020

2020: expected progress – best estimate



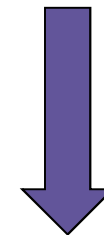
2020 = the last point in time before uncertainties increase to a level where the future requires a broader envelope of potential futures

TYNDP16: 4 Visions for 2030



TYNDP16: Idea of constructing 4 extreme Visions stays, but...

- Data can change
- Boundary conditions can change
- Methodology how to construct the Visions can change
- ...



All input/parameters/ideas are welcome!

Parameters

VISION 3:
"GREEN
TRANSITION"

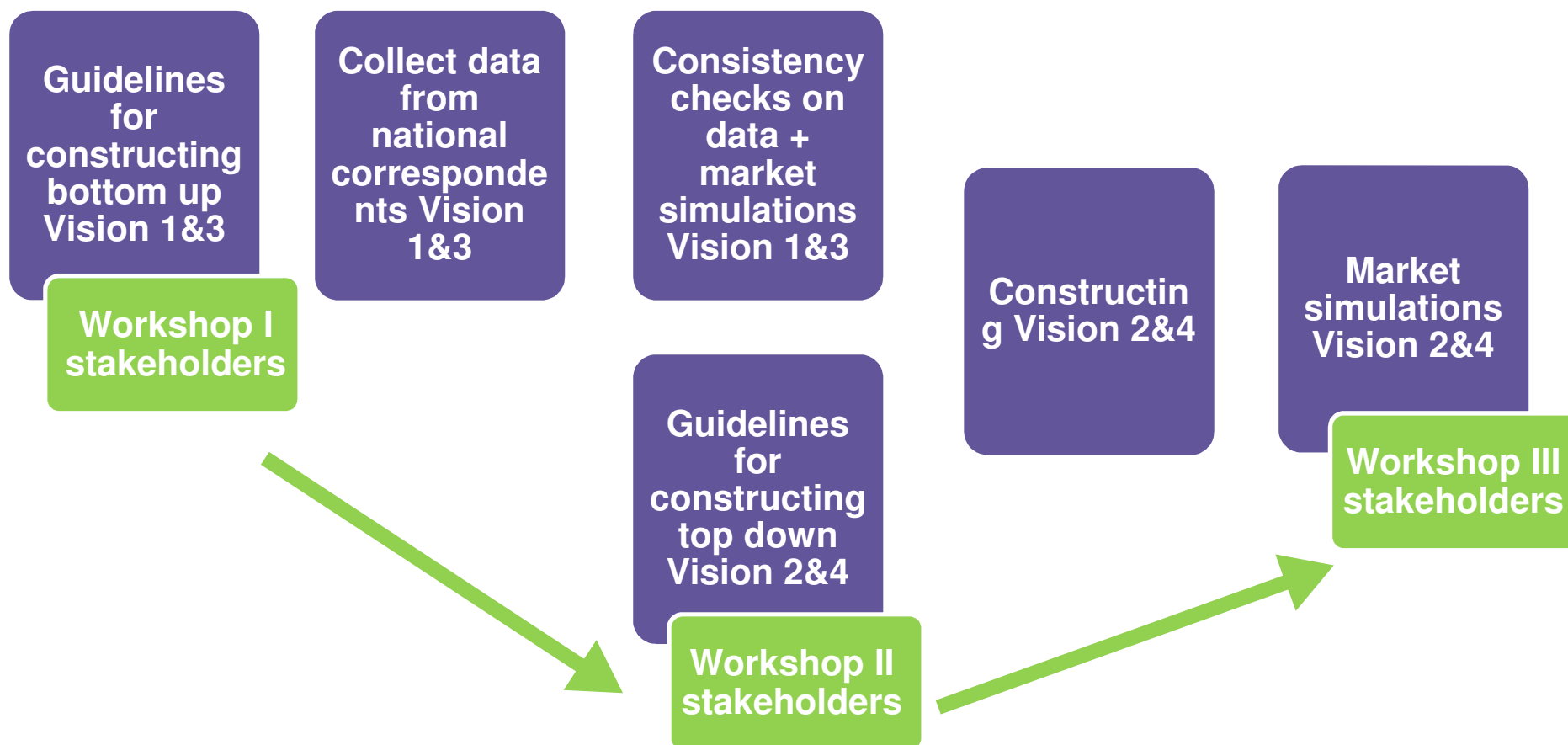
VISION 4:
"GREEN
REVOLUTION"

VISION 1:
"SLOW
PROGRESS"

VISION 2:
"MONEY
RULES"

- **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

Construction process for 2030 visions



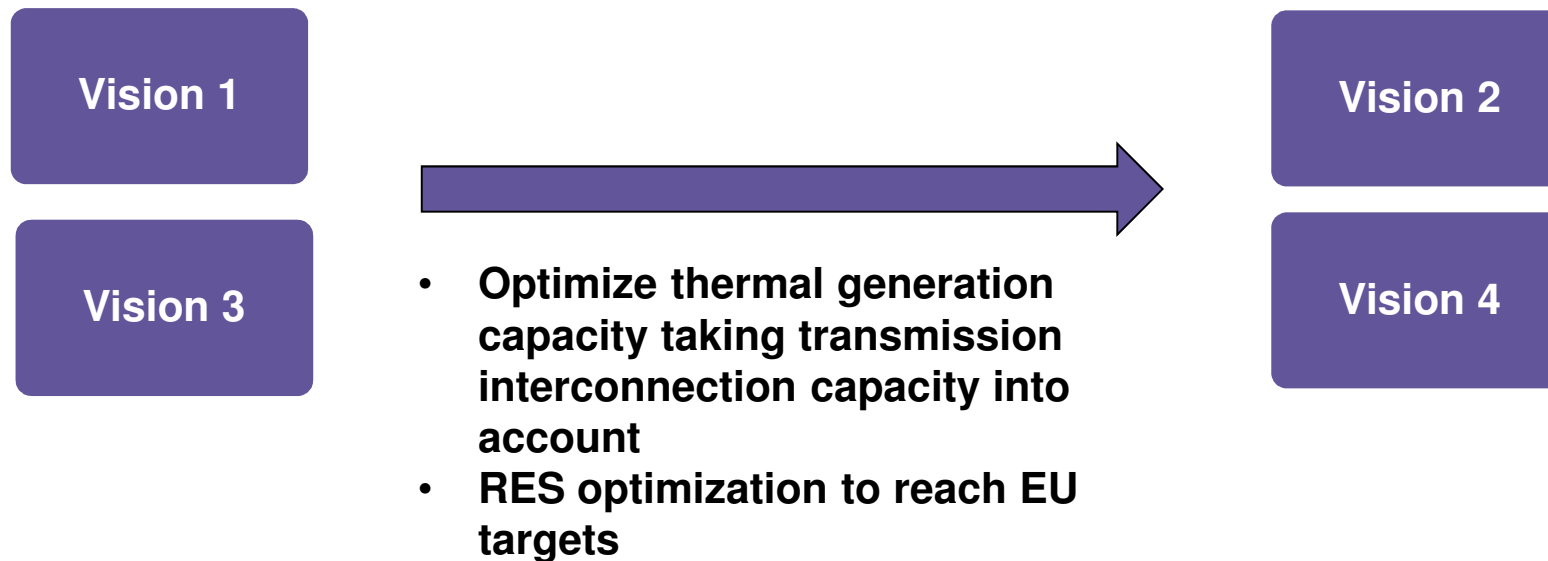
Overall methodology documented in final TYNDP 2016 report

Construction process for 2030 visions



- In order to ensure stakeholders support of the scenarios used to assess projects, stakeholders are consulted regarding probable tendencies towards 2030
- National data (data for vision 1 “Slow Progress” and 3 “Green Transition”) provided by Long-term Adequacy Correspondent (LAC) should be coherent with the general common framework set by ENTSO-E
- The top-down approach for visions 2 “Money Rules” & 4 “Green Revolution” requires that they are established at a centralized European level

Construction process for 2030 visions



Market modelling

Inputs

- Multiple scenarios with hypotheses regarding
 - Demand profile
 - Generator characteristics
 - Other generation profile
 - Wind and Solar Profiles
 - Transfer Capacities
 - Reserve
 - Exchanges to Rest of World profile
 - Fuel and CO₂ prices

Modelling

- Chronological Unit Commitment Economic Dispatch model
- Hourly model
- Each country is a single market node
- Minimise the system cost (fuel bill/operating costs) subject to constraints such as must-run, reserve, generator capabilities.

Outputs

- National Balances
- Market Node Marginal costs
- Hourly generation pattern for each generator
- System/Fuel cost
- Fuel consumption by fuel type

Main comments from previous consultations/workshops

Comments from:

- **Stakeholders through**
 - **Public consultation**
 - **Long-Term Network Development Stakeholders Group**
 - **Bilateral meetings**
 - **Previous workshops**
 - **Questionnaires**
- **National correspondents**
- **PEMS-ET**
- **Regional groups**
- **...**

Main comments from previous consultations/workshops

Main comments: 4 clusters

General

- Visions should be more divergent
- Clarification on adequacy criteria used
- Intermediate time-step
- CO₂ price unrealistically high

Demand

- Underpin the expected impact of efficiency measures on electricity consumption
- Demand growth is too much for Vision 4 and energy efficiency is not well reflected

Thermal Reduction

- Generation capacity: sufficient return of investment?
- Thermal units should be optimized in EU visions: nuclear almost the same for all visions
- Combination of high RES, high demand and high amount of inflexible generation: system not cost-effective

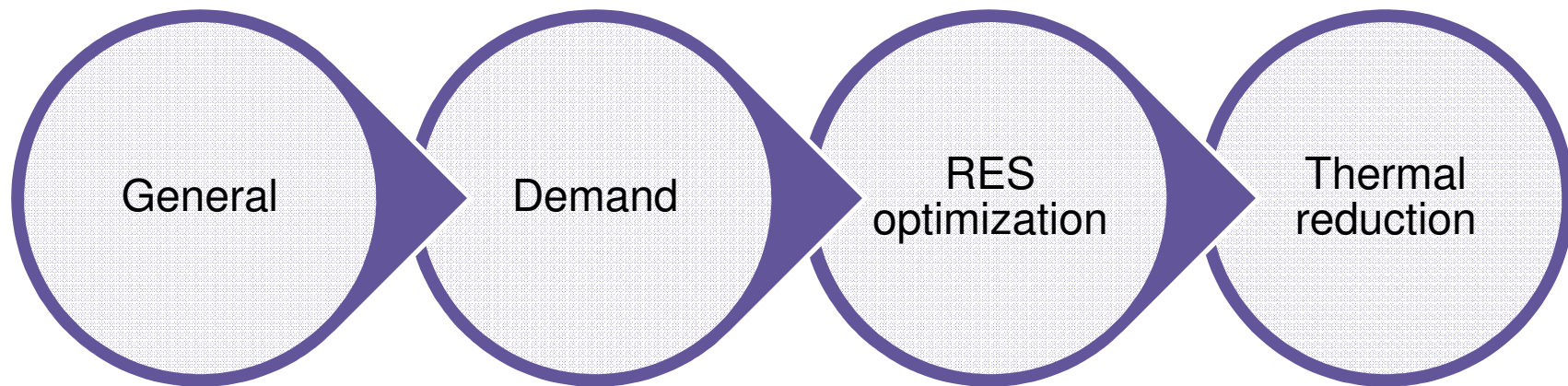
RES Optimization

- Upper limits for wind capacity
- Distribution of RES capacity over the different countries
- RES should be optimized in EU visions

Focus of the workshop

Document sent out last week

- Background and extra explanation for each topic
- Specific questions for each topic



Questions

- Which parameters are important to take into account in order to come to Visions that differ enough from each other?
- What is the level of adequacy that can be expected for 2030 in the 4 Visions?
- What are good sources for fuel and CO2 prices? What is the expected merit order for 2030 for the 4 Visions?

Demand

Questions

- How do you view the development of total power consumption in the future for the 4 Visions: stagnation, recession, growth?
- How is the development impacted by:
 - Economic growth
 - Energy intensive industrial development
 - Electric vehicles
 - Heat pumps
 - Demand response
 - Energy efficiency

Thermal reduction

Questions

- What conventional power generation technologies should primarily be considered for reduction?
- What innovations in conventional power generation will be available and if yes to what extent will they be available?
- How favourable do you consider the boundary conditions for different technologies in each country?

RES optimization

Questions

- How to do RES optimization?
- Which parameters should be considered?
- Which limits and constraints should be taken into account?

Idea of the workshop today

Brainstorm in 3 groups

- No presentation on the topics
- Open discussion -> 'What can we improve?'
- Data/sources are welcome during the workshop or later on

Question: does this cover your expectations for today?



Let's get started!

Contact:
Cindy.Bastiaensen@elia.be

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Reliable Sustainable Connected

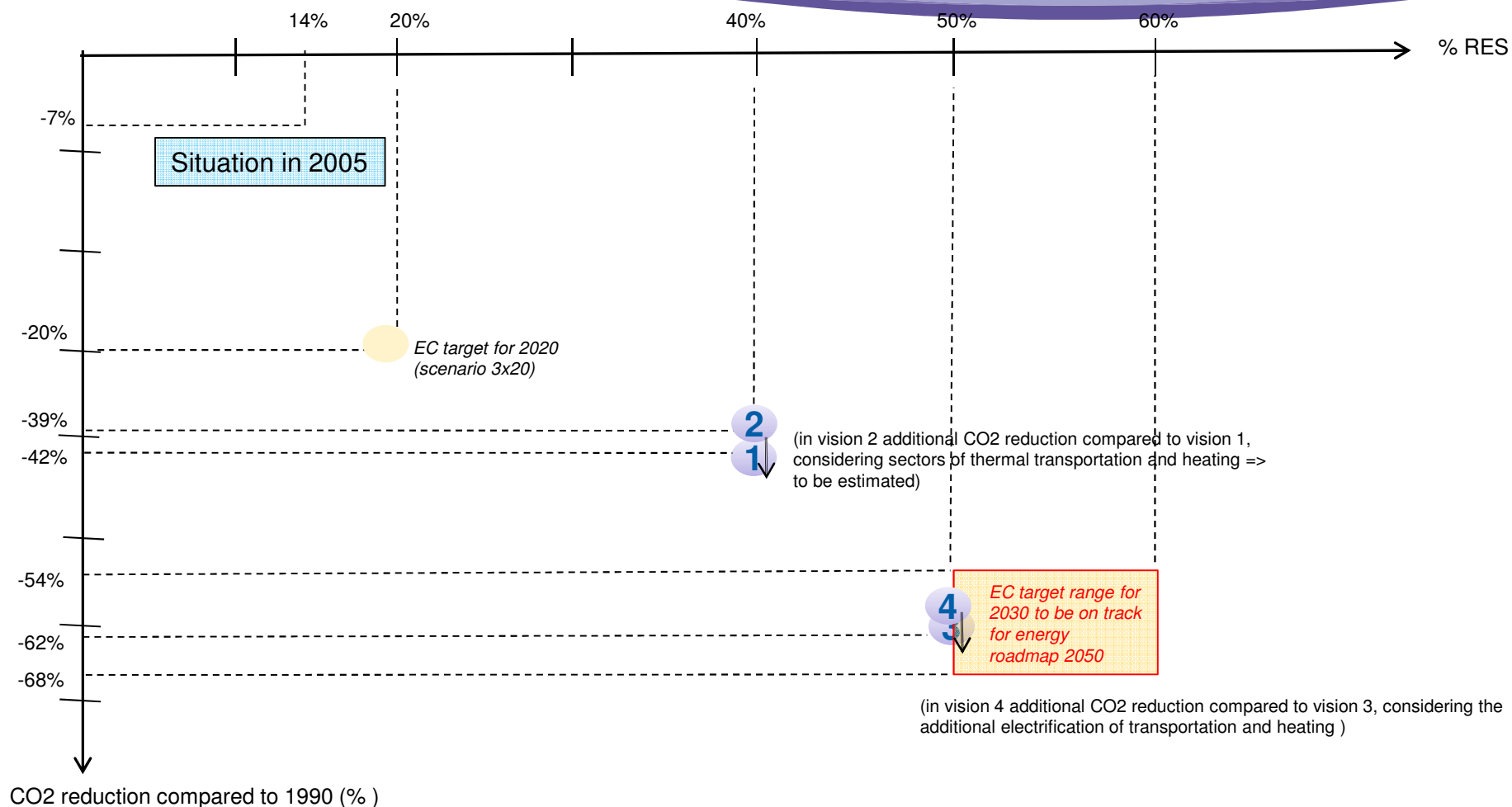
A satellite image of Europe at night, showing the continent illuminated by city lights against the dark blue background of the Earth and the starry night sky. The text "Back-up slides" is centered over the image.

Back-up slides

General Characteristics of all 2030 Visions - TYNDP 2014

	Vision 1 : Slow progress	Vision 2 : Money rules	Vision 3 : Green transition	Vision 4 : Green revolution
Economic and financial conditions	Less favourable	Less favourable	Favourable	Favourable
Focus of energy policies	National	European	National	European
Focus of R&D research schemes	National	European	National	European
CO ₂ prices and primary energy prices	Low CO ₂ prices and high primary energy prices	Low CO ₂ prices and high primary energy prices	High CO ₂ prices and low primary energy prices	High CO ₂ prices and low primary energy prices
Electricity demand	Lowest level	Higher than in Vision 1	Higher than in Vision 2	Higher than in Vision 3
Demand respons potential	Used as today	Partially used	Partially used	Fully used
Electric vehicles	No commercial break through of electric plug-in vehicles	Electric plug-in vehicles (with flexible charging)	Electric plug-in vehicles (with flexible charging)	Electric plug-in vehicles (with flexible charging and generation)
Heat pumps	Implemented (although not evenly spread around Europe)	Implemented (although not evenly spread around Europe)	Implemented (although not evenly spread around Europe)	Much more heat pumps implemented (although not evenly spread around Europe)
Back-up generation	Level of back-up generation higher than in Vision 2 but lower than in Vision 4	Lowest level of back-up generation	Highest level of back-up generation	Level of back-up generation higher than in Vision 2 but lower than in Vision 3
Nuclear	National view	Public acceptance	National view	Public acceptance
CCS	Not commercially implemented	Partially implemented	Not commercially implemented	Fully implemented
Storage	As planned today	As planned today	Decentralised storage (limited amount but higher than in Vision 4)	Mainly additional centralised hydro storage + some decentralised storage
Smart grid solutions	Partially implemented	Fully implemented	Partially implemented	Fully implemented

TYNDP 2014 - A bridge towards the energy roadmap for 2050



EC target range for 2030 to be on track for energy roadmap 2050:

- Visions 3 and 4 are in the range for CO2 reductions (-62%) / slightly inferior for RES integration
- Visions 1 and 2 are not on track for both indicators