MOVING FORWARD TOGETHER

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Economic opportunities of energy transition / Twinning final conference

Wolfram Sparber, Eurac Research - Italy

Twinning Project
Renewables Development in Ukraine

State Agency on Energy Efficiency and Energy Saving of Ukraine

E-CONTROL

eurac research

AUSTRIAN ENERGY AGENCY

umweltbundesamt

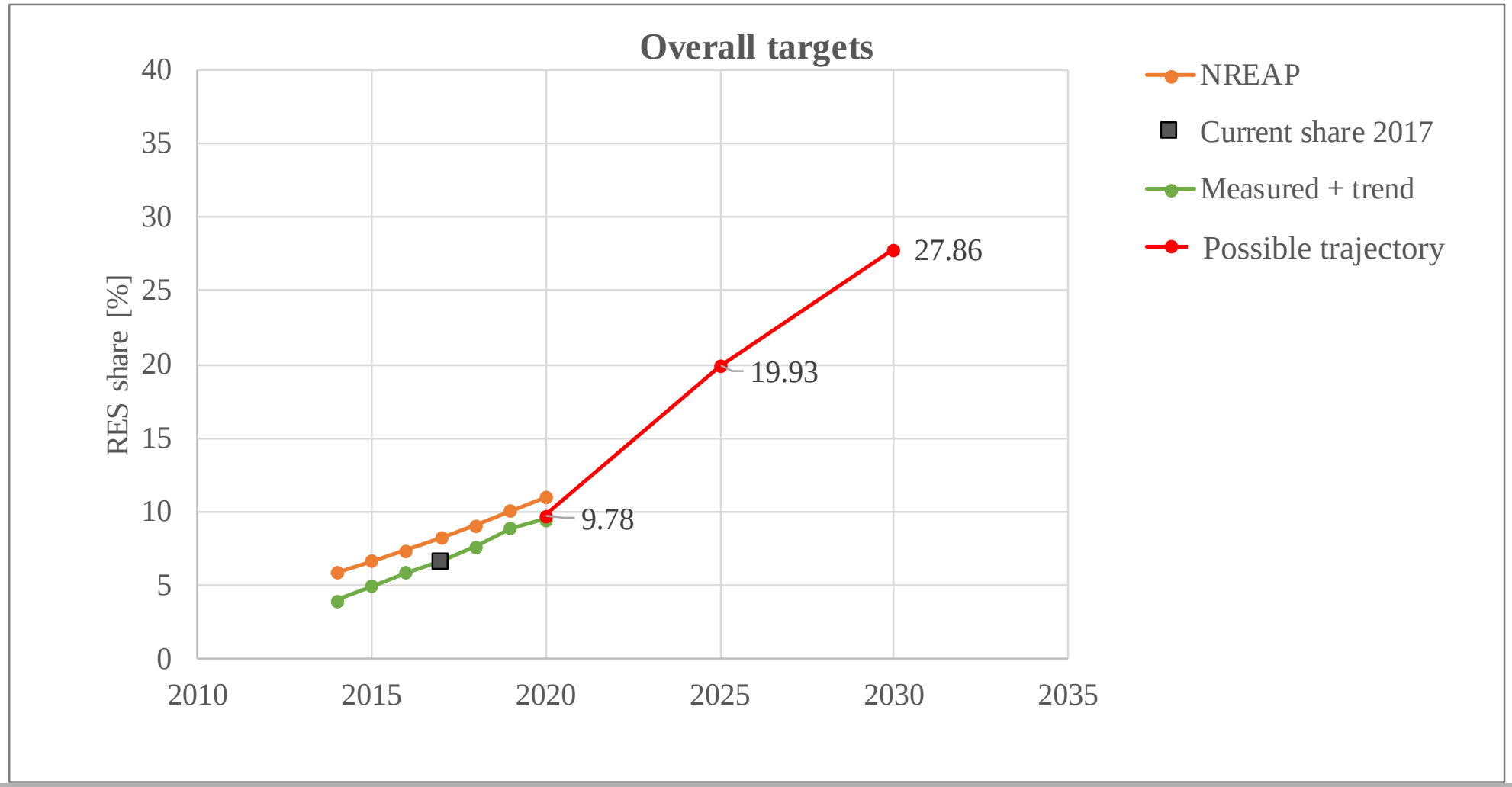
PERSPEKTIVEN FÜR UMWELT & GESELLSCHAFT

Federal Ministry
Republic of Austria
Sustainability and Tourism

Energy transition in Ukraine

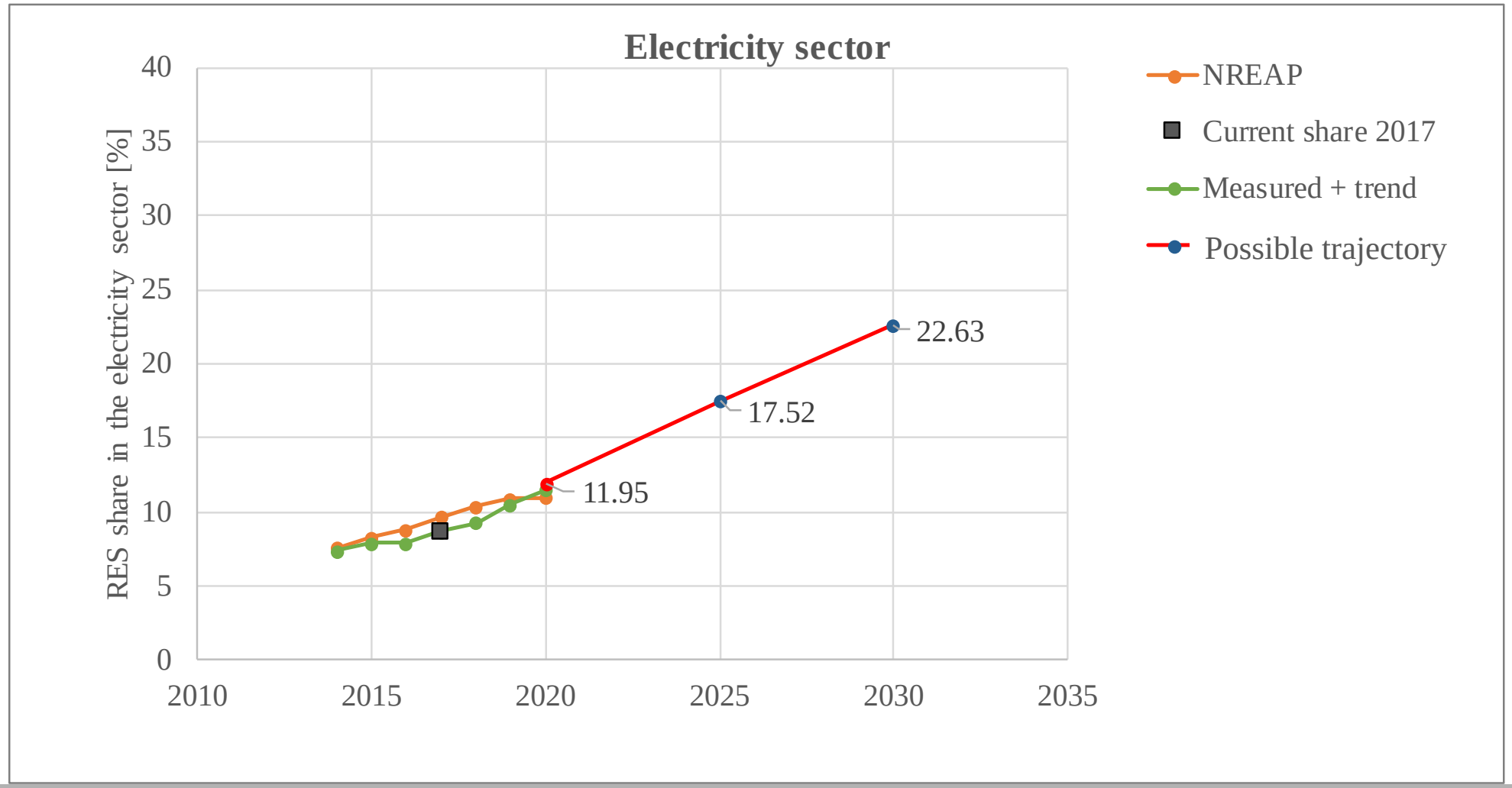
Source: UA Map Investment Energy Efficiency, https://uamap.org.ua/

Renewable energy – historic development and possible trajectory



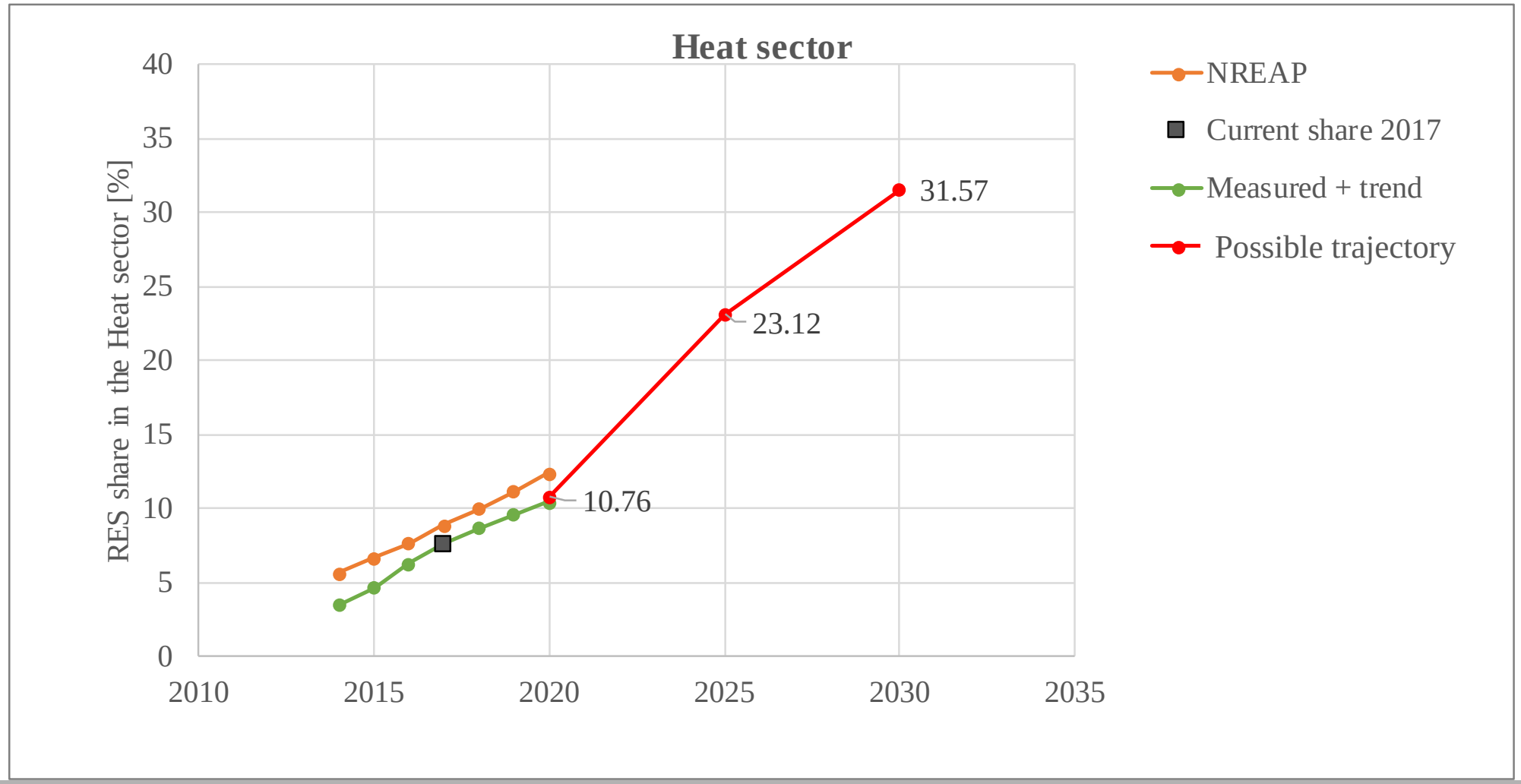
Data elaborated within the Twinning project

Renewable electricity – historic development and possible trajectory



Data elaborated within the Twinning project

Renewable heat – historic development and possible trajectory



Data elaborated within the Twinning project

Energy transition

What does it mean?

What is the impact on the economic development?

What are opportunities and threats of the transition?

Unfortunately there was not enough time to answer this questions within the Twinning projects in detail, but within Eurac Research we did some calculations and estimations for Italy which might be of interest.

Energy transition in Italy

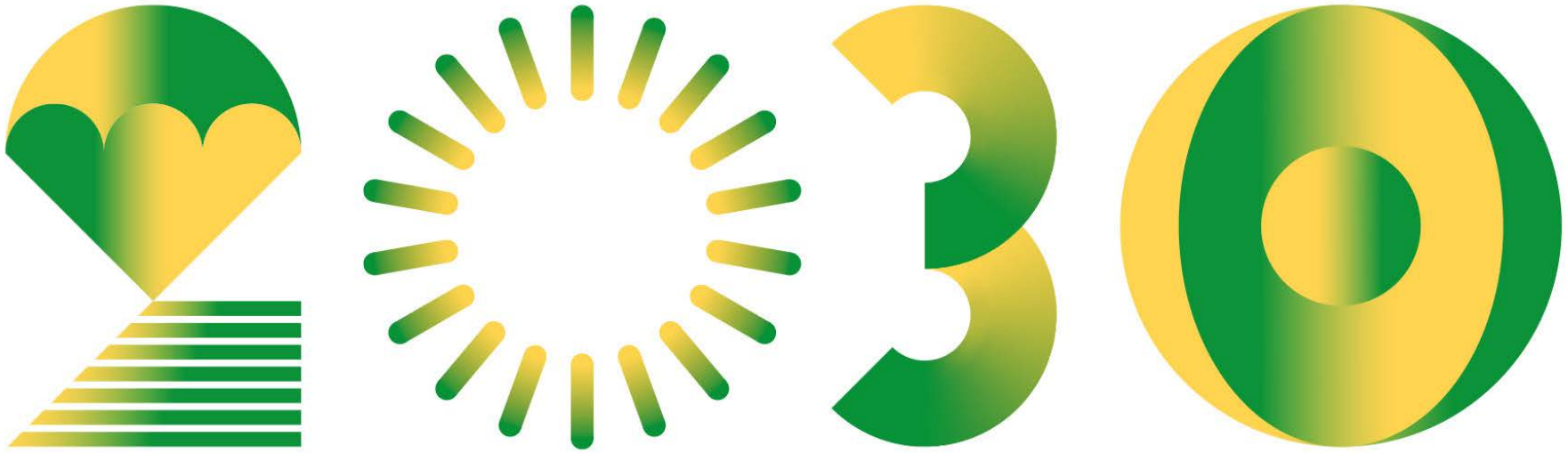
ENERGIA CLIMA 2030

MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE

Ministero dello Sviluppo Economico

MIT Ministero delle Infrastrutture e dei Trasporti

ENERGIA CLIMA



[1] Proposta di piano PNIEC, 2020

Italy - 2030

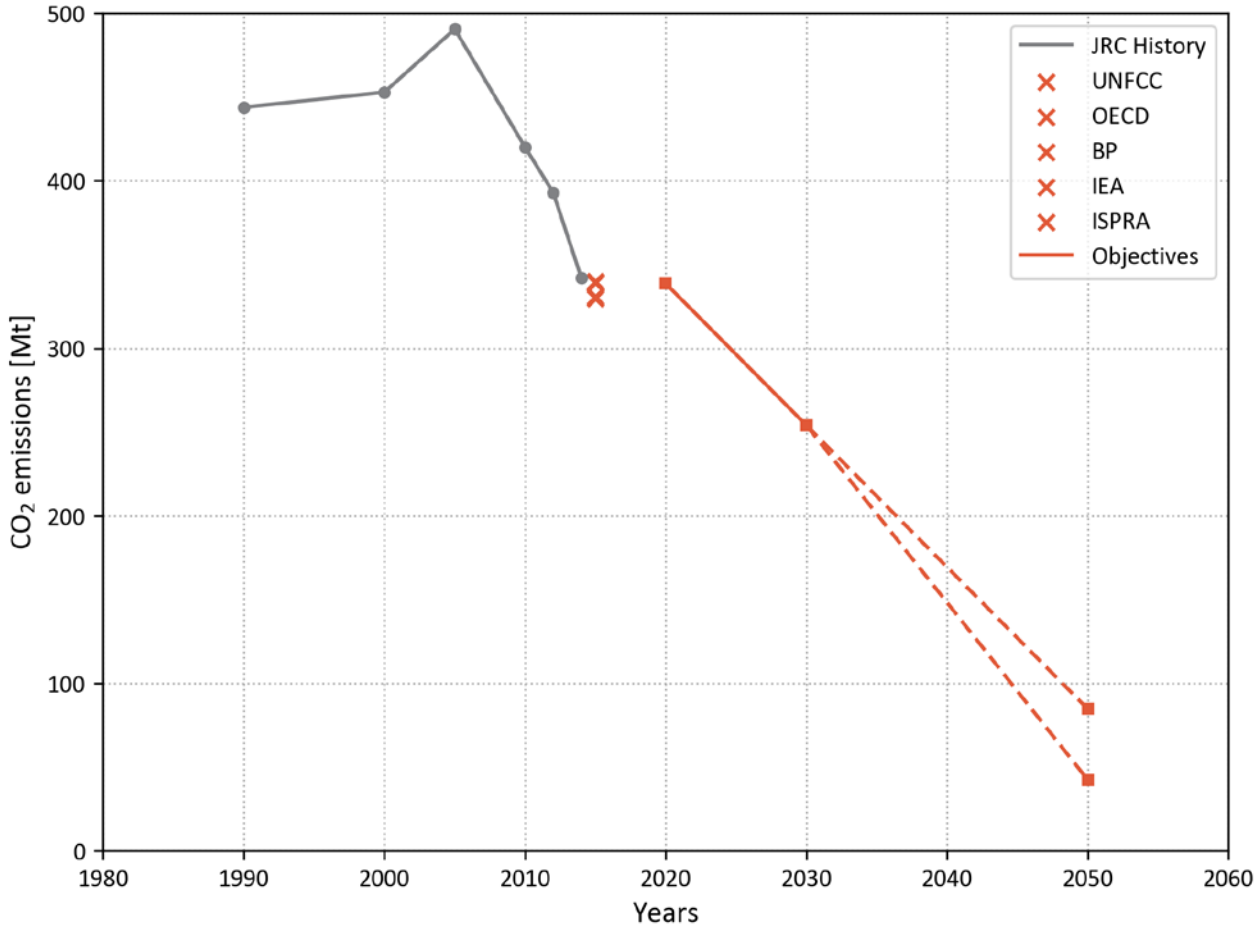
Target

- 40% emissions

at 2030 respect to value of 1990

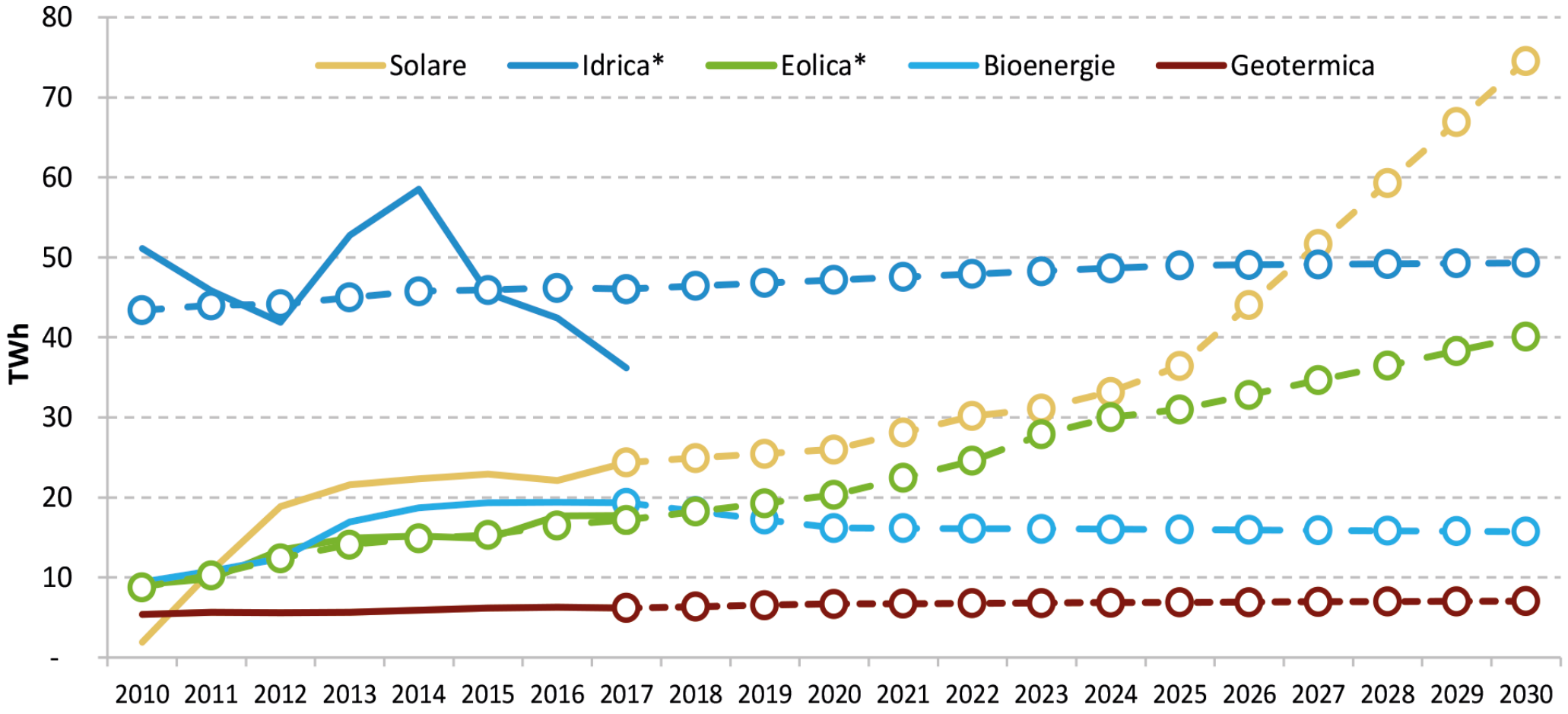
32% RES share

55.4% electricity sector
33% heat sector
21.6% transport sector



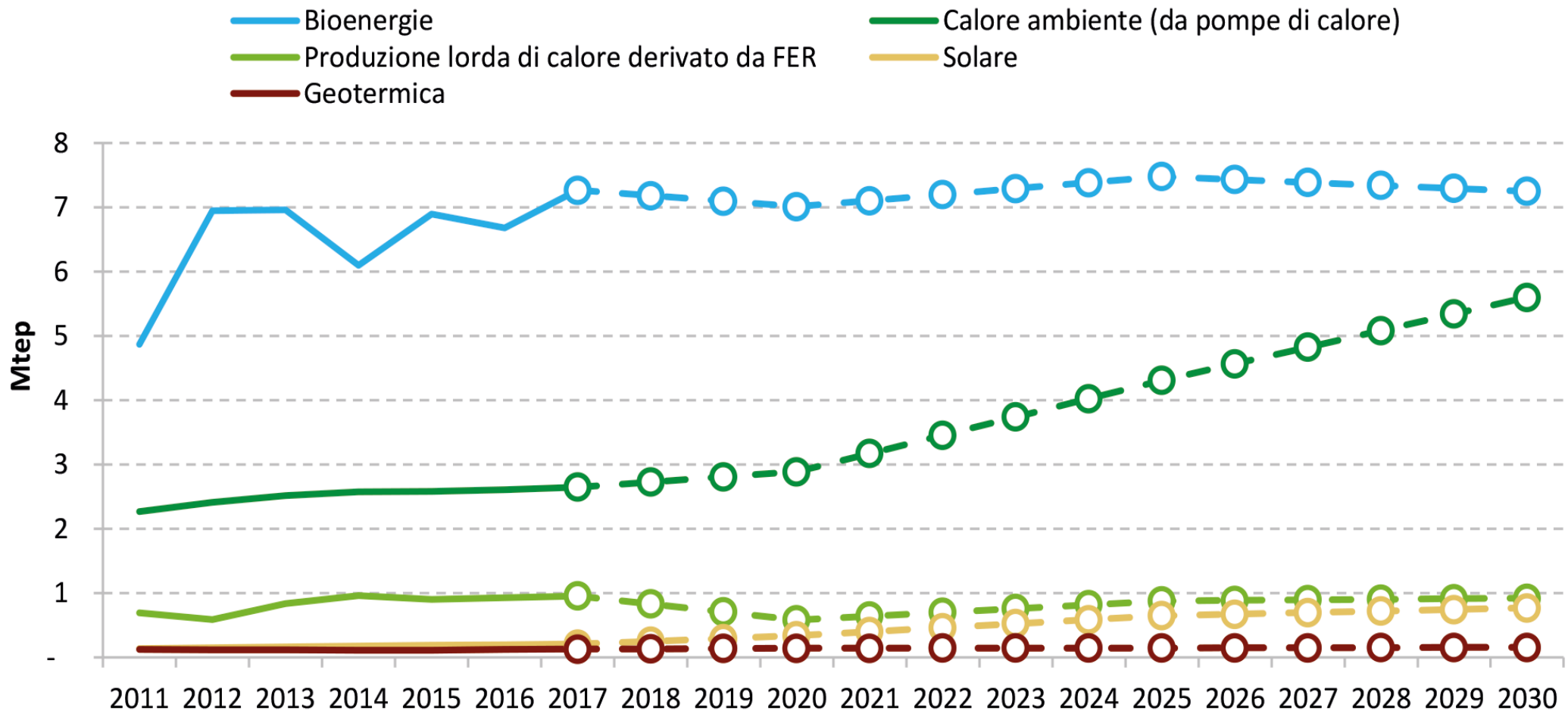
[2] EUROSTAT, 2019. [3] UNFCC, 2016. [4] OECD, 2016. [5] BP, 2016. [6] IEA, 2016. [7] ISPRA, 2016. [8] European commission, 2007. [9] European commission, 2014. [10] European commission, 2018

Renewable electricity – historic development and expectations till 2030



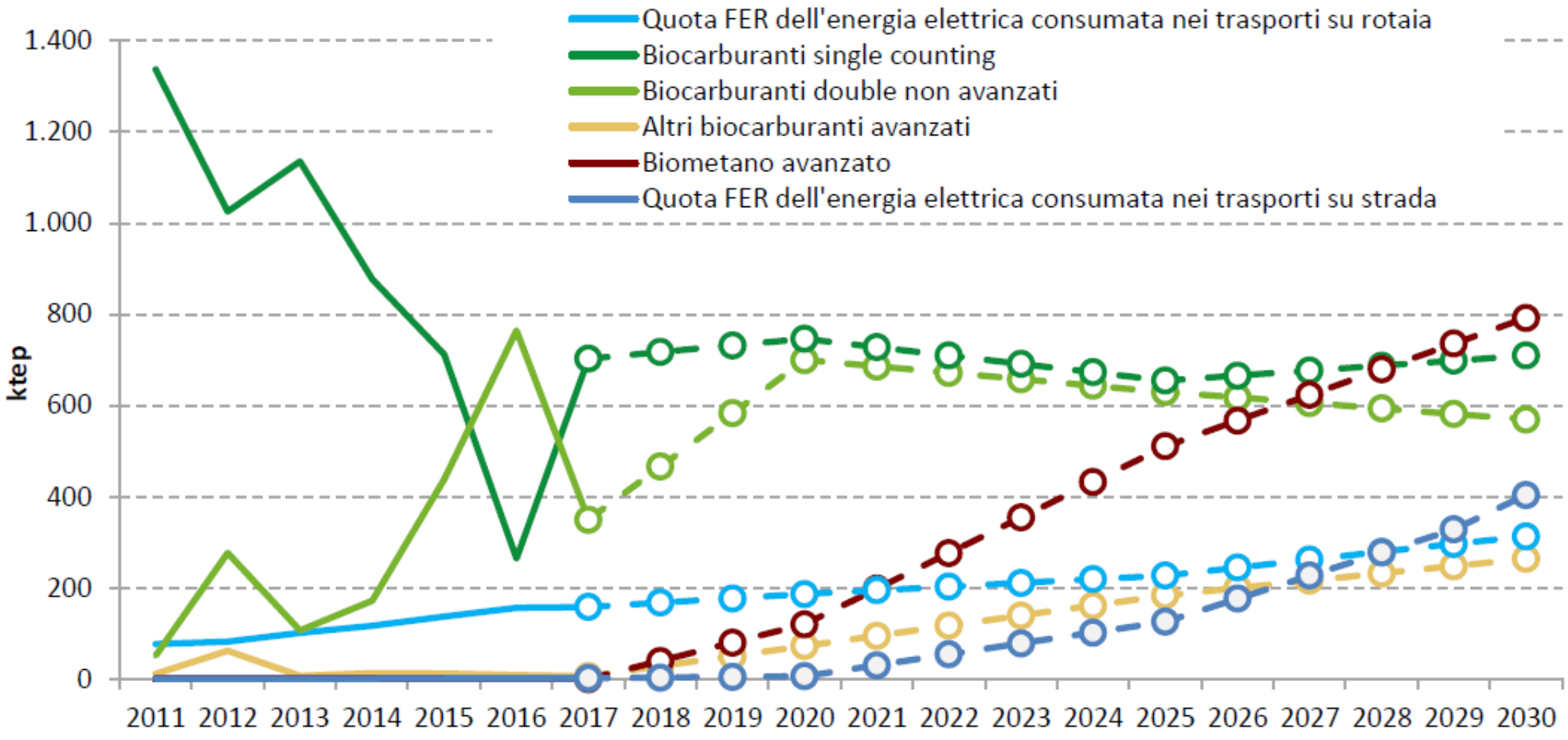
Source: PNIEC, GSE and RSE 2020

Renewable thermal – historic development and expectations till 2030



Source: PNIEC, GSE and RSE 2020

Renewable transport – historic development and expectations till 2030



Source: PNIEC, GSE and RSE 2020

Considered sectors

Energy system modelling considering **sector-coupling, efficiency measures, e-mobility, storage, hydrogen** and **hourly time-step**

Electricity

Heat

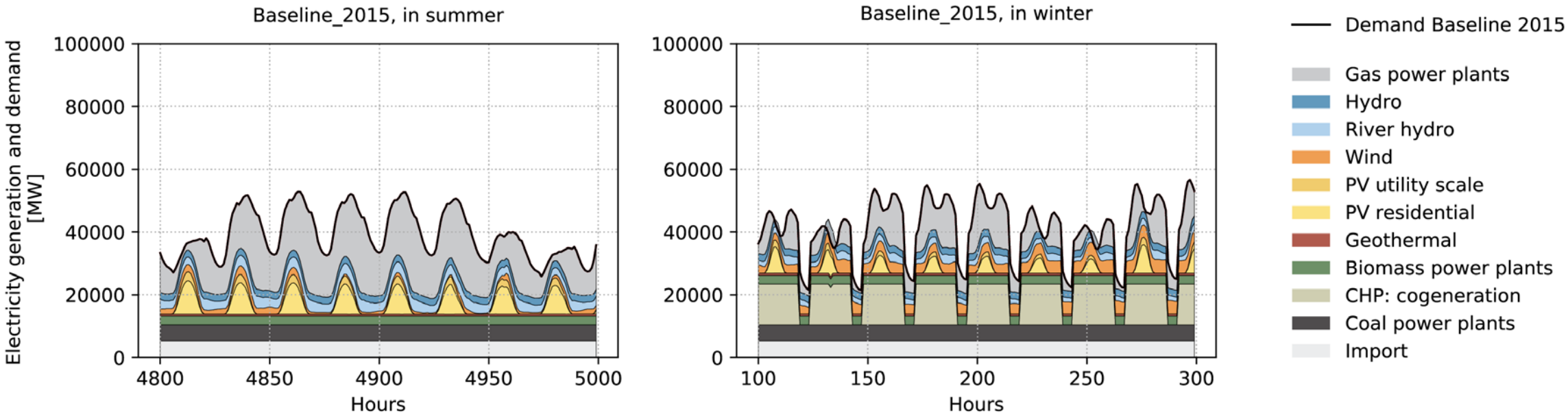
Transport

[11] Smart Energy System concept, 2010

Hourly electricity generation

Which sources cover hourly demand?

Example of a week in a summer and a week in winter

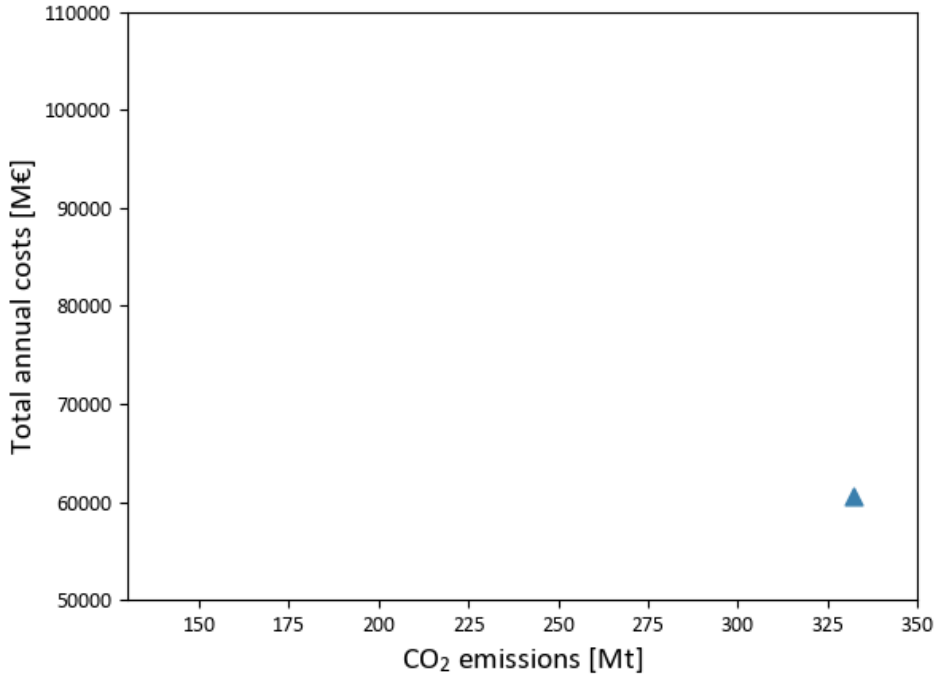


[16] Terna - Statistical Data 2015. [17] Heat Roadmap Europe 2015

Optimization model of the energy system

Model n objectives - Eurac Research

Simulation model		Optimization model
EnergyPLAN (Aalborg University)	+	Multi objective evolutionary algorithm MOEA



Each point on the chart shows total costs and CO_2 emissions per each combination of technologies of the energy system.

For each combination of technologies of the energy system, hourly energy production and consumption have been simulated.

Optimization model of the energy system

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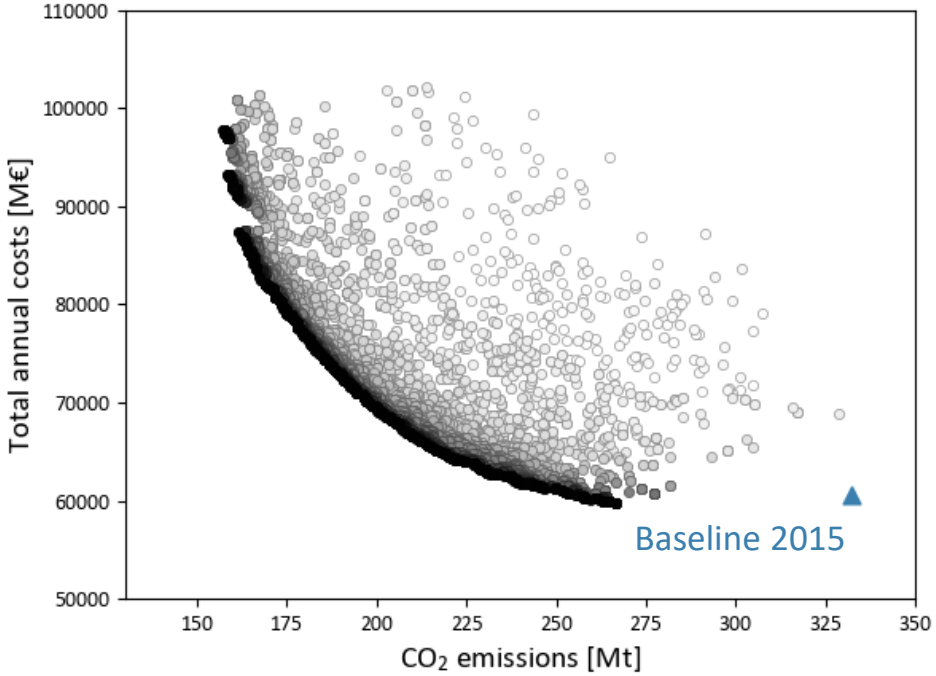

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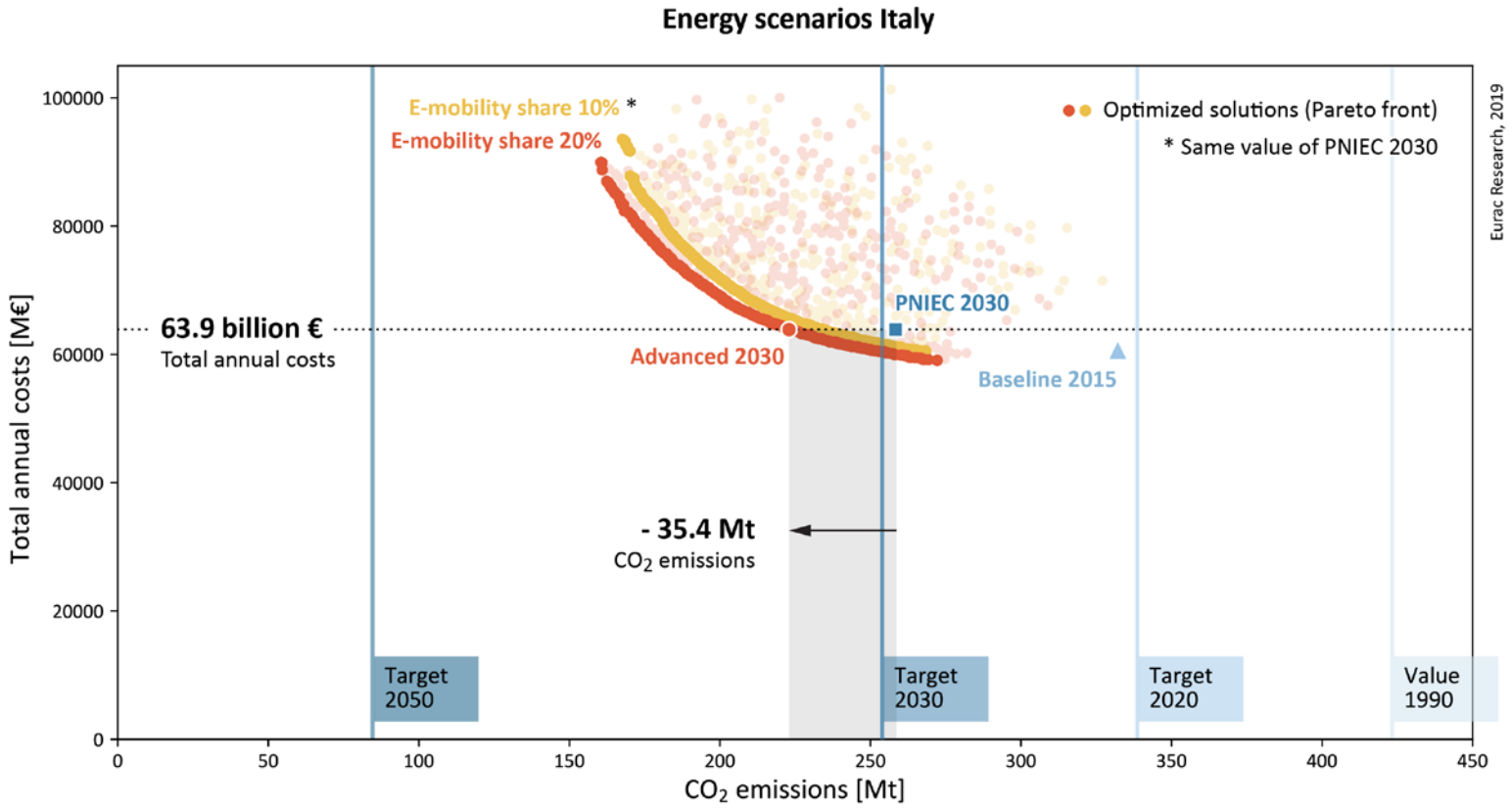
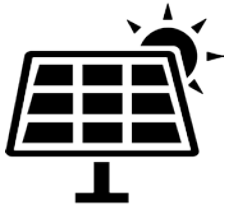
Results of the simulations



Each single dot shows total annual costs and CO_2 emissions of a specific energy scenario. It can be seen that the PNIEC scenario is close to a cost optimum for the given CO_2 emission target. Still keeping the cost constant other scenarios can be identified further reducing CO2 emission in a relevant way.

[1] Proposta di piano PNIEC, 2018. [8] European commission, 2007. [9] European commission, 2014. [10] European commission, 2018

Values of the main technologies in the different scenarios

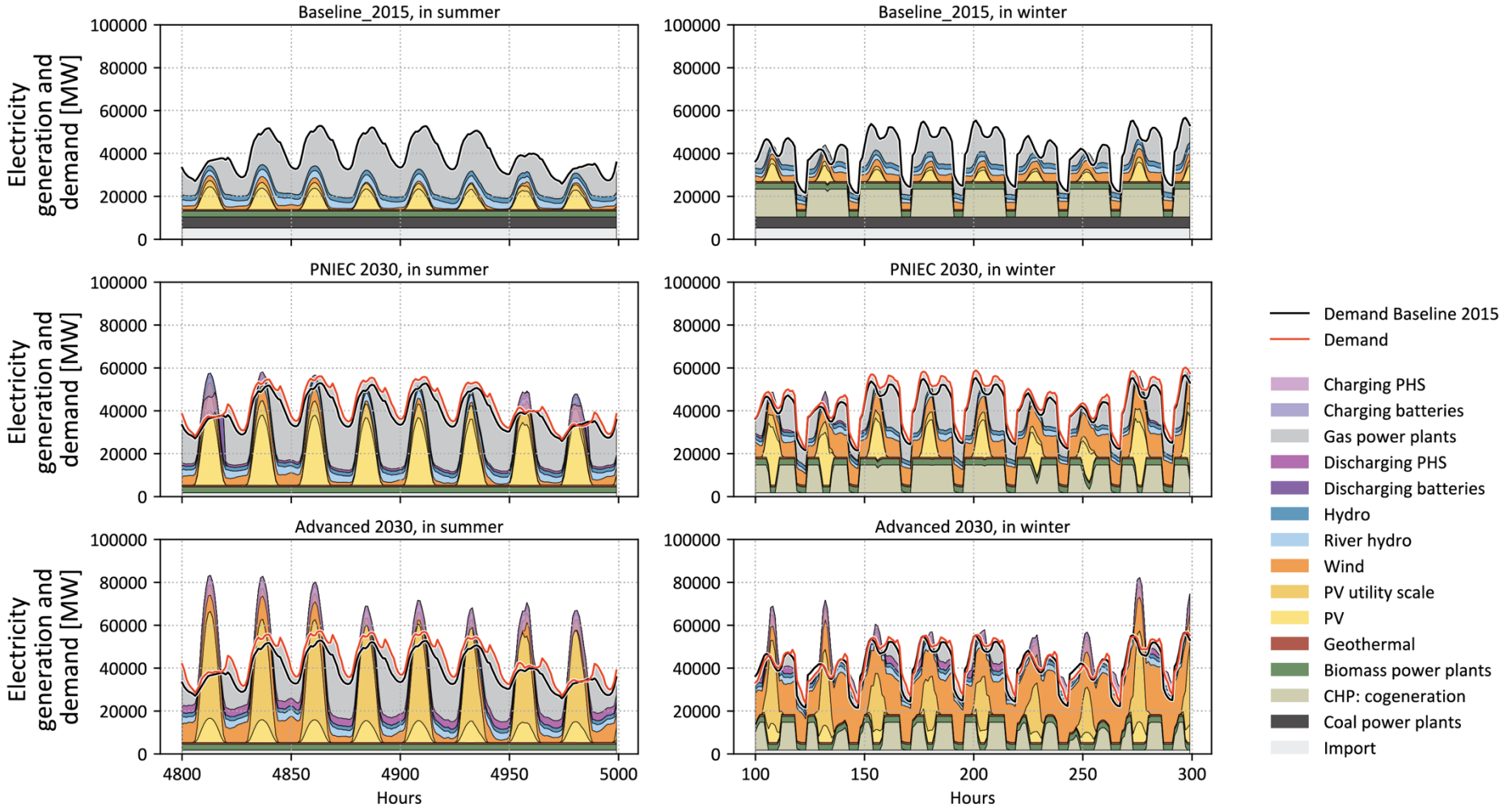
	 PV	 Wind power	 Stationary Batteries	 Batteries of EV*	 Advanced Biomethane	 Energy efficiency of buildings
Baseline 2015	19 GW	9 GW	0 GWh	0 GWh	3 TWh	0 %
PNIEC 2030	59 GW	23 GW	40 GWh	200 GWh	15 TWh	15 %
Advanced 2030	86 GW	48 GW	0 GWh	400 GWh	3 TWh	30 %

*Vehicle to grid is not considered in the simulations

**PNIEC 2030 scenario considers energy production from RES as given in PNIEC, but historical energy equivalent hours leading to differences in installed capacity

[1] Proposta di piano PNIEC, 2018

Electricity change in demand and generation mix



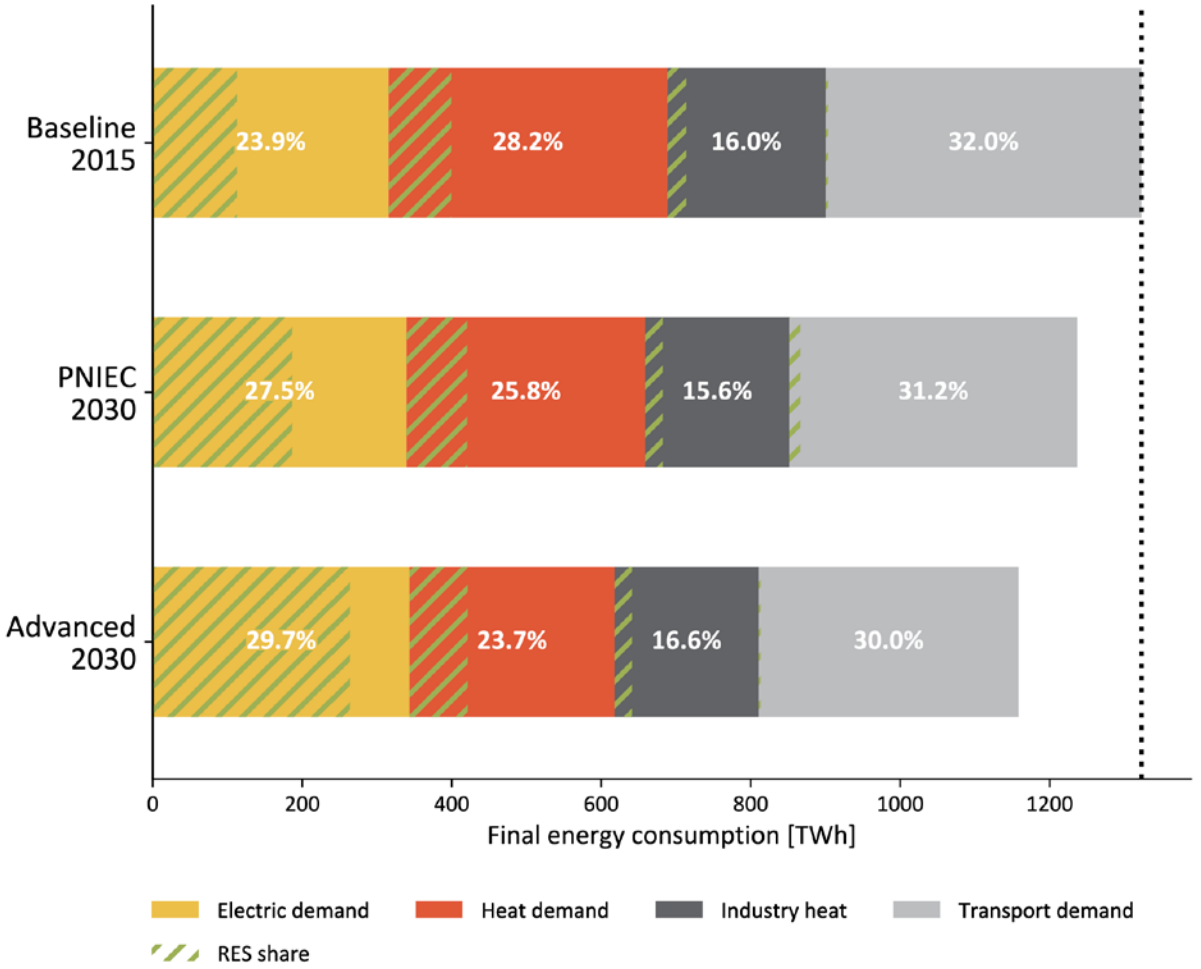
Eurac Research, 2019

Final energy consumption

The **overall final energy consumption is reducing** over the scenarios.

This is based on the energy **efficiency measures** in the building sector, industry sector and electrification of transport.

The **renewable share is increasing** in all sectors but mainly in the electricity sectors



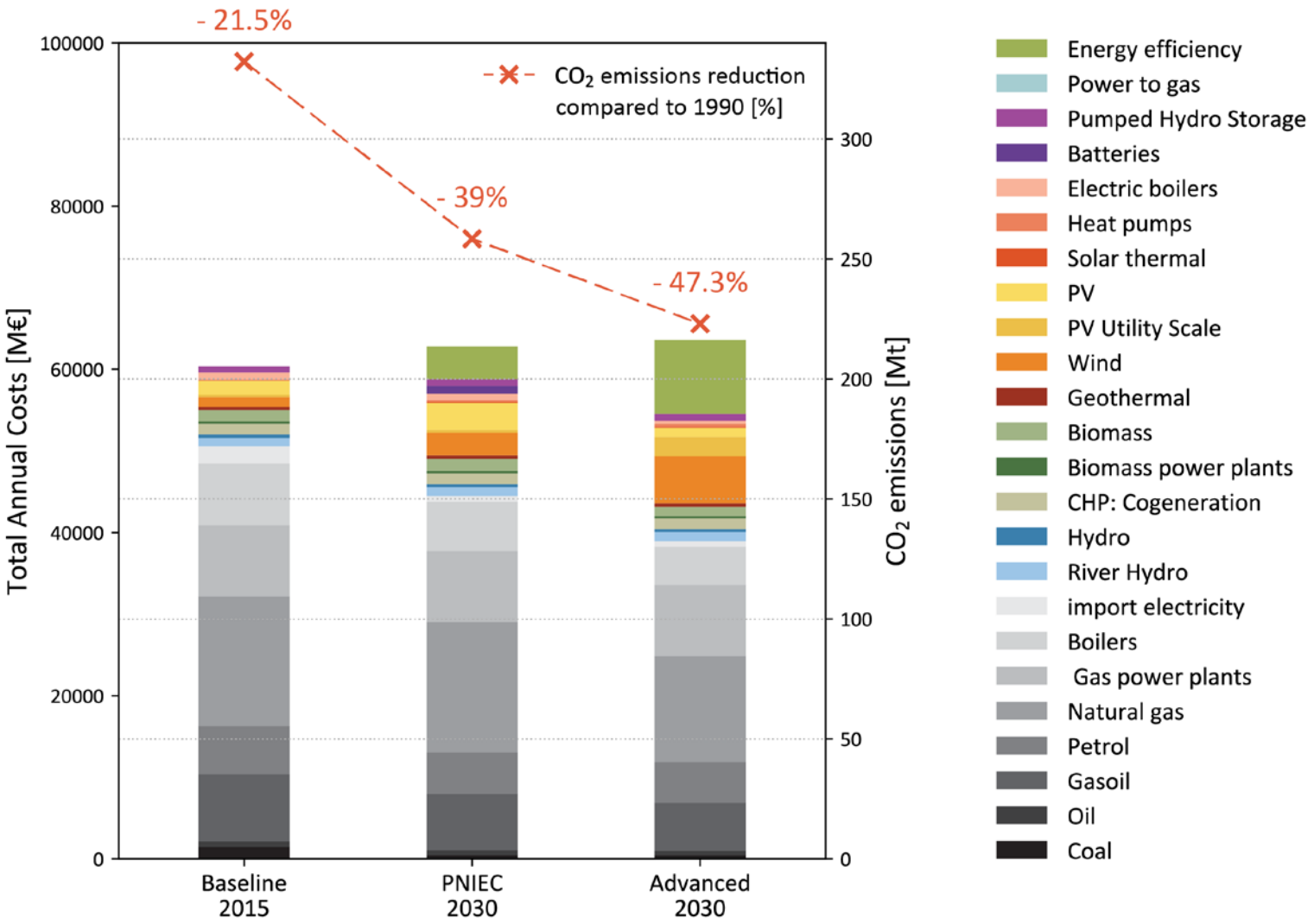
Eurac Research, 2019

The results

The **overall CO_2** emissions are reducing by 39% and 47% respectively

The **overall cost** is slightly growing from Base 2015 to the PNIEC scenario and remaining constant for the Advanced 2030.

The **share of expenditures** for renewables and efficiency increases the one for fossil fuels decreases

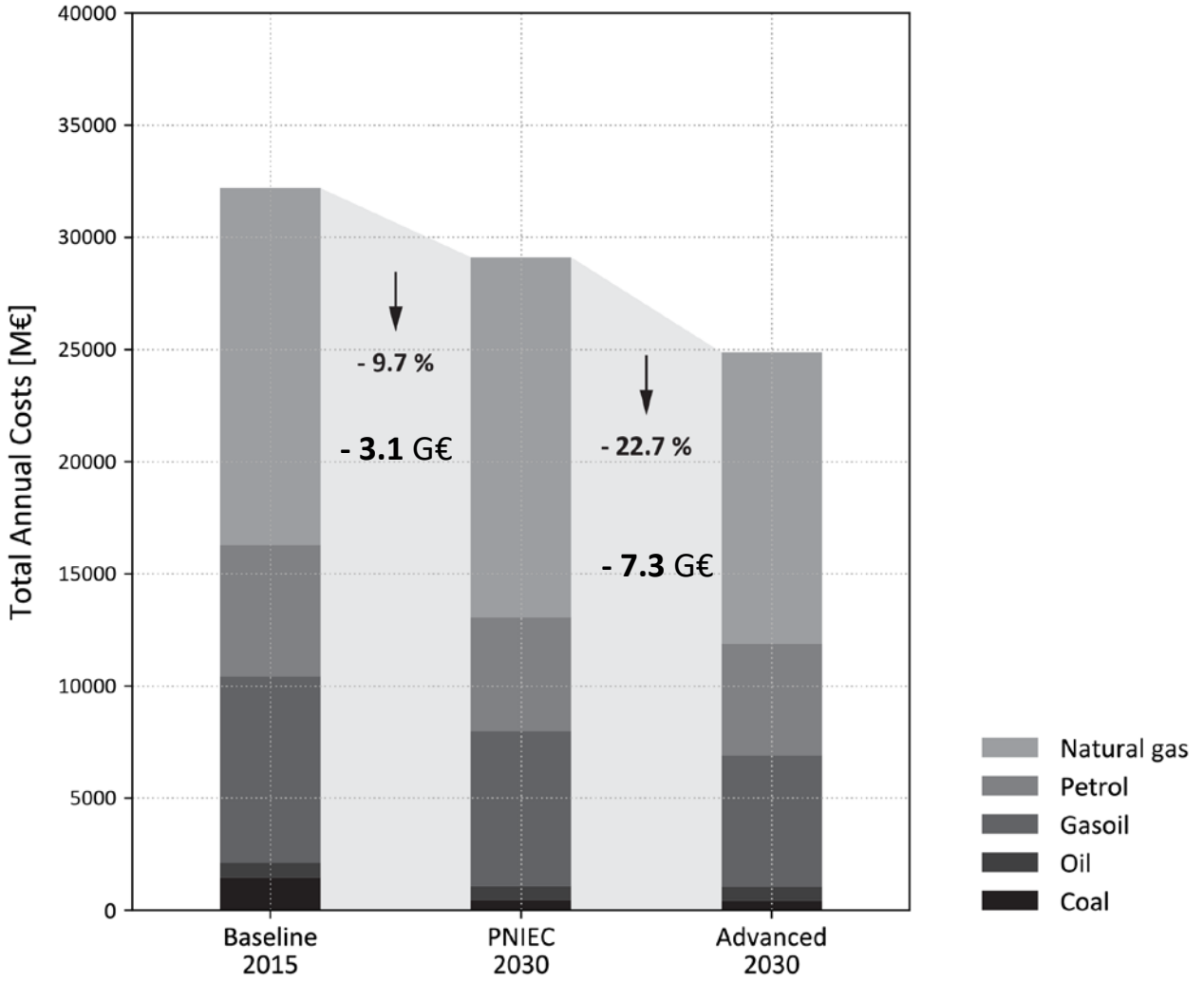


Eurac Research, 2019

Fossil fuel costs

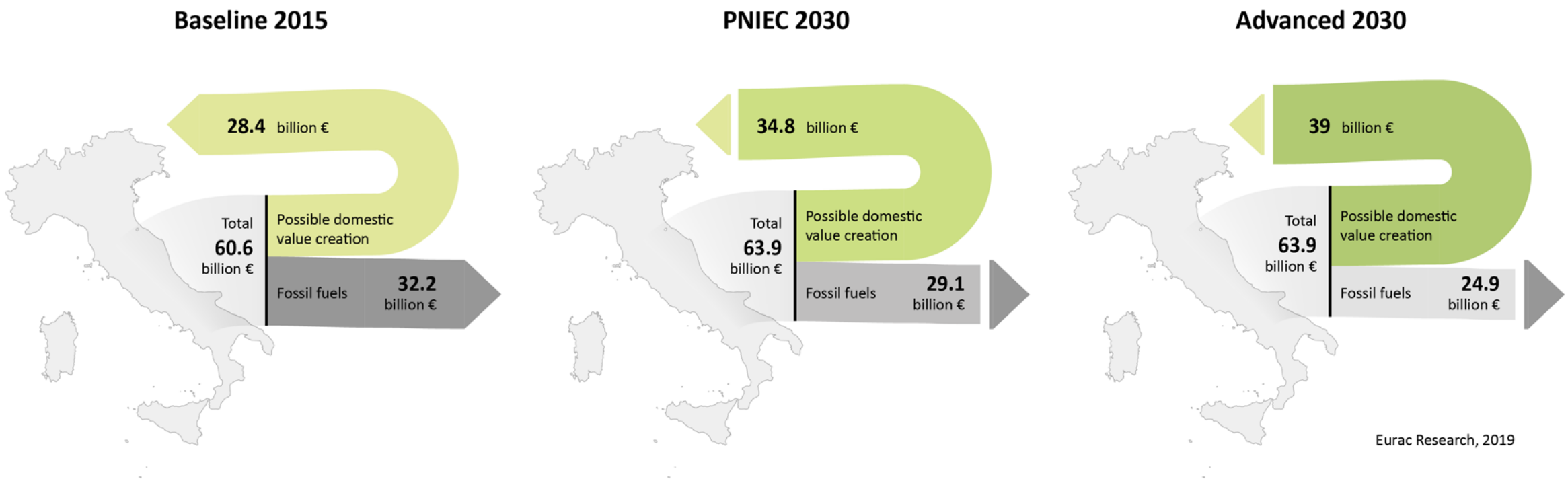
By limiting CO_2 emissions as well the **imports of fossil fuels** are being **reduced** by 10% and 23% respectively.

Here through the **energy dependence of Italy** form other countries **is reduced** while the **internal added value** through renewables and efficiency in Italy can be **increased**.



Eurac Research, 2019

Expenditures for different energy scenarios



The imports of fossil fuels reduces by **over 7 billion € per year**. Expenditures available for investments in the Italian energy systems

Possible domestic value creation

- Energy efficiency
- Energy infrastructure
- Renewable Energy Sources

Conclusions for Ukraine?

- Energy transition will be **a major transformation** of the **power**, the **heat**, the **building**, the **industry** and the **mobility sector**?

- As every transformation it has **opportunities and threats**, but for countries with few fossil fuels but a huge renewable energy potential as **Ukraine it is a big economic opportunity**!
- Creating **jobs in Ukraine** and **enhancing energy, policy and economic independence.**
- By implementing the transition **several billion € annually can be shifted from fossil fuel imports towards sustainable energy investments in Ukraine**

The full study of Italy can be **downloaded for free at our website**. In the publications section there are several scientific publications explaining the model and all assumptions in detail
http://www.eurac.edu/en/research/technologies/renewableenergy/references/Pages/Simulazioni-energetiche.aspx

Thank you for your attention

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