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THE ROLE OF LOCAL ENERGY PLANNING IN THE ACHIEVEMENTS OF REGIONAL AND NATIONAL SUSTAINABILITY TARGETS: AN ITALIAN CASE STUDY

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Outline

- Introduction
- Purpose of the study
- Methodology
- Case study presentation
- Reference scenario
- Validation
- Future scenario with updated targets
- Results
- Conclusions and further developments

Purpose of the study

Covenant of Mayors for Climate & Energy EUROPE

City level energy plan

Critical issues in vertical coordination of energy plans

- Differences in goals over time
- Differences in the strategies
- Differences in specific renewable energy resources

Consequences

- Overexploiting local energy resources
- Negligence towards valorisation

Objective: investigation on the role of the local energy plans in the achievement of the regional and national sustainability goals

Methodology

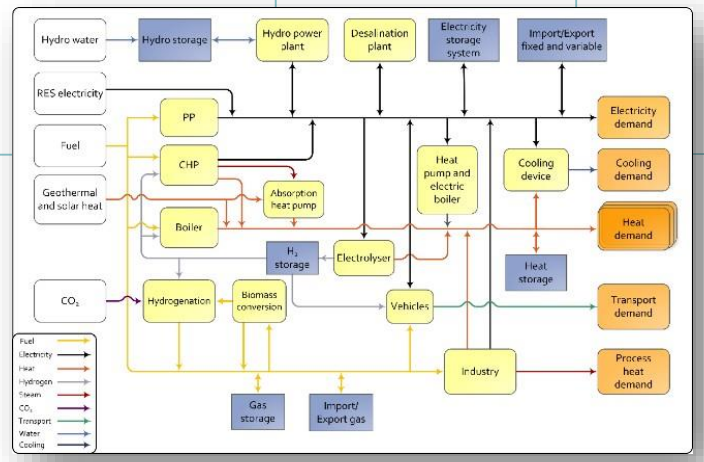
- Data collection and elaboration
  - Electricity
  - Households
  - Industry
  - Transport

Energy demand and supply evaluation

Scenario definition

- Reference scenario
- Future scenario

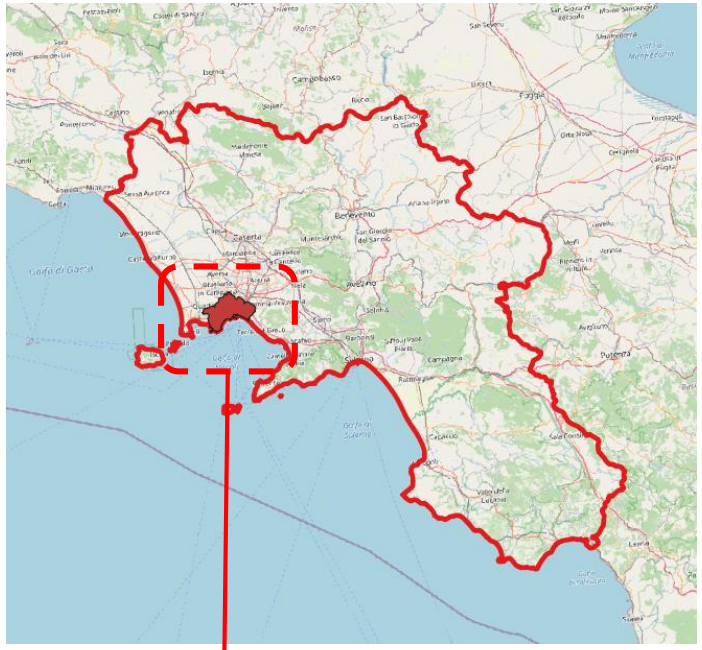
TRNSYS 17

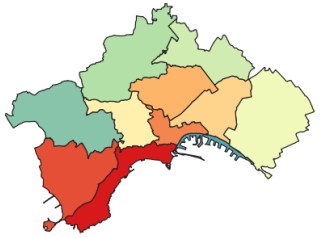


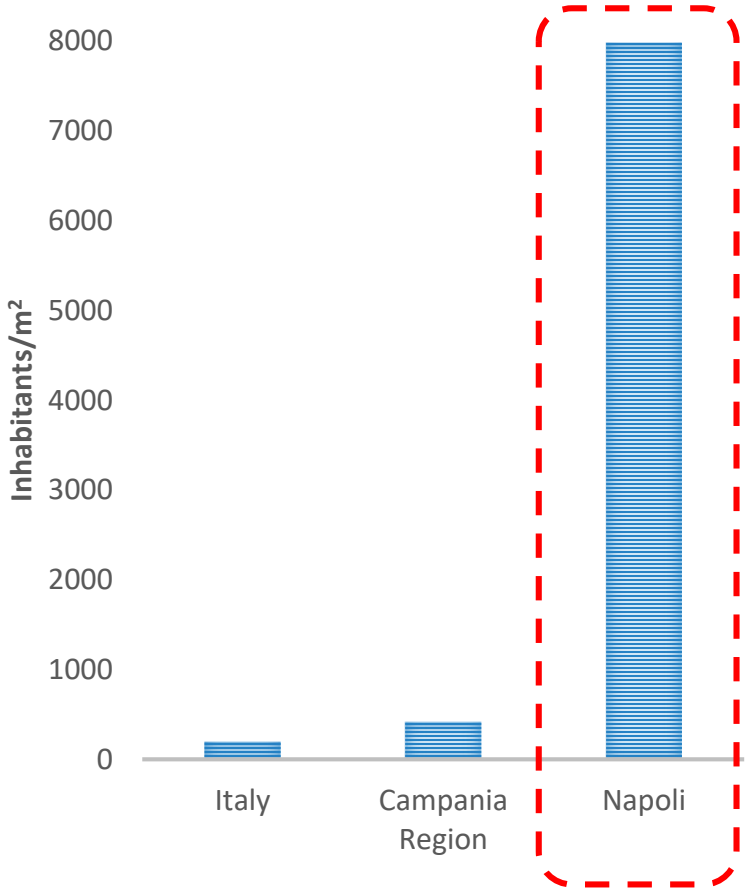
- Electric energy covered by RES
- PES
- CO_2

Environmental and energy analysis

Case study presentation







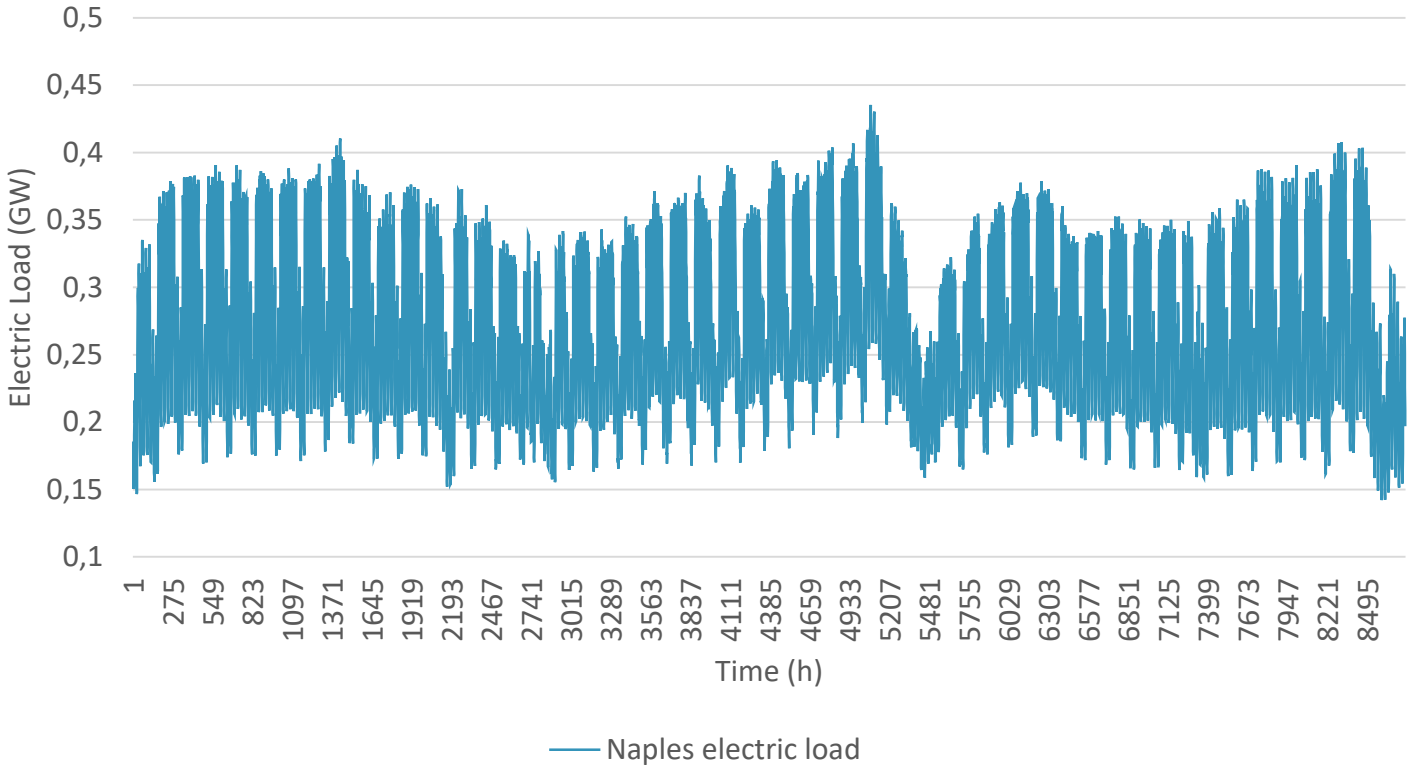
Climatic zone	Operating season	Daily working hours
A	1/12– 15/03	6
B	1/12– 31/03	8
C	15/11– 31/03	10
D	1/11– 15/04	12
E	15/10 – 15/03	14
F	No limitation	No limitation

Reference scenario

Demand side data collection and elaboration

Electricity

Input data	Availability	Estimation method
Annual demand	X	-
Annual hourly distribution		Share of the hourly distribution of southern Italian grid

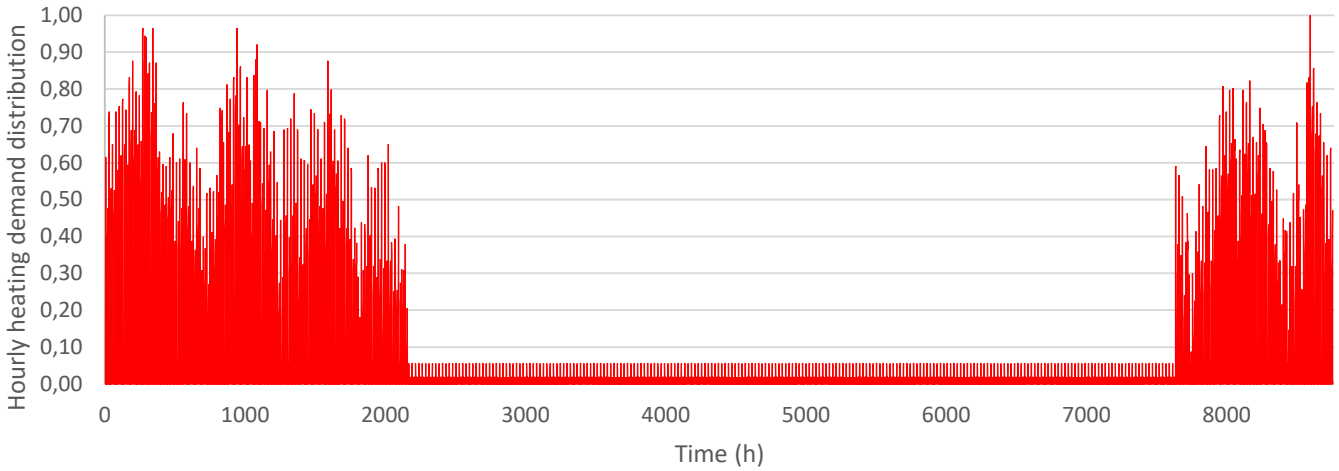


Reference scenario

Demand side data collection and elaboration

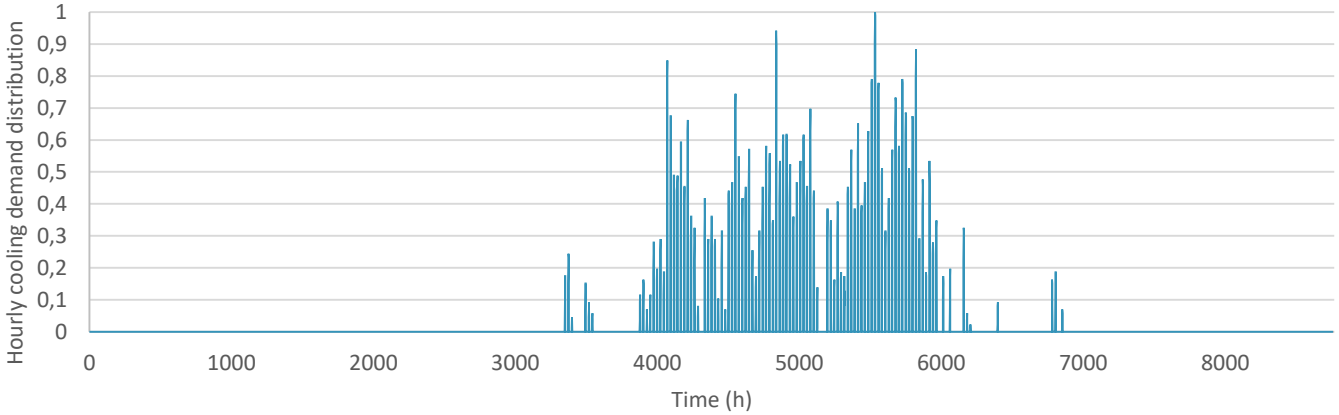
Heating and Domestic Hot Water

Input data	Availability	Estimation method
Annual consumption per type of fuel	X	Based on the type of plants used
Type of plants used	X	-
Efficiency of the plants		Plausible values
Annual hourly distribution		Heating degree hours



Cooling

Input data	Availability	Estimation method
Annual consumption per type of fuel		Based on the type of plants used and share of the national consumption
Type of plants used	X	-
Efficiency of the plants		Plausible values
Annual hourly distribution		Cooling degree hours



Reference scenario

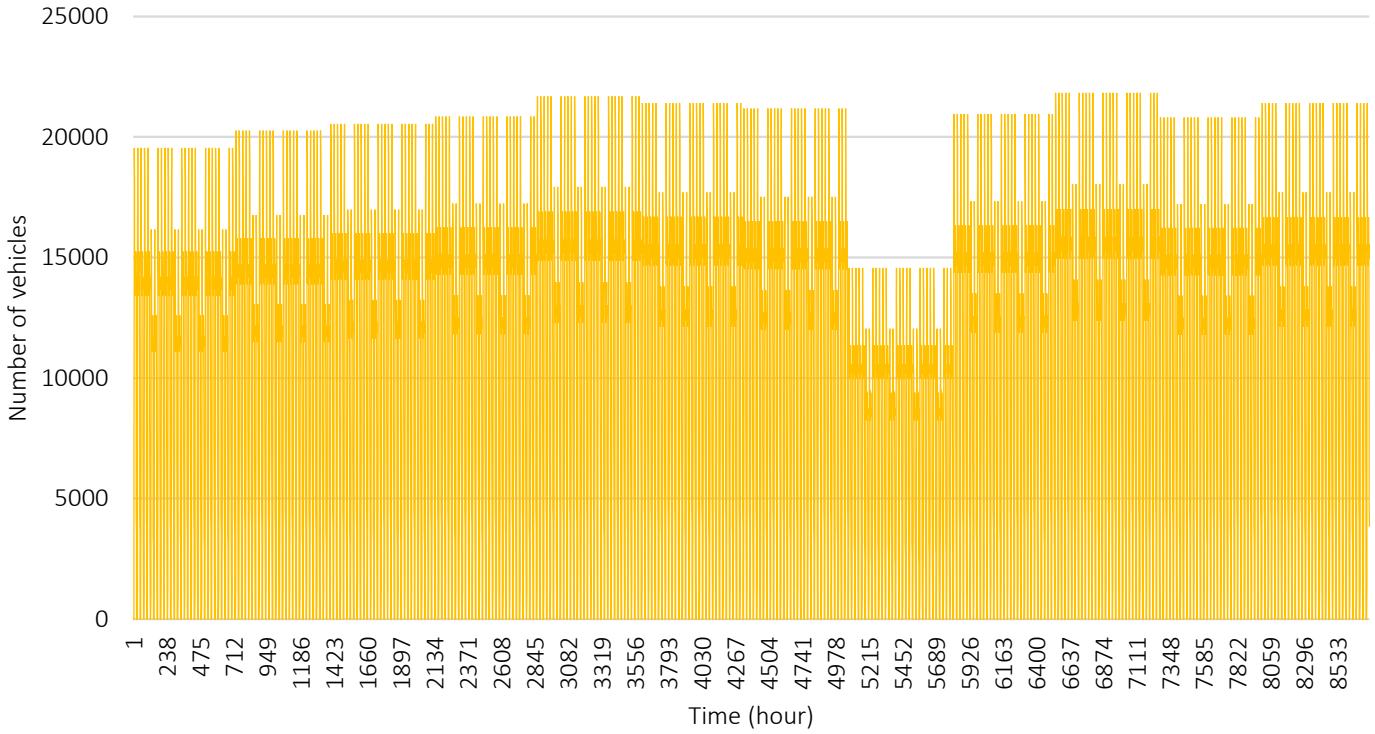
Demand side data collection and elaboration

Transport

Input data	Availability	Estimation method
Public Transport		
Annual consumption per type of fuel	X	-
Ngas and electricity load hourly distribution		not introduced
Private Transport		
Annual consumption per type of fuel		Based on share of vehicles
Ngas and electricity load hourly distribution		Based on traffic studies and vehicle stock determination

Industry

Input data	Availability	Estimation method
Annual consumption per type of fuel		Based on share of energy consuming companies



Reference scenario

Supply side data collection and elaboration

CHP and PP

(1) Napoli Levante plant

Electric power capacity (MW)	400
Annual Ngas Consumption (avarage MSm^3)	259
Operating hours (avarage)	5000
Typology	Combined cycle
Electric energy production (GWh/year)	1320

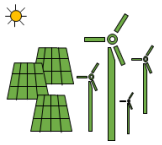
(2) Federico II Hospital CHP plant

Electric power capacity (kW)	5550
Thermal power capacity (kW)	8500
Typology	Simple cycle gas turbine
Service	Trigeneration plant for the Federico II Hospital

(3) Biogas plant

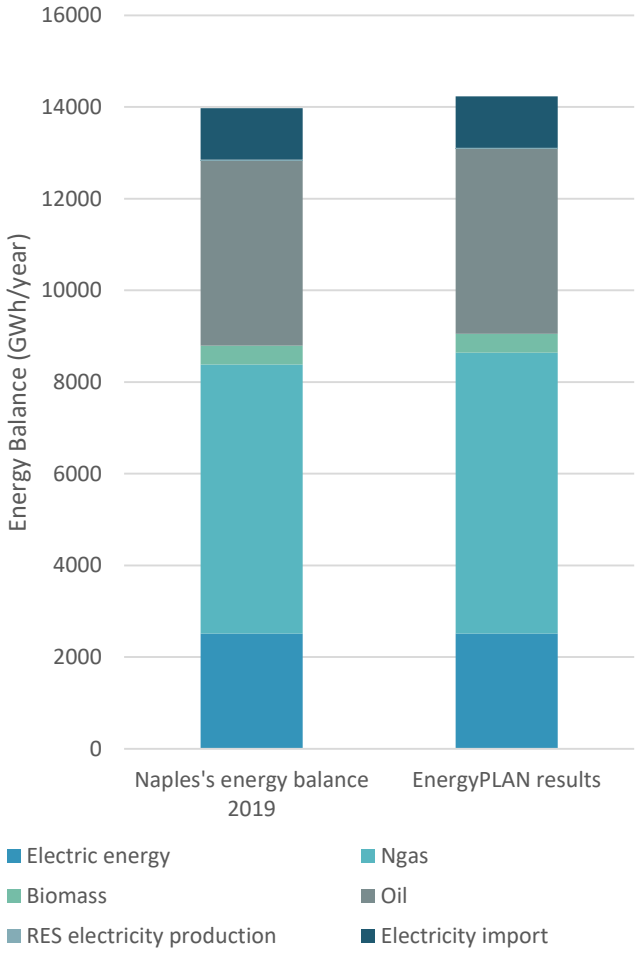
Electric power capacity (kW)	2064

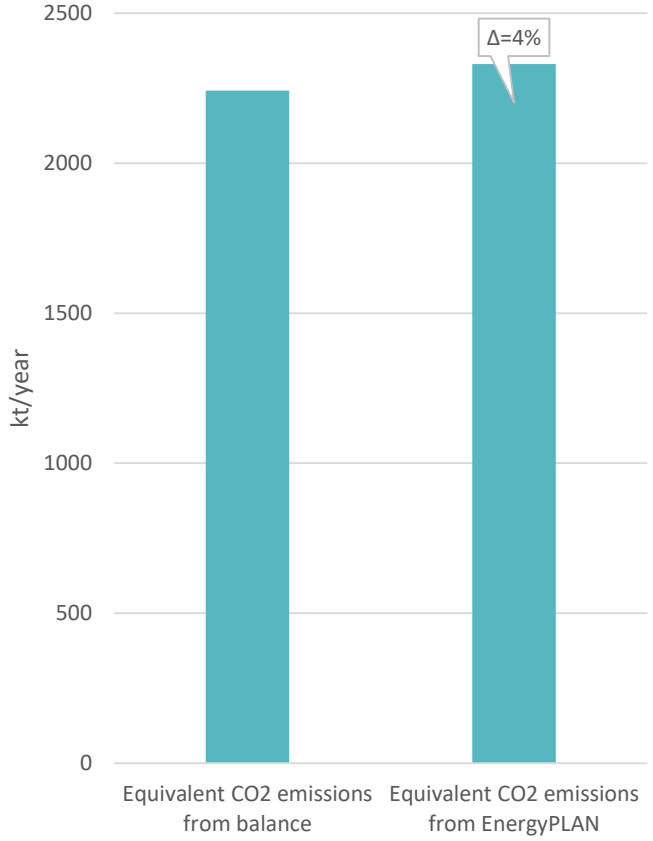
Fluctuating RES

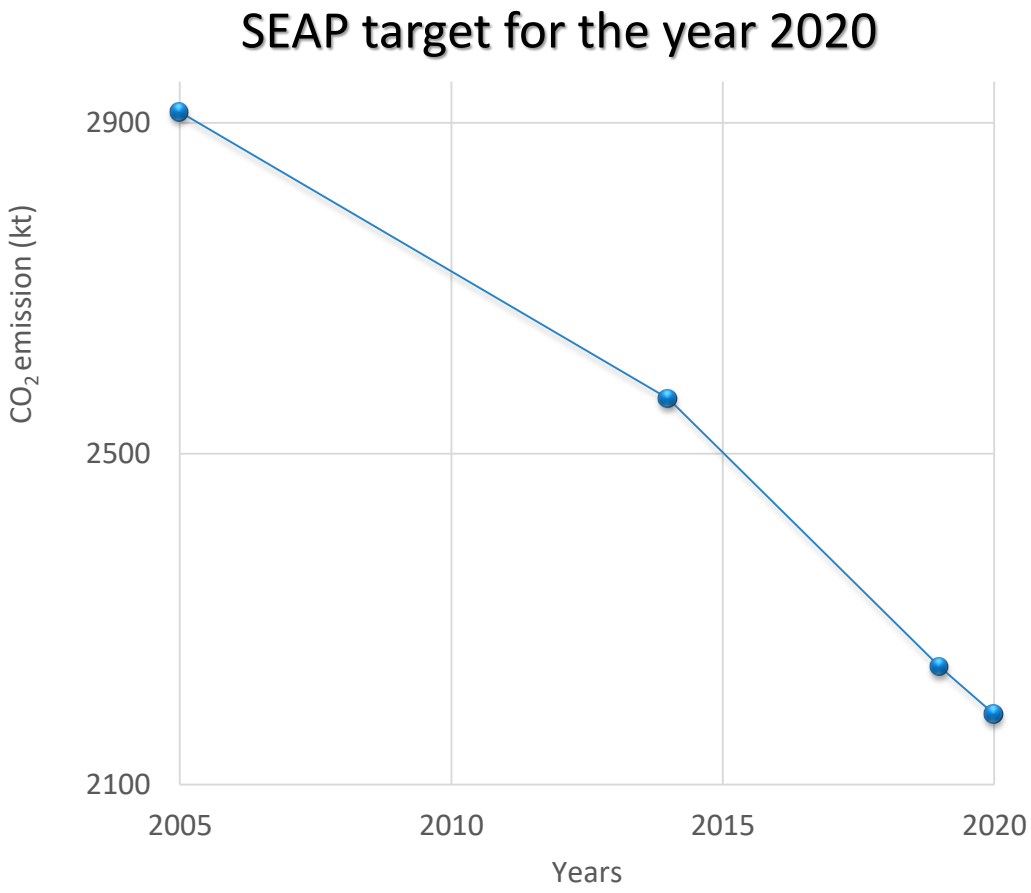


(1) PV plant installed capacity (MW)	12,4
Annual hourly load distribution	Dynamic simulation of a plausible commercial system (considering different espositions) TRNSYS17
(2) Total ST plant installed surface (m^2)	510
Annual hourly load distribution	Dynamic simulation of a plausible system (considering a storage and different espositions) TRNSYS17
(3) Hydropower installed capacity (kW)*	300
Annual electric production (GWh)	2
Annual hourly load distribution	Share of the southern Italian run off river production

Validation


16000
14000
12000
10000
8000
6000
4000
2000
0
Energy Balance (GWh/year)
Naples's energy balance 2019
EnergyPLAN results
Electric energy
Ngas
Biomass
Oil
RES electricity production
Electricity import


2500
2000
1500
1000
500
0
kt/year
Δ=4%
Equivalent CO2 emissions from balance
Equivalent CO2 emissions from EnergyPLAN


SEAP target for the year 2020
2900
2500
2100
CO_2 emission (kt)
2005
2010
2015
2020
Years

2030 BAU scenario and SECAP target

-40% reduction in GHG emissions by 2030

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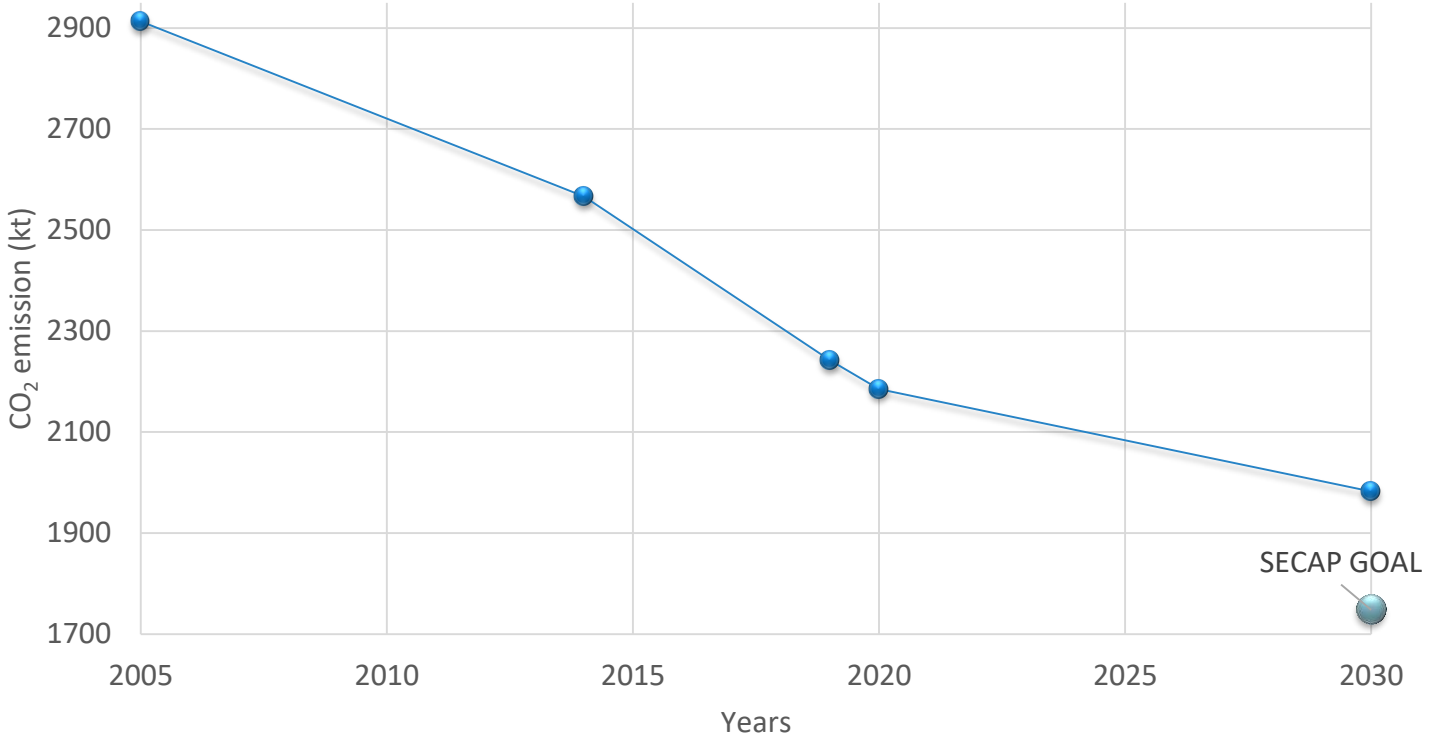
Demand recalibration

- Electricity demand and cooling demand assumed to increase as the NECP evaluations;
- Thermal energy demand and industrial sector demand expected to decrease according to NECP estimation;
- Transport consumption recalibrated according to the trend provided by the NECP;

Supply configuration with ongoing actions of the SEAP

- PV panels for an increase in installed capacity of 22 MWe
- Hydroelectric plant of 400 kW

Results and conclusions



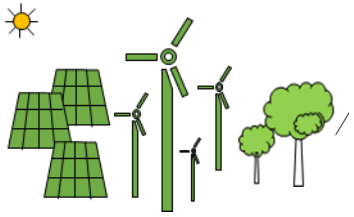
2030 SECAP scenario

RES action
Technical potential

Wind

Solar

Biomass



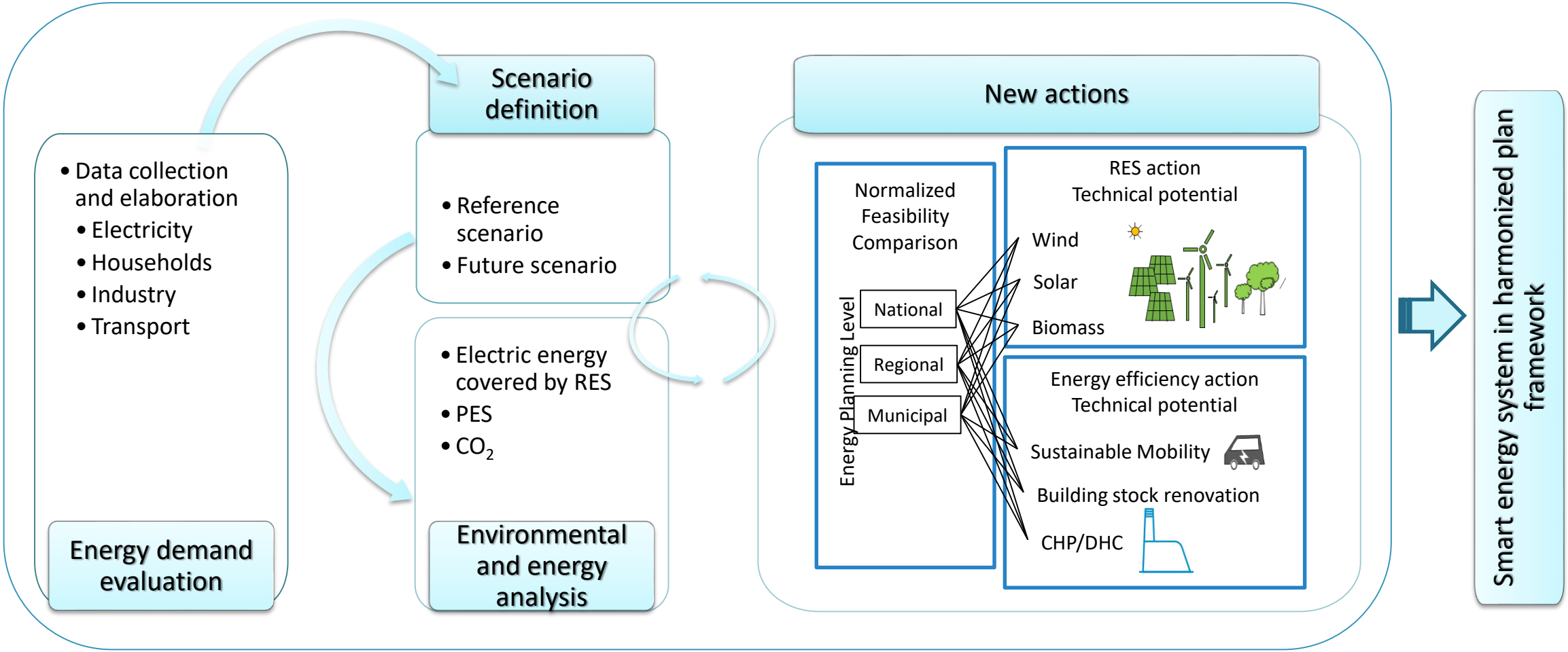
Energy efficiency action
Technical potential

Sustainable Mobility

Building stock renovation

CHP/DHC

Further developments



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THANK YOU!

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