TYNPD 2014- 2030 Scenario Development Status

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Reliable Sustainable Connected

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1. *Brief Introduction of the 2030 Visions*

2. Public Consultation

3. Pan European Market Simulations

Brief Introduction of the 2030 Visions

Storyline

Scenario elaboration & validation → *Market studies* → *Network studies* → *CBA evaluation* → *TYNDP 2014*

2 Bottom Up & 2 Top Down Scenarios on 2030

Stakeholders Interraction for data gathering& fine-tuning scenarios

3 Workshops With Stakeholders

2 web consultation

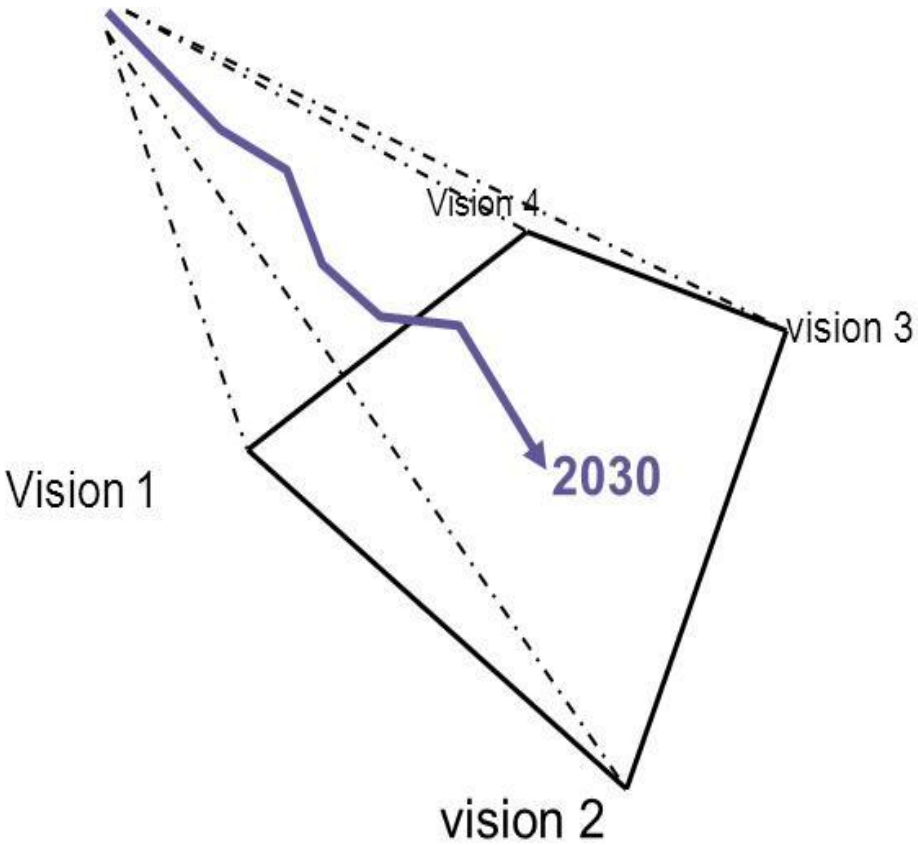
2 request for input

Expert Team Pan European Scenario Bulding:

14 Physical Meetings + 50 Telco

Brief Introduction of the 2030 Visions

2030 Visions: bridge between the EU 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).

THE PATHWAY REALISED IN THE FUTURE FALLS WITH A HIGH LEVEL OF CERTAINTY IN THE RANGE DESCRIBED BY THE FOUR DESCRIBED VISIONS

Brief Introduction of the 2030 Visions

2030 Visions: a Bridge between the European Energy Targets for 2020 and 2050

On track for energy roadmap 2050

VISION 3: "GREEN TRANSITION"	VISION 4: "GREEN REVOLUTION"
VISION 1: "SLOW PROGRESS"	VISION 2: "MONEY RULES"

High degree of integration of the internal electricity market

Brief Introduction of the 2030 Visions

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 storage
  - Centralized storage
- **Grid**
  - smart grid and the impact on load & generation patterns

Brief Introduction of the 2030 Visions

Construction Process for 2030 visions

- a dedicated ENTSO-E TSO Expert Team
  - **Data range checks of Visions 1 "Slow Progress" and 3 "Green Transition"**
  - **<u>Quantification of the two European top down 2030 Visions 2 "Money Rules" and 4 "Green Revolution"</u>**

Inputs request for visions:
4th Dec 2012 – 7th Jan 2013

Input from first stakeholders workshop 17/4/2012 for construction of guidelines & default values

Input from National Long term Adequacy correspondents regarding national scenarios

Compilation/Check of data by Expert team & construction of European scenarios – European level

Inputs from second stakeholders workshop 22/11/2012 for methodology for constructing European scenarios

ENTSO-E System Development Committee validates work of Expert team & national LACs

Expert Team performs market studies at European level

Inputs from third stakeholders workshop 02/07/2013 for final adaptations of constructed scenarios

Regional groups use output of European market studies to model other regions & add detailled market analyses of the own region

Public consultation for visions: mid-July 2013 – mid-Sept 2013

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Brief Introduction of the 2030 Visions

Market nodes – ENTSO-E pan-Eu market simulation

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Public consultation
Summary

All in all about 60 comments were received

The most important ones have been integrated into our dataset (RES ambition not high enough)

The rest of the main comments are summarized and responded in the following slides

In order to avoid delay to the whole TYNDP process no additional changes besides remedial actions to Vision 4 were implemented

All the constructive feedback will be taken into account in the next TYNDP process

Public consultation
Demand vs Energy Efficiency

Public Feedback

- Demand growth is too much for Vision 4 and energy efficiency is not well reflected
- The main criticism is that in a scenario where there is a combination of high RES, high demand and high amount of inflexible generation, the system would not be cost-effective.

Entso-e Response

- While this argument might be right we must also acknowledge the fact that Vision 4 is supposed an extreme scenario where there are favorable financial conditions.
- Even IEA justifies the increase in demand through electrification which enables savings in other sectors (IEA WEO 2012)
- This discrepancy in CAGR between Roadmap 2050 and entso-e scenarios can also be explained by a lack of analysis to work out a more precise impact on efficiency gain coming from technological breakthrough and paradigm shift, which is something we should improve for the next TYNDP

Public consultation
CO2 Prices

Public Feedback

- CO_2 price unrealistically high
- Some criticized that the IEA 450 ppm scenario is outdated and that the CO_2 price which we use is too high

Entso-e Response

- We checked with the last version of the IEA WEO 2012 (we took our values for 2035 from WEO 2011) and the CO_2 prices which we assumed (31 EUR/ton and 93 EUR/ton) are still compatible with what they forecasted: 120 USD/ton

Public consultation
Nuclear Capacity

Public Feedback

- Nuclear almost the same for all visions
- This point is related to the first point on demand growth. The criticism is that we have too much inflexible generation in our high RES scenario.

Entso-e Response

- From the last IEA WEO the expected nuclear contribution to the generation mix is high in the 450 ppm scenario: ½ ratio to RES production for OECD

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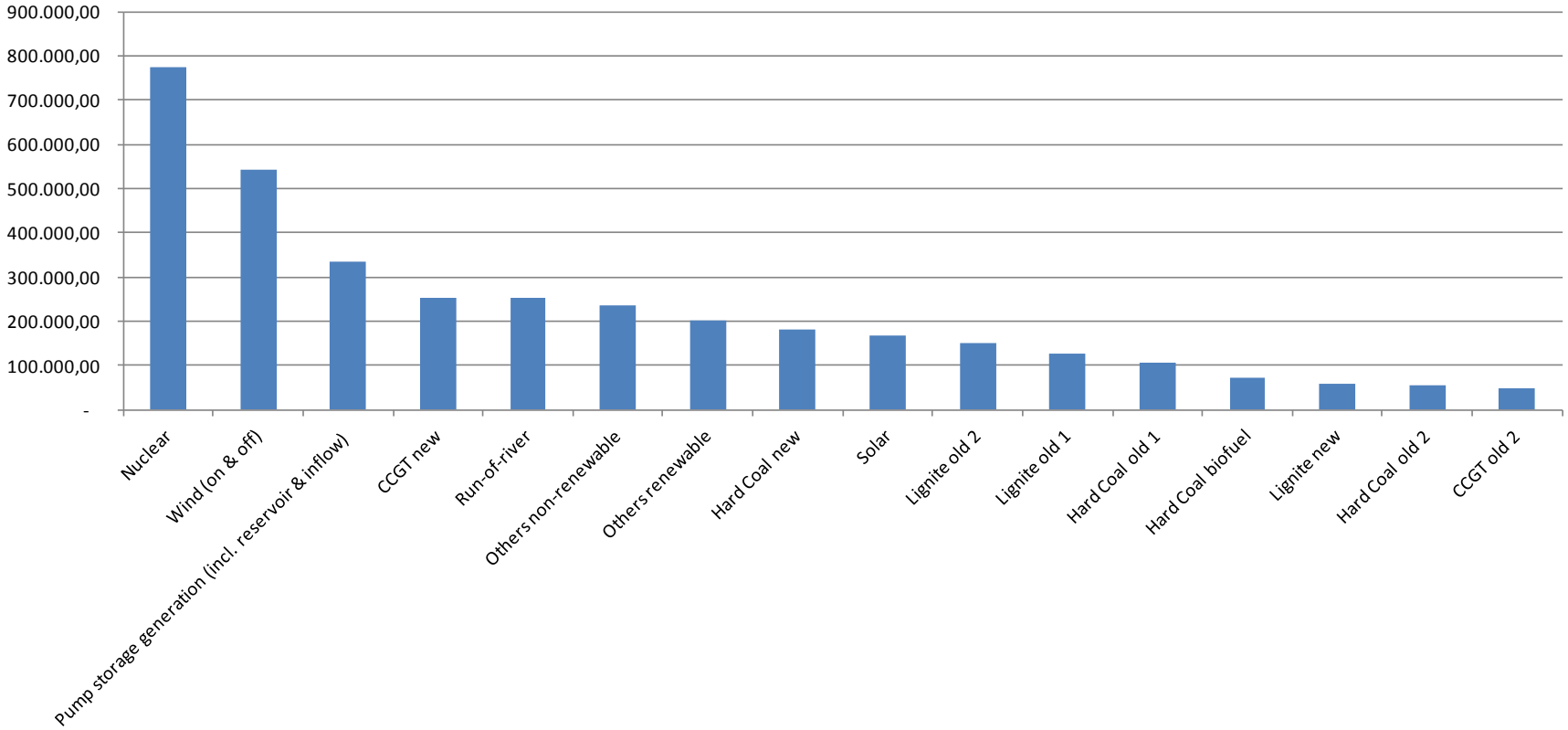
Pan European Simulation
Comparison of the 2 Most Contrasting Scenarios 1/3

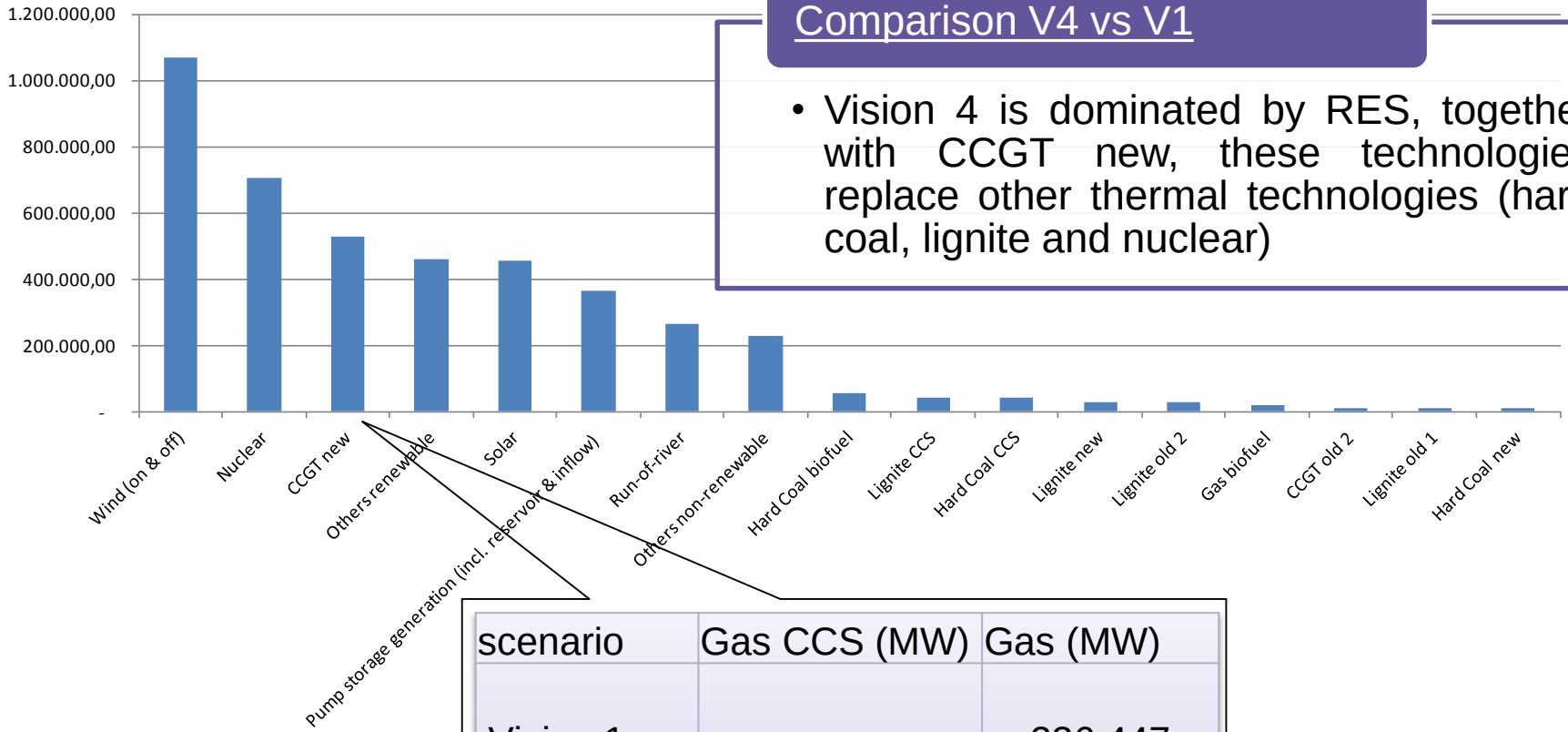
Generation Output Vision 1 [GWh]



Pan European Simulation

Comparison of the 2 Most Contrasting Scenarios 2/3

Generation Output Vision 4 (GWh)



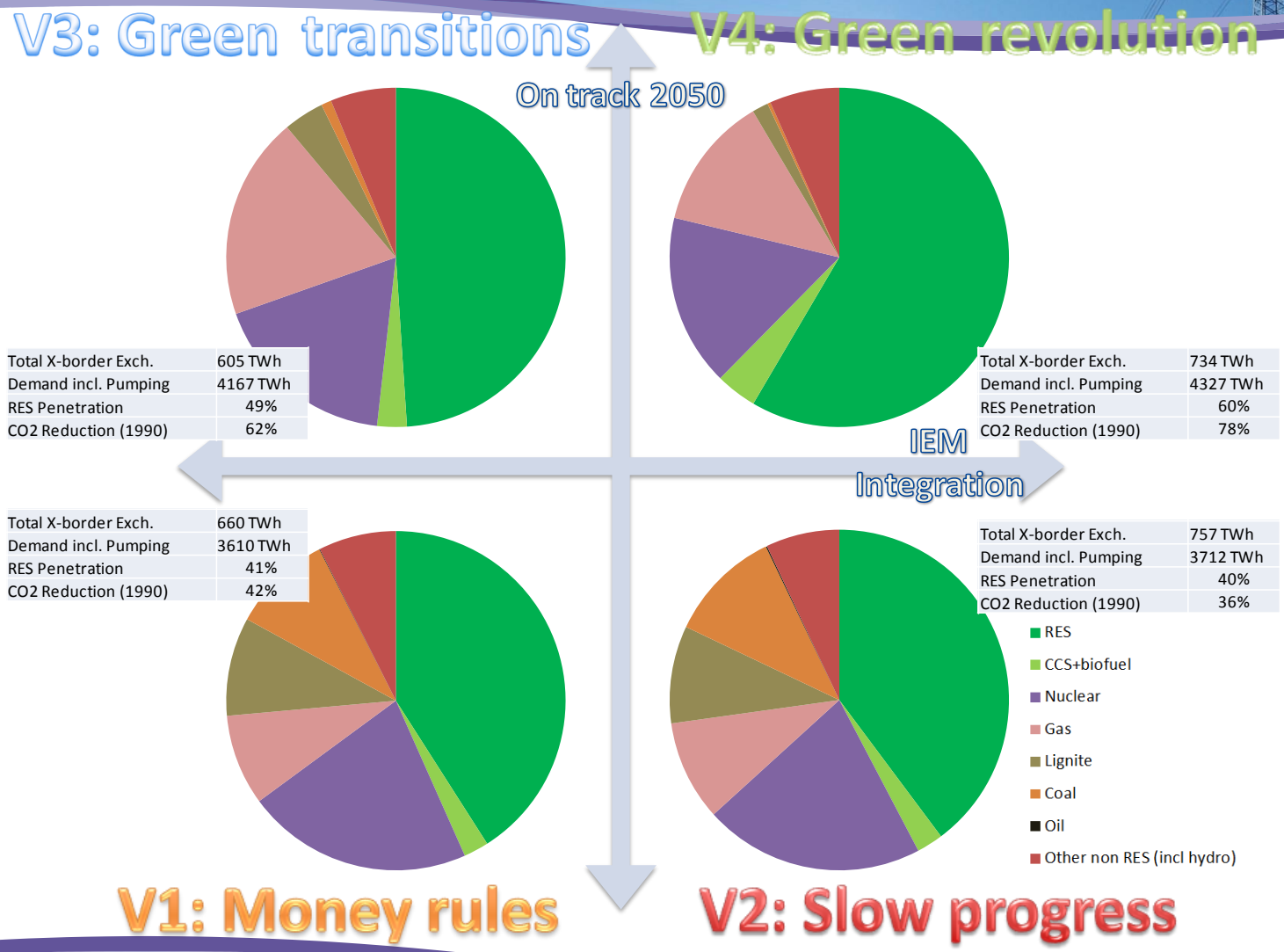
Comparison V4 vs V1

- Vision 4 is dominated by RES, together with CCGT new, these technologies replace other thermal technologies (hard coal, lignite and nuclear)

scenario	Gas CCS (MW)	Gas (MW)
Vision 1	-	236.447
Vision 4	1.180	272.713

Pan European Simulation

Market Simulation Results from all Visions



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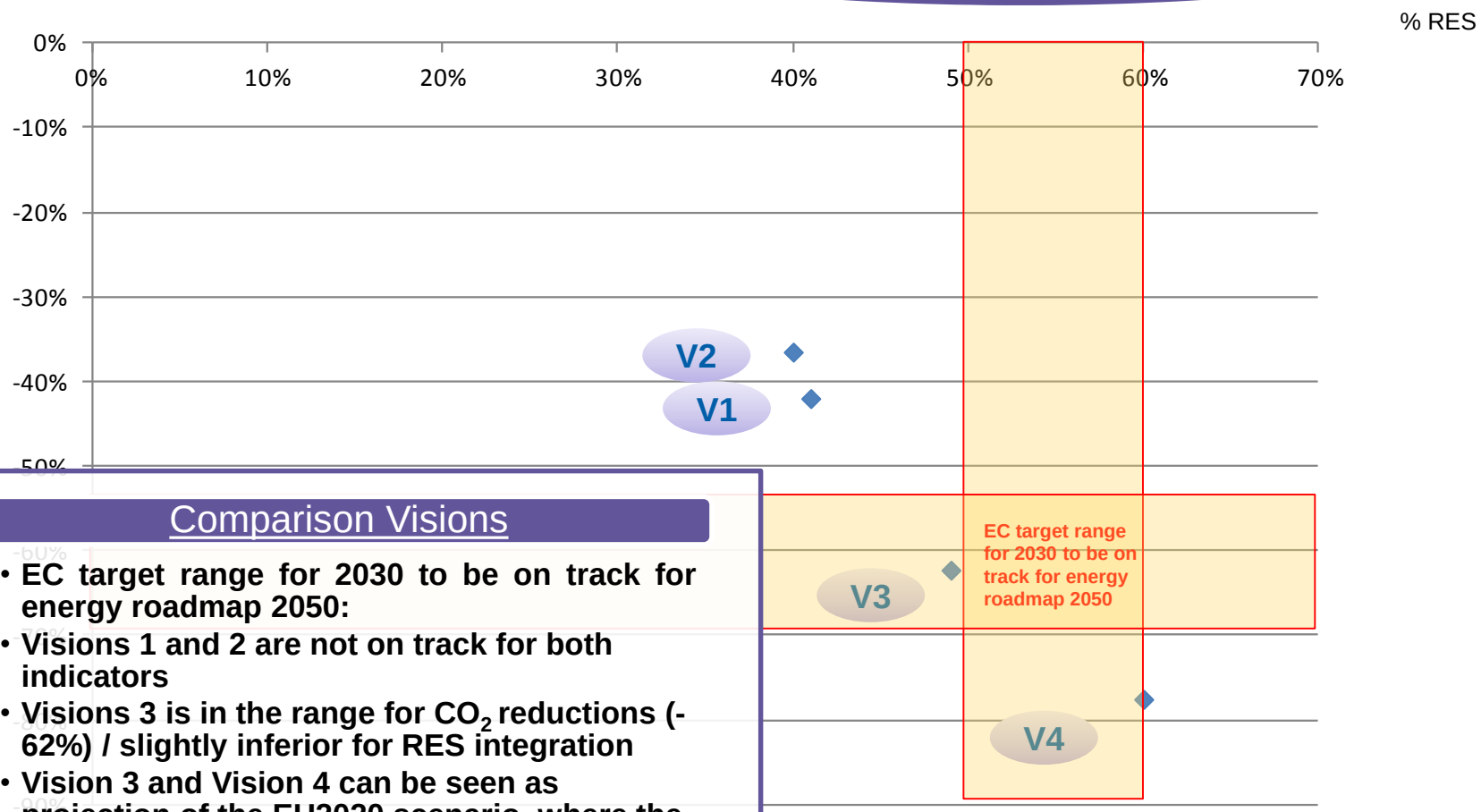
Pan European Simulation
Consistency with EC targets



Comparison Visions

- **EC target range for 2030 to be on track for energy roadmap 2050:**
- **Visions 1 and 2 are not on track for both indicators**
- **Visions 3 is in the range for CO_2 reductions (-62%) / slightly inferior for RES integration**
- **Vision 3 and Vision 4 can be seen as projection of the EU2020 scenario, where the CO_2 emission is less than Visions 1 and 2 because of additional nuclear generation**

BACK UP

Brief Introduction of the 2030 Visions

General Characteristics of all Visions

top-down scenarios

	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

bottom-up scenarios