BETTER

Turkey Case Study

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European stakeholder workshop
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Energy Economics Group

Co-funded by the Intelligent Energy Europe Programme of the European Union

Key characteristics

Status quo

- Strong and constantly growing economy
- High demand for electricity (6.7-7.5% p.a. predicted)
- High rate of GHG emissions
- Dependence on (imported) fossil fuels (72% in 2011)

Policy ambitions

- Expansion of nuclear power/large hydro projects
- Privatization/deregulation of energy market
- Increase cooperation (EU/EC)
- RES expansion (Law No. 5346)

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Key characteristics

Environment for RES development

- Large potential (solar, wind, geothermal and biomass technologies)
- RES development pushed by financial support from domestic sources and international development funds
- Population largely in favor of RES expansion

- Limited political willingness and no long-term strategy
- Current cooperation limited (EC/EU)

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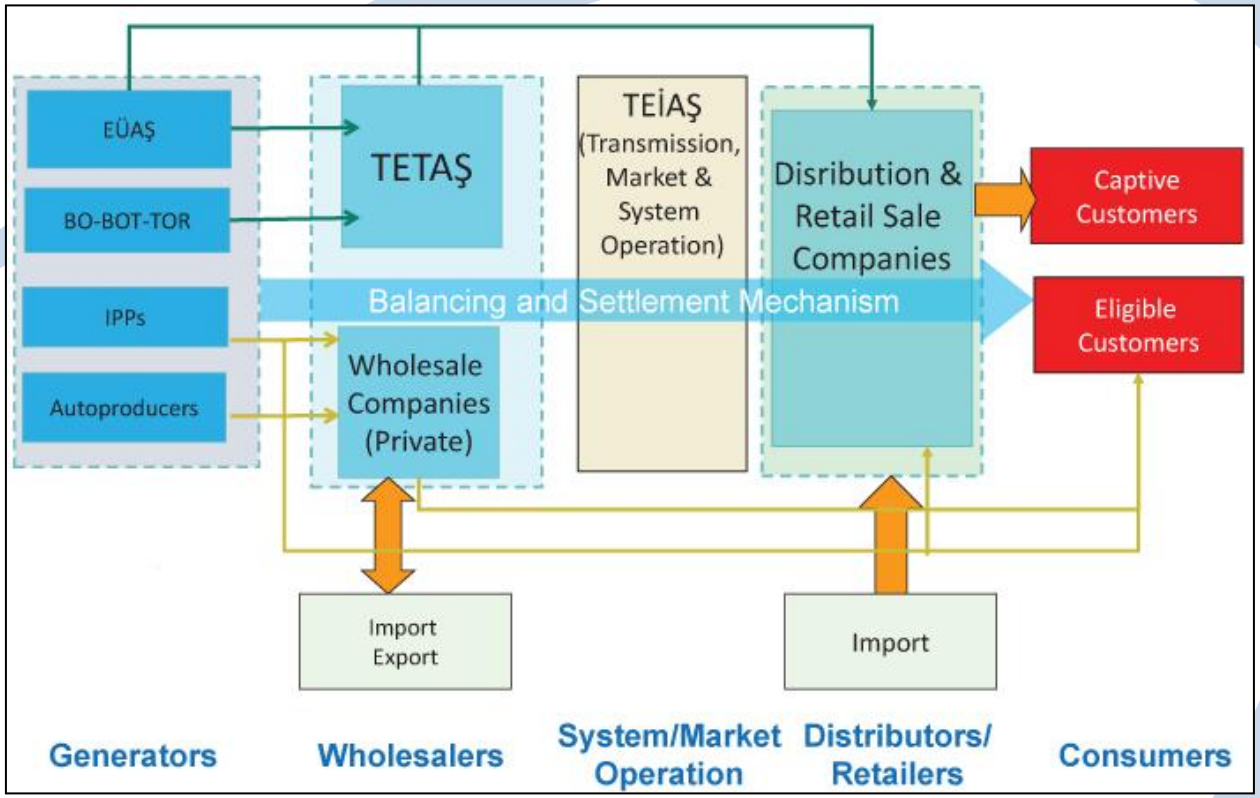
Turkish Electricity Market



Architecture of the Turkish Electricity Market

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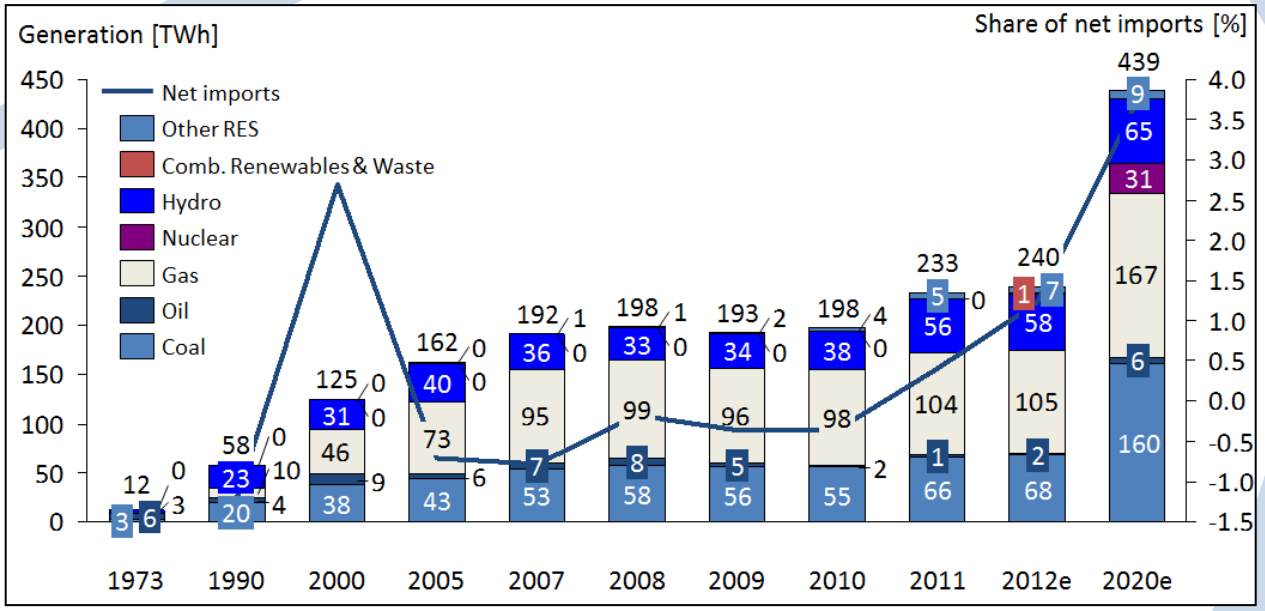
Electricity generation in Turkey



Historic and forecasted gross electricity generation broken down in energy balance items (left), share of net electricity imports in own generation (right)

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Simulated Scenarios (Bottom Up)

- Installed capacities of the Green-X model were used to simulate the hourly power production for a typical year
- The most extreme scenarios BAU and SNP max (both 2023) were analysed for this presentation

- BAU = business as usual meaning continuation of currently implied RES policies
- SNP = strengthened national policies, SNP max referring to a country that puts in maximum effort to reach higher RES targets

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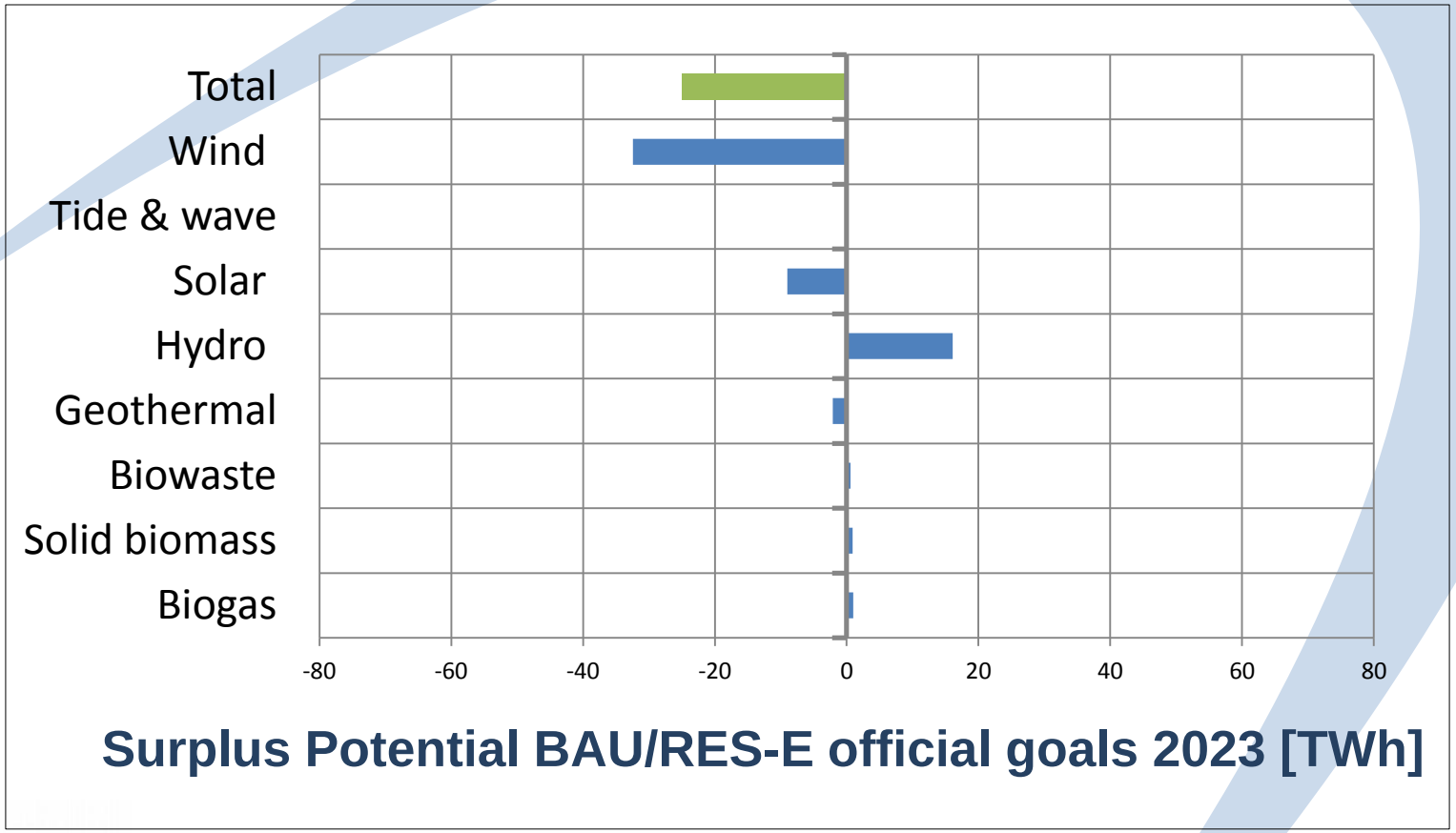
RES export potential (Bottom Up)



Surplus Potential BAU/RES-E official goals 2023 [TWh]

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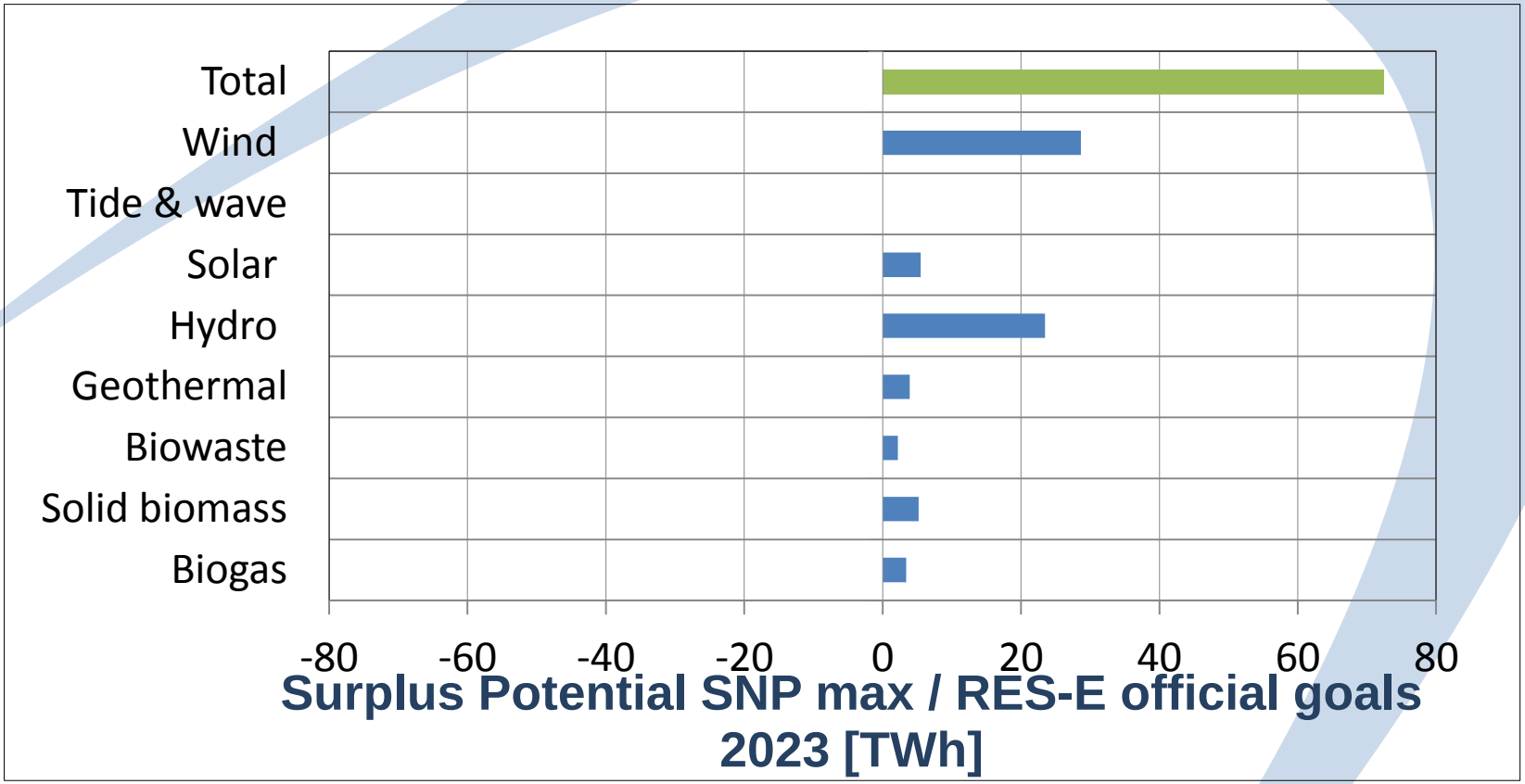
RES export potential (Bottom Up)



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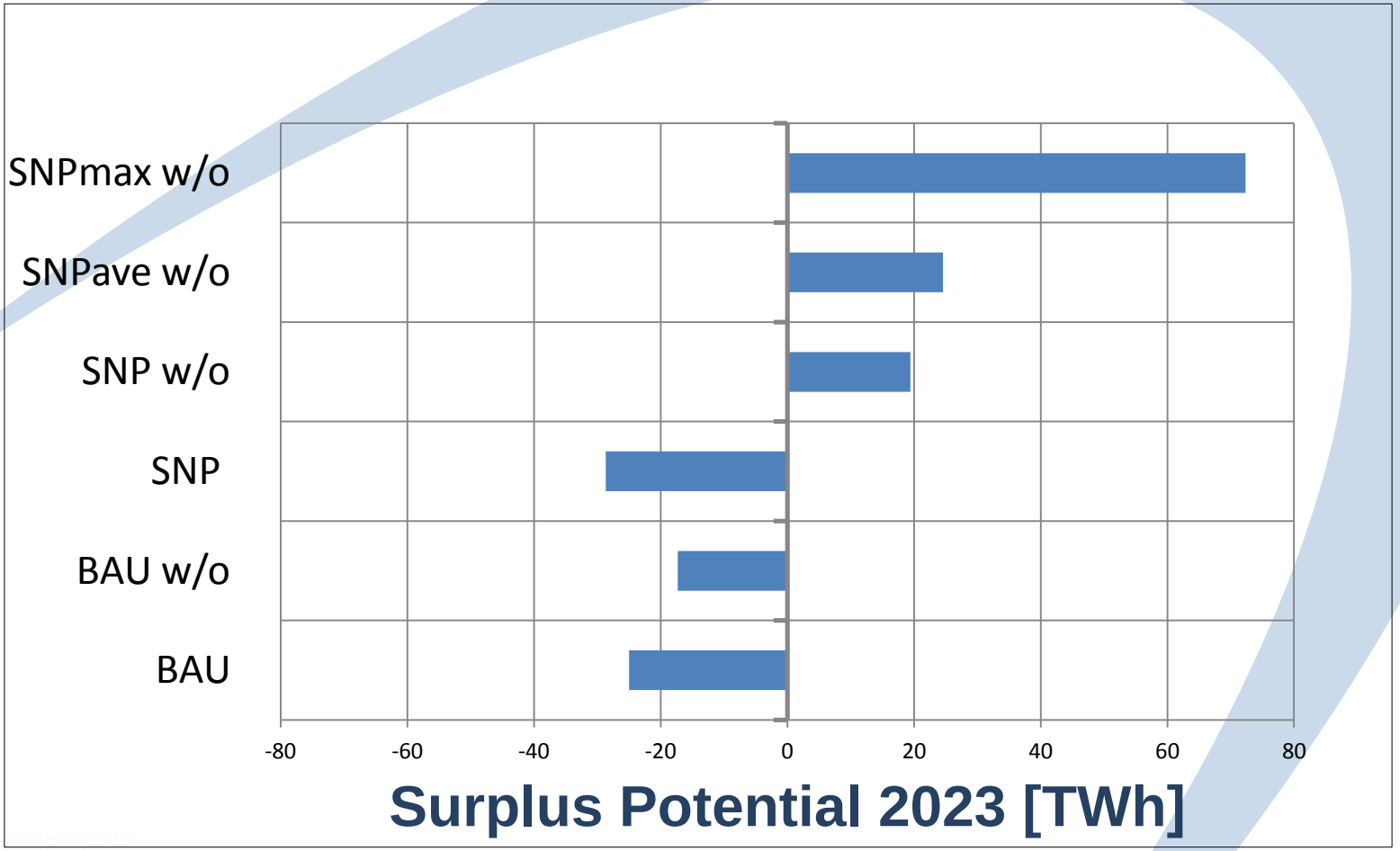
RES export potential (Bottom Up)



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Can electricity exports under the cooperation mechanisms create new business models?

- Share of exports subject to agreement between Turkey and buyer country

- ➔ **Part of the electricity under Joint Projects can stay in Turkey and count to the Turkish target**
  - Combination with Carbon finance still possible
  - No use of domestic feed-in for RES share consumed in Turkey

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Capacity increase in Turkey - Assumptions

- Bank interest rate 10%
- Share equity/debt 30%/70%
- Loan period 14 years
- Export electricity price € 90/MWh
- Export share 30%
- Export period 20 years
- Domestic electricity market price € 60/MWh
- O&M € 30/kW
- Investment Costs € 1100/kW
- ➔ partly high sensitivity of results on choice of parameters !

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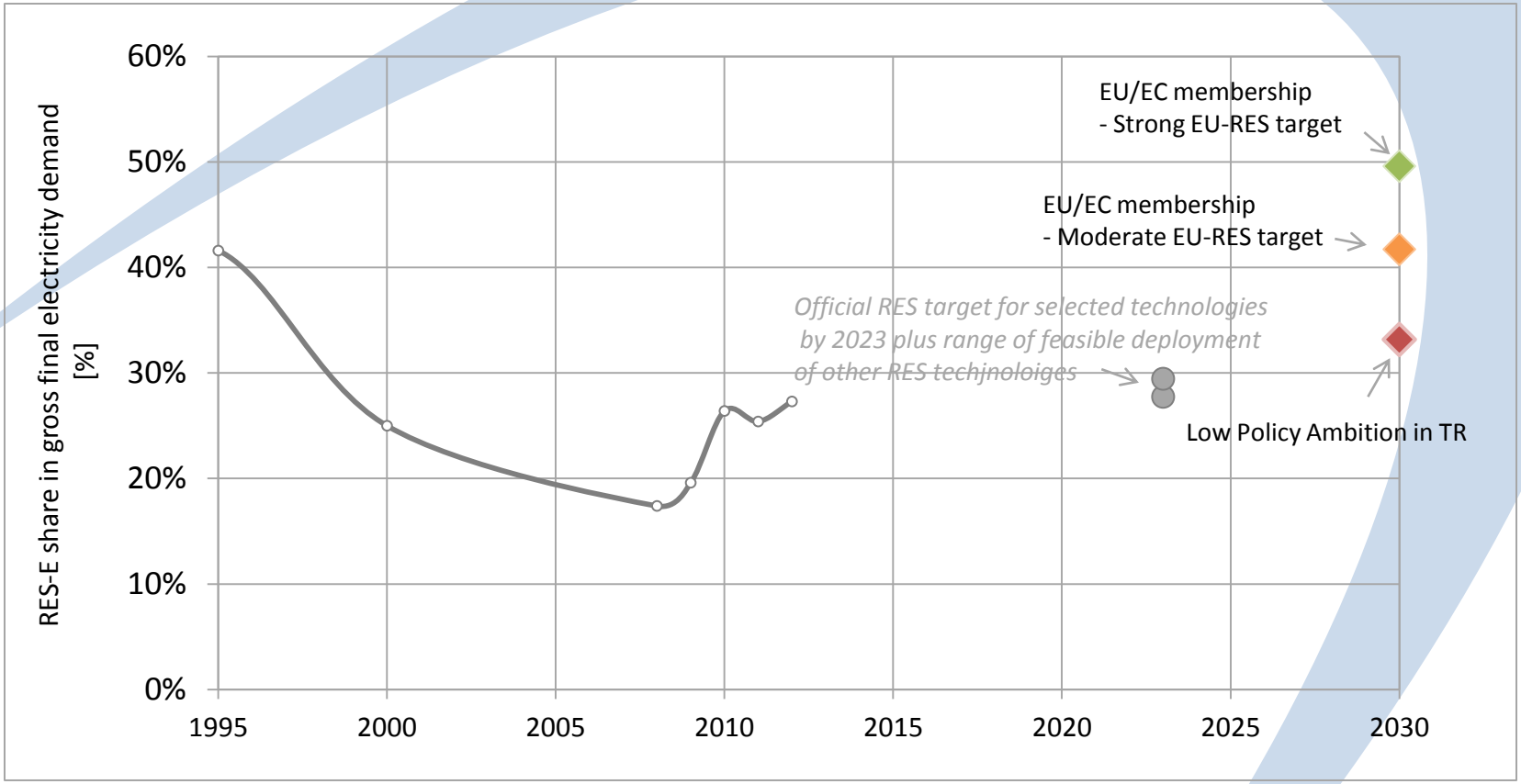
RES deployment (Integrated)



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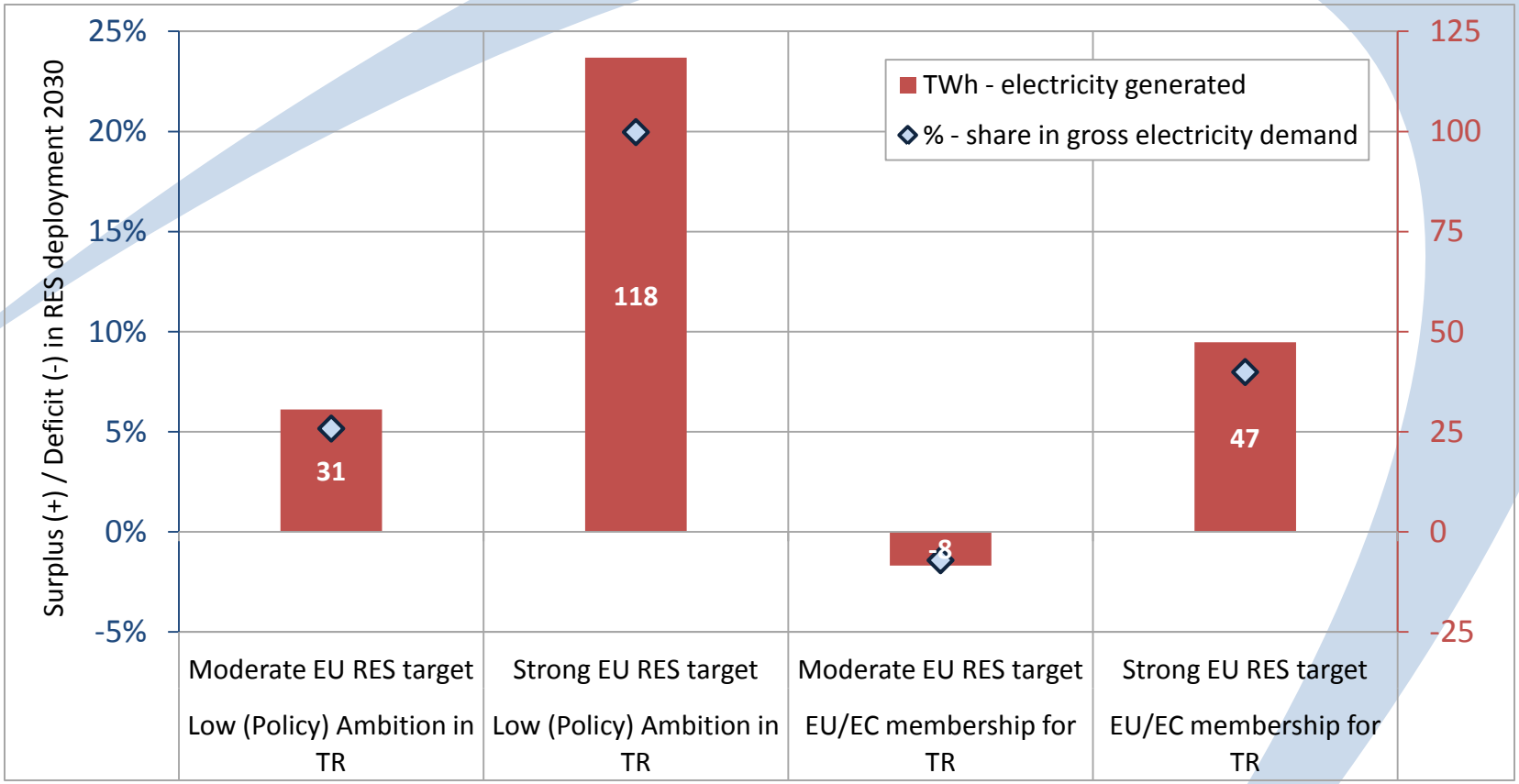
RES export potential (Integrated)



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Key drivers for cooperation on RES

Benefits for Turkey

- Additional revenues from selling surplus electricity
- Technology/knowledge transfer
- Decrease supply dependency in the long run
- Improve the trade balance through energy exports

Benefits for EU

- Large RES-potential (good resource quality)
- Cooperation advantages in a broader sense (pumped hydro for international balancing)

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Key constraints for cooperation on RES

Grid related constraints

- Technical losses (7-8% in 2012)
- Connection to other countries limited (different synchronous areas)

Non-grid related constraints

- Political situation (conflicts in neighboring countries)
- Uncertainties in future supply portfolio (development of nuclear power/hydro projects)

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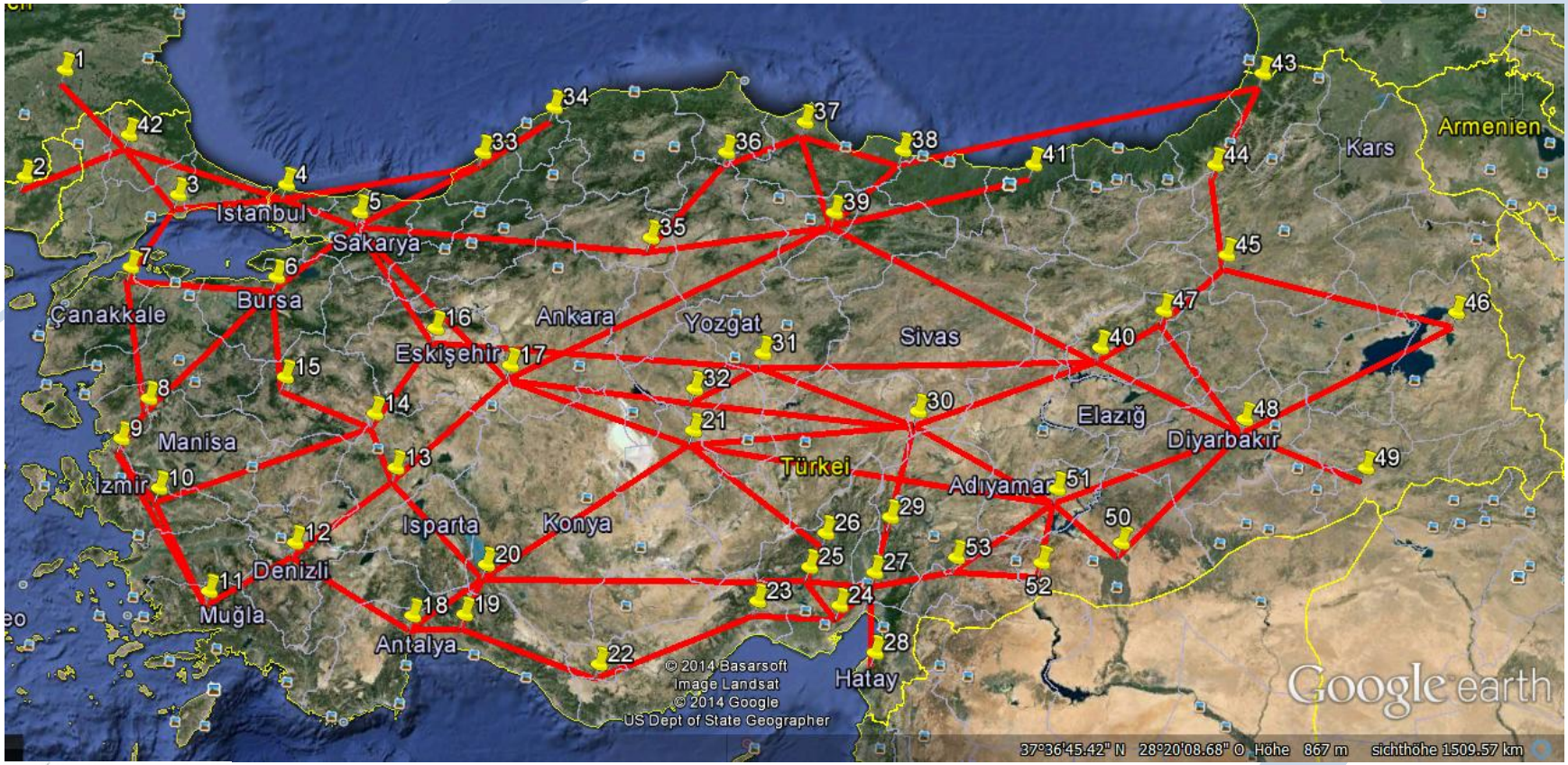
Turkish Electricity Transmission Grid



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Key messages

Current Situation

- Currently Turkey lacks political willingness for focusing on RES deployment
- If surplus RES-E were to be exported, the grid would have to be improved
- Nevertheless, potential and good resources are given

Future Prospects

- 2030 and beyond targets and legal framework are necessary
- Increased cooperation would benefit RES deployment
- Surplus potential by 2030 and beyond depends on development of domestic use and demand (i.e. ambition) at EU level

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Thank you for your attention!

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Key Questions for Panelists

- RES targets for 2030?
- Nuclear/Hydro expansion plans? Are these plans still being pursued?
- Are the current RES goals realistic/does the Turkish government view them as realistic?
- Are there plans to increase RES expansion?

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