POLITECNICO
MILANO 1863

Scenario analysis of the Italian energy system

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Oemof User meeting

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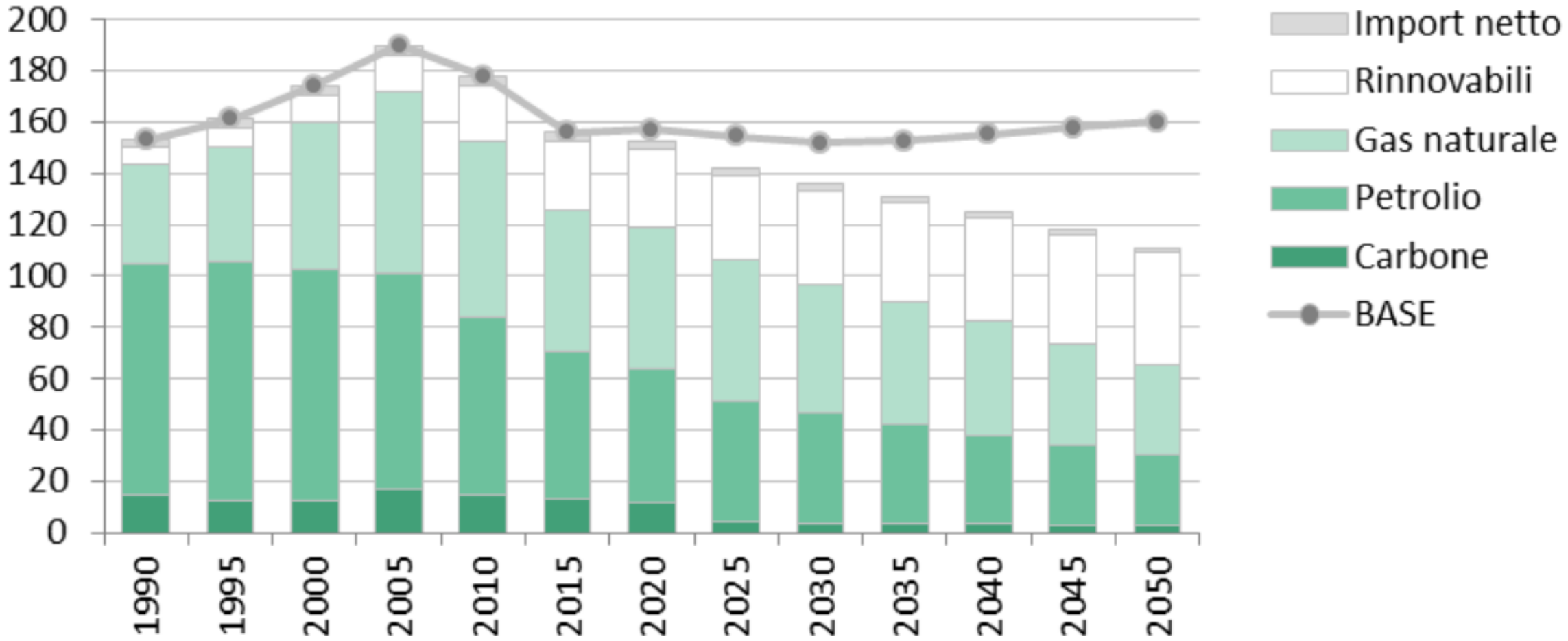
The time horizon of the model is the key factor.

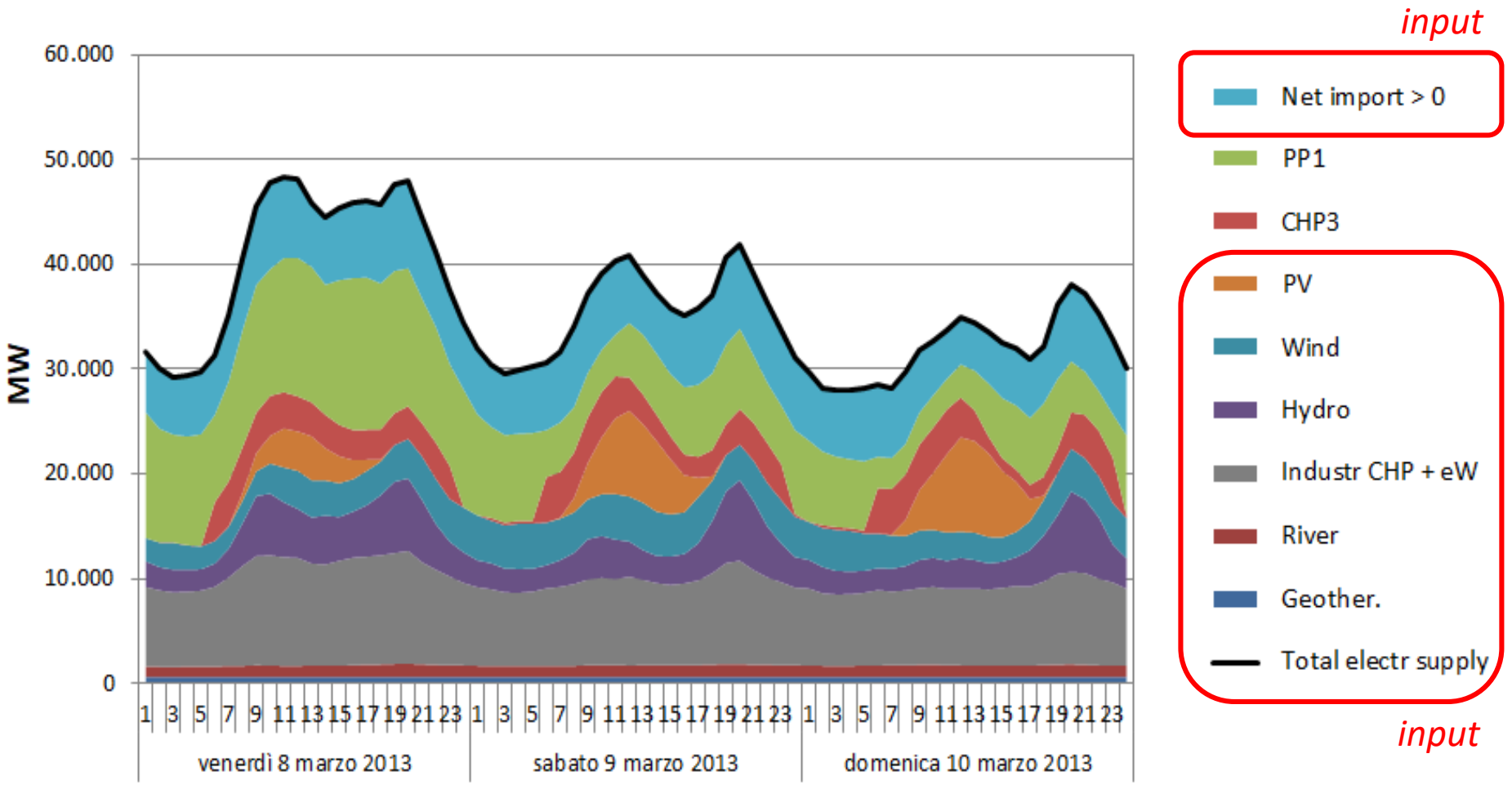
Single year models: non-evolving capital structure, operational dynamics, temporal (typically hourly resolution) and technical detail. Suitable for capturing intermittent energy sources impacts on the system.

Long range models: cast over one or more decades, structural evolution of the system, capacity expansion and energy system transition.

Proiezione dello scenario SEN al 2050: evoluzione del fabbisogno di energia primaria (Mtep)

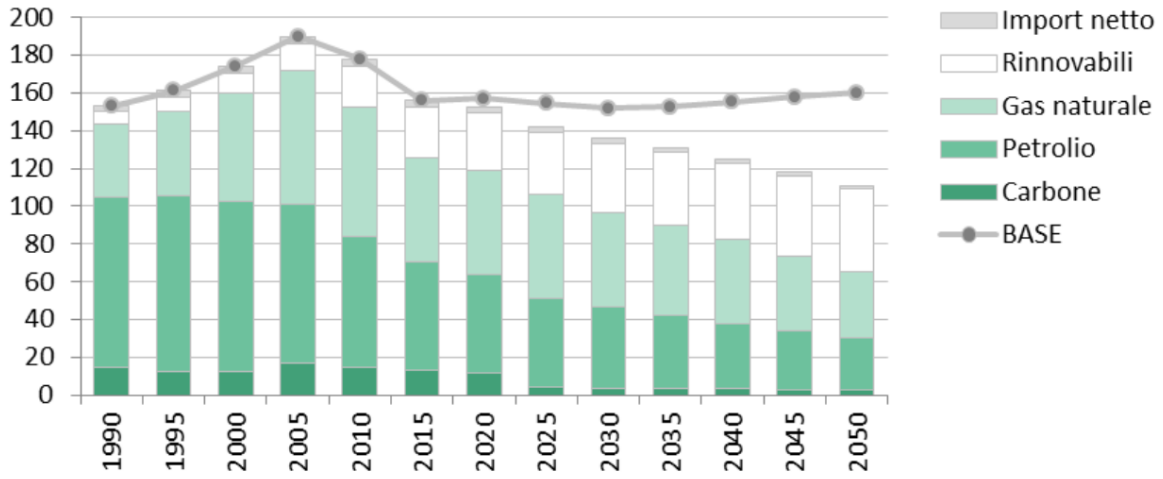


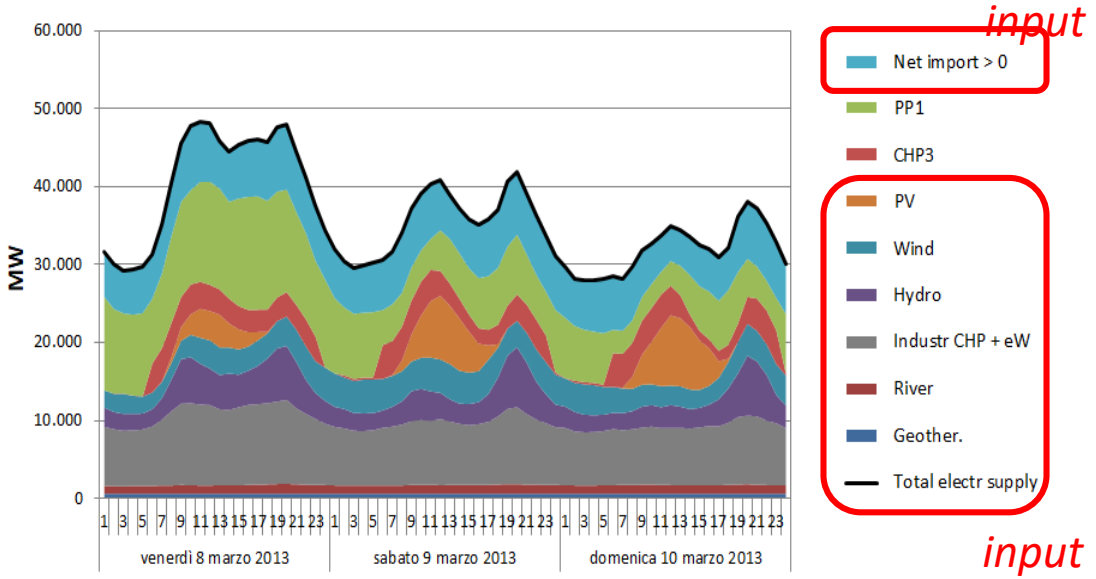
Single year models_typical output



iGAP, ISPRA, EGYPT project…all start with
Long Range models

Proiezione dello scenario SEN al 2050: evoluzione del fabbisogno di energia primaria (Mtep)



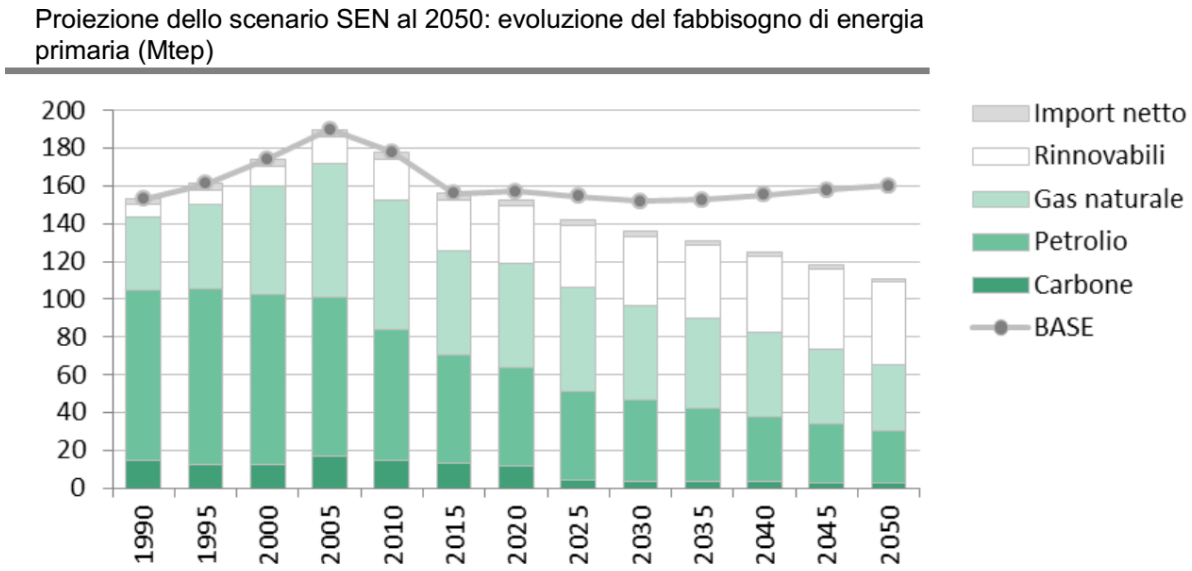


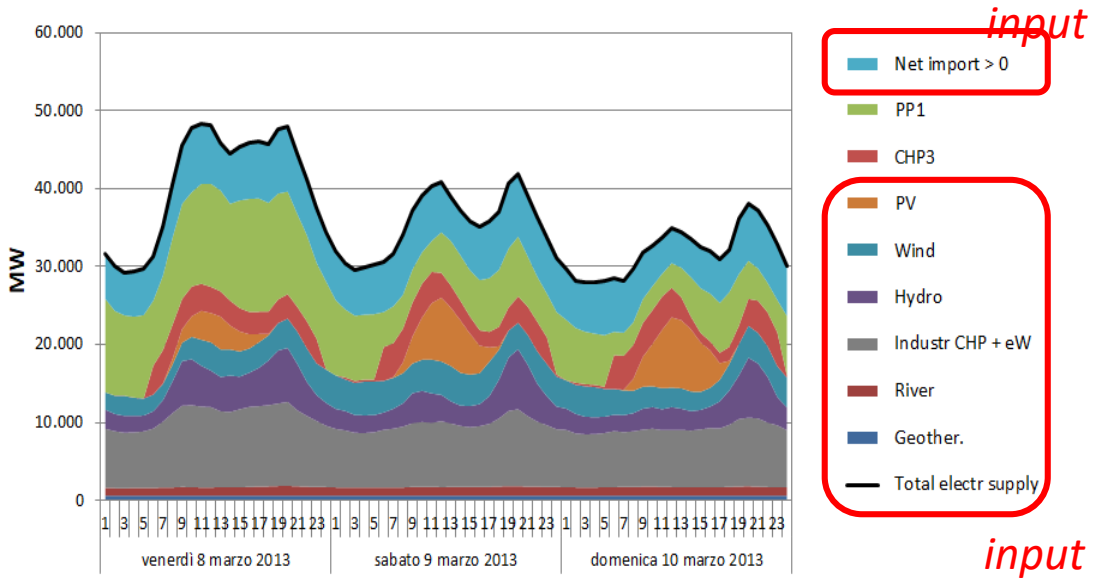
optimized supply

min LCOE

simulated dispatch

min ceep/CO2

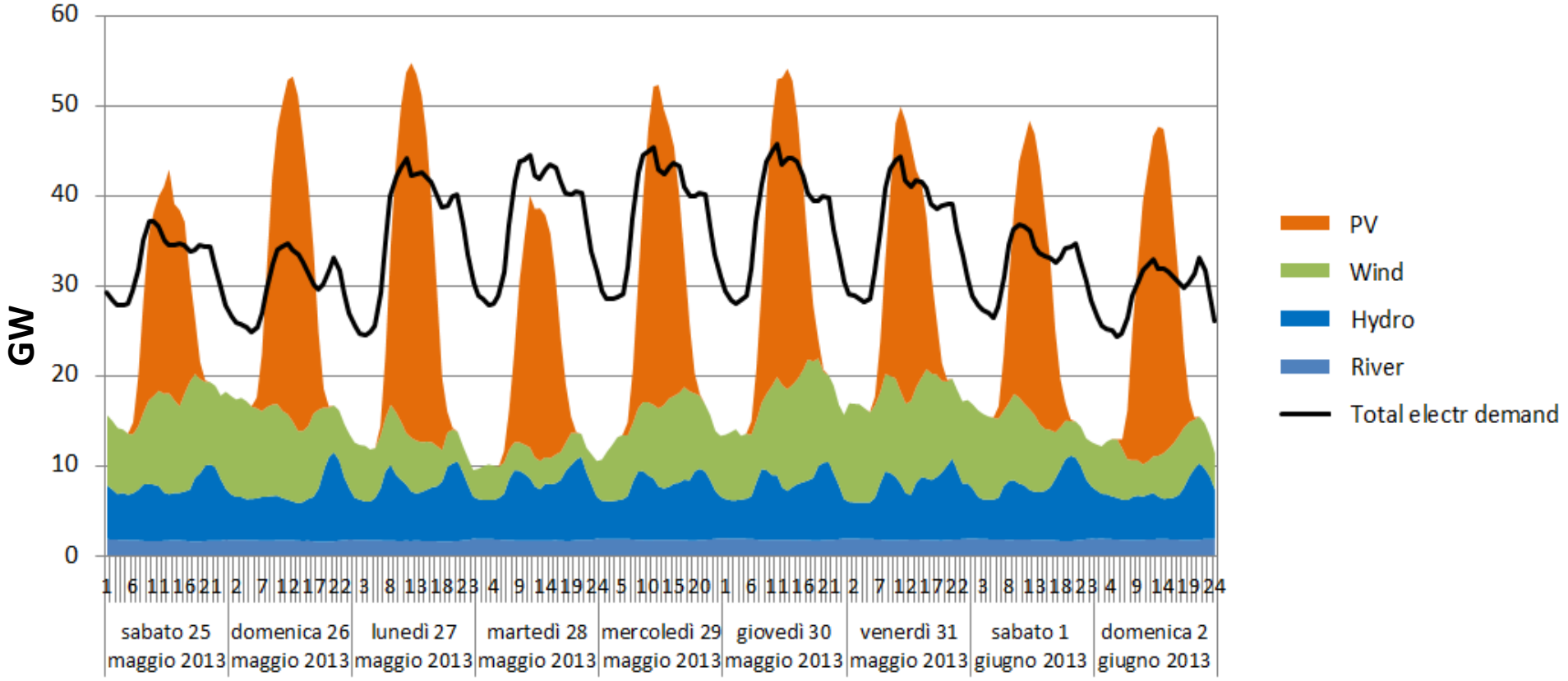




time slices

hourly profiles

- Hydropower = 50 TWh
- Wind power = 40 TWh
- PV power = 72 TWh



ZNES
ZENTRUM FÜR NACHHALTIGE ENERGIESYSTEME
HOCHSCHULE | EUROPA-UNIVERSITÄT FLENSBURG

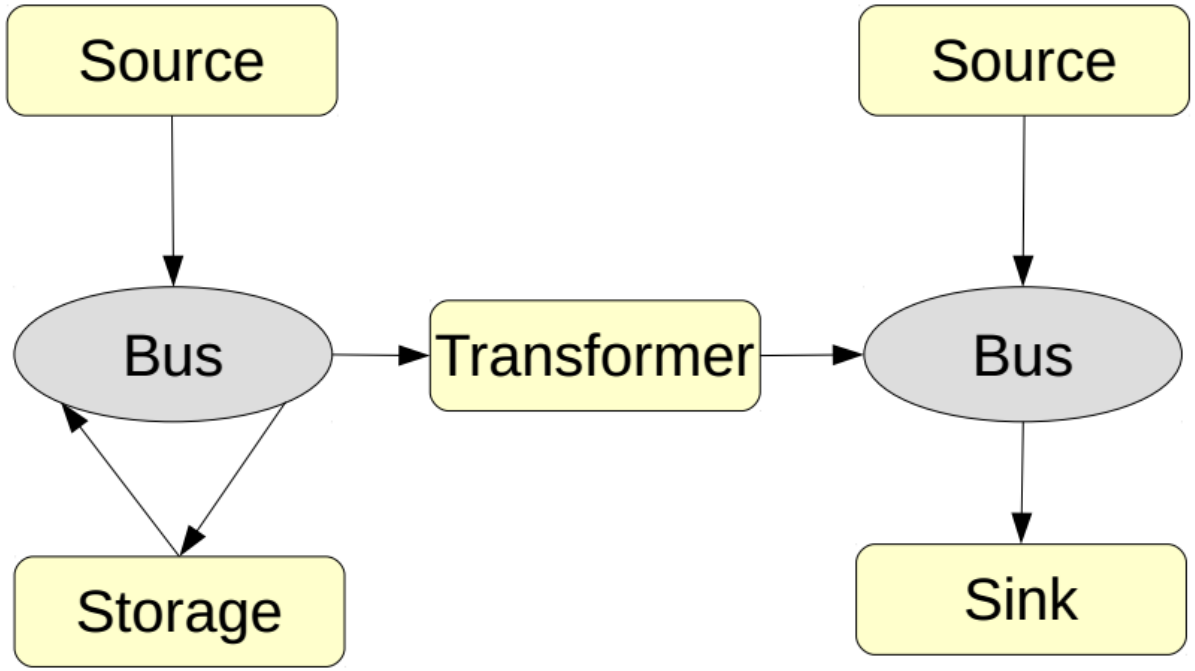
RLI
REINER LEMOINE INSTITUT

OTTO VON GUERICKE
UNIVERSITÄT
MAGDEBURG

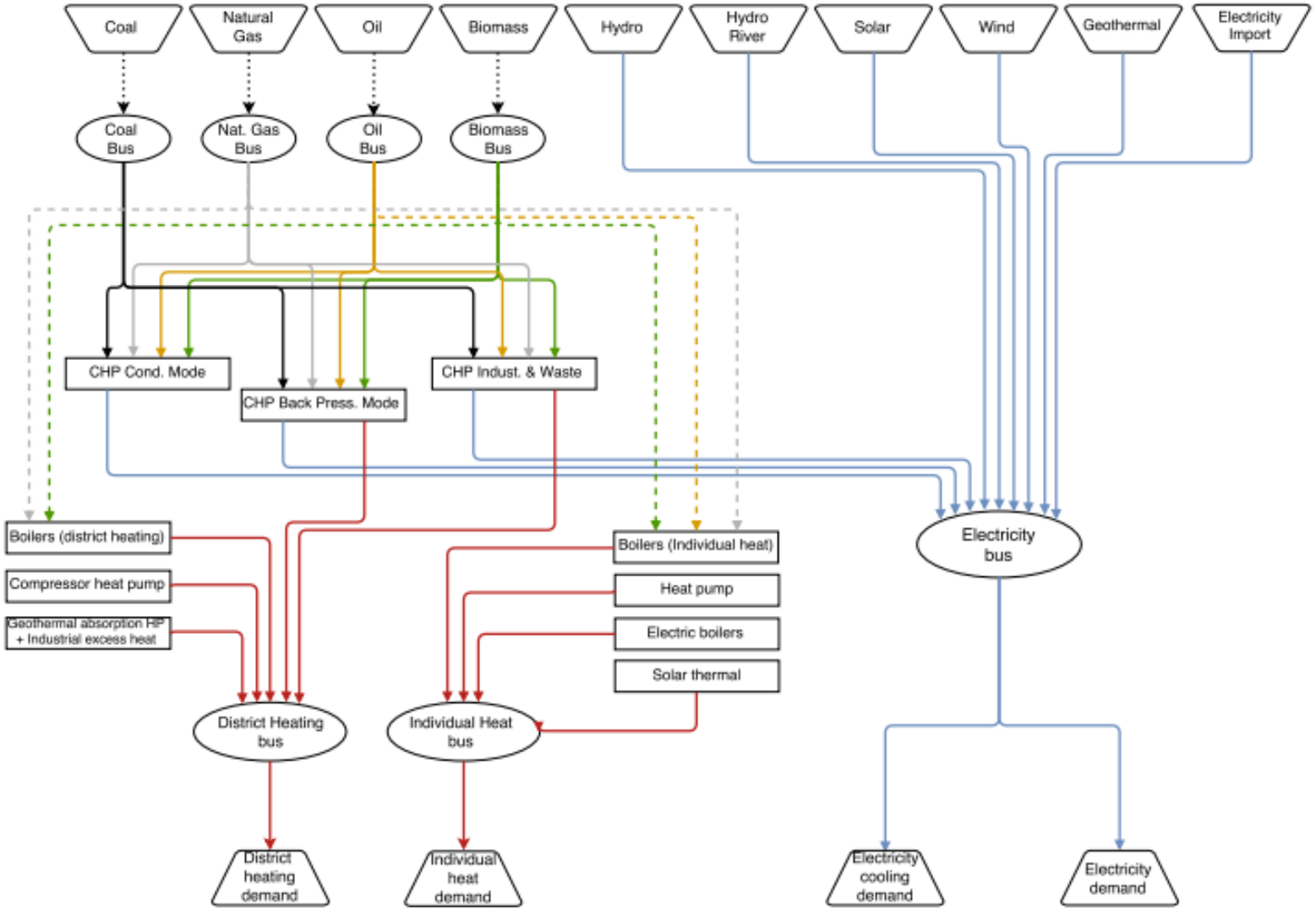
Least cost equilibrium (mixed integer linear programming)

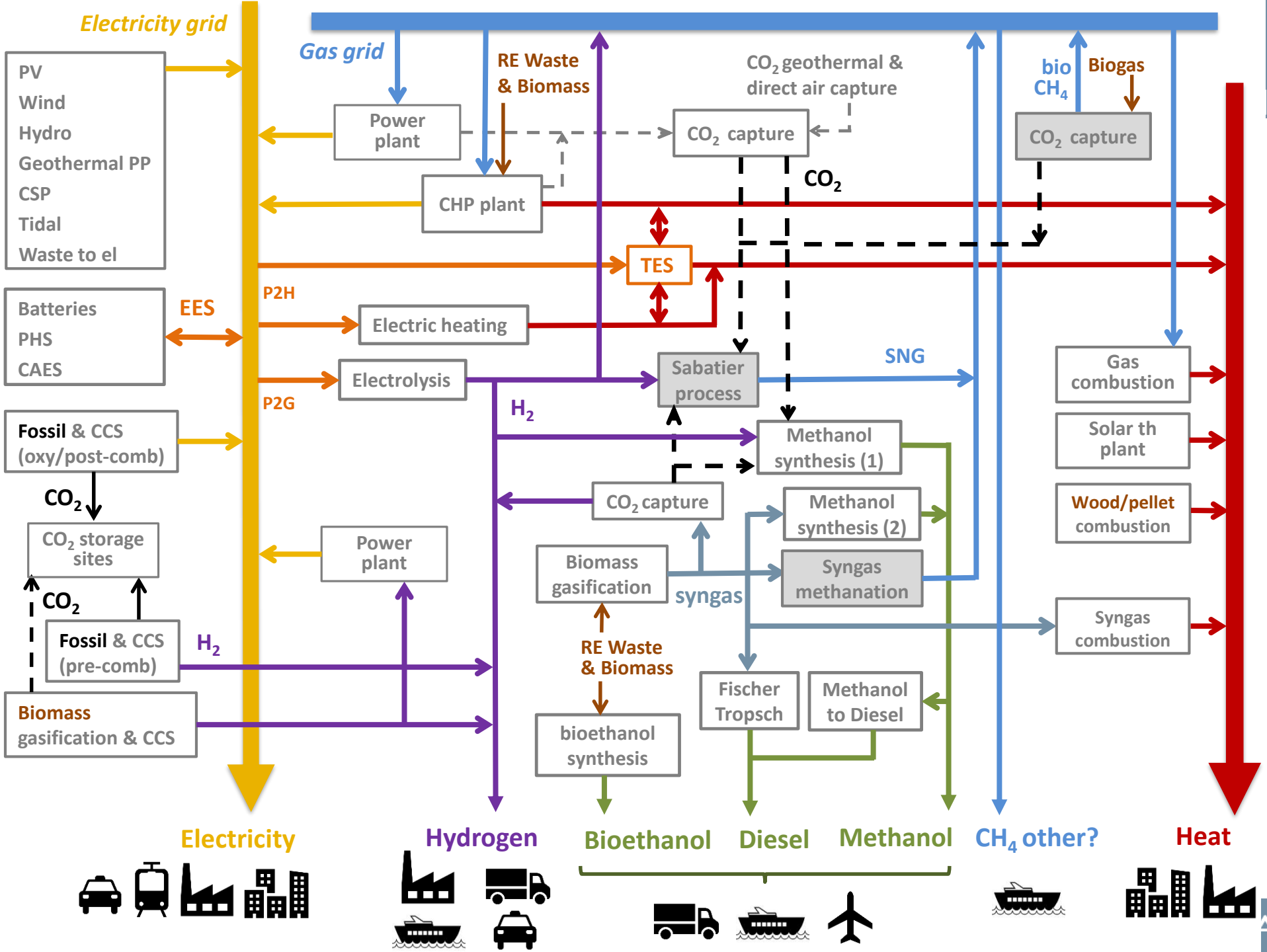
Input: installed capacity

Output: system dispatch (min CO2)

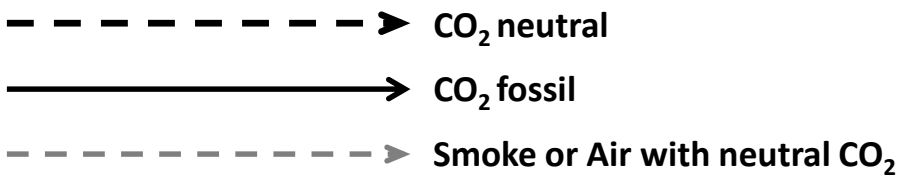


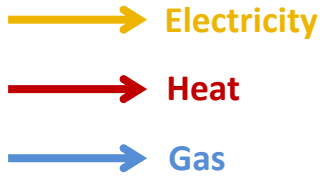
Model Italy 2013

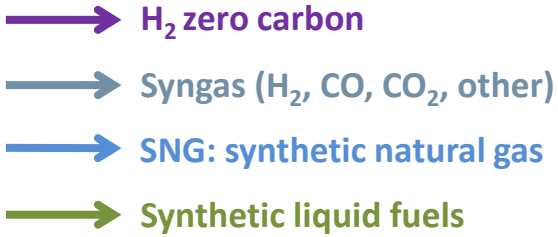



Electricity grid
Gas grid
PV
Wind
Hydro
Geothermal PP
CSP
Tidal
Waste to el
Batteries
PHS
CAES
EES
Fossil & CCS (oxy/post-comb)
CO2
CO2 storage sites
CO2
Fossil & CCS (pre-comb)
H2
Biomass gasification & CCS
Power plant
RE Waste & Biomass
CHP plant
Power plant
CO2 capture
CO2 geothermal & direct air capture
CO2
TES
P2H
Electric heating
P2G
Electrolysis
H2
Sabatier process
SNG
CO2 capture
Methanol synthesis (1)
Methanol synthesis (2)
Biomass gasification
syngas
Syngas methanation
RE Waste & Biomass
bioethanol synthesis
Fischer Tropsch
Methanol to Diesel
bio CH4
Biogas
CO2 capture
Gas combustion
Solar th plant
Wood/pellet combustion
Syngas combustion
Electricity
Hydrogen
Bioethanol
Diesel
Methanol
CH4 other?
Heat

Legenda







EES: Electric Energy Storage

TES: Thermal Energy Storage

P2H: Power to Heat

P2G: Power to Gas