BRINGING EUROPE AND THIRD COUNTRIES CLOSER TOGETHER THROUGH RENEWABLE ENERGIES

Short and long-term perspectives for RES in Turkey – with a first indication of opportunities for RES cooperation with the European Union

Gustav Resch, Andre Ortner, Lukas Liebmann, Gerhard Totschnig,

Energy Economics Group (EEG),
Vienna University of Technology (TU Wien)

Contact: resch@eeg.tuwien.ac.at

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Outline

- Approach taken
- (Draft) **Results on future RES deployment in Turkey**
- Concluding remarks

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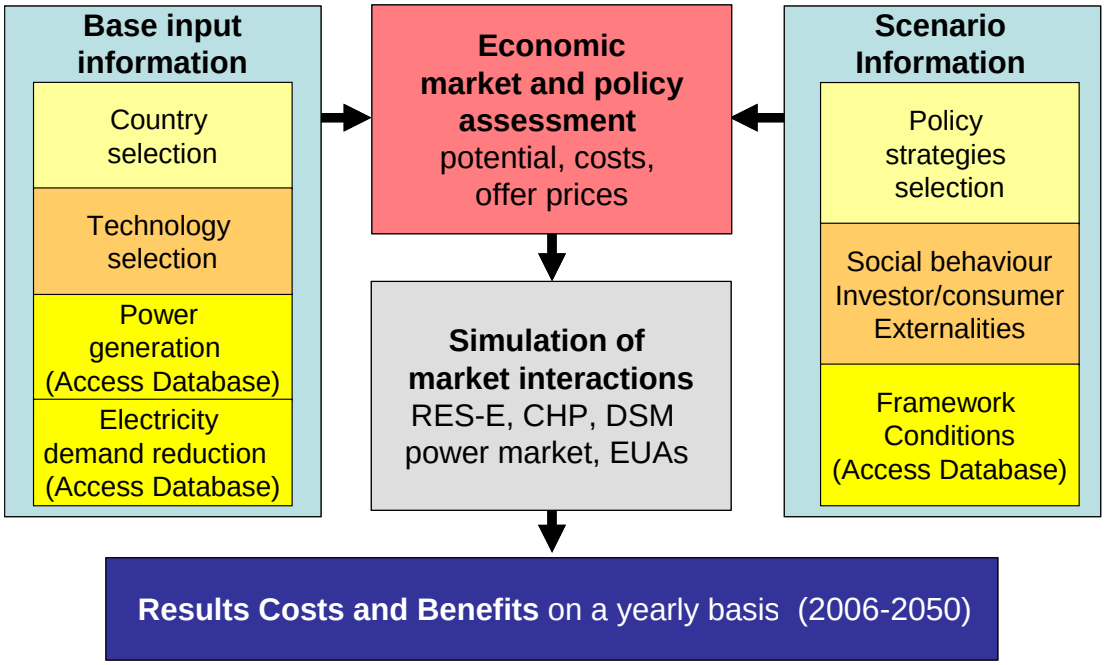
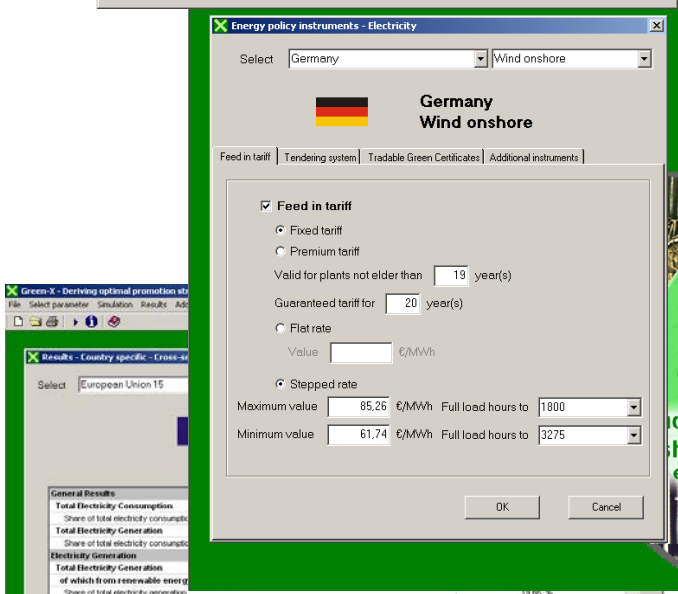
The *Green-X* model

Simulation model for energy policy instruments in the European energy market

- RES-E, RES-H, RES-T and CHP, conventional power
- Based on the concept of dynamic cost-resource curves
- Allowing forecasts up to 2030(2050) on national / EU-27 level





Reference clients: European Commission (DG RESEARCH, DG TREN, DG ENV, DG ENER), Sustainable Energy Ireland, German Ministry for Environment, European Environmental Agency, Consultation to Ministries in Serbia, Luxembourg, Morocco, etc.

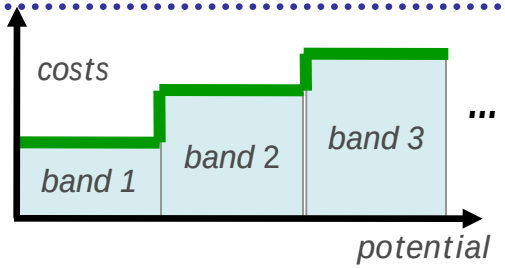
Green-X model – overview & approach

Mid-term (up to 2020)

realisable potentials in year n **n+1**

& corresponding costs for RES at country level

by RES technology *(subdivided into several bands)*



Potential

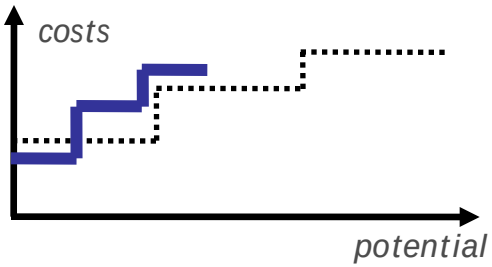
Cost (efficiency)

Technology diffusion *('S-curve')*

(non-economic barriers by technology/country)

Technological change

((global) learning curves by technology)

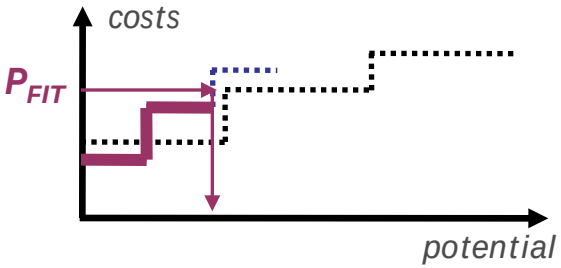


Realisable yearly potentials in year n

Energy policy

(energy prices, RES support)

e.g. Feed-in tariffs,
Investment incentives,
Tendering schemes,
Quotas with tradable green certificates



Deployment in year n

and corresponding costs & benefits

The *Green*-X approach:

Dynamic cost-resource curves

&

a detailed energy policy representation

→ *Overview on assessed cases* *(part 1 of 2)*

BAU – barriers prevail

Remove non-economic barriers hindering an enhanced RES deployment

BAU – barriers mitigated

BAU … business-as-usual

Strengthen RES policy implementation (learning from best-practice policy implementation)

Indicating room for RES cooperation (in principle, if deployment is above Turkey's own targets)

SNPmod
Strengthened national policies offering moderate support

Applying strong financial incentives to trigger massive RES deployment

SNPstrong
Strengthened national policies offering strong support

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→ Overview on assessed cases *(part 2 of 2)*

Scenario acronym	BAU-ref (barriers remain)	BAU-ref	BAU-eff (barriers remain)	BAU-eff
RES policy case	Business-as-usual (BAU)	Business-as-usual (BAU)	Business-as-usual (BAU)	Business-as-usual (BAU)
Demand trend	reference	reference	low	low
Non-cost barriers	prevailing	mitigated	prevailing	mitigated

→ *8 distinct scenarios, reflecting two different demand projections (and two different assumptions related to non-cost barriers (licensing, grid connection, market readiness,…) as well as three different policy tracks)*

Scenario acronym	SNPmod-ref	SNPmod-eff	SNPstrong-ref	SNPstrong-eff
RES policy case	Strengthened support (moderate)	Strengthened support (moderate)	Strengthened support (strong)	Strengthened support (strong)
Demand trend	reference	low	reference	low
Non-cost barriers	mitigated	mitigated	mitigated	mitigated

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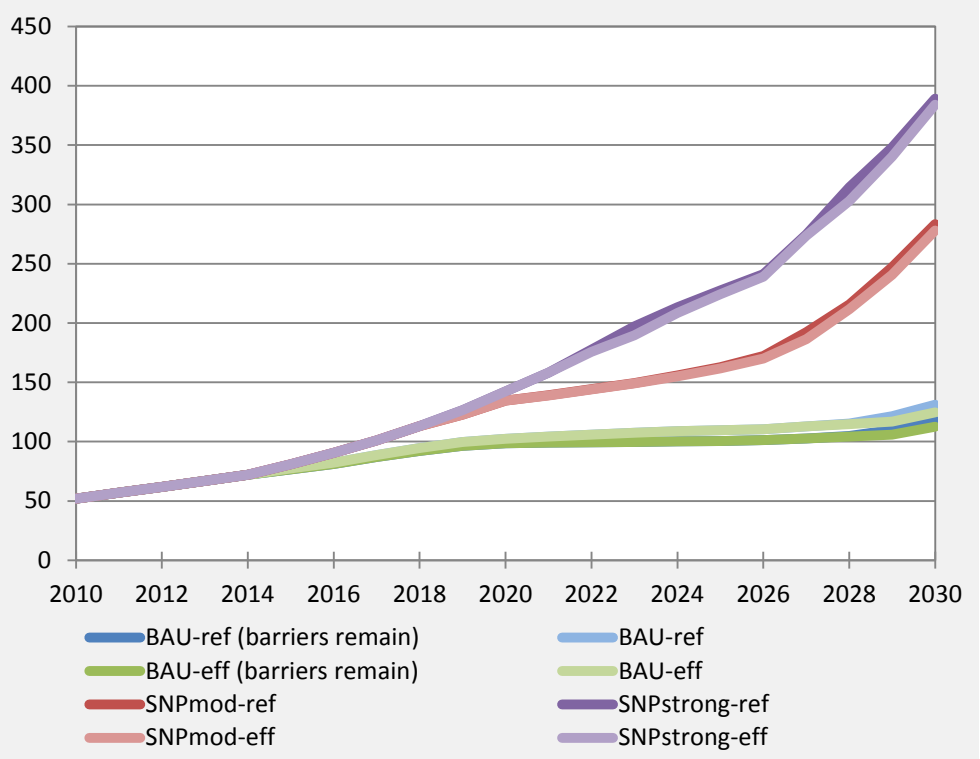
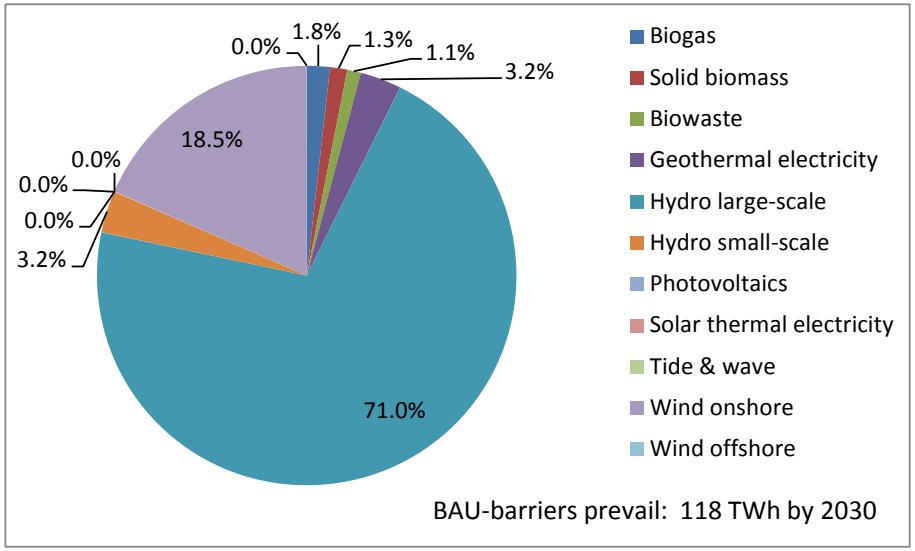
Results on RES-electricity deployment

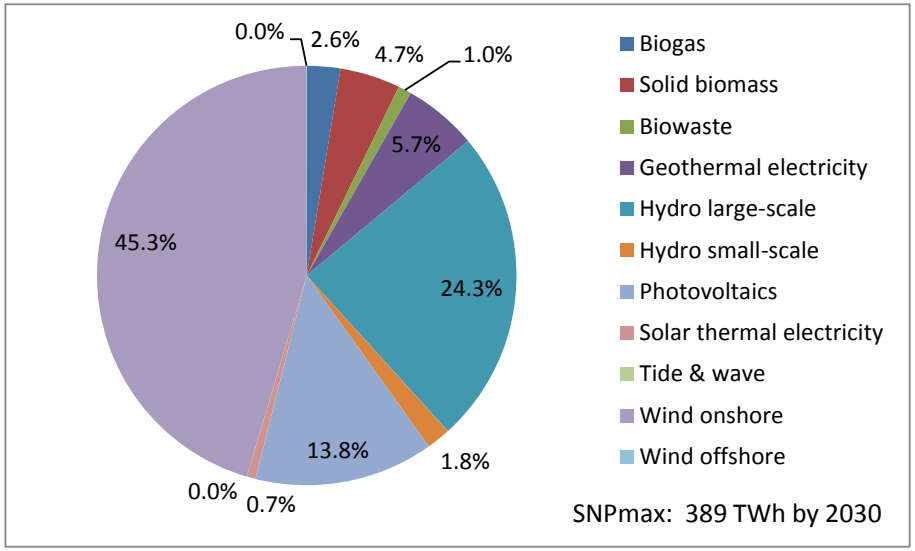
→ The range of feasible RES-electricity deployment is broad, non-cost barriers and (direct & indirect) financial incentives play a decisive role



Electricity generation from RES in Turkey up to 2030 according to different scenarios



Breakdown of 2030 RES-E generation (BAU vs. SNPmax)



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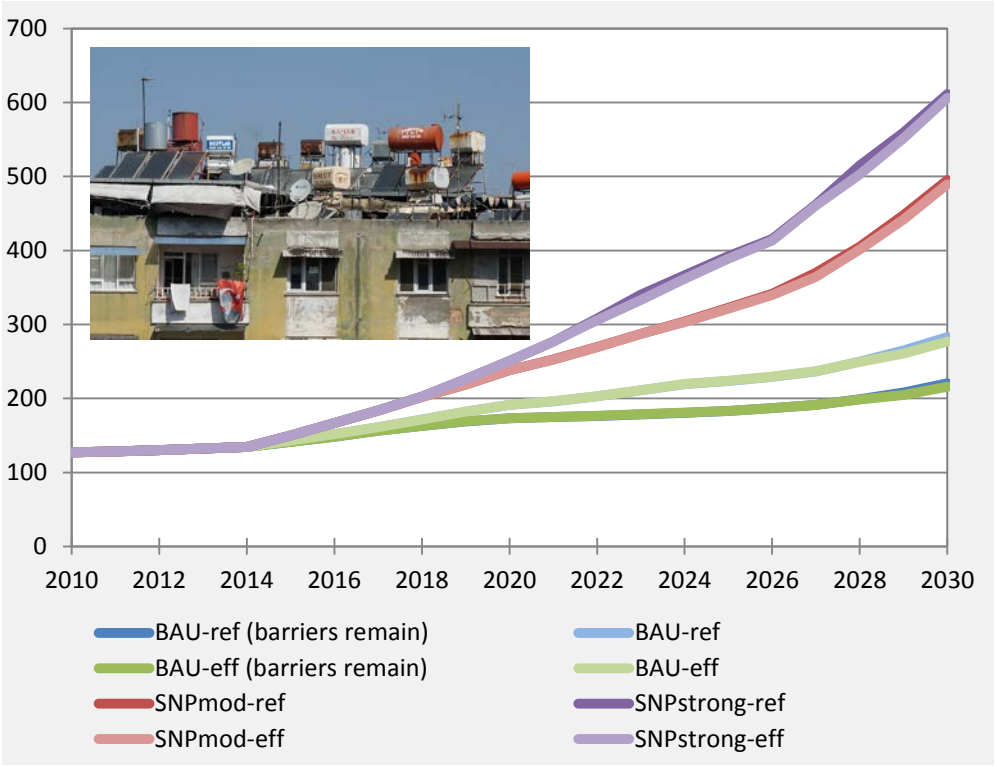
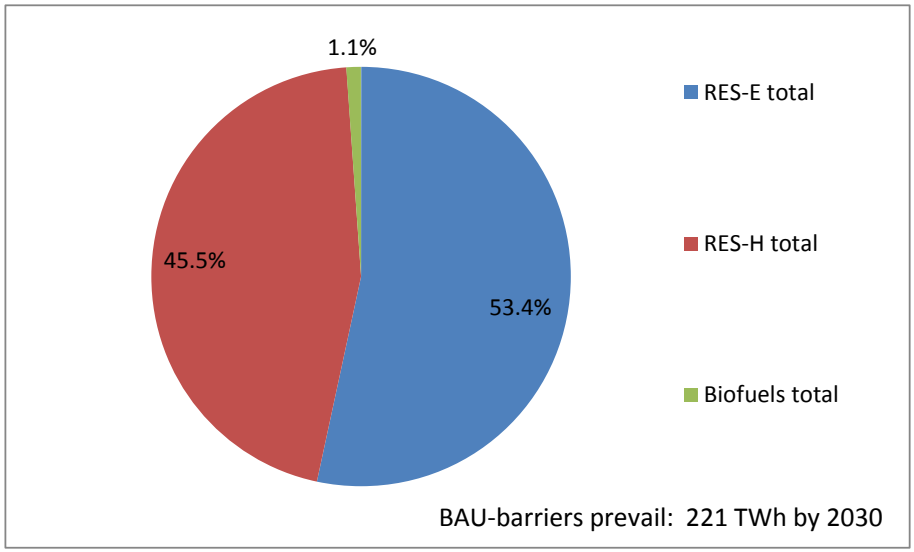
Source: Green-X, 2014

Results on RES deployment in total

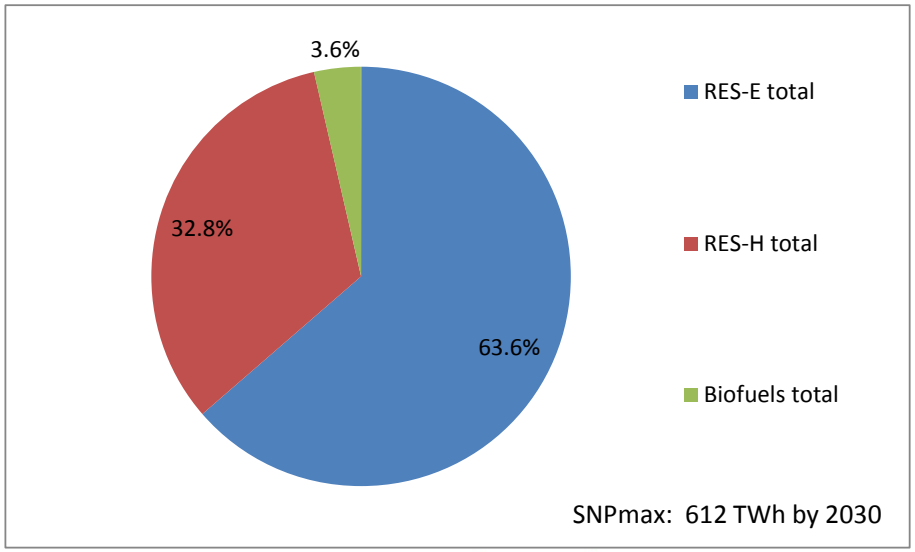
→ RES-electricity is of dominance and is prominently discussed, but also RES in heating & cooling and biofuels for transport provide important contributions to Turkish energy supply



Total RES supply (gross final energy) in Turkey up to 2030 according to different scenarios



Breakdown of 2030 RES production (BAU vs. SNPmax)



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Source: Green-X, 2014

RES shares in demand

→ *Future demand (growth) plays a crucial role, specifically in the electricity and in the transport sector this determines the feasible contribution of RES to meet Turkish (growing) demand*

Share of RES electricity generation on gross electricity demand (left) and share of total RES supply on gross final energy consumption (right) in Turkey according to assessed scenarios

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Source:
Green-X, 2014

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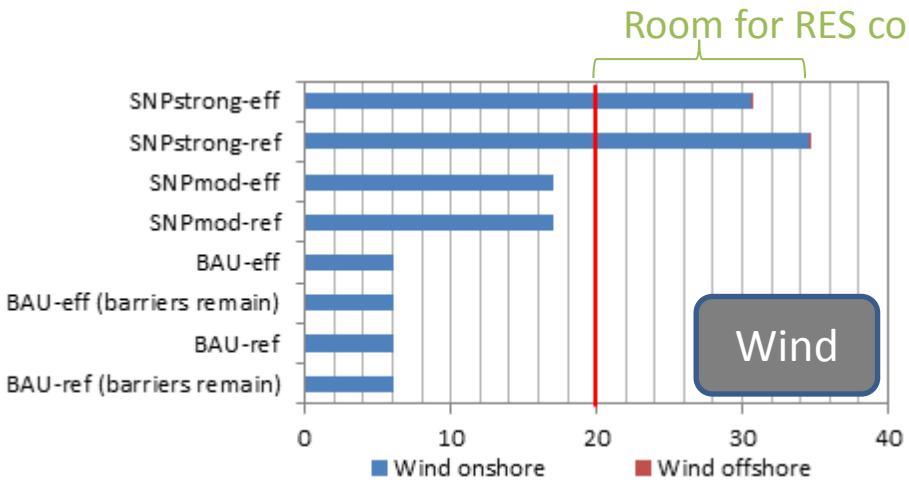
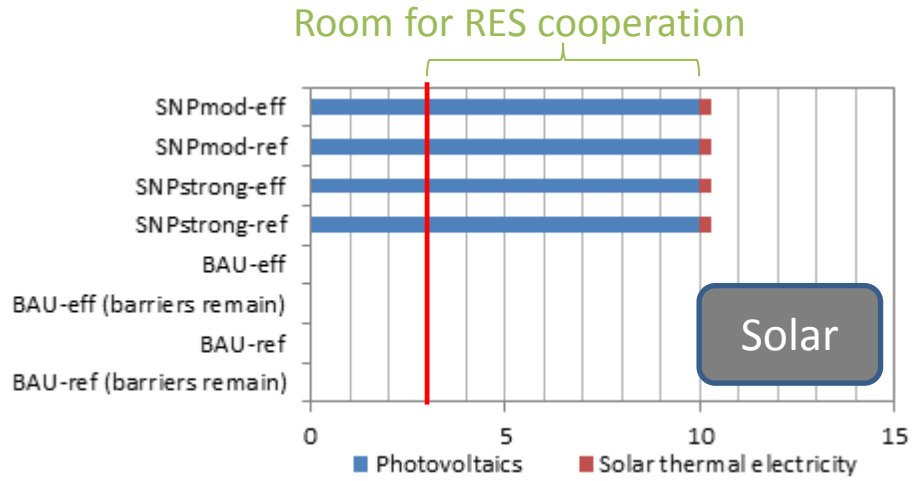
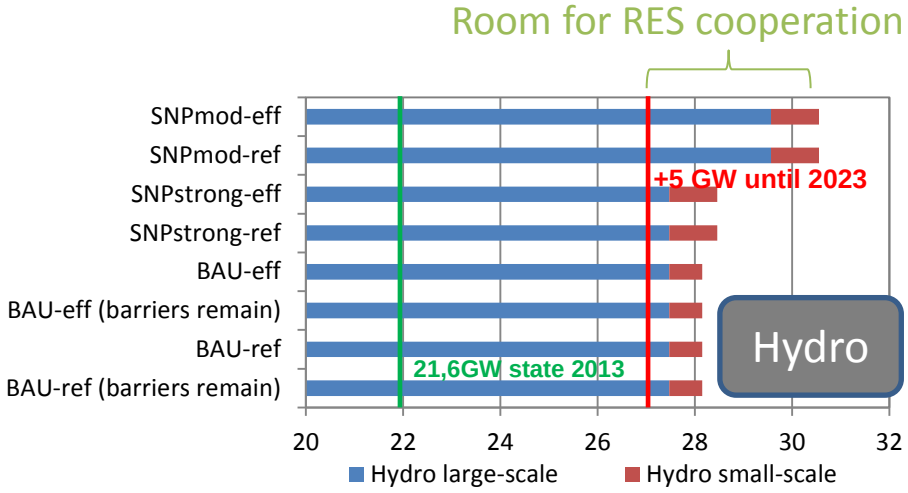
Achievement of technology-specific RES targets for 2023



→ *Achievement of 2023 RES targets appears feasible for wind, solar and hydro – but for wind and solar complementary steps to improve support and remove non-cost barriers appear helpful/necessary*





Installed capacity [in GW] of wind (above), solar (left) and hydro (right) in 2023 in Turkey according to different scenarios (incl. comparison to policy targets)

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Source: Green-X, 2014

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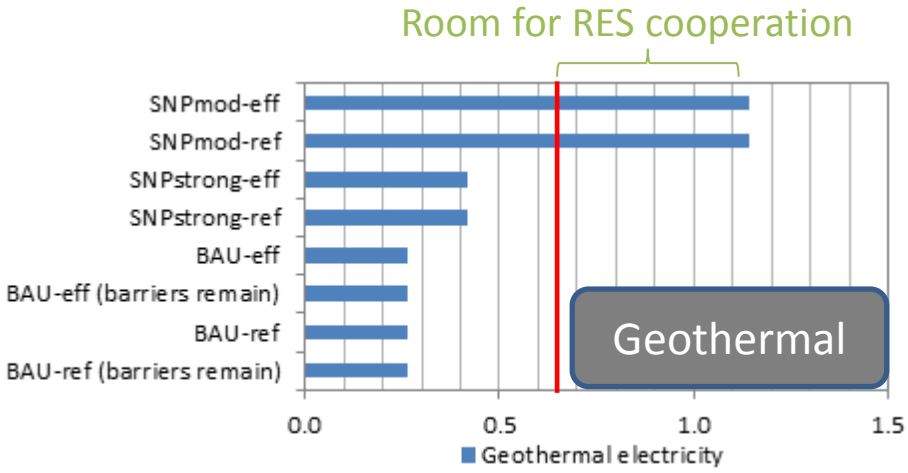
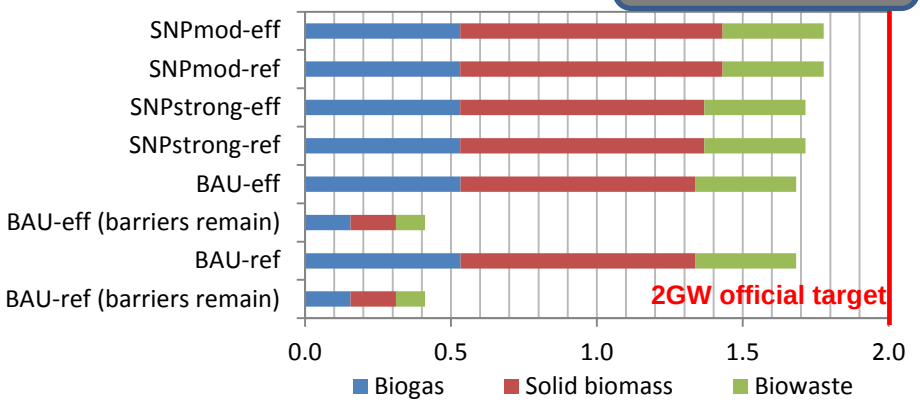
Achievement of technology-specific RES targets for 2023

→ Geothermal electricity generation appears comparatively "well on track" …

… while the achievement of the 2023 target for biomass does not seem likely for the time being





Installed capacity [in GW] of geothermal electricity (left) and biomass (right) in 2023 in Turkey according to different scenarios (incl. comparison to policy targets)

Source: Green-X, 2014

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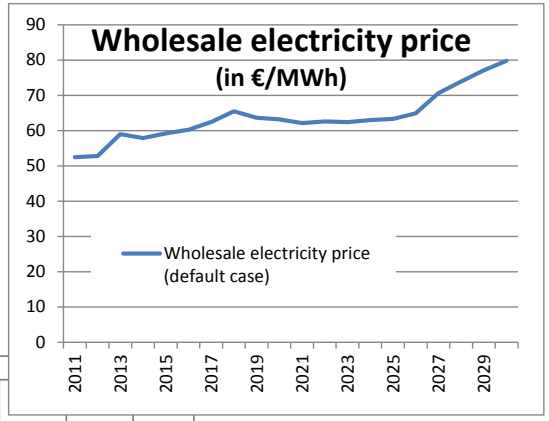
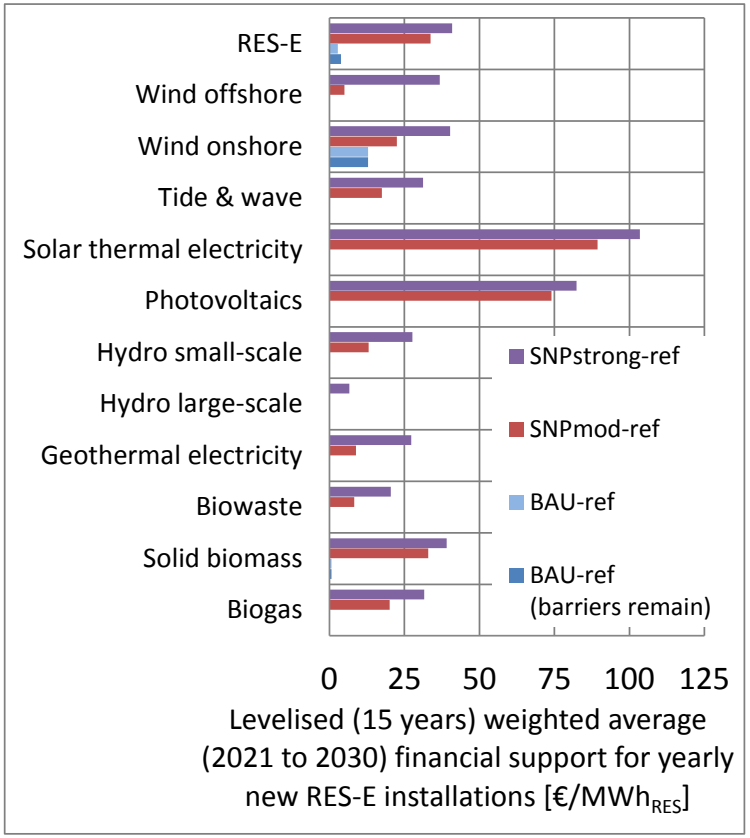
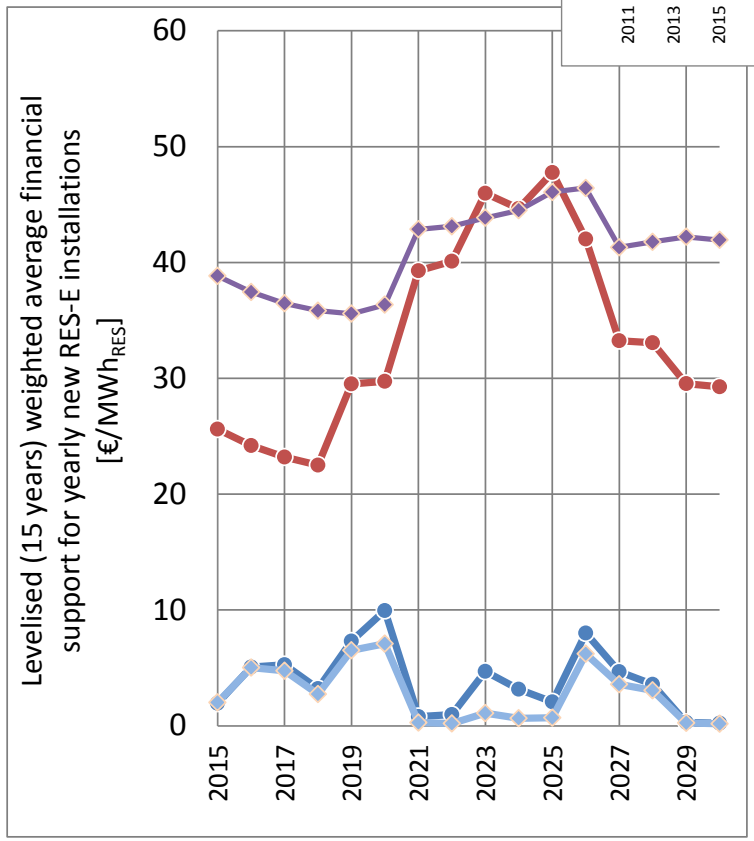
Financial incentives according to assessed policy tracks

→ *In the case of strengthened national policies higher financial incentives for RES are assumed and become effective from 2015 onwards*







Remark:
***Premium** … Incentive for a RES producer on top of revenues from selling electricity on the wholesale market*

Average (2015 to 2030) technology-specific support premiums (left) and development over time of financial support for a new RES installation on average (right)

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Source:
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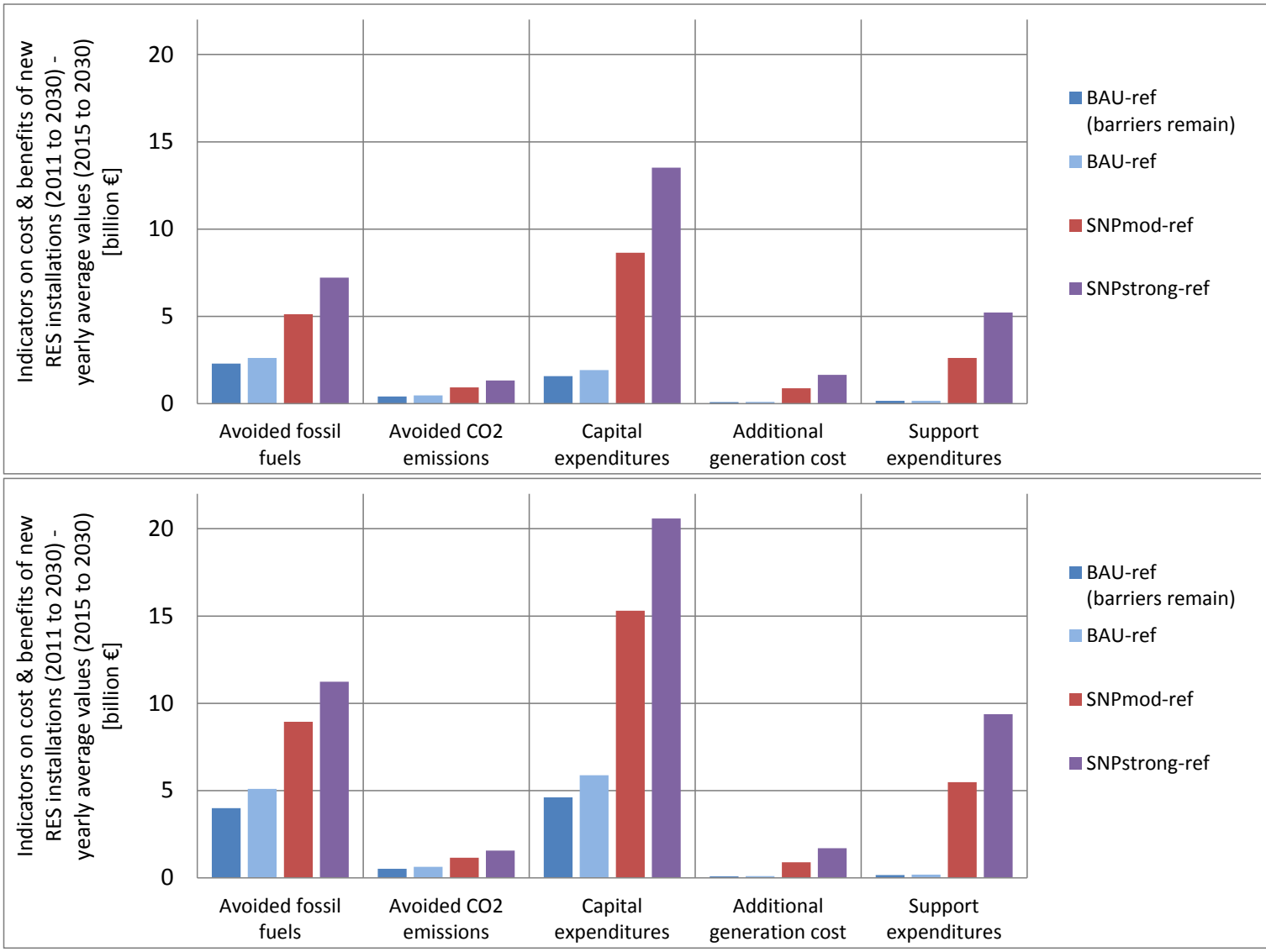
Draft Indicators on costs & benefits of RES(-E) in Turkey



Indicators on costs and benefits for new RES-E (above) and new RES (below) installations (2011 to 2030)

→ *A strong RES deployment in Turkey leads to increases in costs / expenditures*

… but comes along with benefits related to Turkey's trade balance (i.e. less fossil fuel imports) and may cause positive macro-economic impulses (e.g. local investments, manufacturing)

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Source:
Green-X, 2014

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Concluding remarks

- Turkey has sufficient potentials offering a bright future for RES
- The range of feasible RES-electricity deployment is broad, non-cost barriers and (direct & indirect) financial incentives play a decisive roleRES
- RES-electricity is of dominance and is prominently discussed, but also RES in heating & cooling and biofuels for transport provide important contributions to Turkish energy supply today and in the future
- Achievement of Turkey's 2023 RES targets appears feasible for wind, solar, geothermal and hydro, not for biomass – but for wind, geothermal and solar complementary steps to improve support and to remove non-cost barriers appear necessary

Constraints of the undertaken model-based assessment: **the following issues have been neglected so far …**

- **Relevance of local production for cost (decrease?) and for higher incentives**
- **Incentives related to grid connection**
- **Incentives for own consumptions**

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A strong RES deployment in Turkey leads to increases in costs / expenditures … but comes along with benefits related to Turkey's trade balance (i.e. less fossil fuel imports) and may cause positive macro-economic impulses (e.g. local investments, manufacturing)

Thank you for your attention!

Gustav Resch

Email: resch@eeg.tuwien.ac.at

Phone: +43-1-58801-370 354

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