

TYNDP 2016: 2nd Public Workshop on Scenario Development Workshop

PEMS - Short introduction to the process

11th February

*Fabrizio Vedovelli –
Project Group Market Modeling*

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PEMS - Short introduction to the process

Contents



1. Purpose of Pan European Market Study
2. Deliverables
3. Methodology
4. Overview of the resources involved
5. Next steps

PEMS - Short introduction to the process

Purpose of the Pan European Market Study



PG Market Modeling: technical body in charge to manage all Market Studies performed in the framework of TYNDP 2016. Main tasks are related to:

- *Common Planning Study*
- *Pan European Market Study (PEMS)*
- *Project Assessment*

Main purposes of PEMS:

- ✓ To perform Top – Down scenario building (Vision 4 and Vision 2)
- ✓ To provide a reference Market Study for TYNDP 2016
- ✓ To provide the hourly exchanges outside the regional perimeter (if necessary)

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Deliverables



Bottom-Up scenario

EP 2020

V1 2030

V3 2030

Market Simulations

Market Simulations

Market Simulations

Top-Down scenario

V2 2030

V4 2030

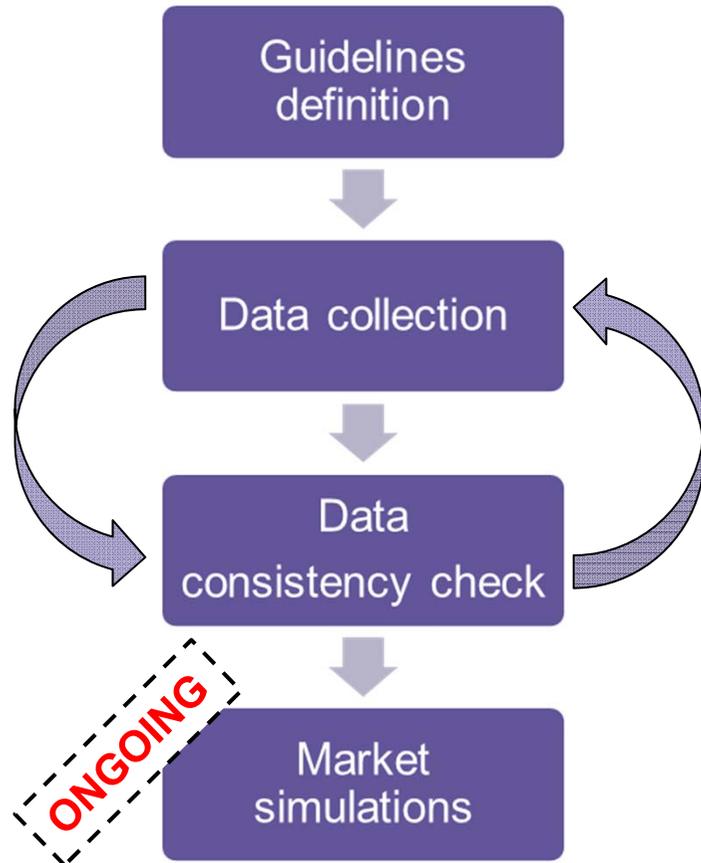
Market Simulations

Market Simulations



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Methodology – quick recall of the process



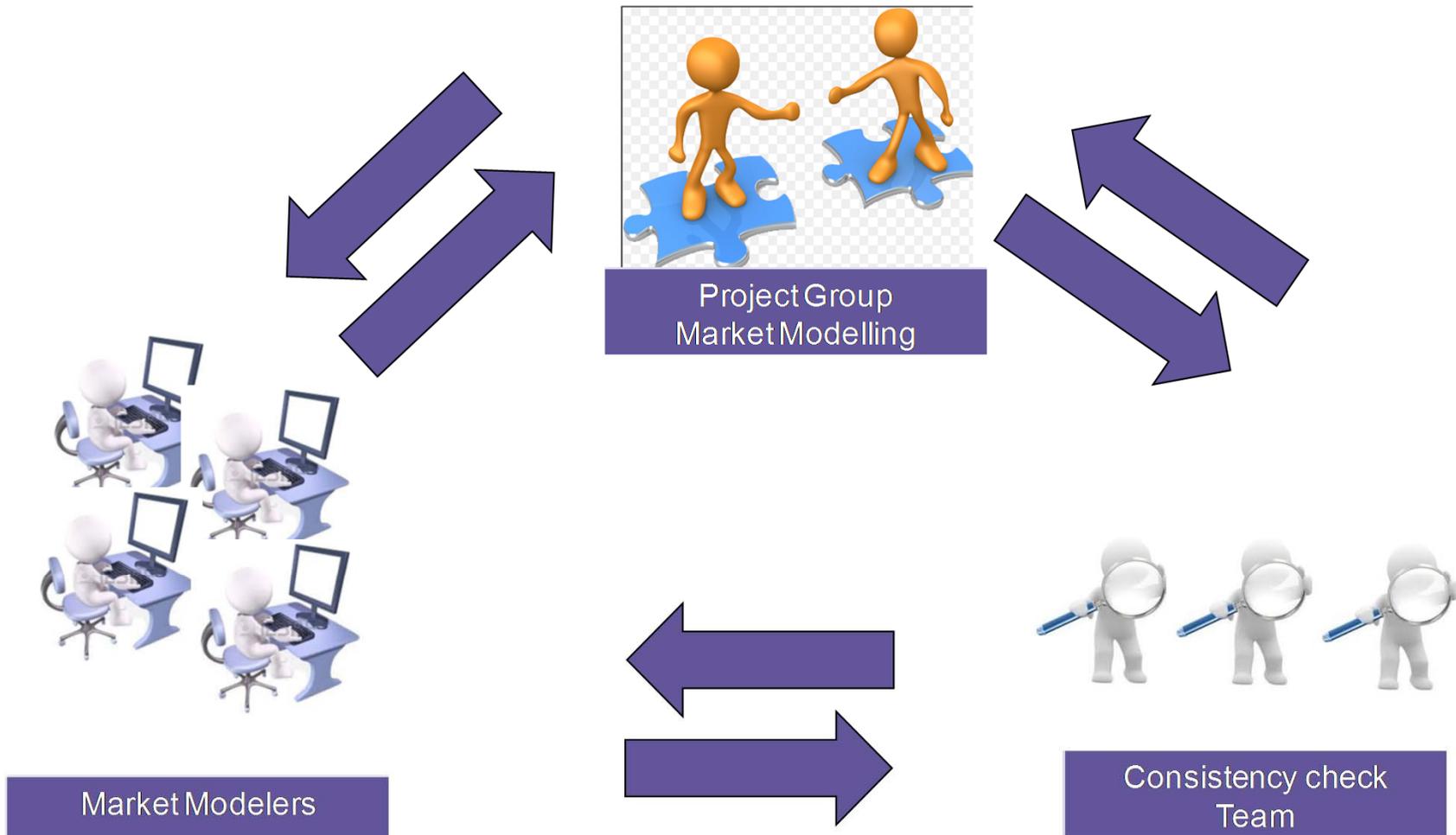
- ✓ All ENTSO-E members involved

- ✓ To check and to correct mistakes
- ✓ To ensure consistency with guidelines
- ✓ Interaction with TSOs

- ✓ All ENTSO-E perimeter
- ✓ NoN ENTSO-E countries by imposed hourly flows
- ✓ At least one node per country (some exceptions)

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Resources involved



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Next Steps

March
2015

Second Stakeholders' Worskhop

May
2015

*TYNDP 2016 Visions available for
consultation*

July
2015

*TYNDP 2016 Visions available for
assessment of the projects*

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PEMS – Main data provide by TSOs

Vision 1 and Vision 3

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PEMS – Main data provide by TSOs

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1. Data collection process & consistency check
2. Demand
3. Generation installed capacity

PEMS – Main data provide by TSOs Deliverables

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V2 2030

V4 2030

Market Simulations

Market Simulations

Delivered by TSOs

Delivered by PEMS

PEMS – Main data provide by TSOs

Data collection process & consistency check



Main checks performed:

- ✓ Demand
 - ✓ *yearly growth rate of electricity demand*
 - ✓ *peak hourly profiles*
 - ✓ *penetration levels of electric vehicles and heat pumps*

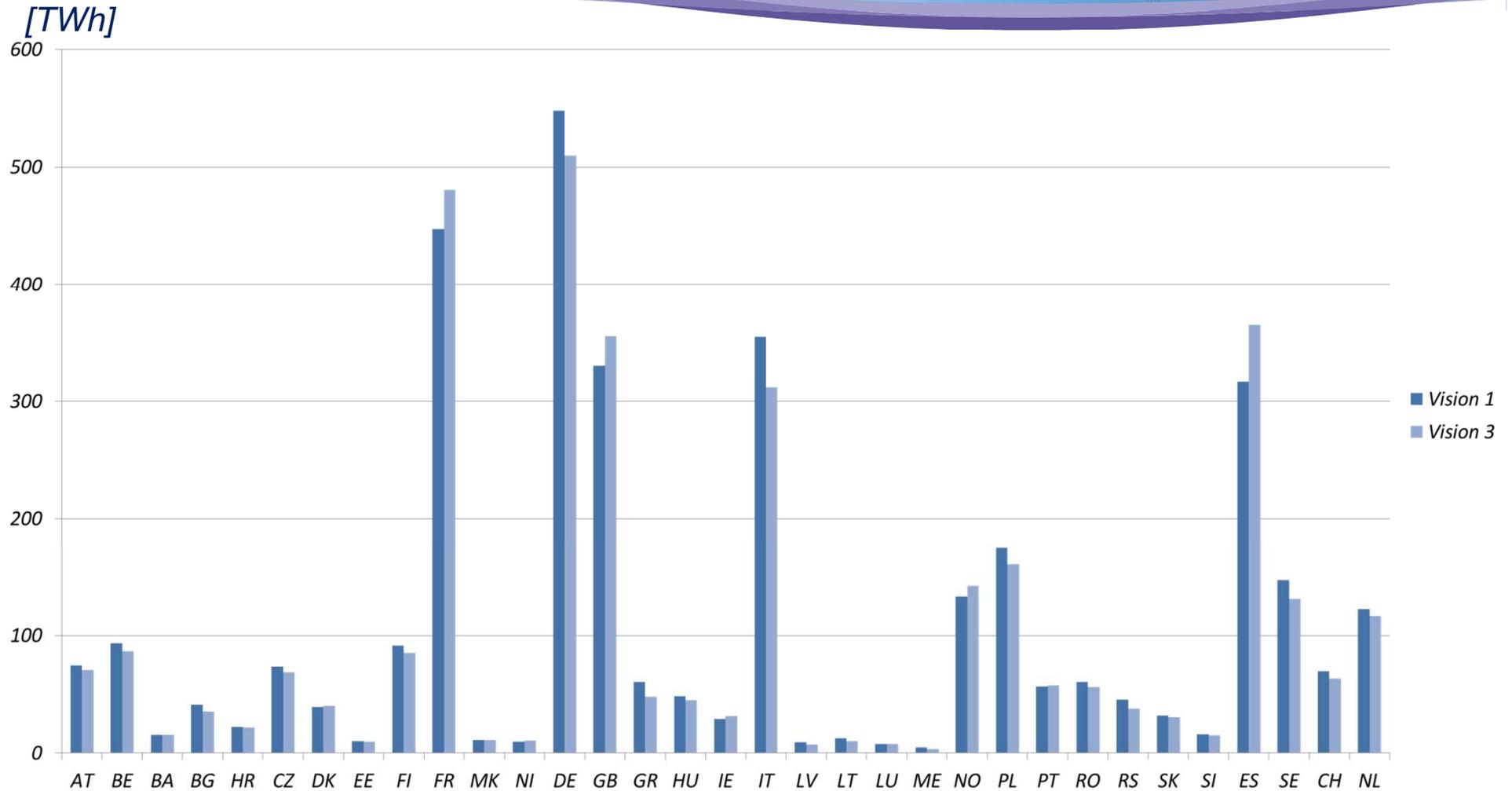
- ✓ RES generation
 - ✓ *correlation among the Visions*

- ✓ Hydro - storage:
 - ✓ *correlation among the Visions*

- ✓ THE generation
 - ✓ *Remaining Adequacy Capacity*

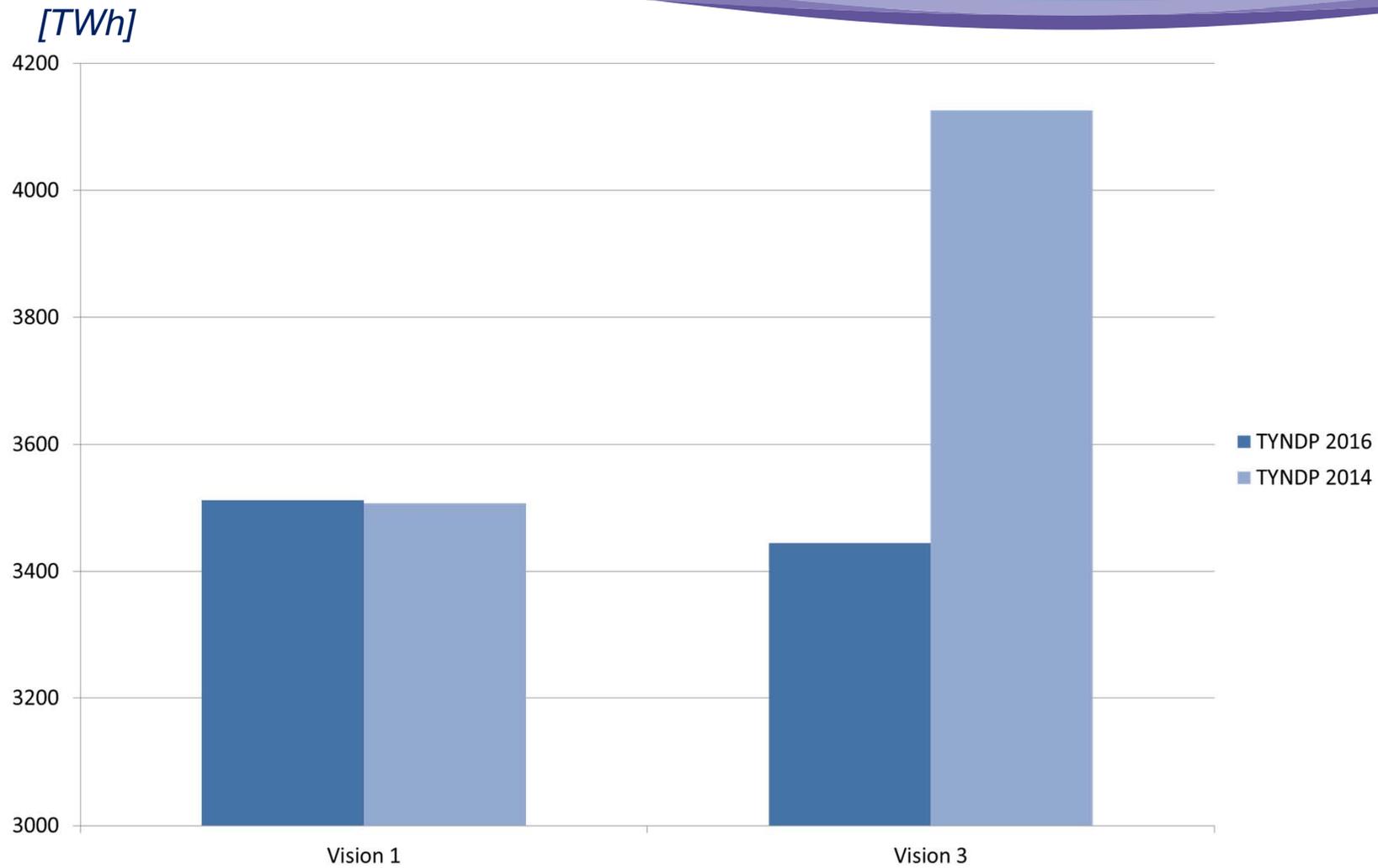
PEMS – Main data provide by TSOs

Demand per country



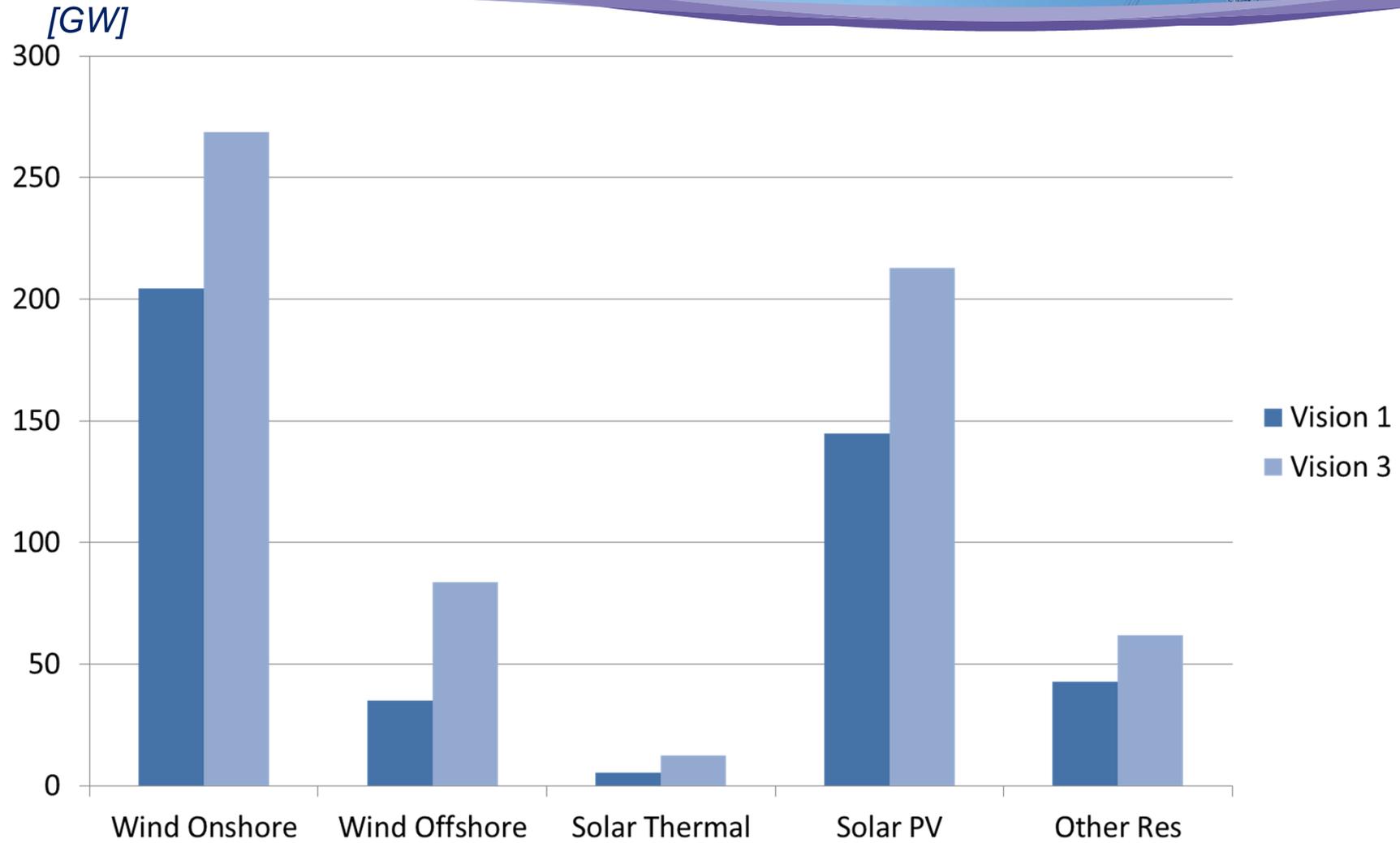
PEMS – Main data provide by TSOs

Demand - (TYNDP 2016 vs TYNDP 2014)



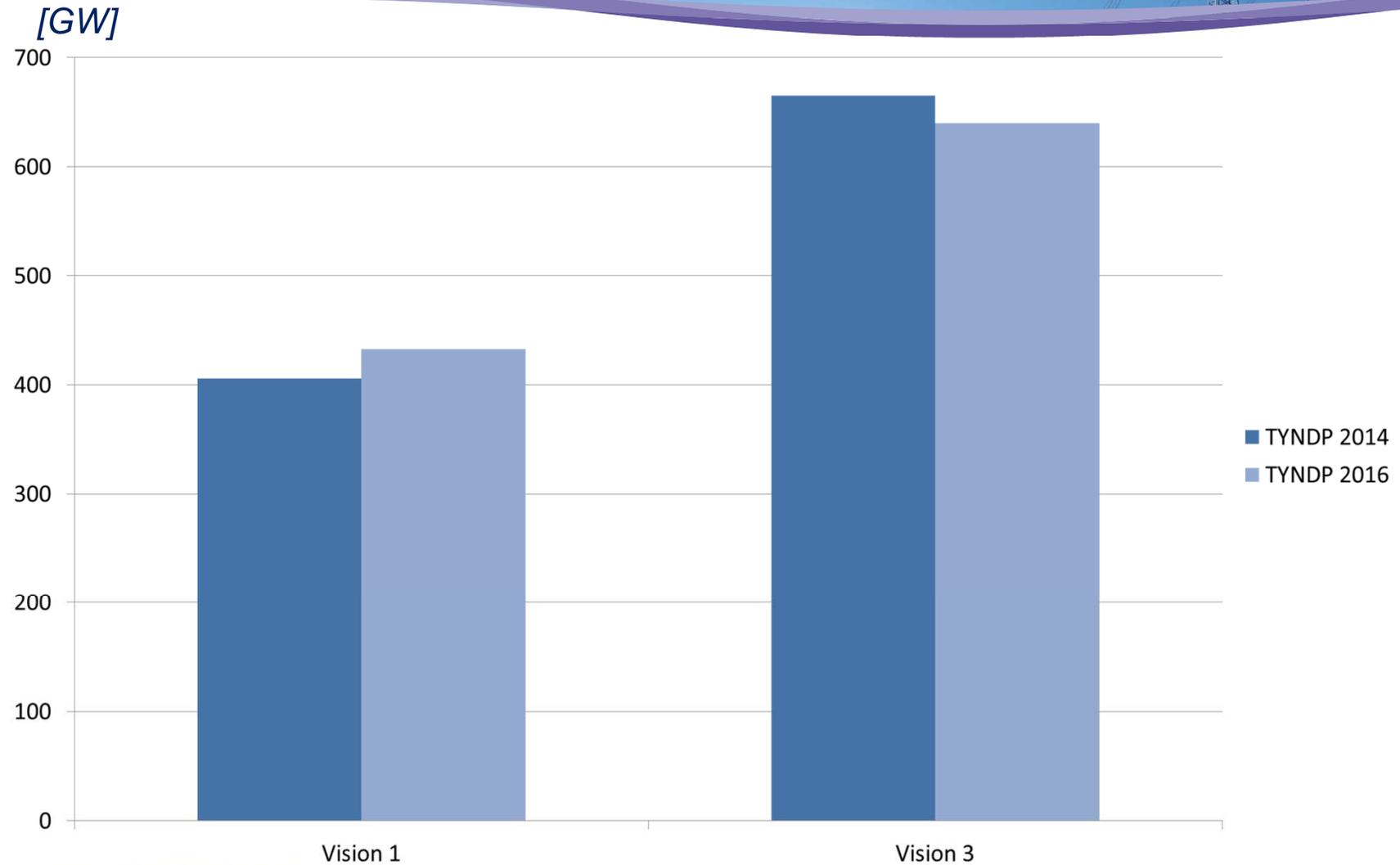
PEMS – Main data provide by TSOs

Generation Installed Capacity – RES



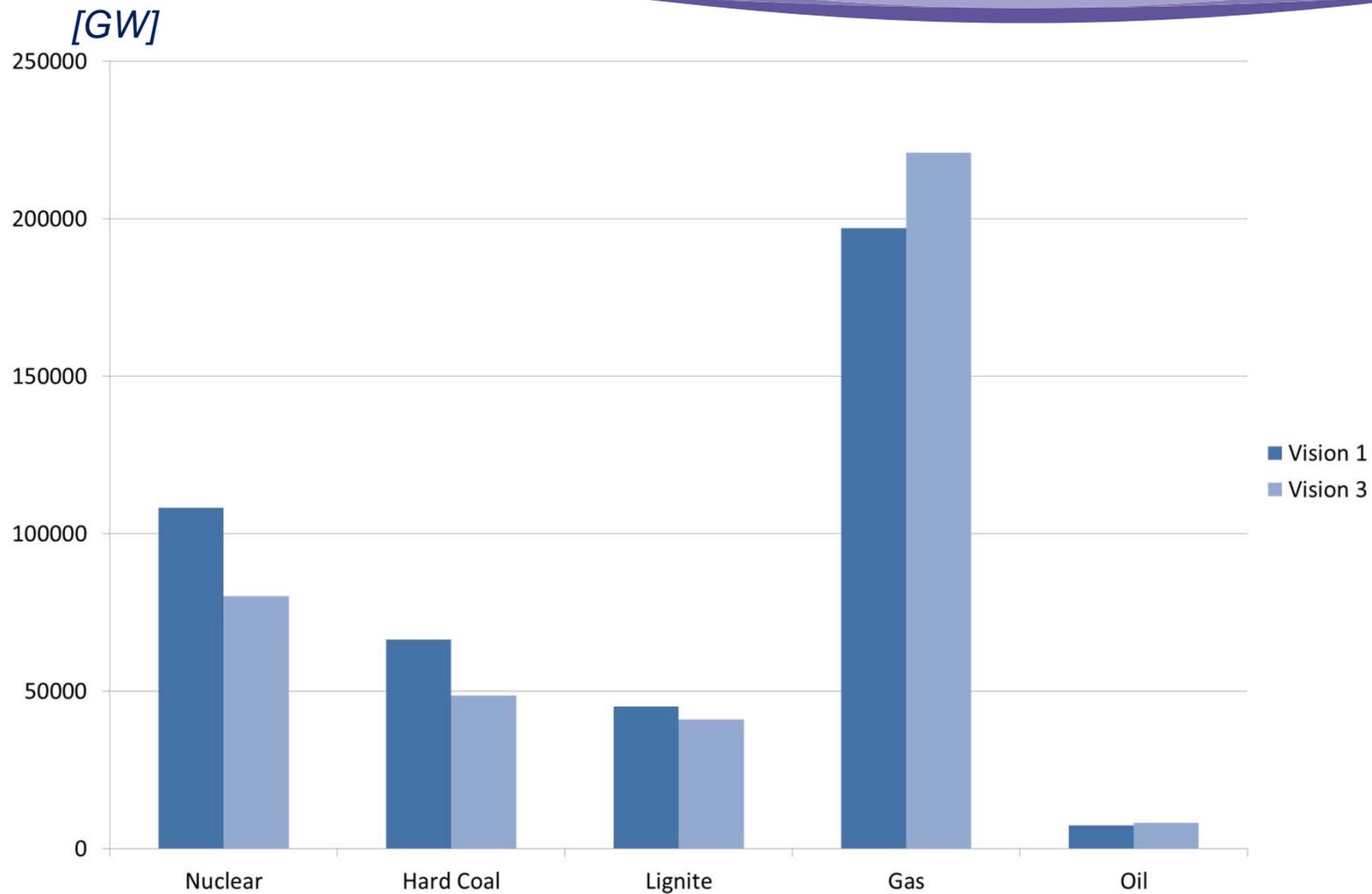
PEMS – Main data provide by TSOs

Generation Installed Capacity – RES (TYNDP 2016 vs TYNDP 2014)



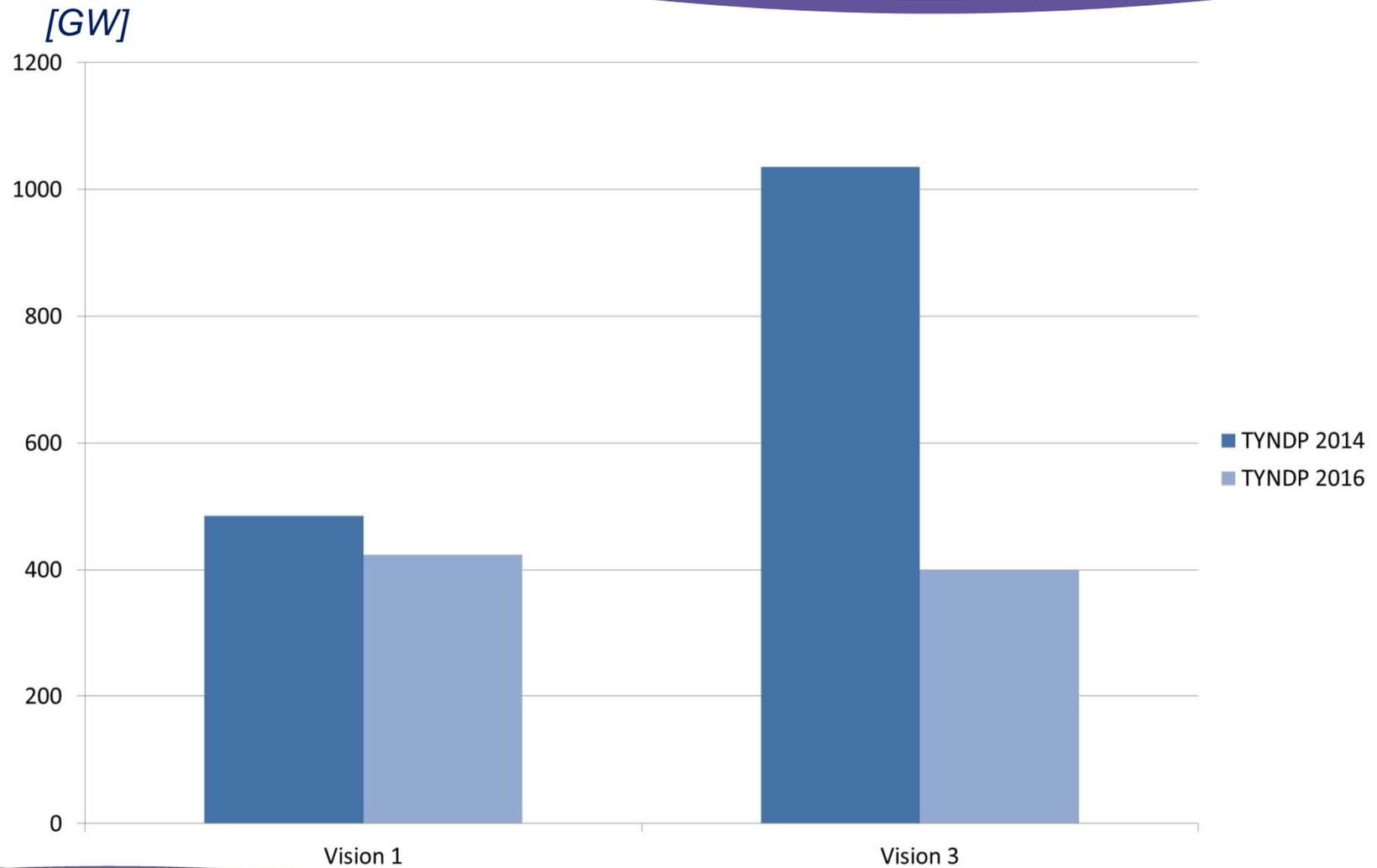
PEMS – Main data provide by TSOs

Generation Installed Capacity - THE



PEMS – Main data provide by TSOs

Generation Installed Capacity – THE (TYNDP 2016 vs TYNDP 2014)



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PEMS – Preliminary results

Vision 3 and Vision 4

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PEMS – Preliminary results

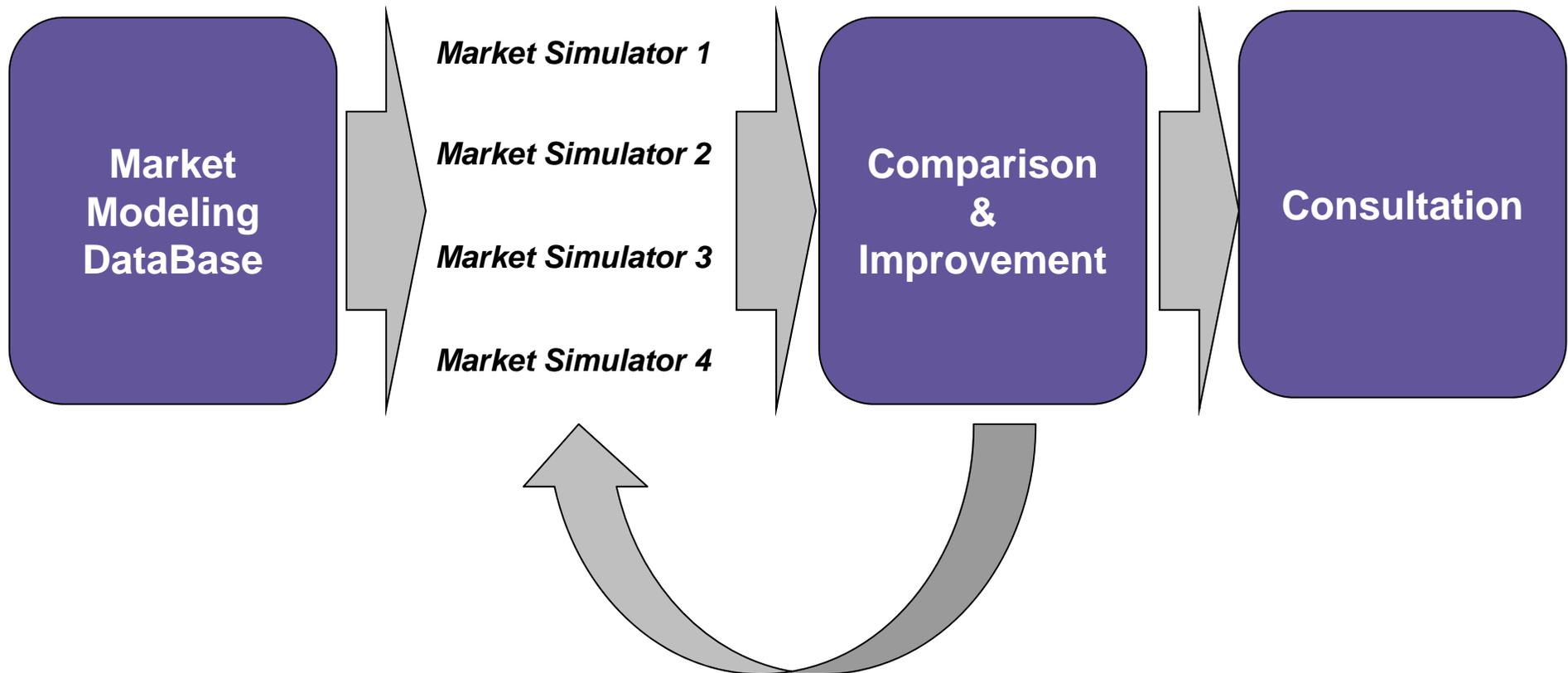
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1. Process
2. Vision 3 – preliminary results
3. Vision 4 – main input data

PEMS – Preliminary results

Process



PEMS – Preliminary results

Process – Market Modeling

Inputs

- Demand profile
- Generator charact.
- Other gen profile
- Wind and solar prof.
- Exchanges Non ENTSO
- Fuel and CO2 prices
- Transmission constraints

Modelling

- Chronologic. Unit Comm.
- Hourly model
- System constraints
- **To minimise the generation cost**

Outputs

- Balances
- Market Node Marginal cost
- Hourly generation pattern
- CO2 emission
-

PEMS – Preliminary results

Process – Perimeter and Market Model



PEMS – Preliminary results

Process – Key data



Data for each Market Node:

- ✓ *Demand*
- ✓ *Thermal Dispatchable generation data set*
- ✓ *Hydro generation data set*
- ✓ *Wind generation data set*
- ✓ *Solar generation*
- ✓ *Other Renewable and NoN Renewable generation data set*
- ✓ *Exchanges capacities among Market nodes*
- ✓ *Exchanges with NoN ENTSO-E countries*

PEMS – Preliminary results

Vision 3

Bottom-Up scenario

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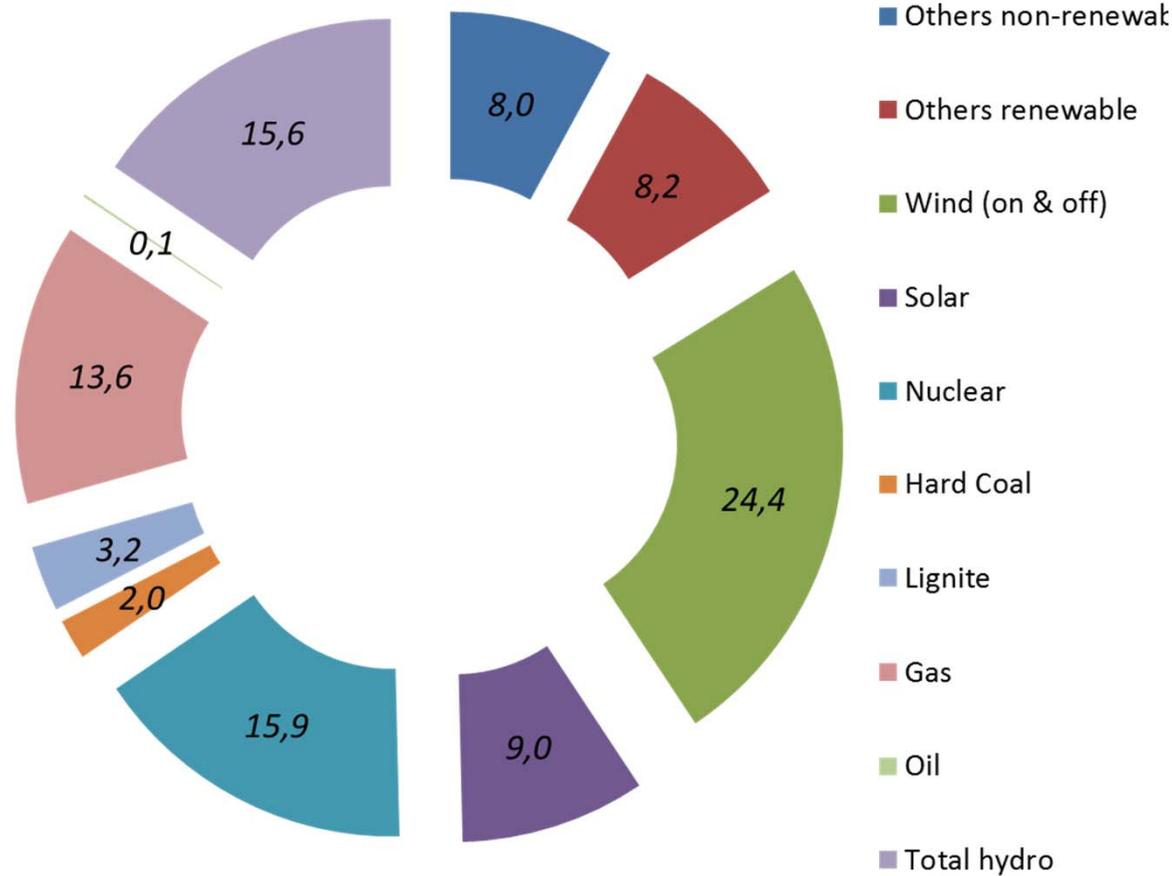
Market Simulations

Delivered by TSOs

Delivered by PEMS

PEMS – Preliminary results

Vision 3 – Generation mix [%]

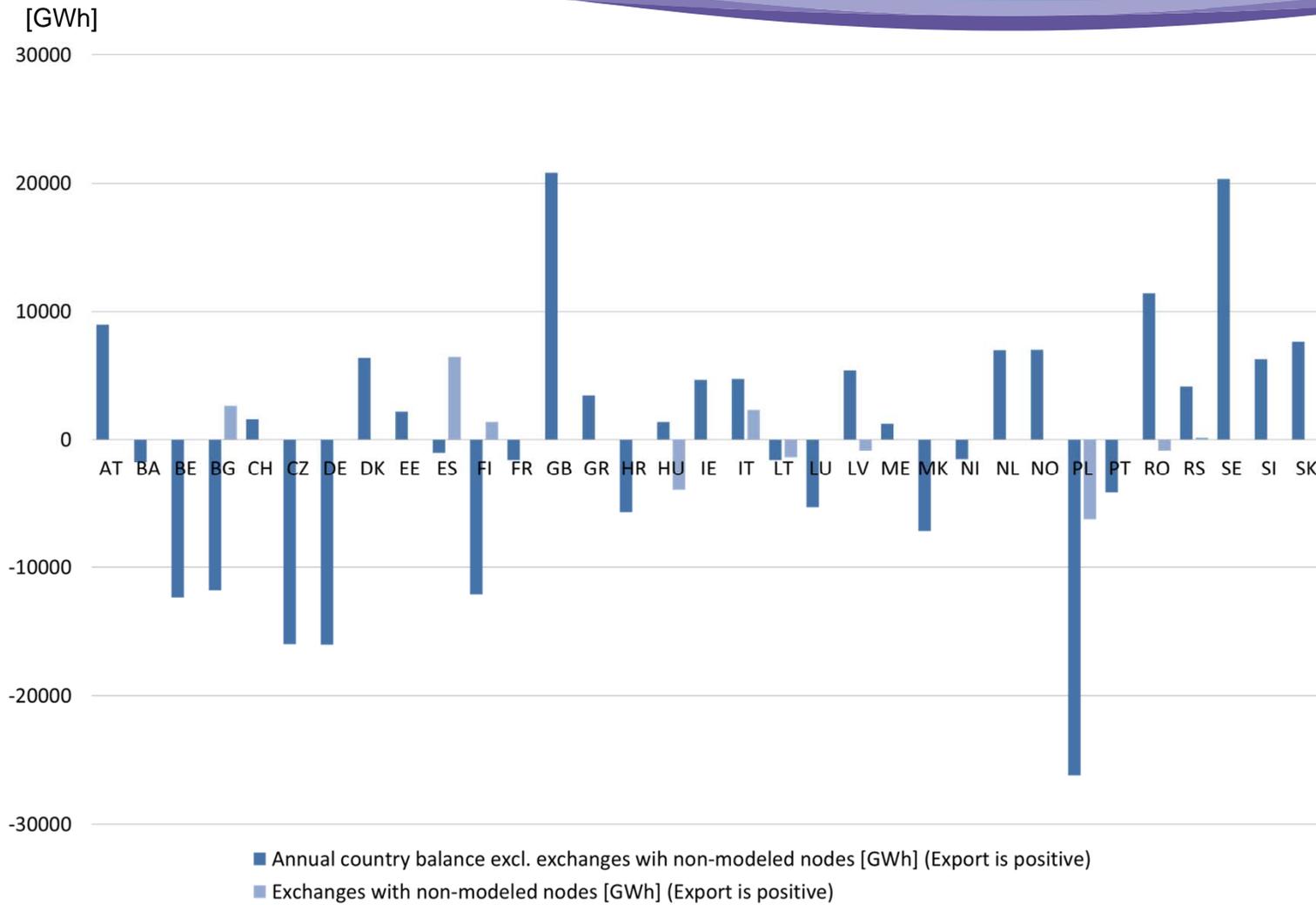


- ✓ *High RES scenario*
- ✓ *Gas before Coal*

About 57% Demand covered by RES

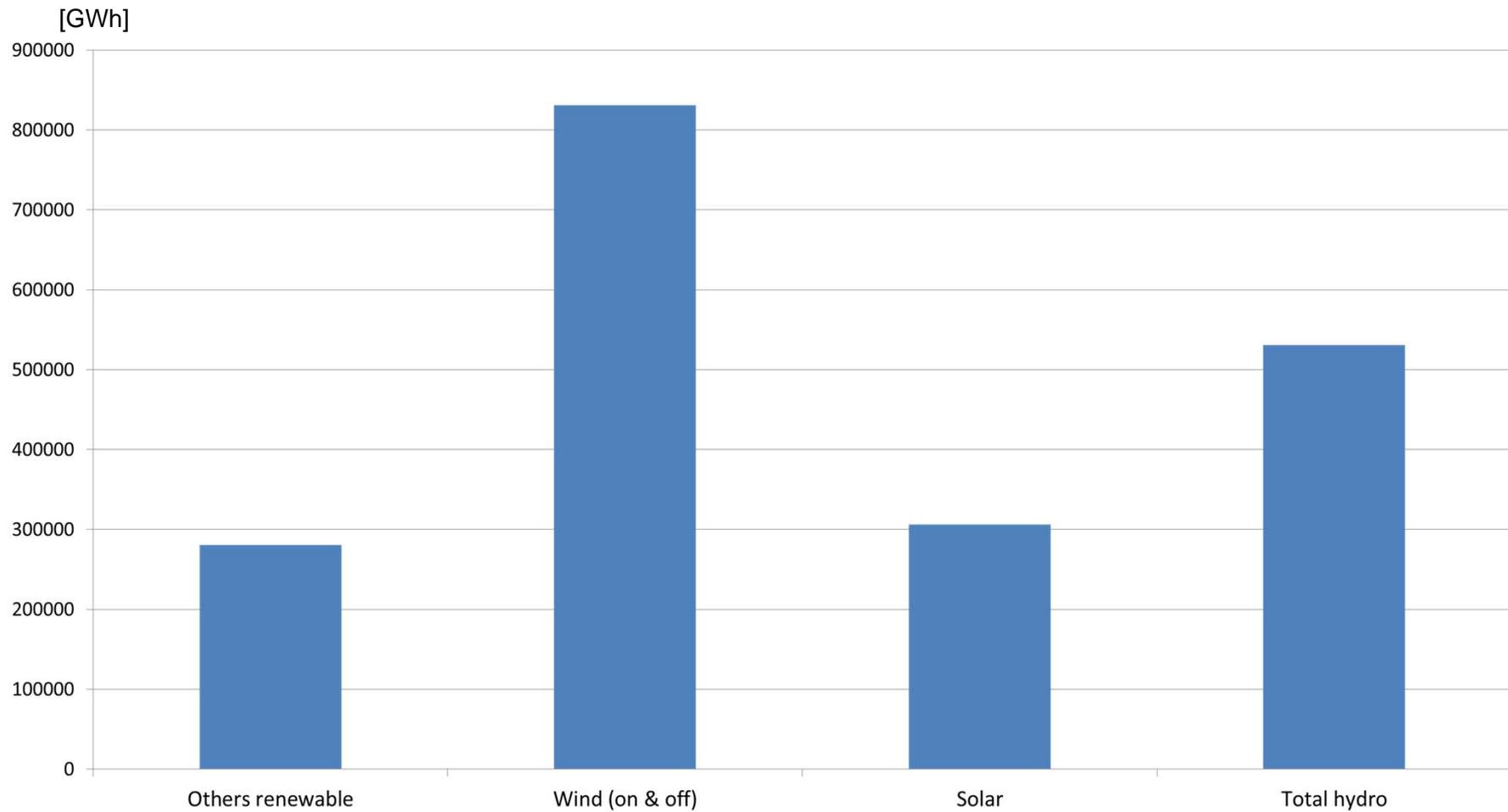
PEMS – Preliminary results

Vision 3 – Countries balance



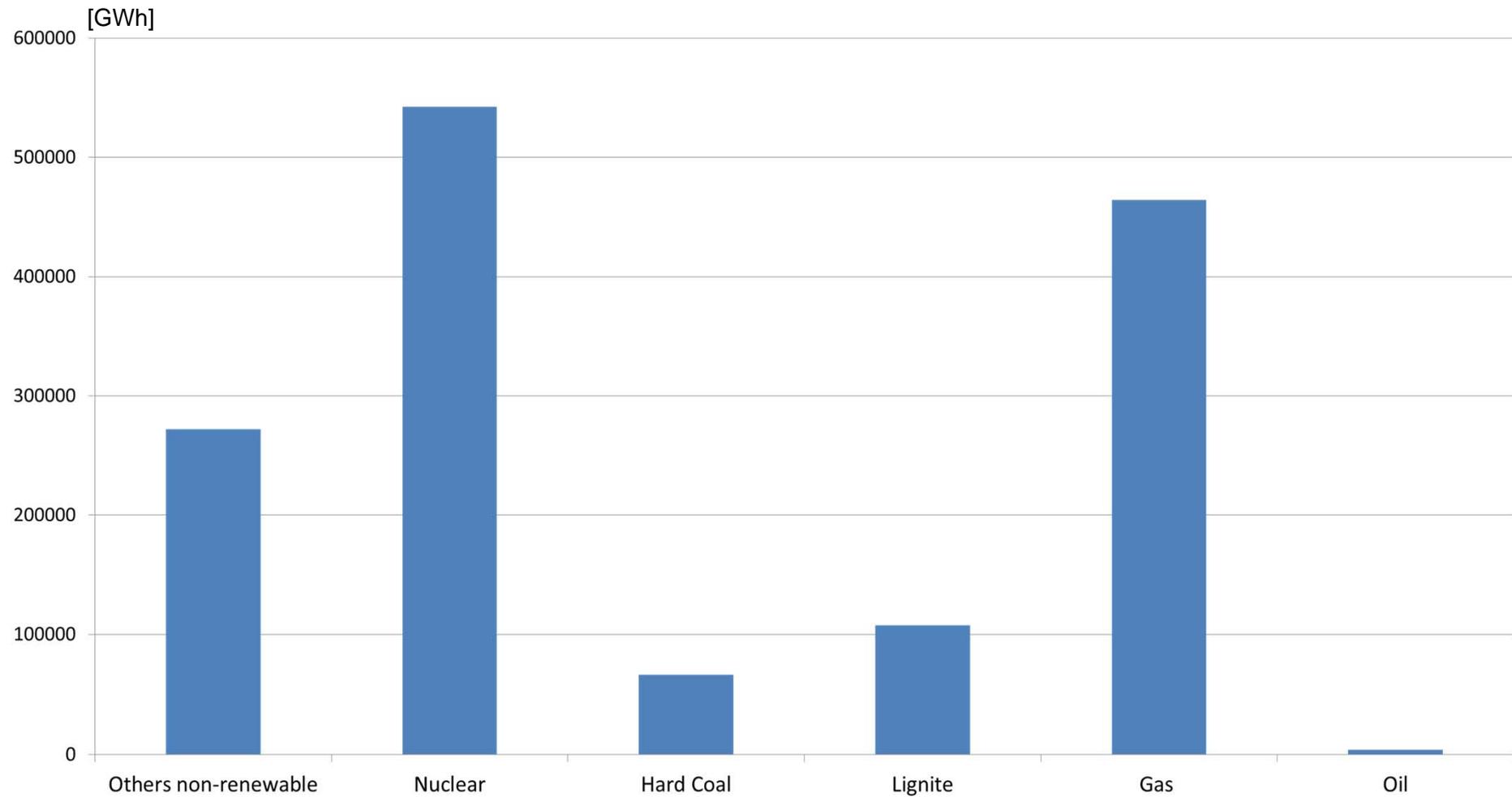
PEMS – Preliminary results

Vision 3 – Renewable generation



PEMS – Preliminary results

Vision 3 – Thermal generation



PEMS – Preliminary results

Vision 4



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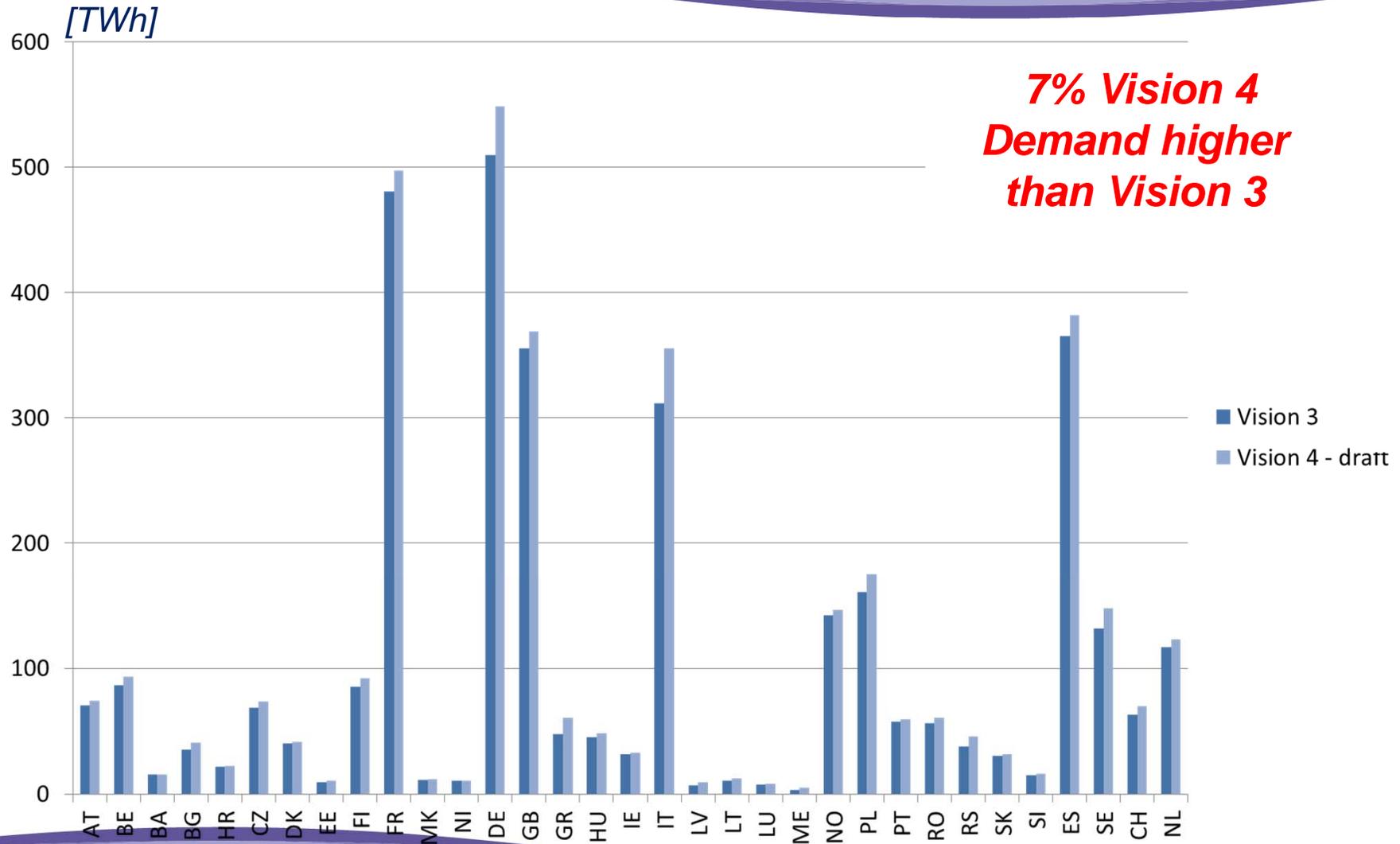
Market Simulations

 Delivered by TSOs

 Delivered by PEMS

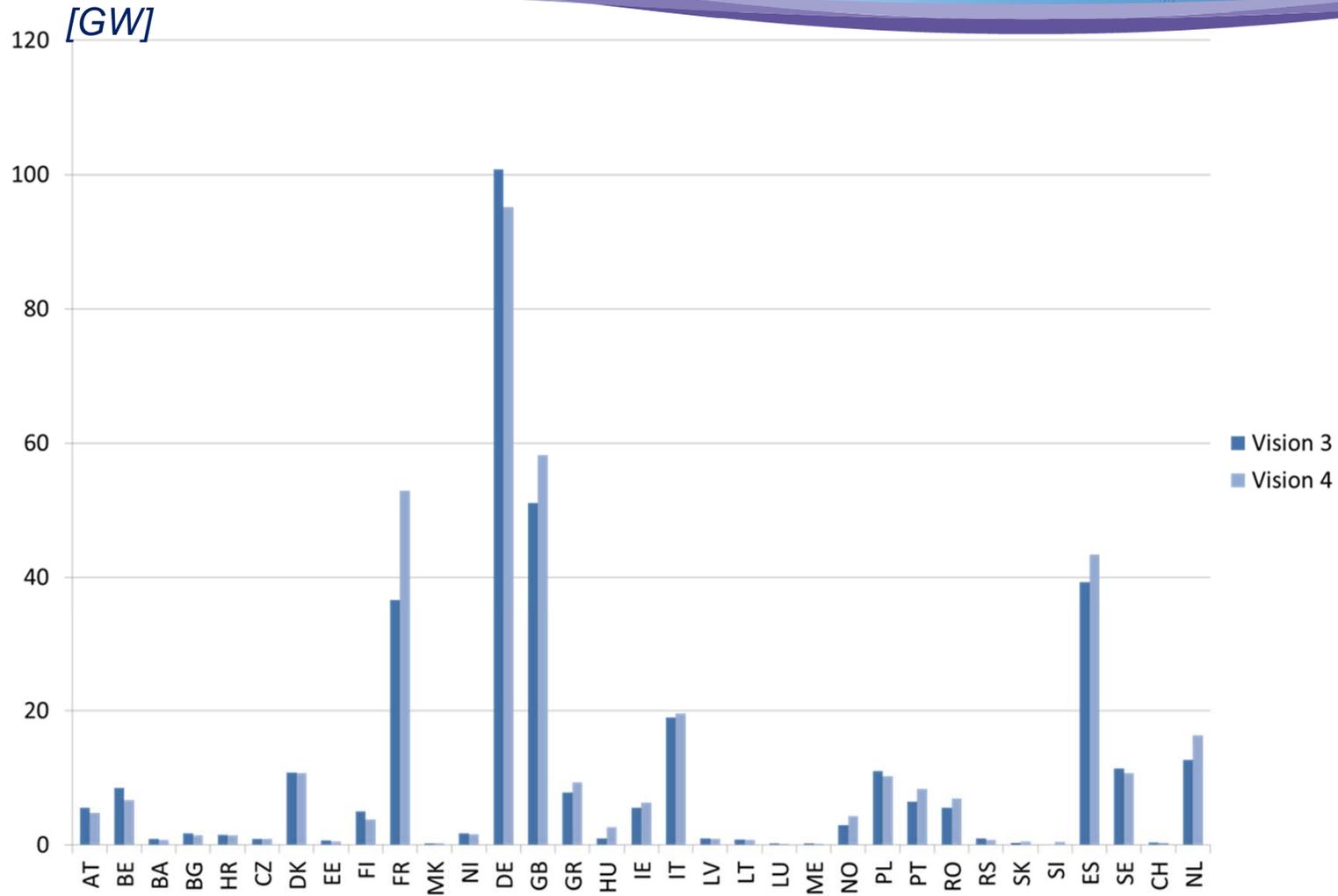
PEMS – Preliminary results

Vision 4 – Demand (Vision 4 vs Vision 3)



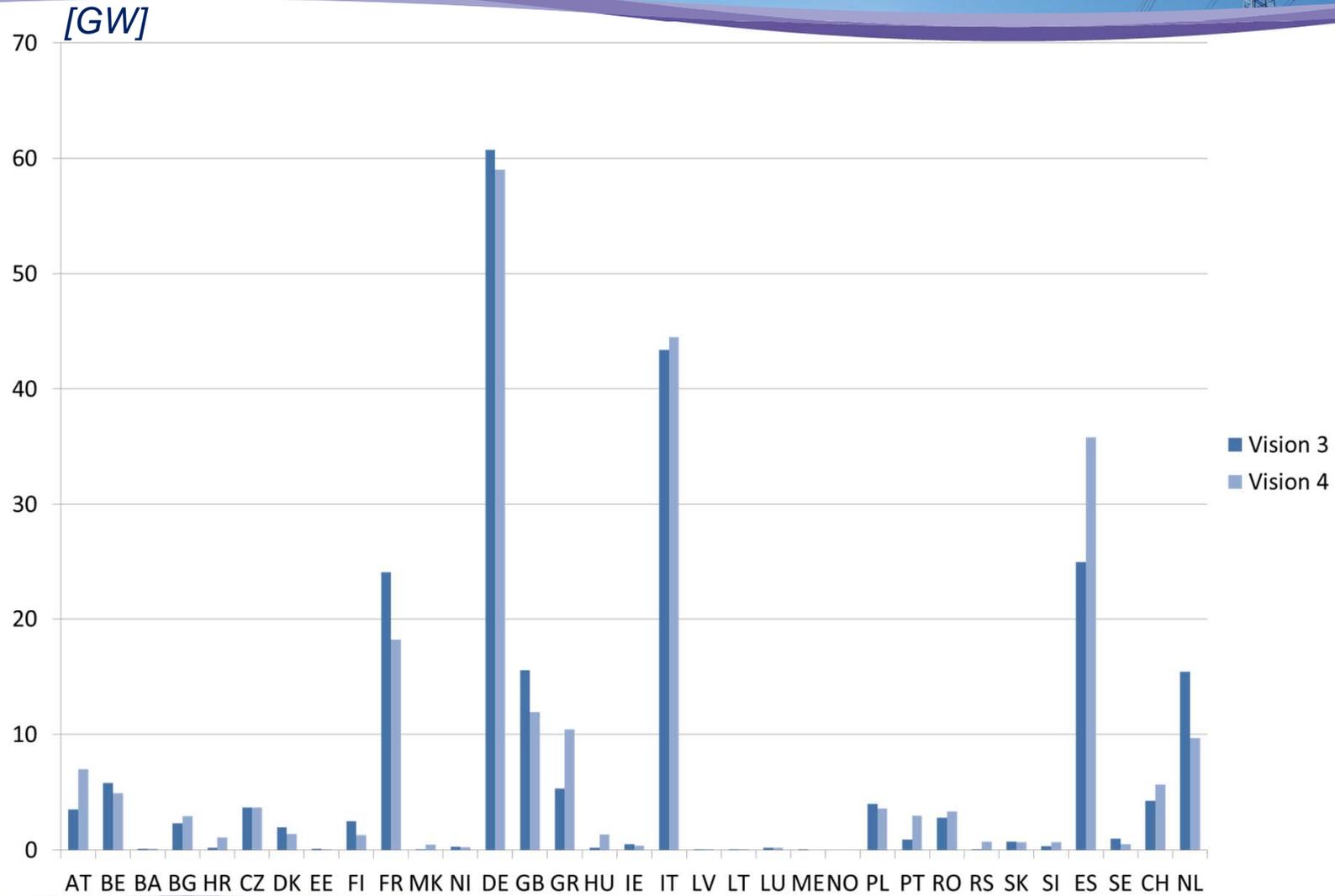
PEMS – Preliminary results

Vision 4 – Wind (Vision 4 vs Vision 3)



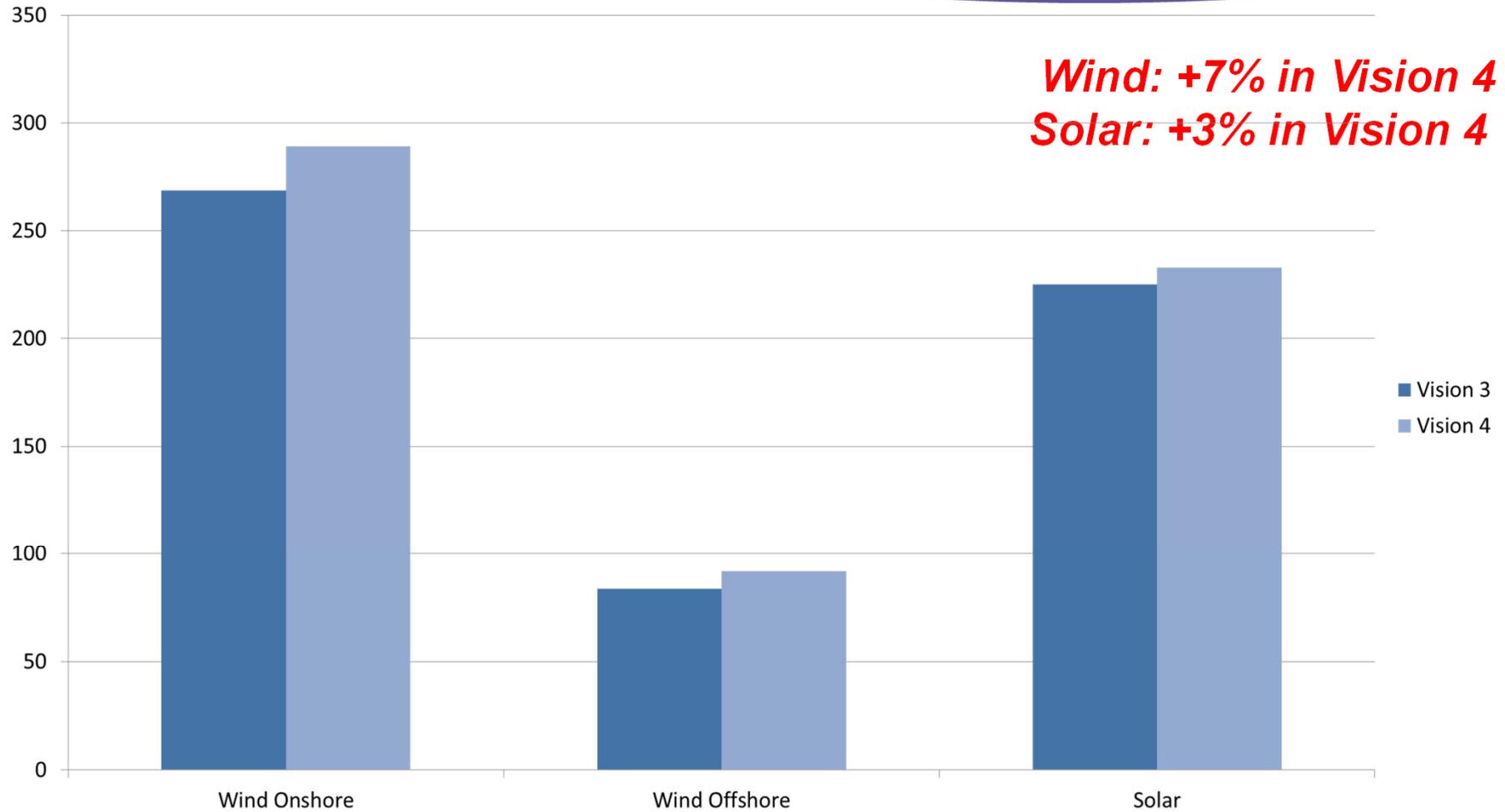
PEMS – Preliminary results

Vision 4 – Solar (Vision 4 vs Vision 3)



PEMS – Preliminary results

Vision 4 – Wind and Solar (Vision 4 vs Vision 3)





Work in progress...

