This project has received funding from the European Union's Horizon2020 research and innovation programme under grant agreement N° 863819

FlexPlan

Final Project Workshop| 14th February 2023

Results of the 6 regional cases

Aleksandr Egorov
R&D NESTER

Agenda

- Power system modelling
- Details of the scenario
- Model simplifications
- Results of the planning process
- Role of storage and demand flexibility

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Power system modelling

Transmission network model

FlexPlan

Germany, Switzerland and Austria

- ENTSO-E model for EU transmission network (NDA)
- OpenStreetMap for sub-transmisison
- Local Grid Development Plans

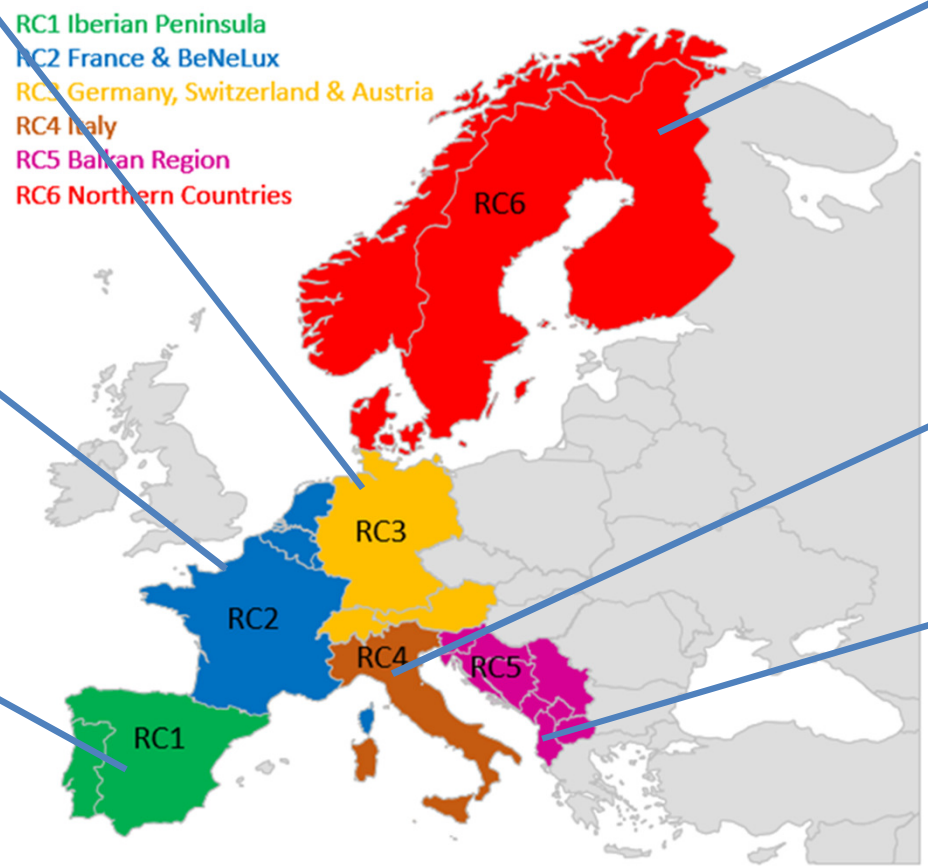
France and BeNeLux

- ENTSO-E model for EU transmission network (NDA)
- French TSO
- Google.Maps (location)

Iberian Peninsula

- ENTSO-E model for EU transmission network (NDA)
- Spanish TSO and OpenStreetMap for sub-transmission networky, complimented with PyPSA-Eur model and Google.Maps (location)

The main source
ENTSO-E model for EU transmission network (NDA)



Northern Countries

- Norwegian energy regulator, local TSO (Norway, NDA)
- PyPSA-Eur model, OpenStreetMap (DK,SE,FI)
- Local Grid Development Plans

Italy

- ENTSO-E model for EU transmission network
- Ministero della Transizione Ecologica
- OpenStreetMap
- Local Grid Development Plans

Balkan Region

- ENTSO-E model for EU transmission network
- OpenStreetMap

entsoe
Transparency Platform

Data for model validation
ENTSO-E TP

Power system modelling

Distribution network model

FlexPlan

Data provided from DiNeMo (Distribution Network Models) platform

↓

Synthetic distribution networks are generated

↓

Level of congestion is estimated for each distribution network

↓

Grid reduction performed in order to consider congested areas only

↓

Distribution network is integrated into the transmission model

https://ses.jrc.ec.Europa.eu/dinemo

PDF

G. Viganò, M. Rossi, C. Michelangeli and D. Moneta, "Creation of the Italian Distribution System Scenario by Using Synthetic Artificial Networks"
2020 AEIT International Annual Conference, 2020, pp. 1-6

Agenda

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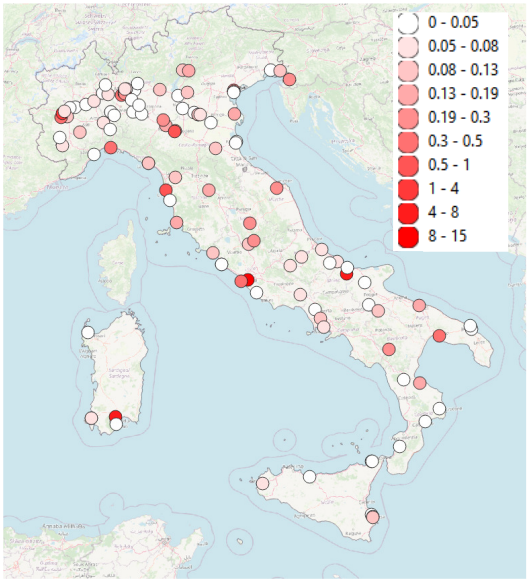
Details of the scenario

Environmental impact – Air Quality

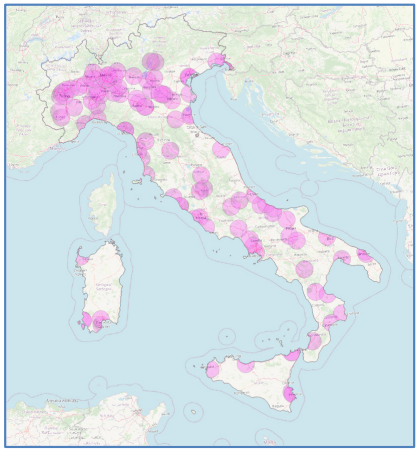
FlexPlan

Health impact (YOLL/µg·m^{-3})
Cost (€/YOLL)
Reference production (MWh)

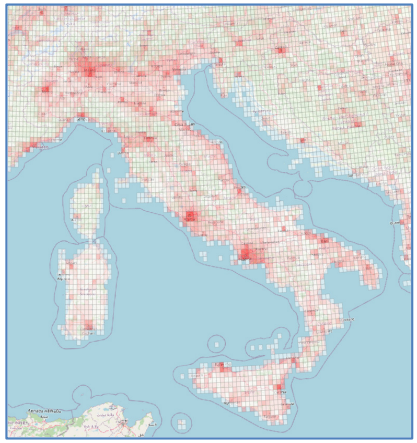
Air quality impact cost (€/MWh)



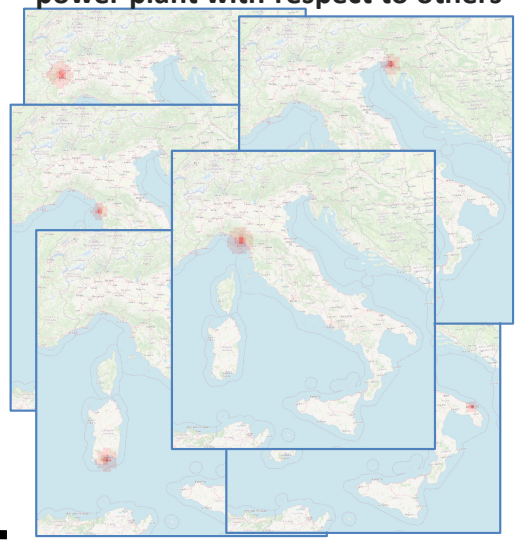
Impact areas around power plants (25 km radius)



Resident population



Weighting factor of individual power plant with respect to others



Pollutant concentration cumulative impact due to all generators, estimated with air quality simulations

Details of the scenario

Environmental impact – Carbon Footprint

FlexPlan

Planning investments

2750÷3500 kg of CO_2*km^{-1}*year^{-1}

114÷173 kg of CO_2*km^{-1}*year^{-1}

100÷900 kg of CO_2*MVA^{-1}*year^{-1}

Climate change avoidance costs €/tCO_2 equivalent (€2016)

	Low	Central	High
CO_2 Emissions – short and medium run (until 2030)	60	100	189
CO_2 Emissions – long run (from 2040 to 2060)	156	269	498

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Planning tool testing and model simplifications

FlexPlan

Grid Expansion Planning (GEP) process

- Role of the **non-expanded Optimal Power Flow**
  - Simulation of the scenario and indication of the level of congestion for grid elements
- Role of **Pre-processor**
  - Identification of potential asset investments aimed at solving congestion (with priorities depending on congestion severity – Lagrange Multipliers)
  - Identification of nodes in which storage/demand flexibility can be beneficial for congestion management (using Locational Marginal Prices)
  - Proposal of storage technology on the basis of characteristics of congestions and territory
- Role of **Planning tool**
  - Returns the list of the candidates which minimizes the total costs (CAPEX+OPEX), and details on their behaviour

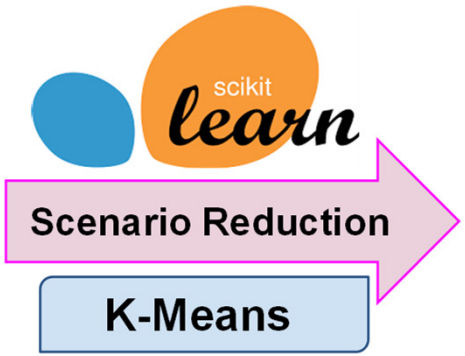
Planning tool testing and model simplifications

FlexPlan

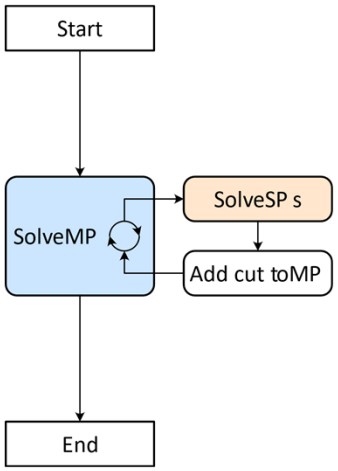
Dealing with real-size power systems

The development of the planning procedure has been carried out in order to be able to manage:

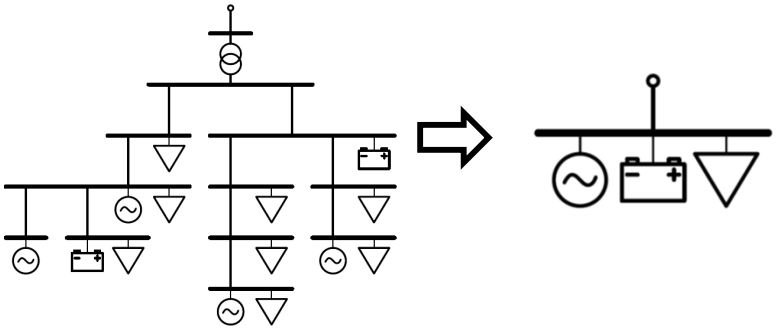
- **Real/size power systems** with more voltage levels simultaneously (transmission, sub-transmission and distribution)
- **Multiple scenarios** to consider both variability of electricity demand and renewable power production (climatic variants)
- **Multiple target years**, to optimally select investments by considering planning impact over their entire lifetime



Scenario reduction



Benders decomposition

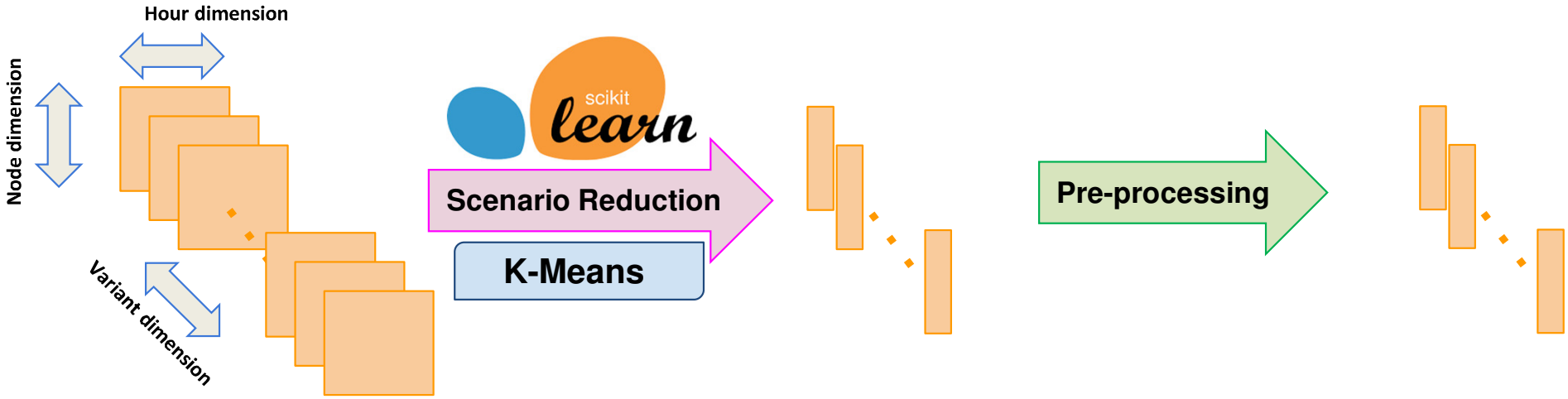


Transmission & Distribution decomposition

Planning tool testing and model simplifications

FlexPlan

Scenario reduction



35 yearly variants * 8760 hours

2 yearly variants * **8760** hours

1 yearly variant * **52** weekly variants * **168** hours

Time profiles of 35 climate variants for each decade (2030-40-50) and scenario (DE,GA,NT)

- 2 representative climate variants (with different probabilities)
- 12 representative weeks (one for each month of the year)
- Time resolution: 1 hour (168 time steps per week)

Planning tool testing and model simplifications

FlexPlan

Model simplifications

Event though the tools have been optimized in order to manage real-size systems, operating in a multitude of scenarios and climate variants, FlexPlan regional cases have been studied by applying some simplifications.

4 representative weeks
(instead of 12)

Reduced time resolution
(2-hour time blocks)

Limited portion of Distribution Network
(~10%)

~100 planning candidates

Total processing time per reference year
3÷5 days

Relaxed optimality tolerance
(0.01% MIP-gap)

1-decade time horizon
(instead of 3)

Reduced amount of Transmission AC lines
(short lines neglected)

1 climate variant
(instead of 35)

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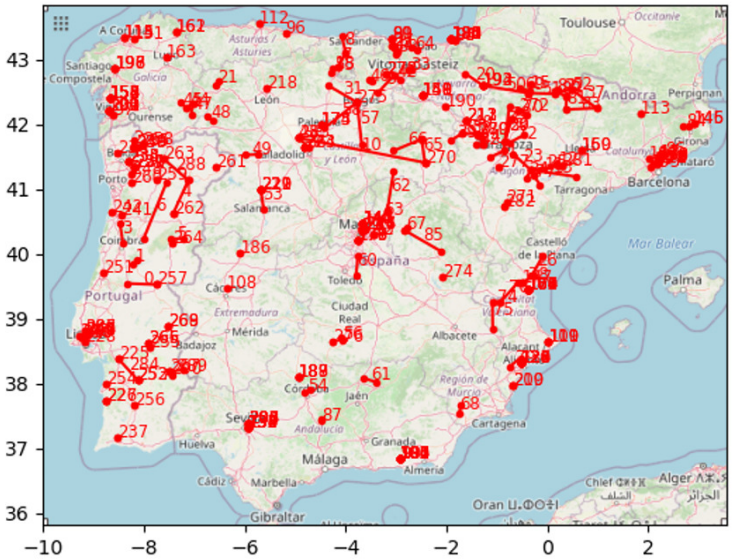
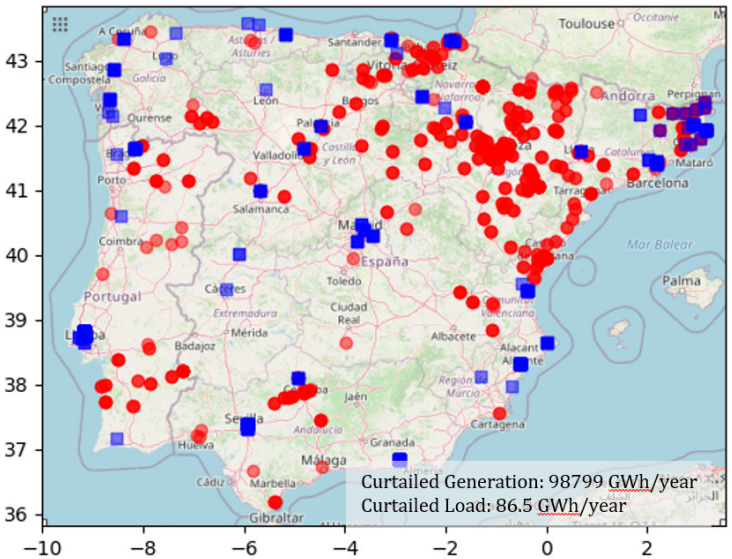
Results of the planning process

FlexPlan

Iberian Peninsula - 2030

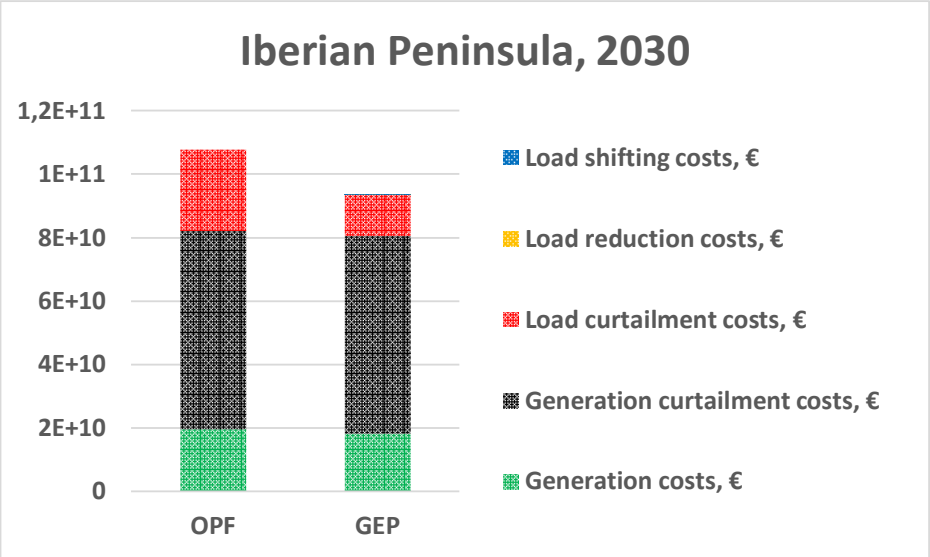


Overloaded lines and transformers



Curtailed generators (red circles) and loads (blue squares)

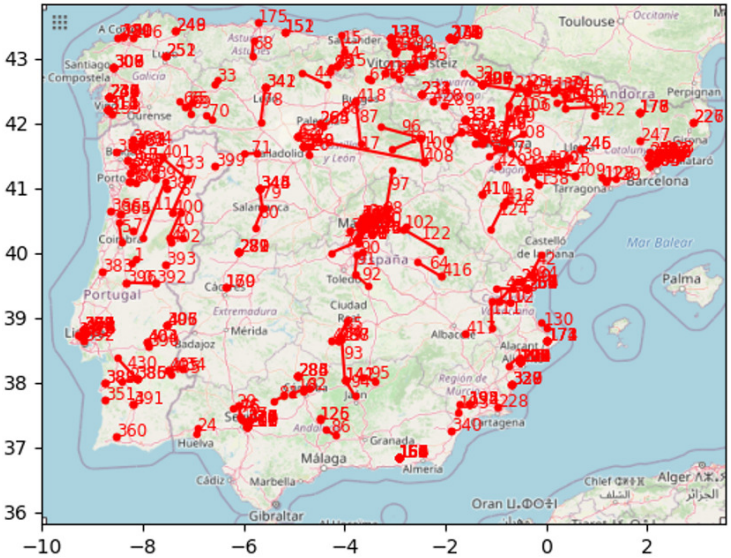
Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	57	4	6	33	100
Investment decisions	6 (T)	0 (T)	2	9	49
	30 (D)	2 (D)			
Investment rejected	1 (T)	2 (T)	4	24	51
	20 (D)	0 (D)			



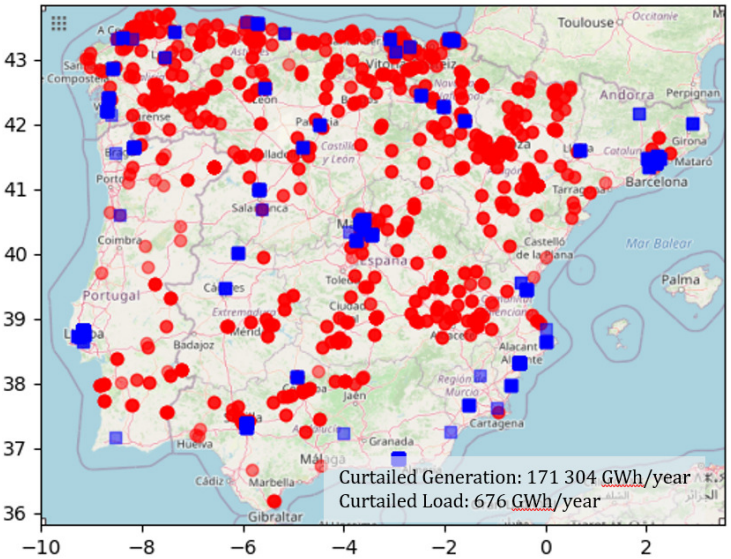
Results of the planning process

FlexPlan

Iberian Peninsula - 2040

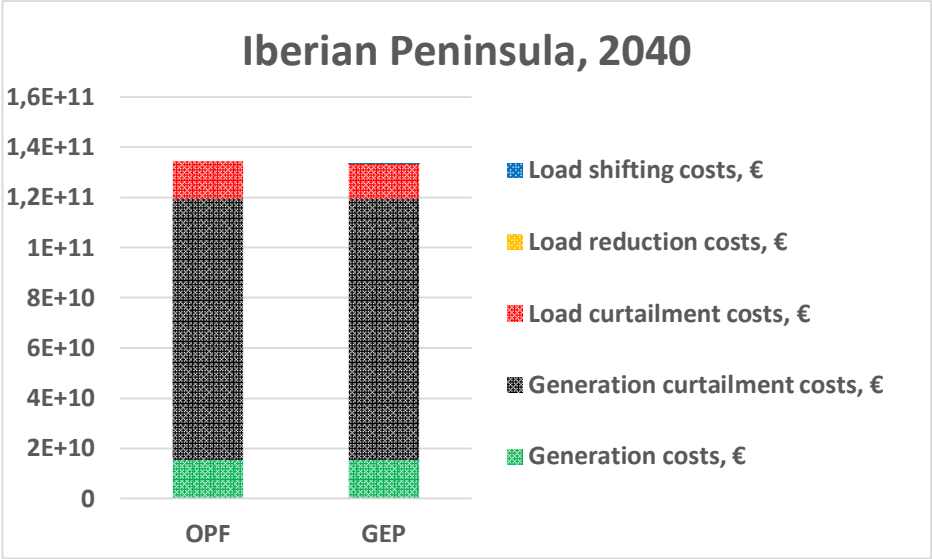


Overloaded lines and transformers



Curtailed generators (red circles) and loads (blue squares)

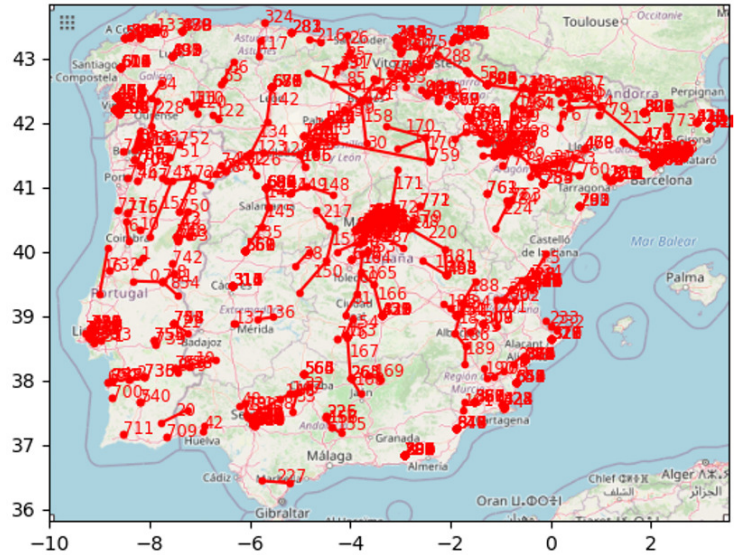
Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	74	0	5	21	100
Investment decisions	0 (T)	0 (T)	2	5	44
	37 (D)	0 (D)			
Investment rejected	0 (T)	0 (T)	3	16	56
	37 (D)	0 (D)			



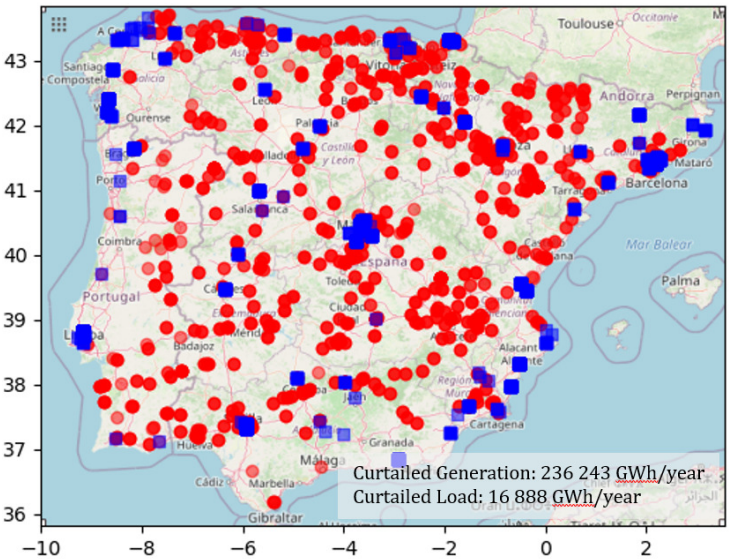
Results of the planning process

FlexPlan

Iberian Peninsula - 2050

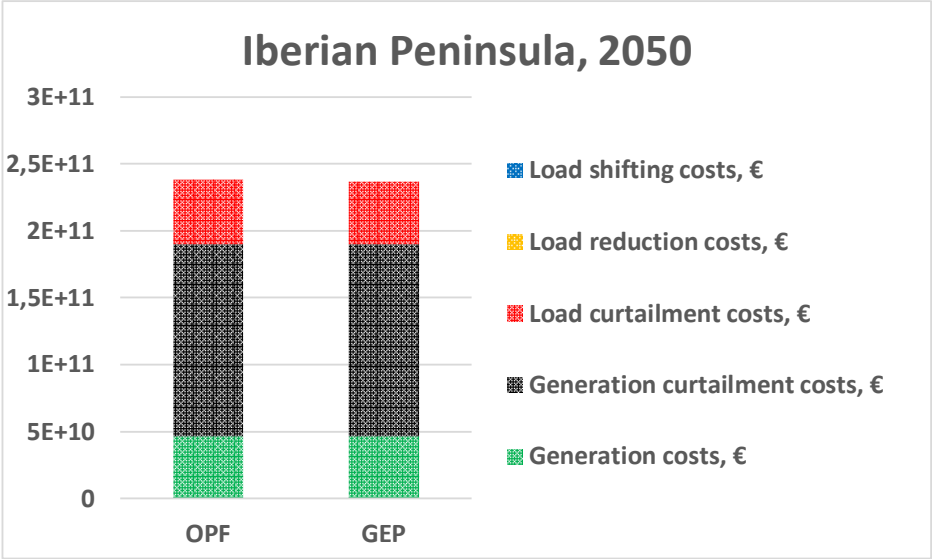


Overloaded lines and transformers



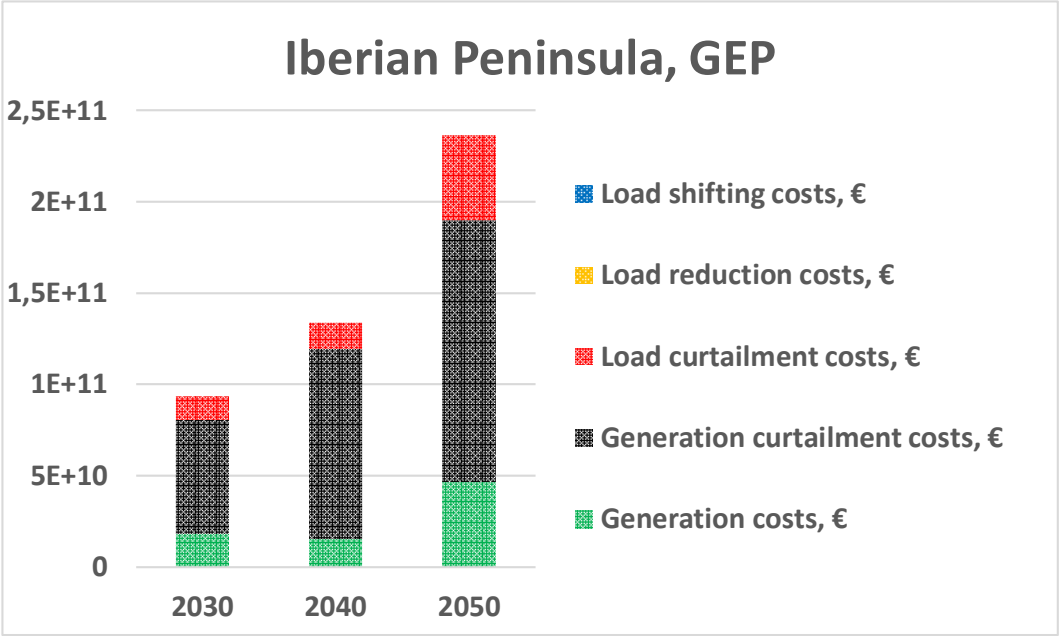
Curtailed generators (red circles) and loads (blue squares)

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	98	0	2	0	100
Investment decisions	0 (T)	0 (T)	2	0	38
	36 (D)	0 (D)			
Investment rejected	0 (T)	0 (T)	0	0	62
	62 (D)	0 (D)			



Results of the planning process

Iberian Peninsula

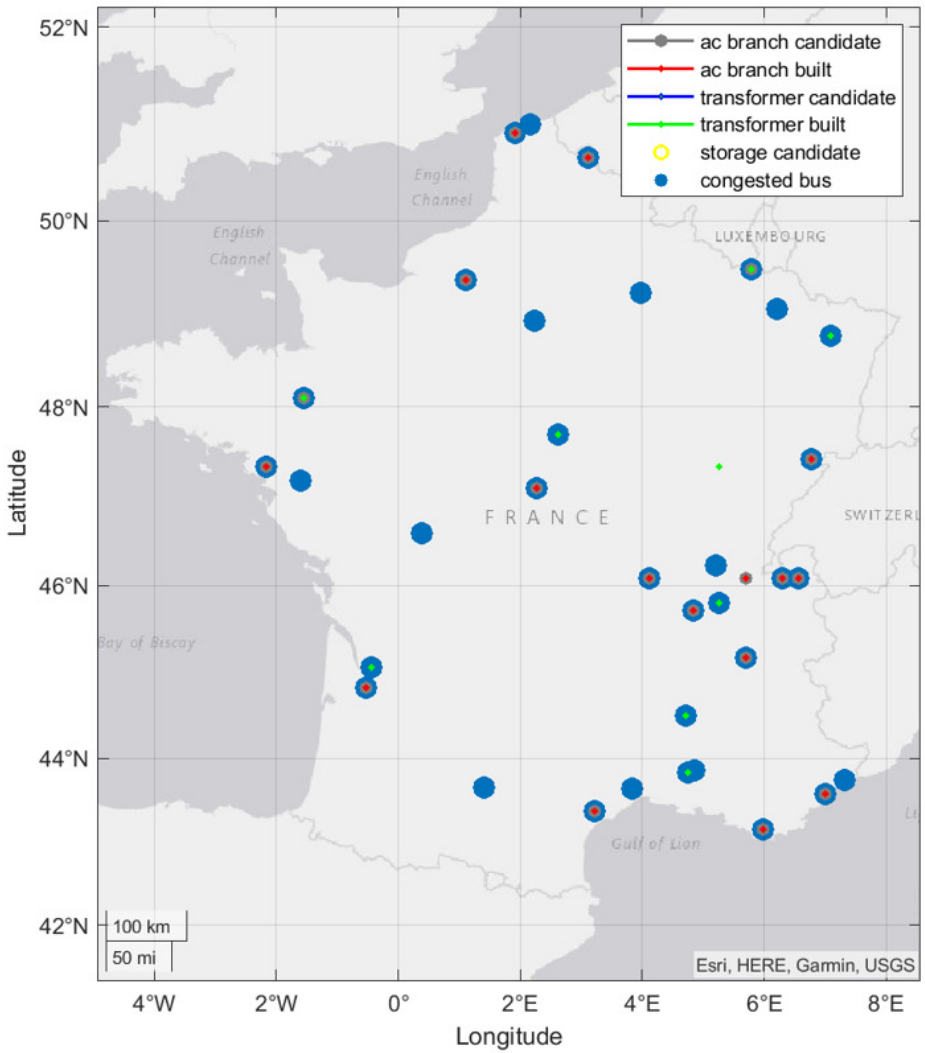


Year	2030	2040	2050
Carbon Footprint impact assessment, %	8.49	6.62	11.2
Air Quality impact assessment, %	2.1	1.08	1.81

Results of the planning process

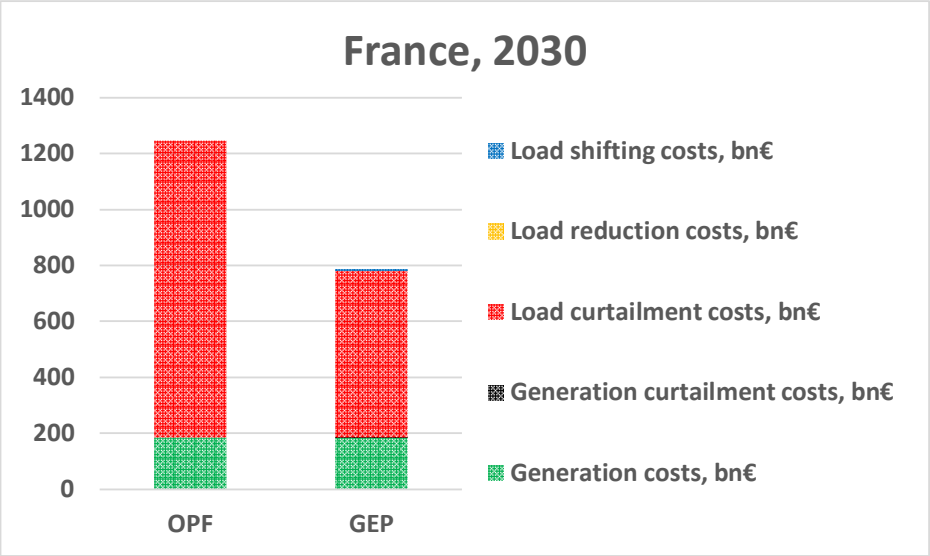
France - 2030

FlexPlan



Investment decisions

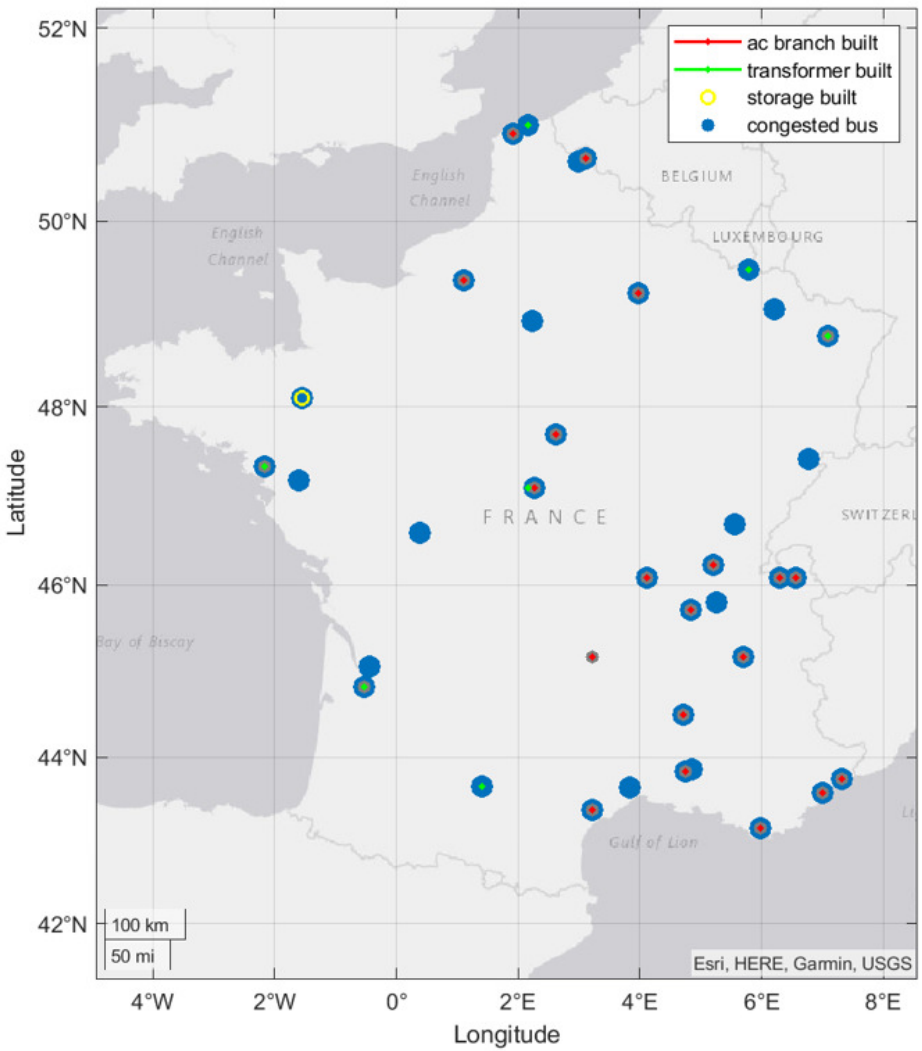
Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	60	23	0	15	100
Investment decisions	0 (T)	0 (T)	0	0 (T)	72
	38 (D)	25 (D)		9 (D)	
Investment rejected	0 (T)	0 (T)	0	0 (T)	28
	22 (D)	0 (D)		6 (D)	



Results of the planning process

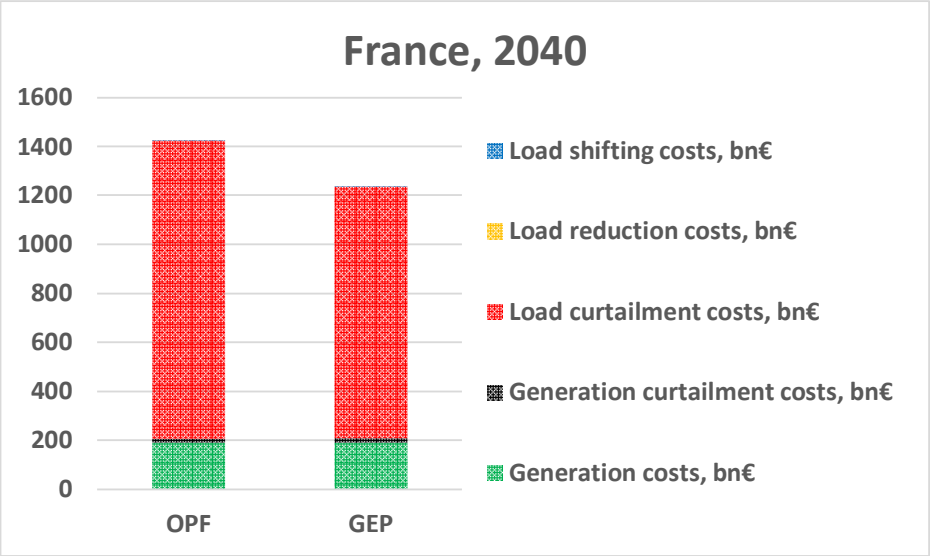
France - 2040

FlexPlan



Investment decisions

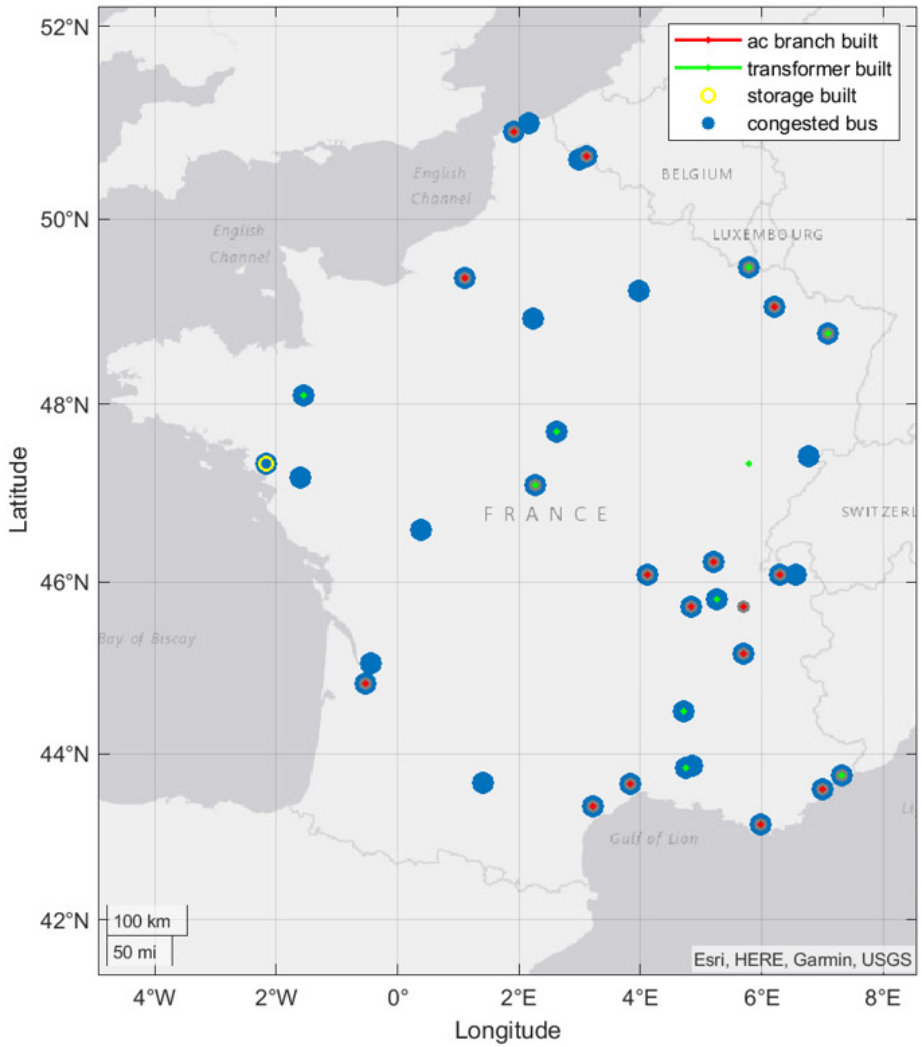
Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	79	7	1	13	100
Investment decisions	0 (T)	0 (T)	1	0 (T)	58
	42 (D)	7 (D)		8 (D)	
Investment rejected	6 (T)	0 (T)	0	0 (T)	42
	31 (D)	0 (D)		5 (D)	



Results of the planning process

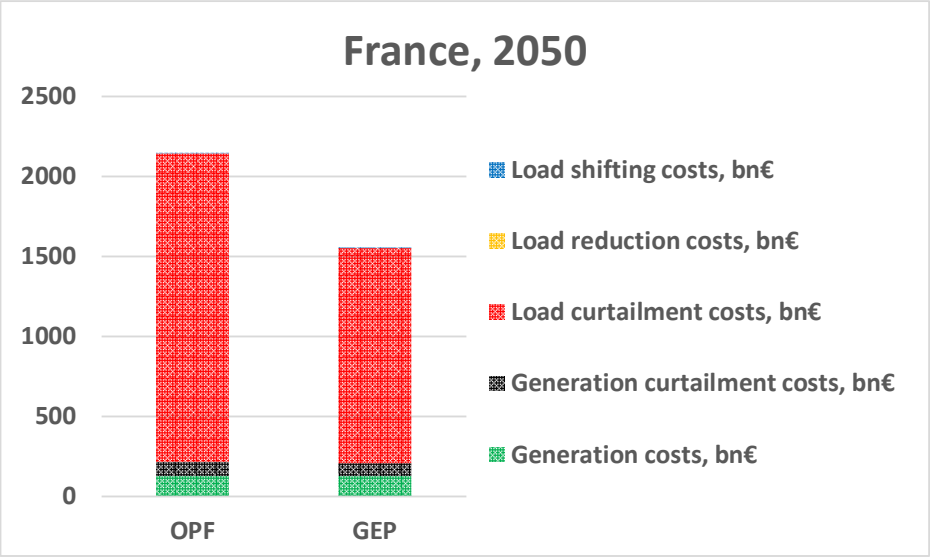
France - 2050

FlexPlan



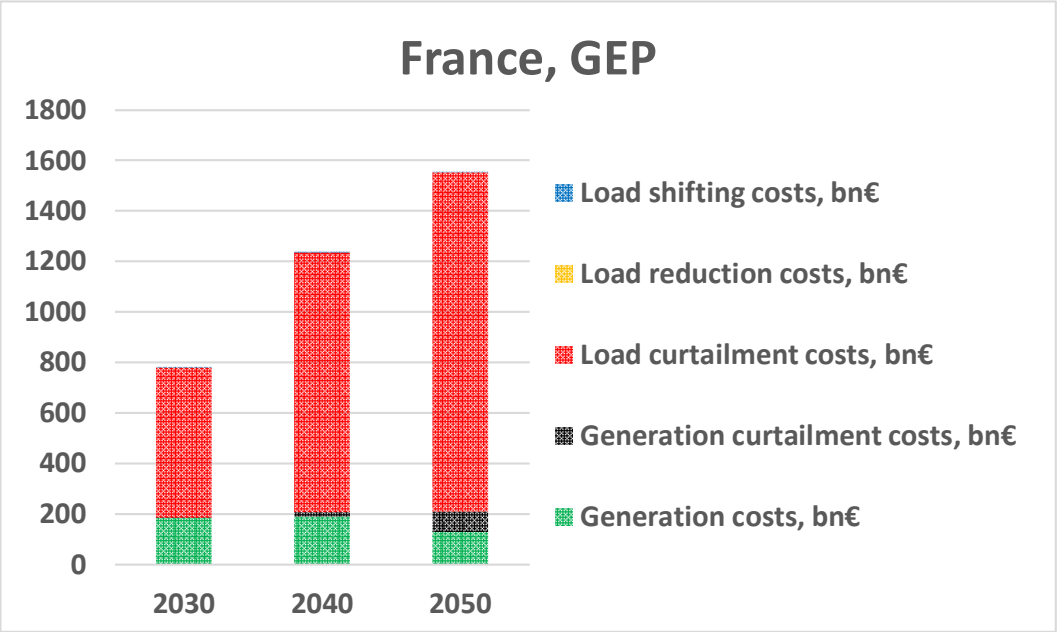
Investment decisions

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	67	19	2	12	100
Investment decisions	0 (T)	0 (T)	1	0 (T)	67
	39 (D)	19 (D)		8 (D)	
Investment rejected	6 (T)	0 (T)	1	0 (T)	33
	22 (D)	0 (D)		4 (D)	



Results of the planning process

France

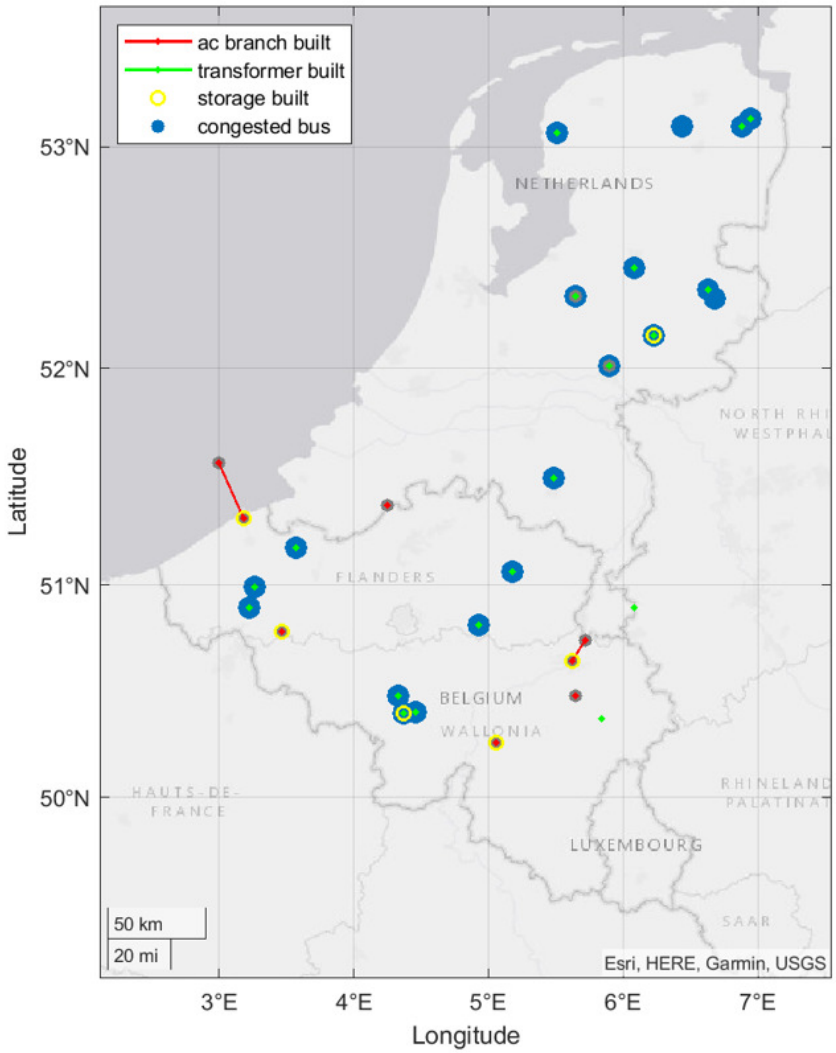


Year	2030	2040	2050
Carbon Footprint impact assessment, %	4.73	3.72	1.95
Air Quality impact assessment, %	2.01	1.27	0.7

Results of the planning process

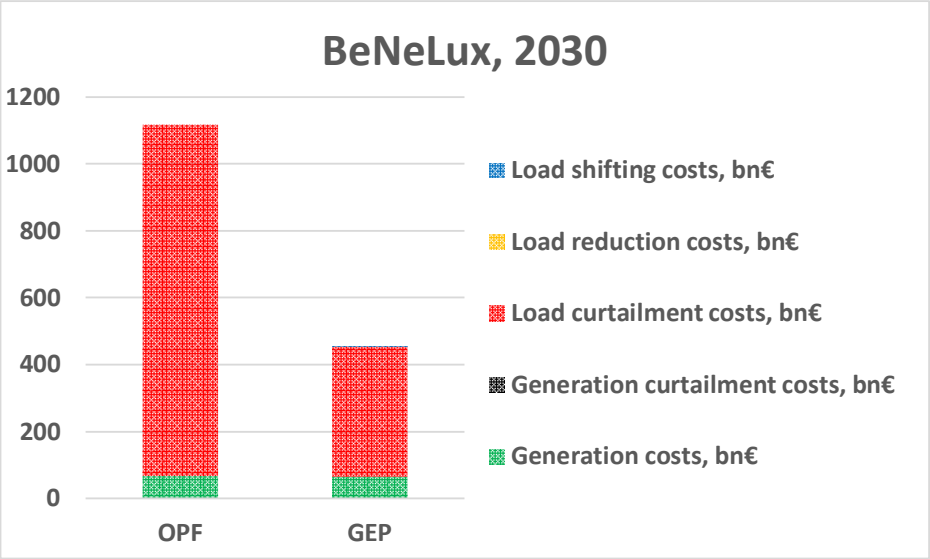
BeNeLux - 2030

FlexPlan



Investment decisions

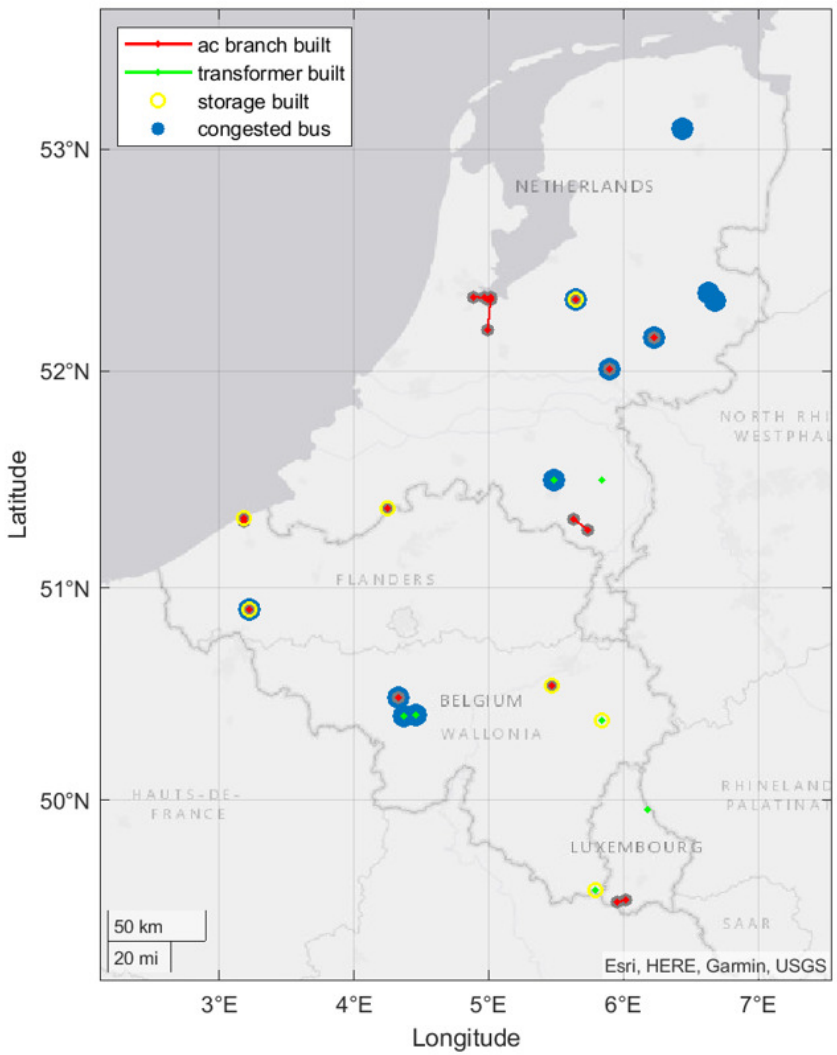
Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	13	35	19	18	85
Investment decisions	6 (T)	4 (T)	12	0 (T)	57
	3 (D)	31 (D)		1 (D)	
Investment rejected	0 (T)	0 (T)	7	3 (T)	28
	4 (D)	0 (D)		13 (D)	



Results of the planning process

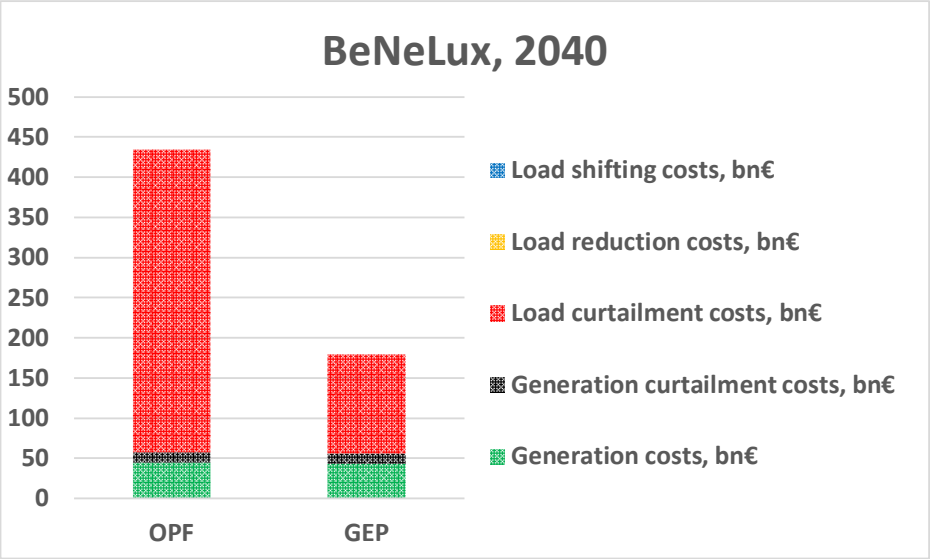
BeNeLux - 2040

FlexPlan



Investment decisions

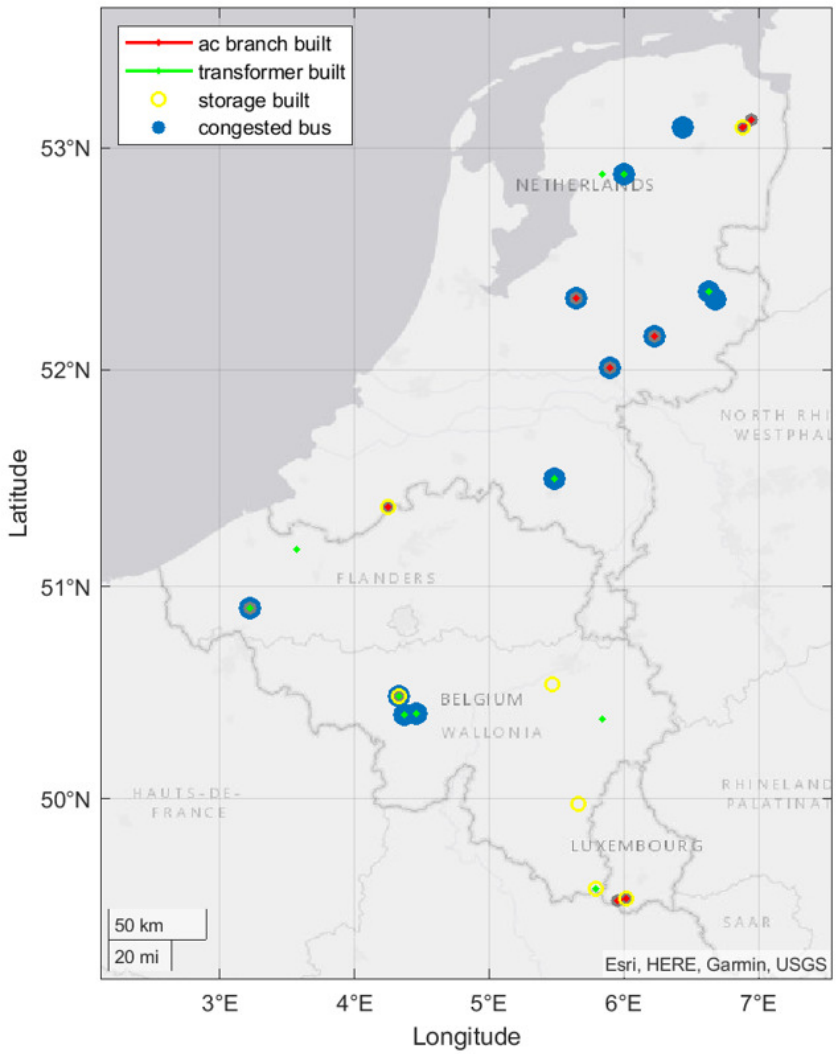
Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	28	7	19	11	65
Investment decisions	7 (T)	4 (T)	7	0 (T)	36
	11 (D)	3 (D)		4 (D)	
Investment rejected	2 (T)	0 (T)	12	2 (T)	29
	8 (D)	0 (D)		5 (D)	



Results of the planning process

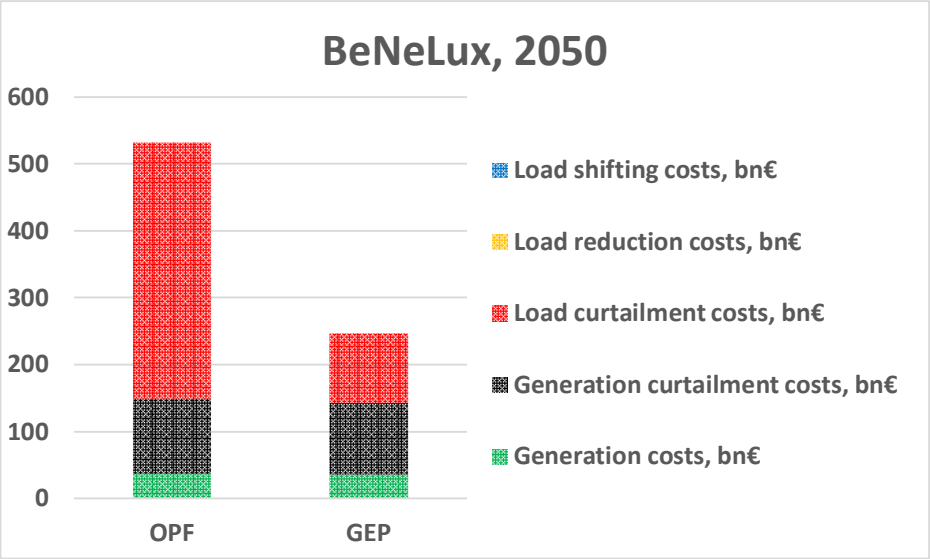
BeNeLux - 2050

FlexPlan



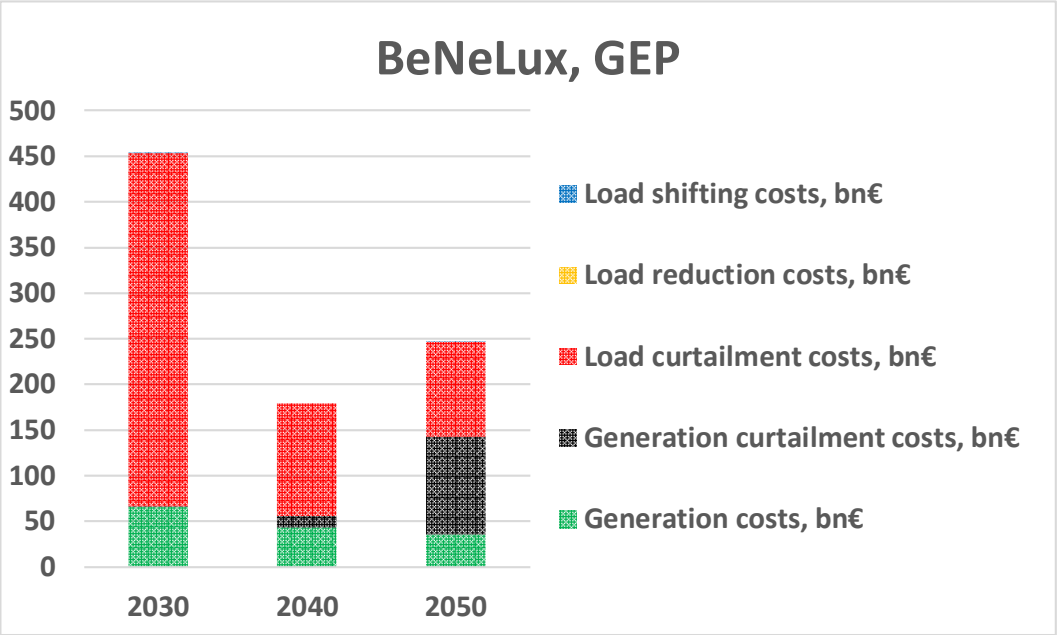
Investment decisions

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	33	18	20	14	85
Investment decisions	3 (T)	4 (T)	12	0 (T)	50
	12 (D)	14 (D)		5 (D)	
Investment rejected	7 (T)	0 (T)	8	4 (T)	35
	11 (D)	0 (D)		5 (D)	



Results of the planning process

BeNeLux



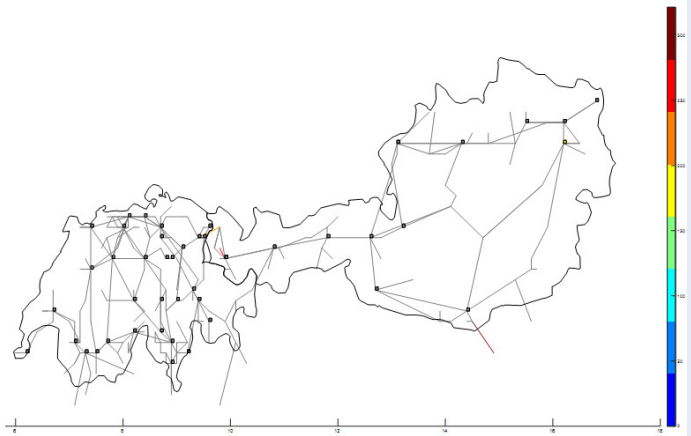
Year	2030	2040	2050
Carbon Footprint impact assessment, %	2.91	4.85	2.89
Air Quality impact assessment, %	0.2	0.34	0.2

Results of the planning process

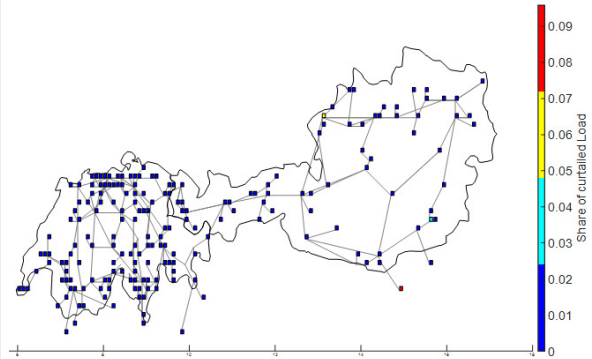
Switzerland and Austria - 2030

FlexPlan

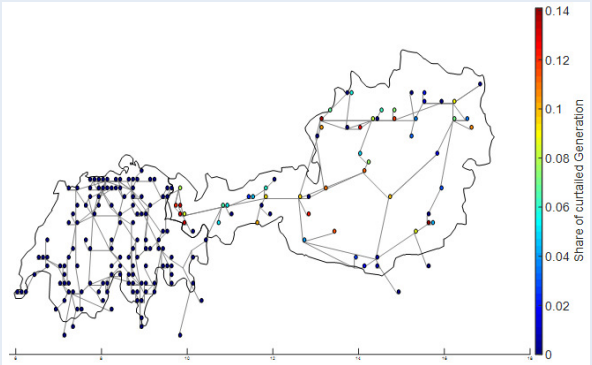
Lagrange Multipliers of lines and transformers



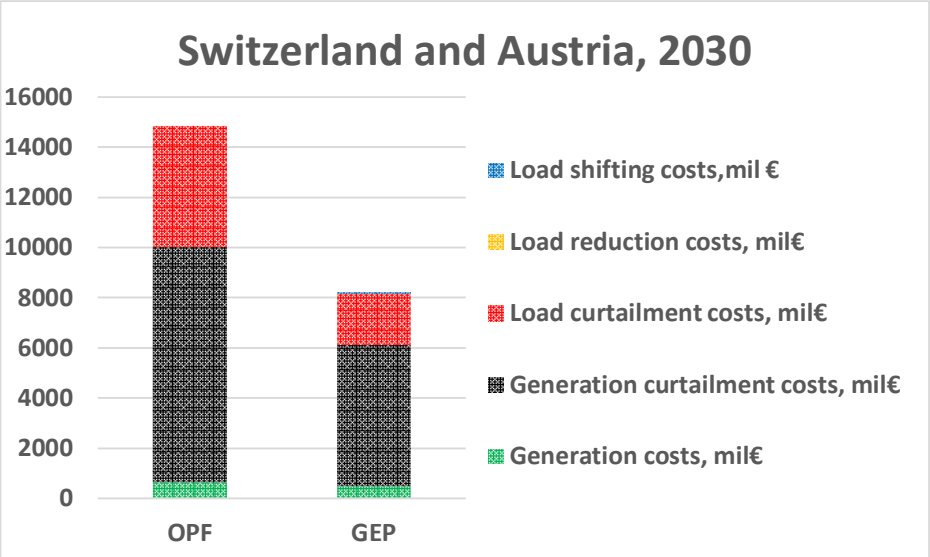
Load Curtailment



Generation Curtailment



Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	9	0	11	5	25
Investment decisions	4	0	1	5	10
Investment rejected	5	0	10	0	15

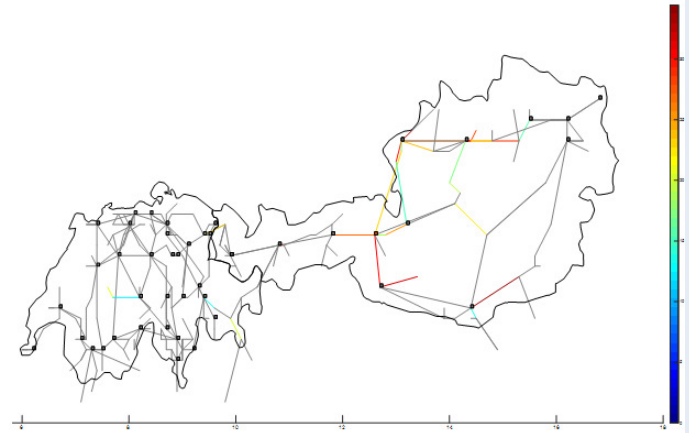


Results of the planning process

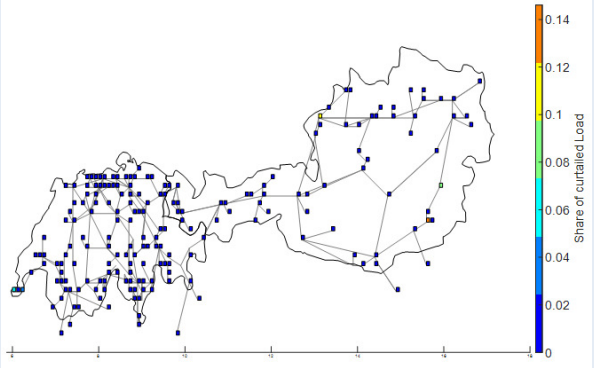
Switzerland and Austria - 2040

FlexPlan

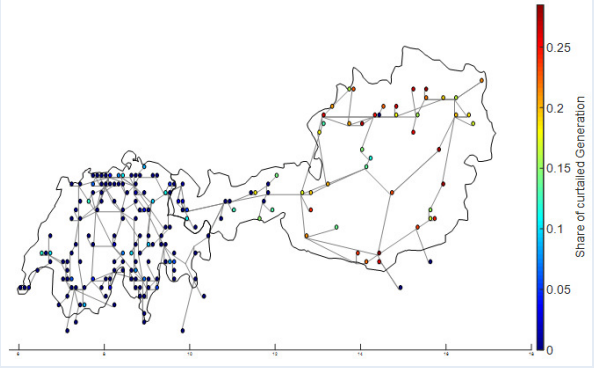
Lagrange Multipliers of lines and transformers



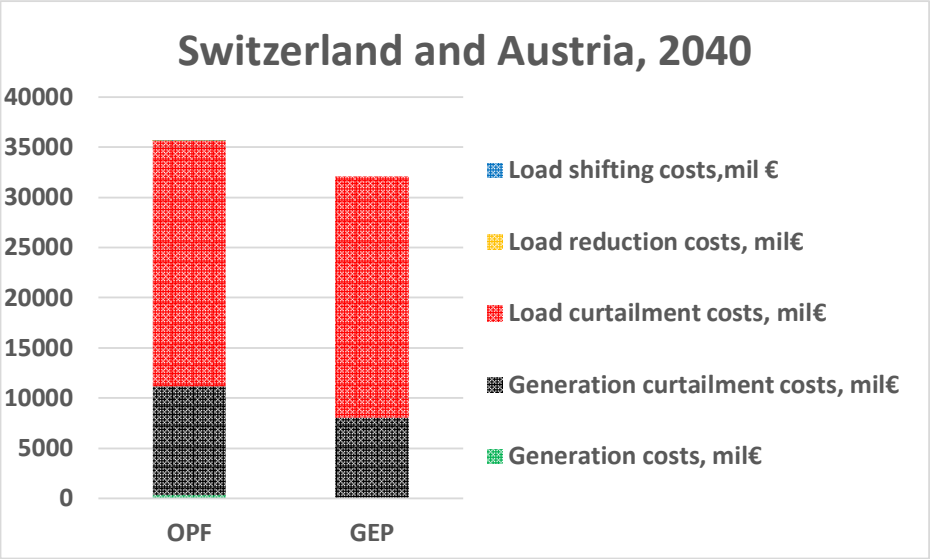
Load Curtailment



Generation Curtailment



Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	35	1	45	19	100
Investment decisions	18	0	38	19	75
Investment rejected	17	1	7	0	25

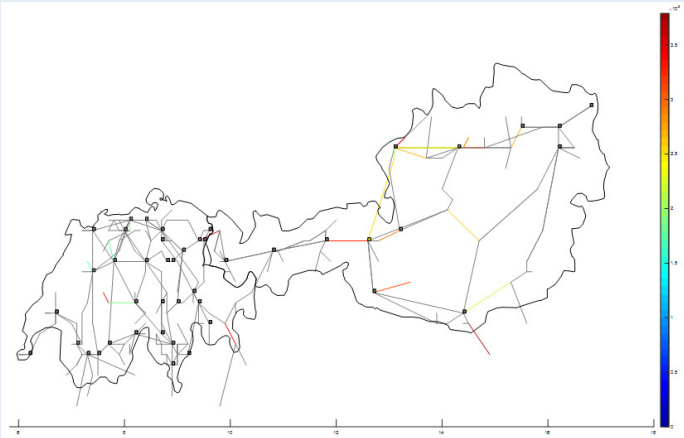


Results of the planning process

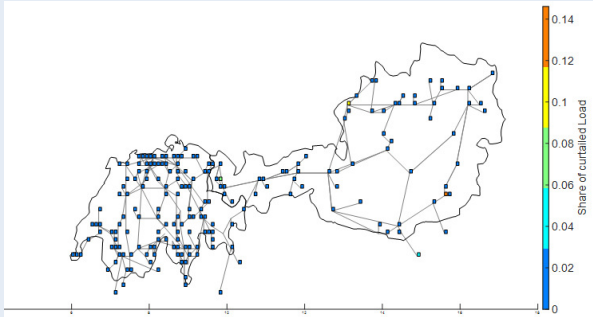
Switzerland and Austria - 2050

FlexPlan

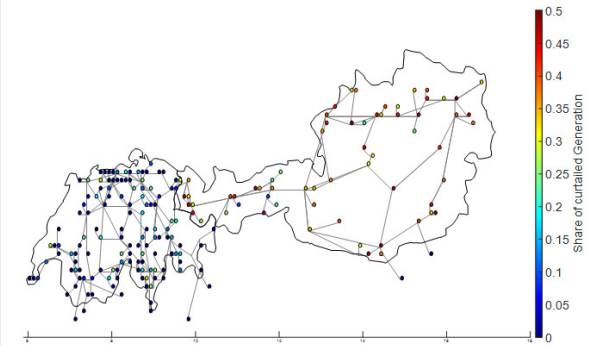
Lagrange Multipliers of lines and transformers



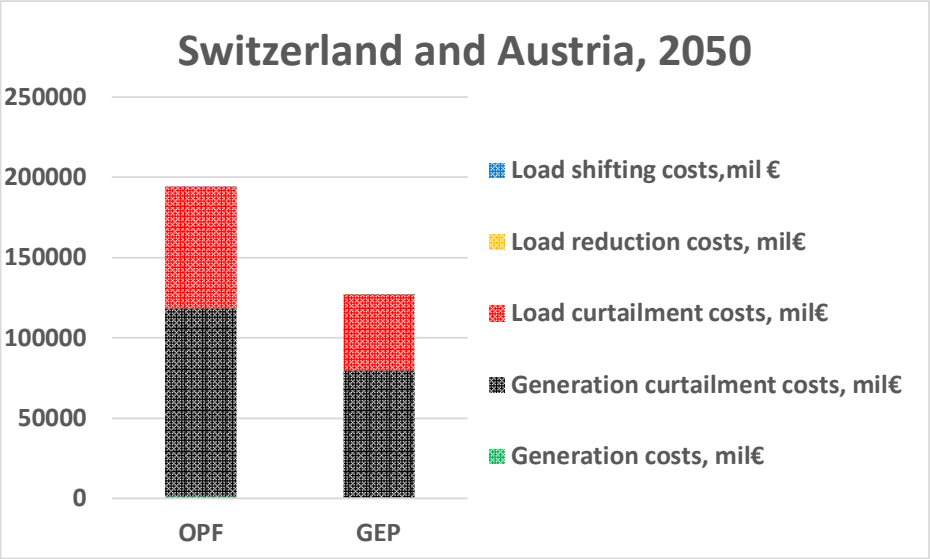
Load Curtailment



Generation Curtailment

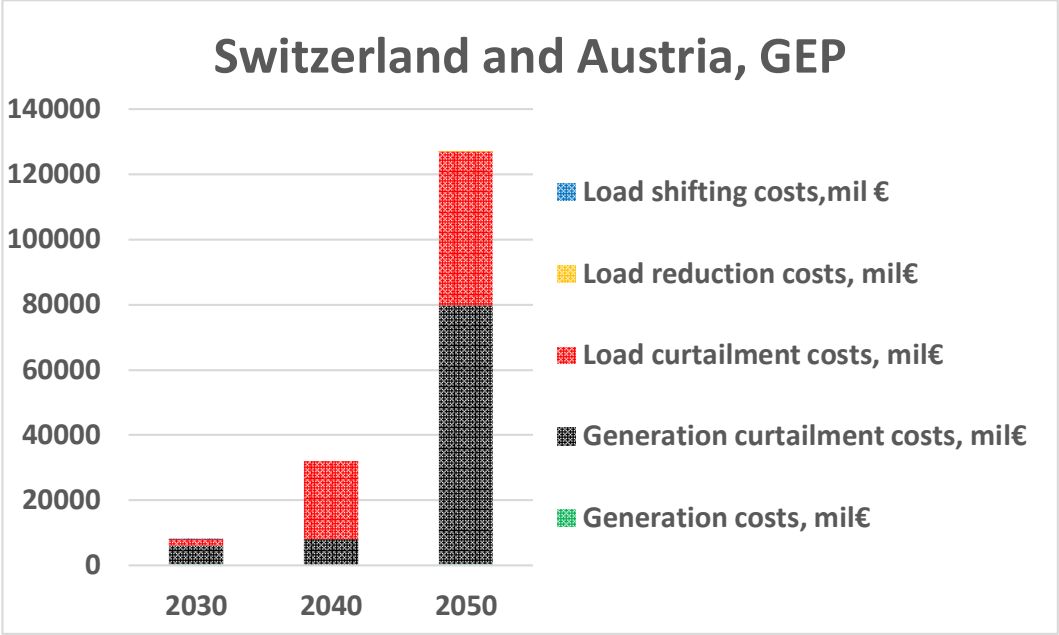


Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	20	0	20	19	59
Investment decisions	13	0	17	17	47
Investment rejected	7	0	3	2	12



Results of the planning process

Switzerland and Austria



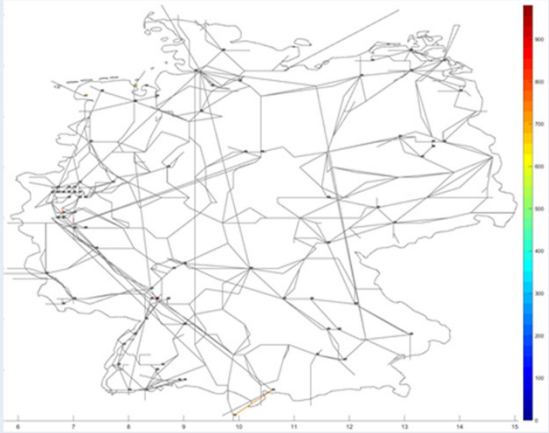
Year	2030	2040	2050
Carbon Footprint impact assessment, %	0.005	0.017	0.004
Air Quality impact assessment, %	< 0.00001	< 0.00001	< 0.00001

Results of the planning process

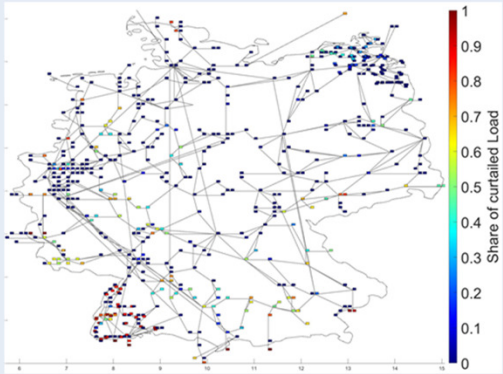
Germany - 2030

FlexPlan

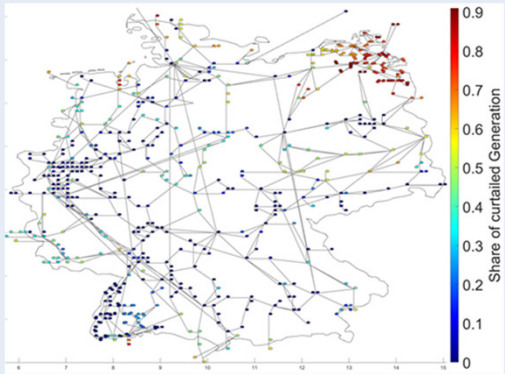
Lagrange Multipliers of lines and transformers



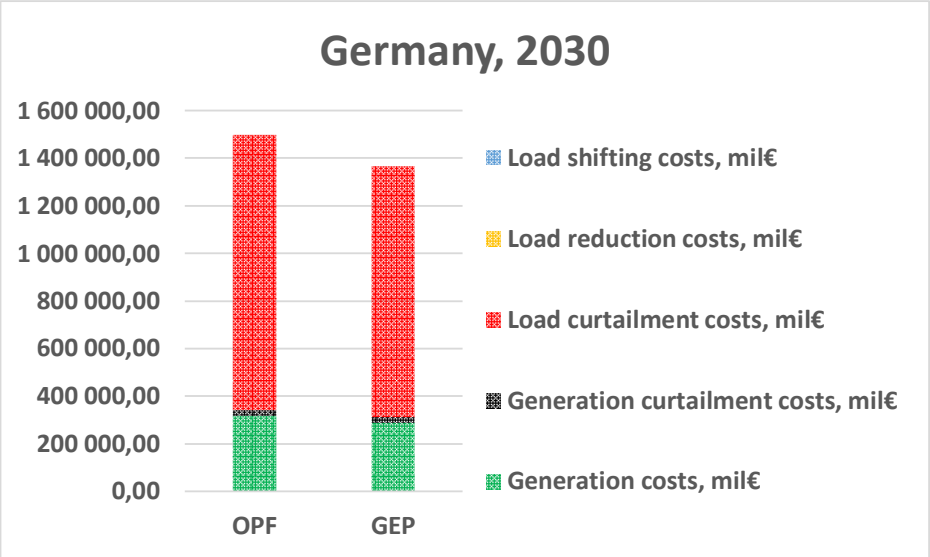
Load Curtailment



Generation Curtailment



Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	3	0	3	1	7
Investment decisions	W1: 3 W3: 0 W4: 0	0	W1: 0 W3: 0 W4: 0	W1: 0 W3: 0 W4: 0	W1: 3 W3: 0 W4: 0
Investment rejected	W1: 0 W3: 3 W4: 3	0	W1: 3 W3: 3 W4: 3	W1: 1 W3: 1 W4: 1	W1: 4 W3: 7 W4: 7

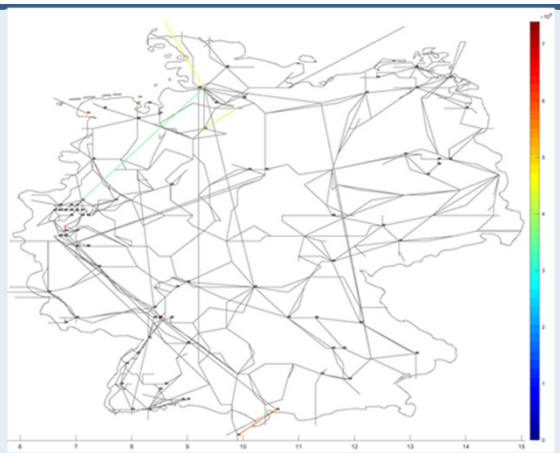


Results of the planning process

Germany - 2040

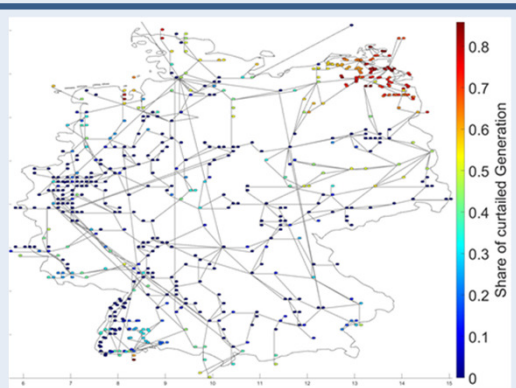
FlexPlan

Lagrange Multipliers of lines and transformers

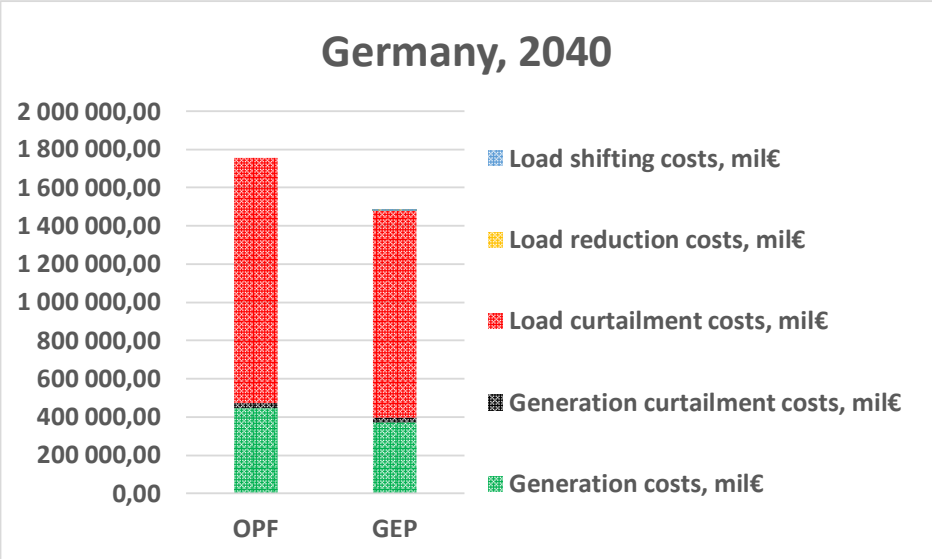


Load Curtailment

Generation Curtailment



Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	3	0	2	1	6
Investment decisions	W1: 0 W2: 2 W3: 2 W4: 3	0	W1: 0 W2: 1 W3: 0 W4: 2	W1: 0 W2: 1 W3: 1 W4: 0	W1: 0 W2: 3 W3: 3 W4: 5
Investment rejected	W1: 3 W2: 1 W3: 1 W4: 0	0	W1: 2 W2: 1 W3: 2 W4: 0	W1: 1 W2: 0 W3: 0 W4: 1	W1: 6 W2: 3 W3: 3 W4: 1

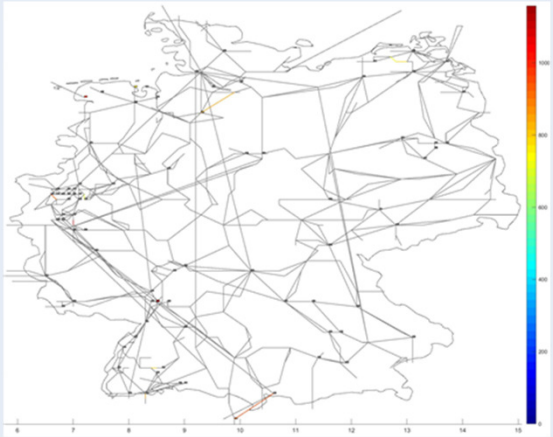


Results of the planning process

Germany - 2050

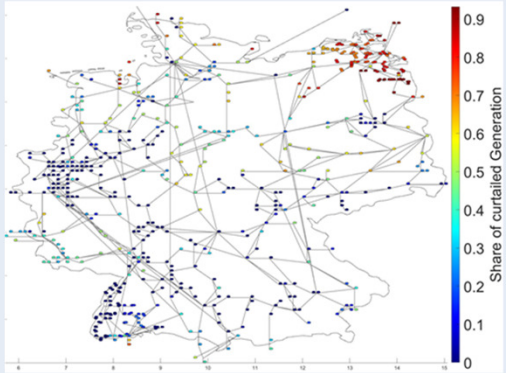
FlexPlan

Lagrange Multipliers of lines and transformers

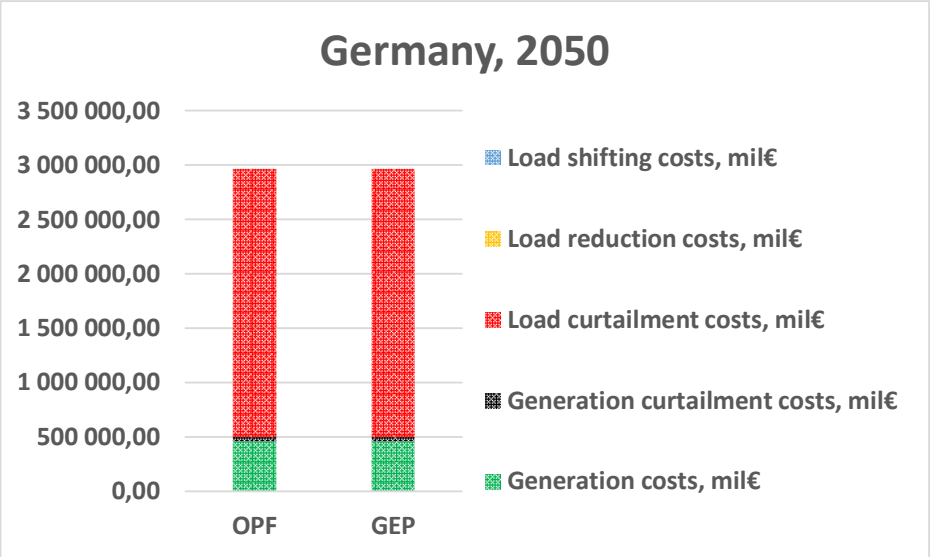


Load Curtailment

Generation Curtailment

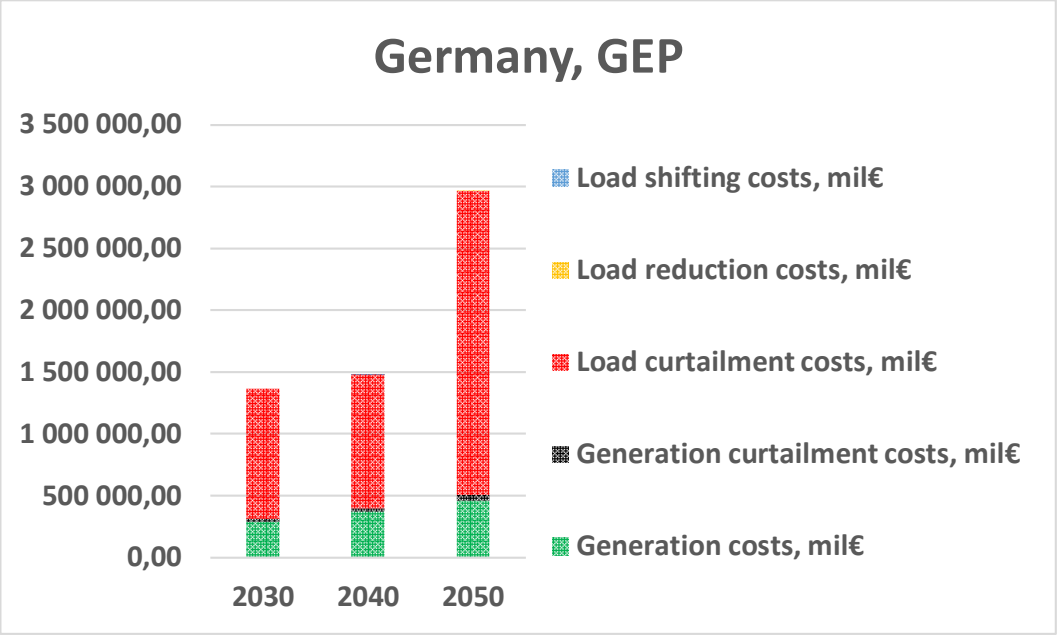


Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	3	0	3	2	8
Investment decisions	W3: 0	0	W3: 0	W3: 0	W3: 0
Investment rejected	W3: 3	0	W3: 3	W3: 2	W3: 8



Results of the planning process

Germany

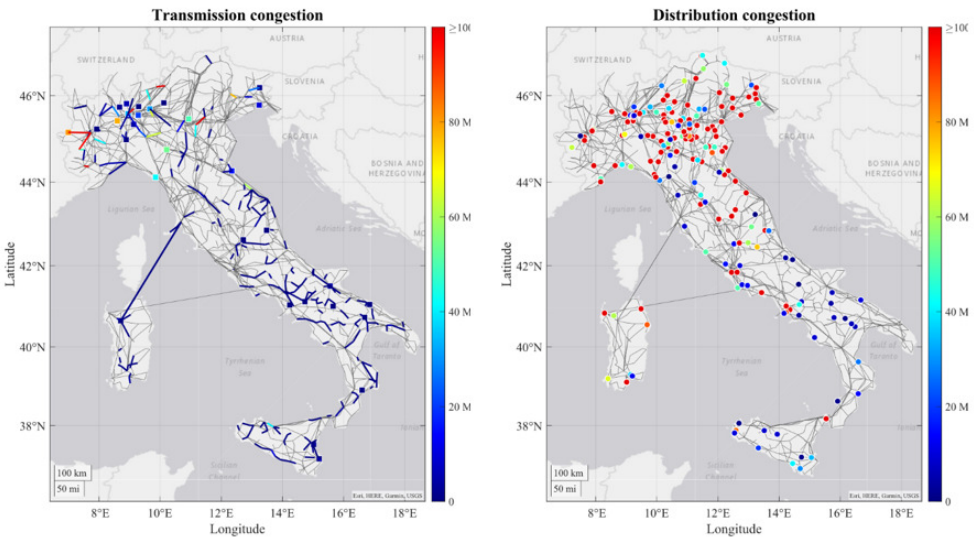


Year	2030	2040	2050
Carbon Footprint impact assessment, %	0.034	0.073	0.035
Air Quality impact assessment, %	0.0002	0.0002	0.00001

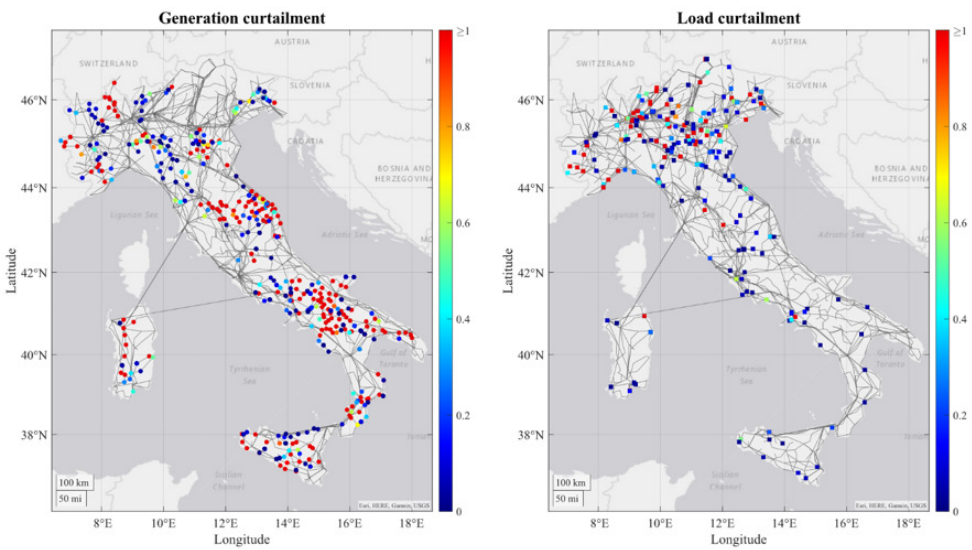
Results of the planning process

Italy - 2030

FlexPlan

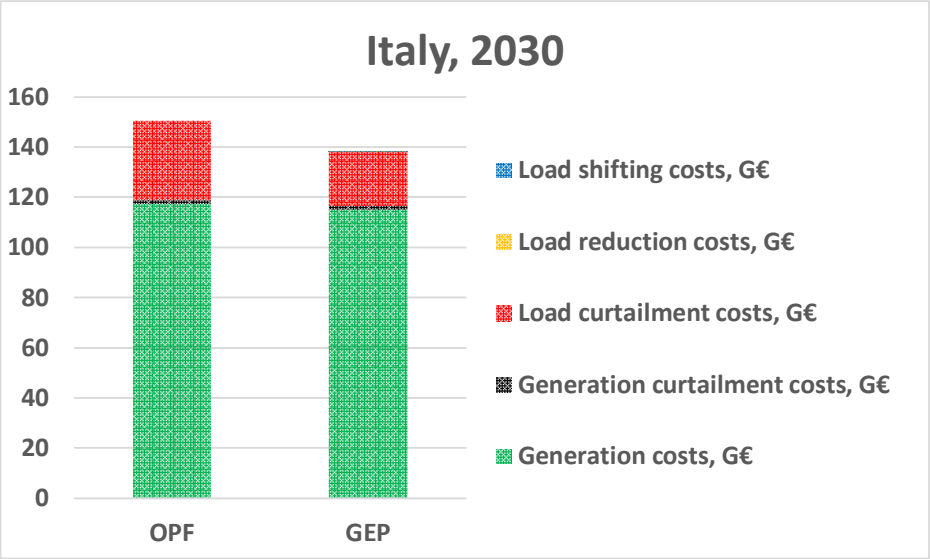


Overloaded lines and transformers



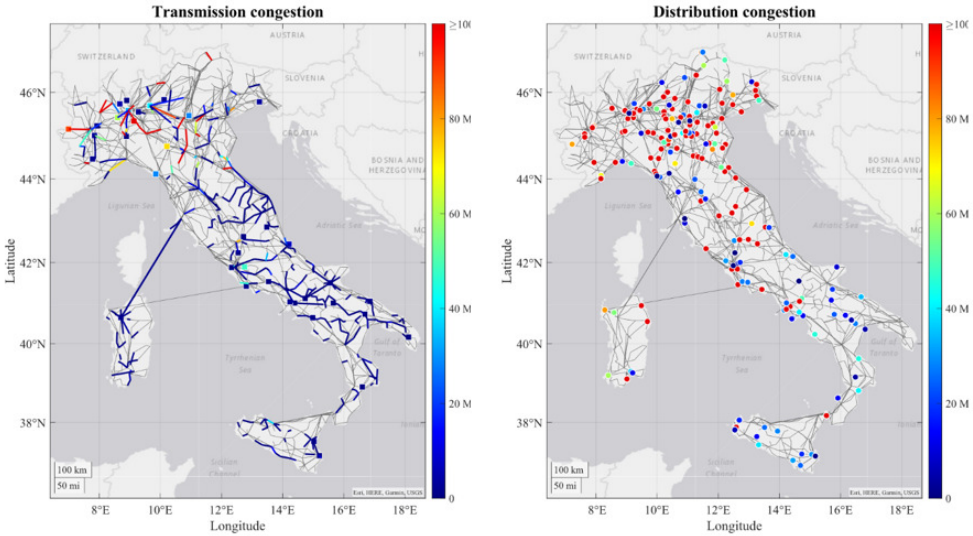
Curtailed generators (circles) and loads (squares)

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	90	2	9	19	120
Investment decisions	7 (T)	1 (T)	6	0 (T)	59
	40 (D)	0 (D)		5 (D)	
Investment rejected	6 (T)	1 (T)	3	0 (T)	61
	37 (D)	0 (D)		14 (D)	

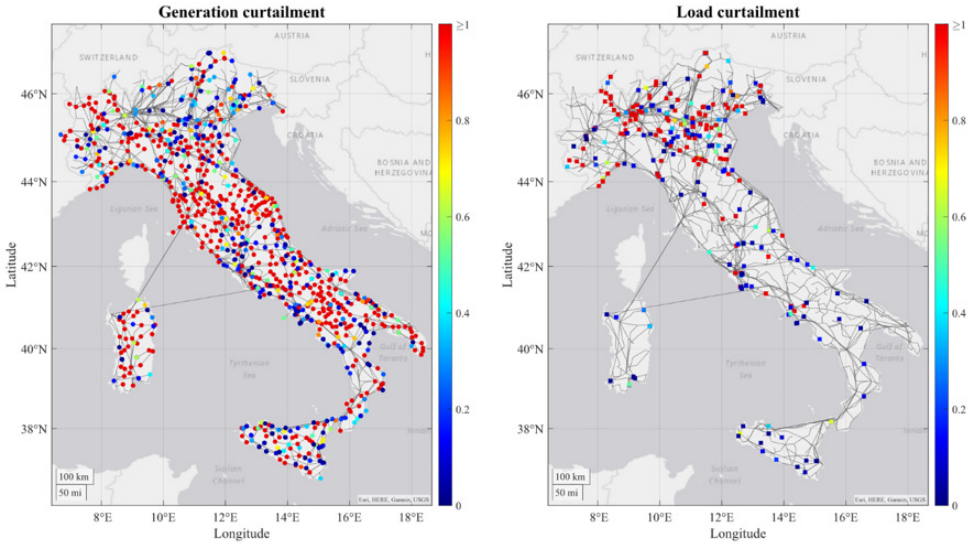


Results of the planning process

Italy - 2040

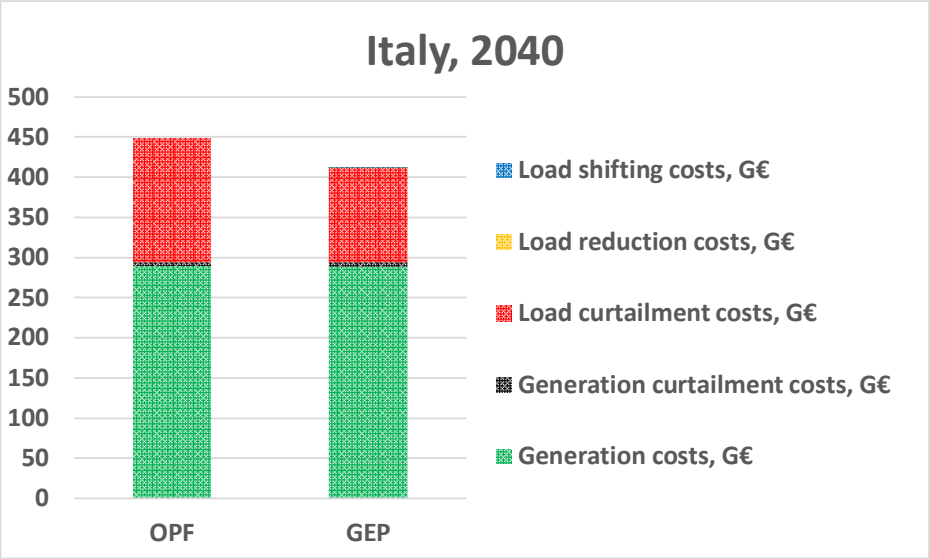


Overloaded lines and transformers



Curtailed generators (circles) and loads (squares)

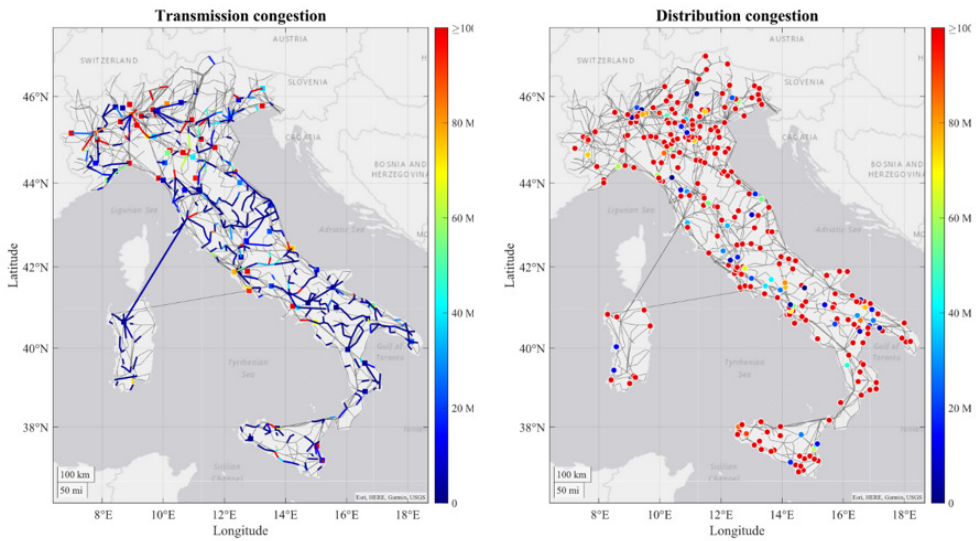
Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	85	0	7	12	104
Investment decisions	12 (T)	0 (T)	6	0 (T)	44
	17 (D)	0 (D)		9 (D)	
Investment rejected	4 (T)	0 (T)	1	0 (T)	60
	52 (D)	0 (D)		3 (D)	



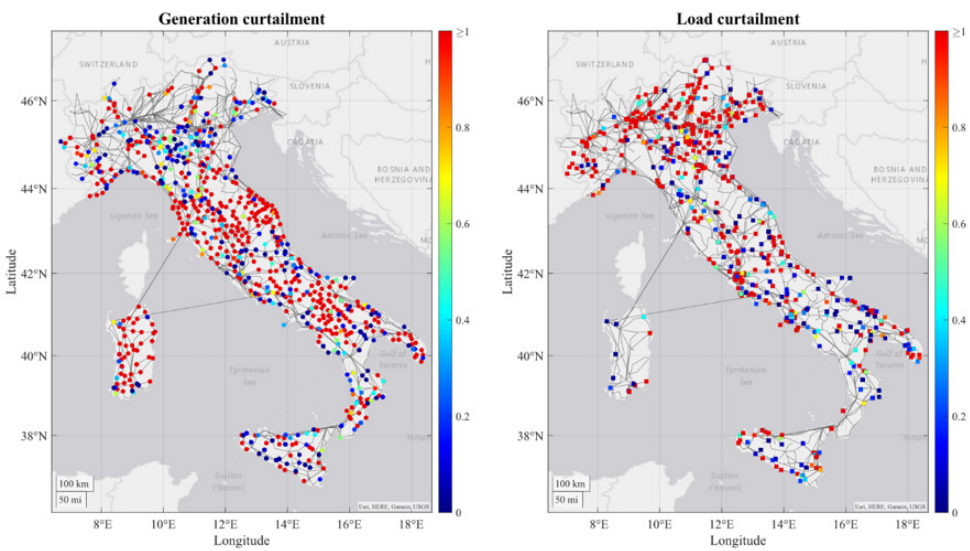
Results of the planning process

Italy - 2050

FlexPlan

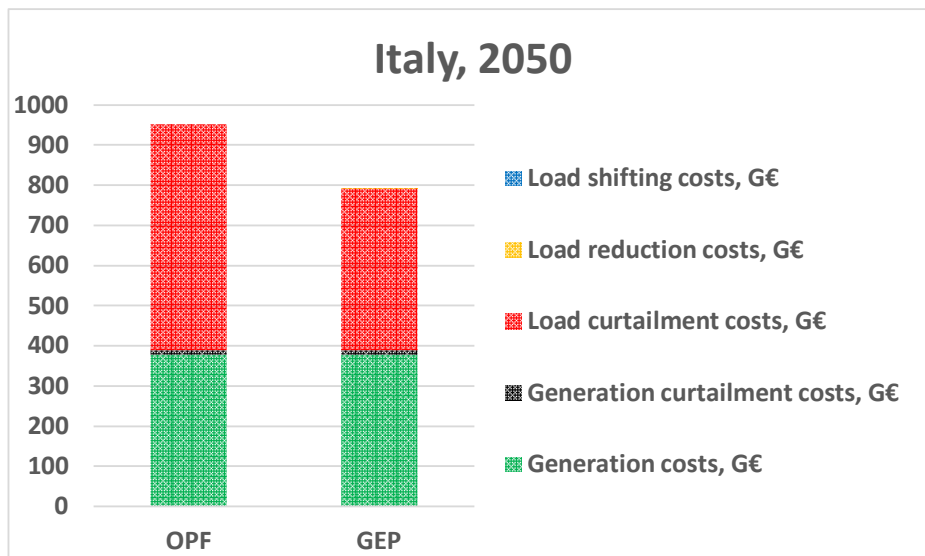


Overloaded lines and transformers



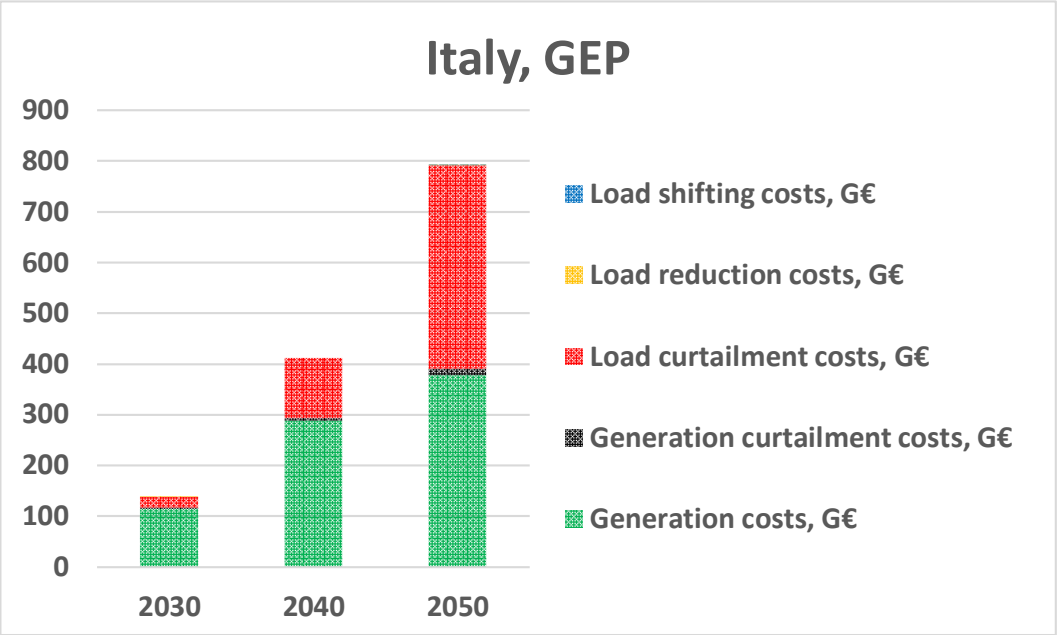
Curtailed generators (circles) and loads (squares)

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	92	9	5	1	107
Investment decisions	6 (T)	4 (T)	5	1 (T)	49
	29 (D)	4 (D)		0 (D)	
Investment rejected	4 (T)	1 (T)	0	0 (T)	58
	53 (D)	0 (D)		0 (D)	



Results of the planning process

Italy



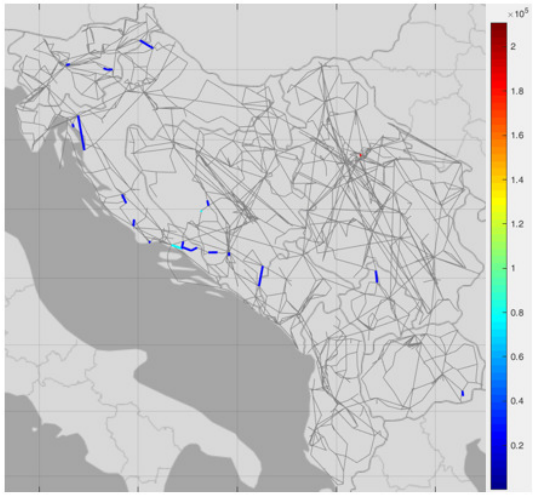
Year	2030	2040	2050
Carbon Footprint impact assessment, %	43.1	52.7	36.4
Air Quality impact assessment, %	0.1	0.05	0.045

Results of the planning process

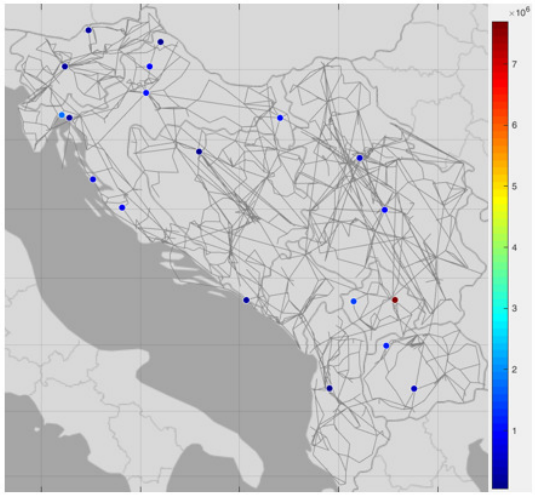
Balkan Region - 2030

FlexPlan

Transmission network



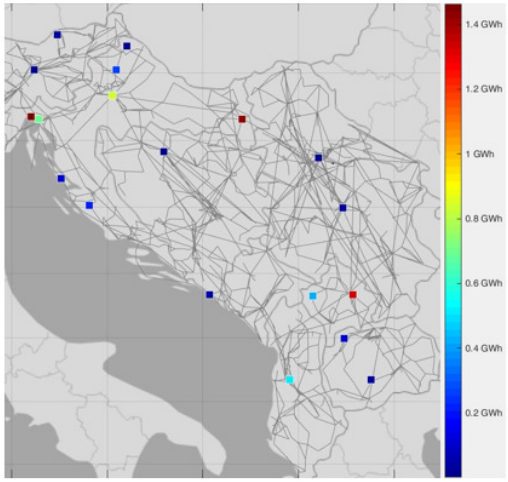
Distribution network



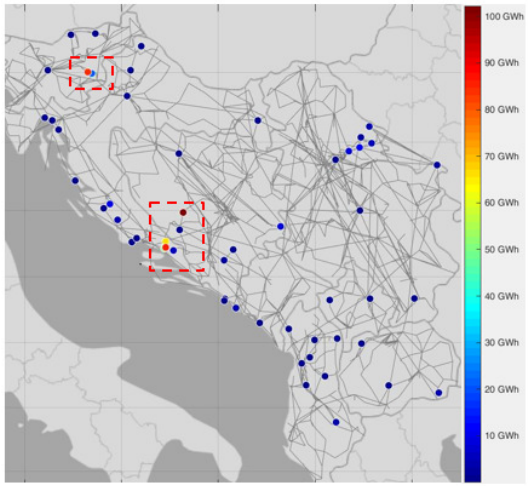
Overloaded lines and transformers

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	37	0	38	25	100
Investment decisions	7 (T)	0 (T)	6	15	38
	10 (D)	0 (D)			
Investment rejected	5 (T)	0 (T)	32	17	62
	15 (D)	0 (D)			

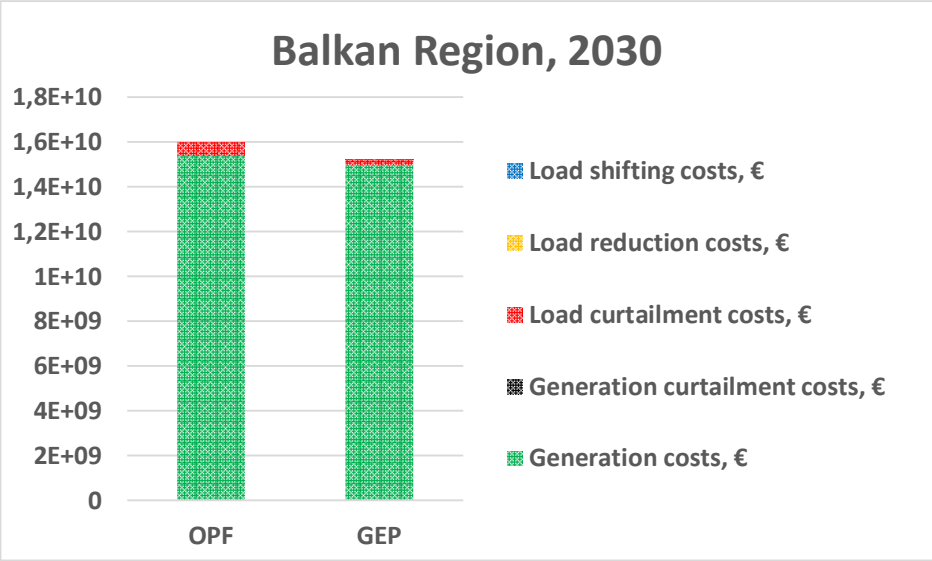
Transmission network



Distribution network



Curtailed generators (circles) and loads (squares)

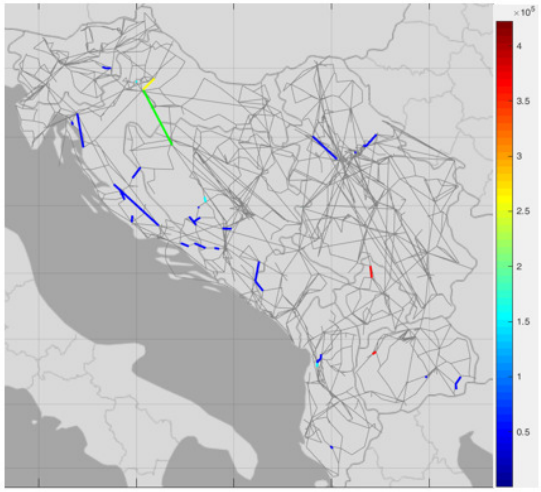


Results of the planning process

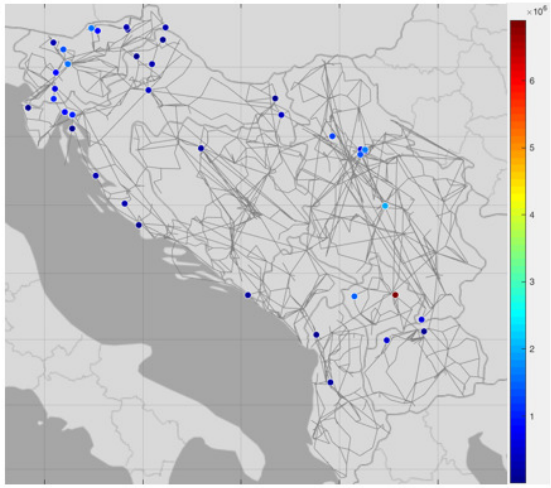
Balkan Region - 2040

FlexPlan

Transmission network



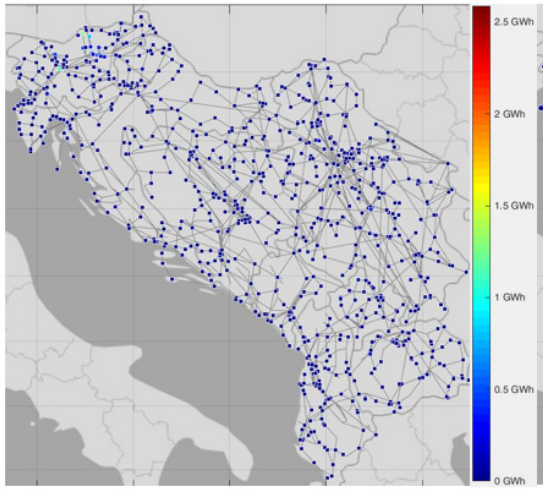
Distribution network



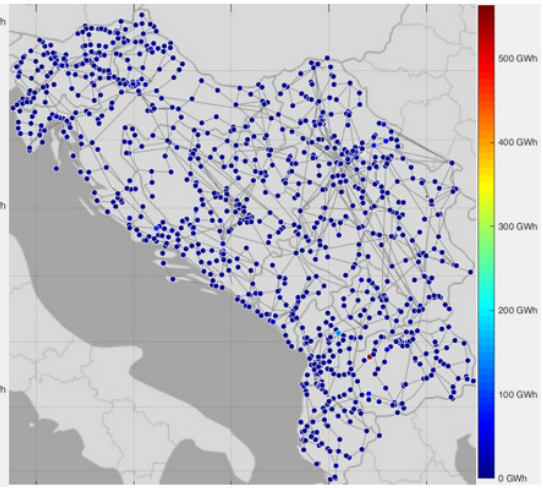
Overloaded lines and transformers

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	40	0	38	22	100
Investment decisions	6 (T)	0 (T)	18	16	51
	11 (D)	0 (D)			
Investment rejected	7 (T)	0 (T)	20	6	49
	16 (D)	0 (D)			

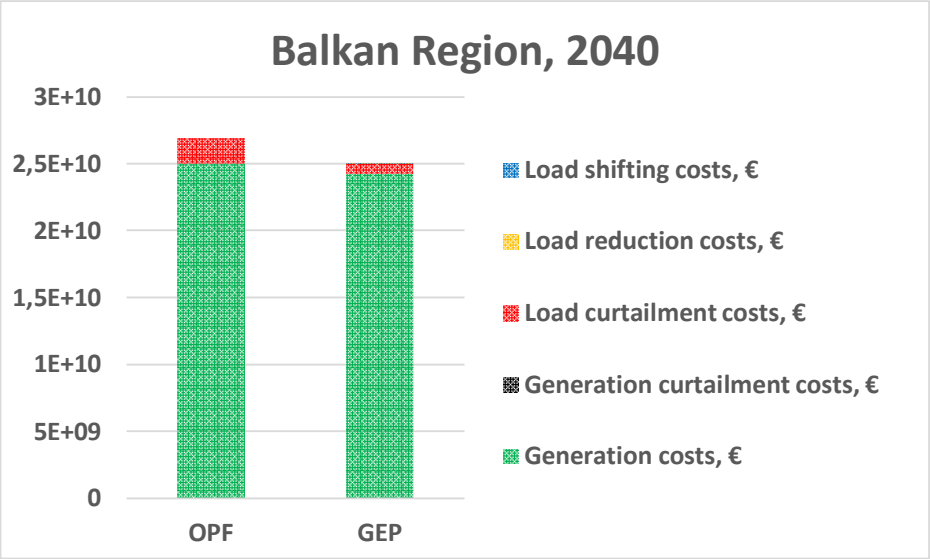
Transmission network



Distribution network



Curtailed generators (circles) and loads (squares)

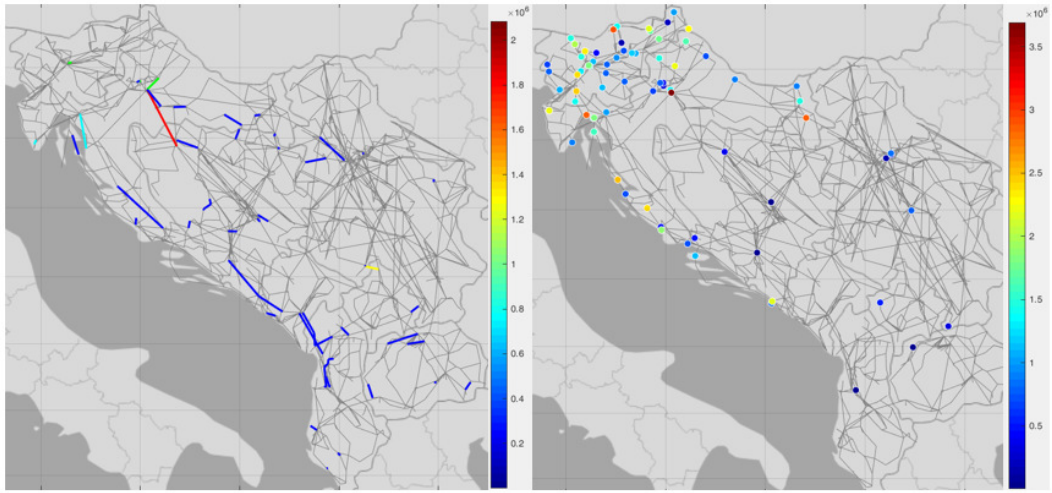


Results of the planning process

Balkan Region - 2050

FlexPlan

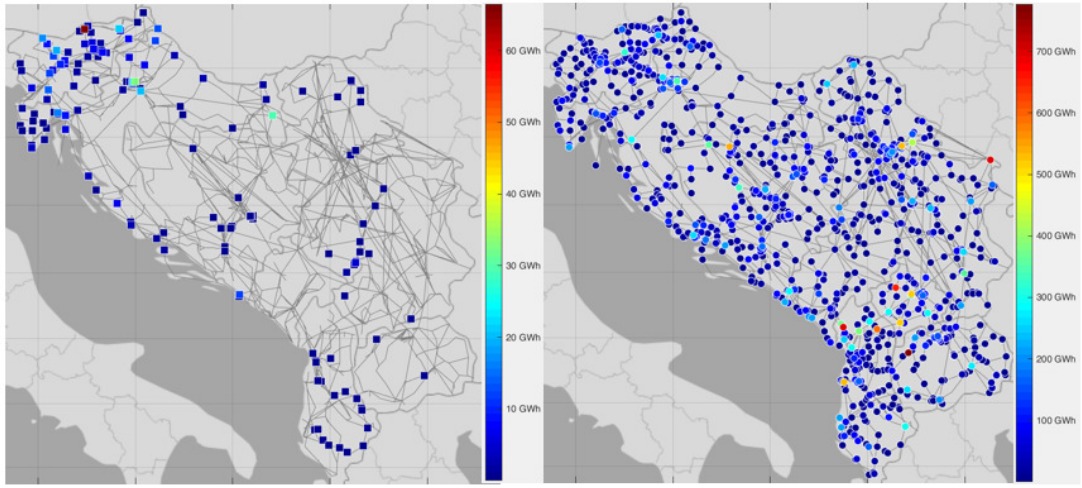
Transmission network *Distribution network*



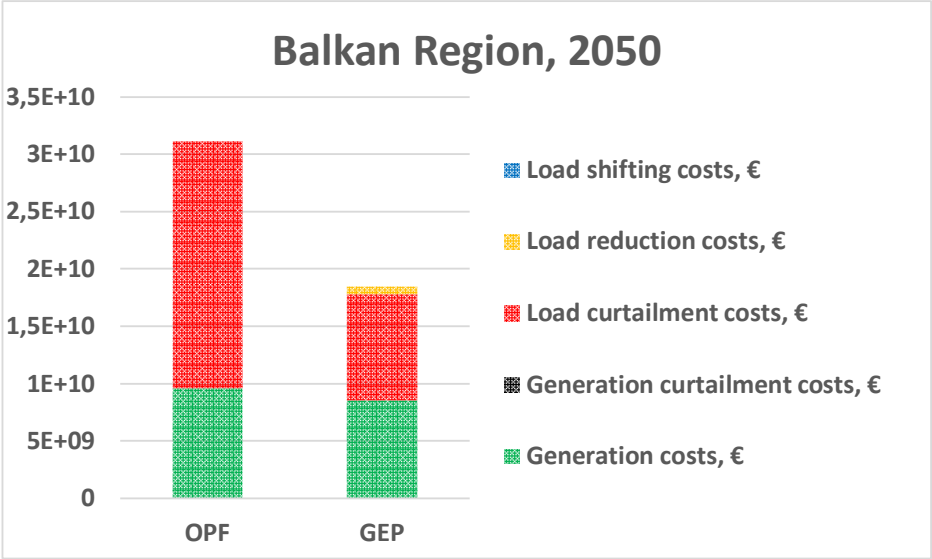
Overloaded lines and transformers

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	44	0	23	33	100
Investment decisions	3 (T)	0 (T)	21	33	79
	22 (D)	0 (D)			
Investment rejected	4 (T)	0 (T)	2	0	21
	15 (D)	0 (D)			

Transmission network *Distribution network*

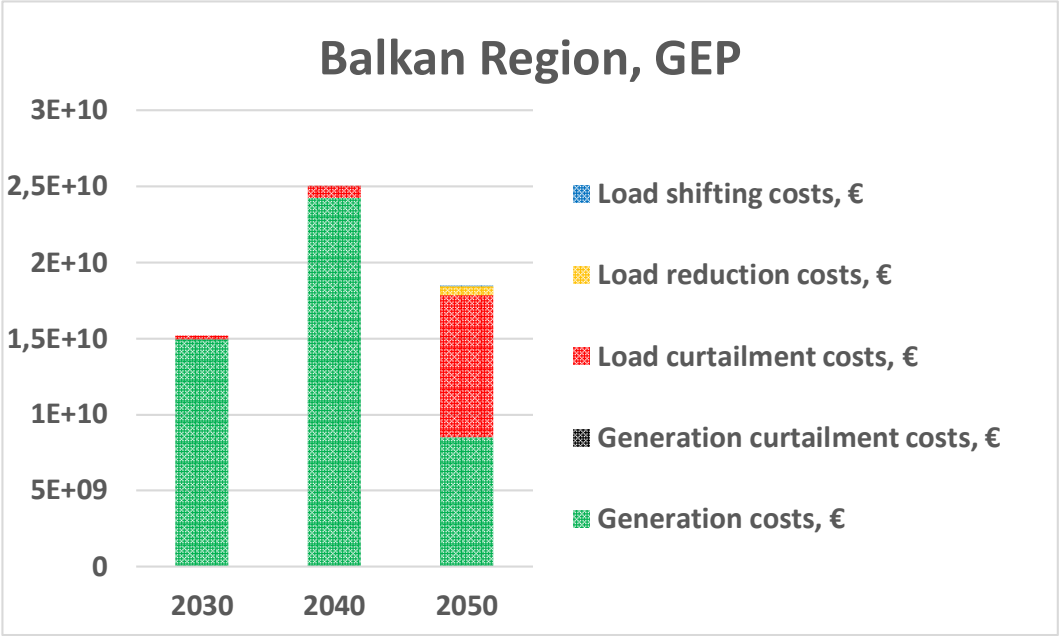


Curtailed generators (circles) and loads (squares)



Results of the planning process

Balkan Region



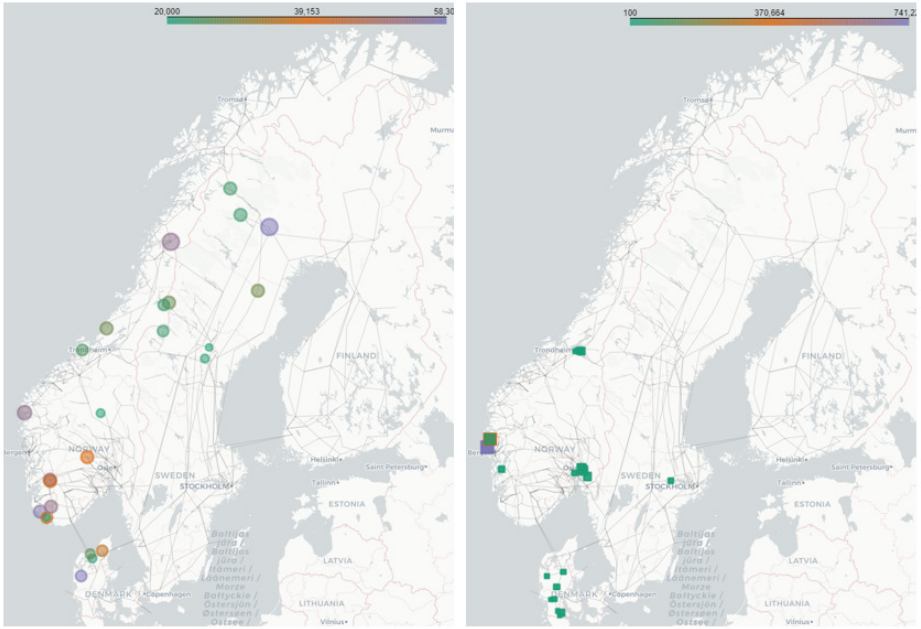
Year	2030	2040	2050
Carbon Footprint impact assessment, %	47.3	69.8	32.8
Air Quality impact assessment, %	1.9	0.81	0.9

Results of the planning process

Northern Countries - 2030

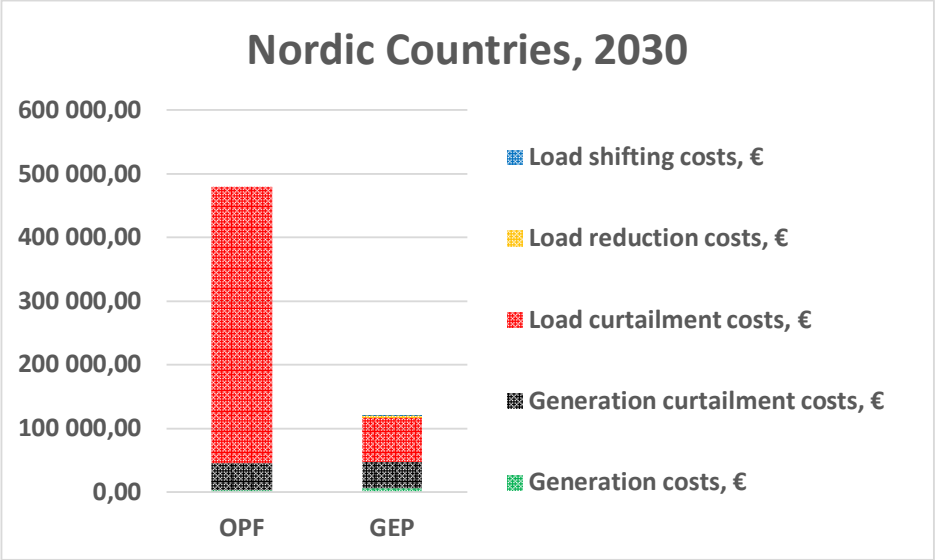
FlexPlan

Overloaded lines and transformers



Curtailed generators (circles) and loads (squares)

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	108	0	3	3	114
Investment decisions	7 (T)	0 (T)	0	3 (T)	73
	63 (D)	0 (D)		0 (D)	
Investment rejected	6 (T)	0 (T)	3	0 (T)	41
	32 (D)	0 (D)		0 (D)	

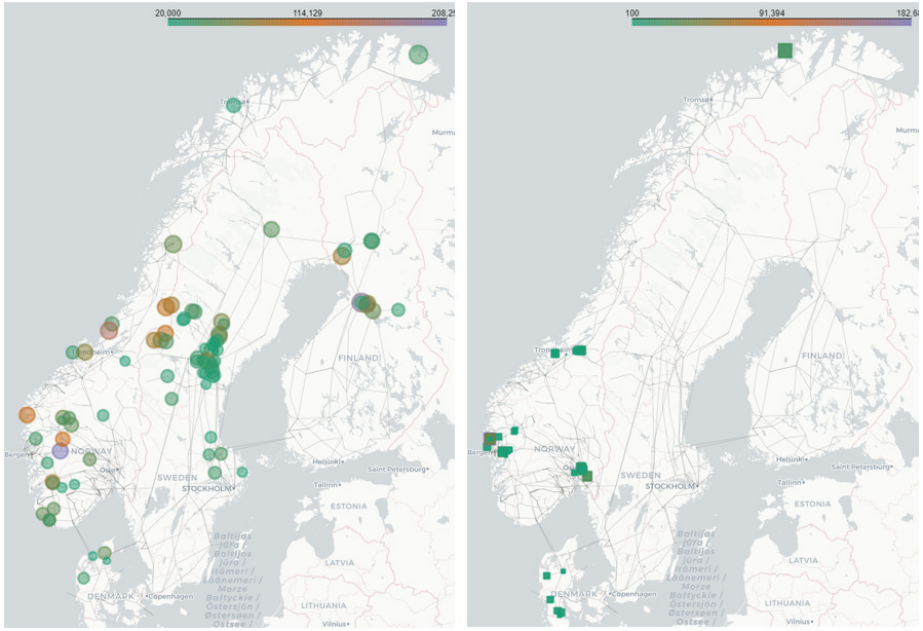


Results of the planning process

Northern Countries - 2040

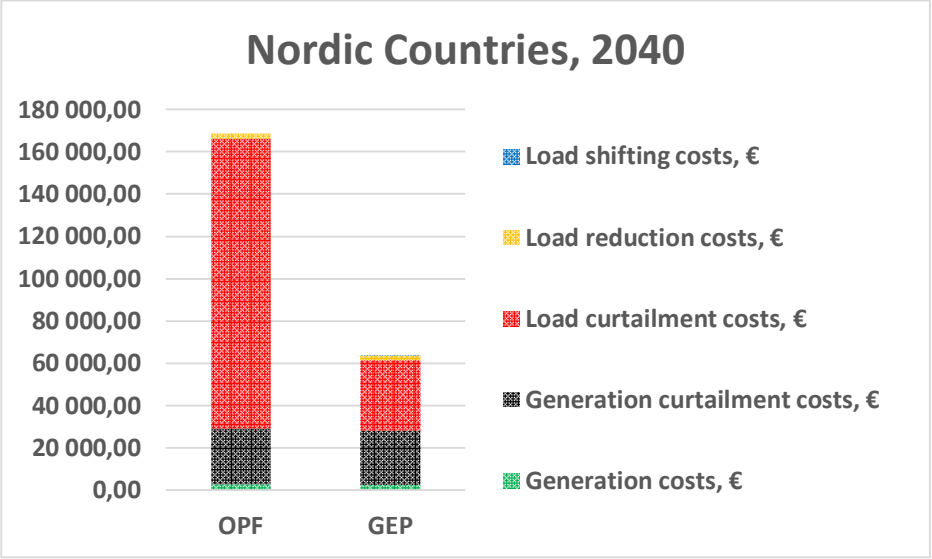
FlexPlan

Overloaded lines and transformers



Curtailed generators (circles) and loads (squares)

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	89	3	8	0	100
Investment decisions	23 (T)	2 (T)	8	0 (T)	53
	20 (D)	0 (D)		0 (D)	
Investment rejected	3 (T)	1 (T)	0	0 (T)	47
	43 (D)	0 (D)		0 (D)	

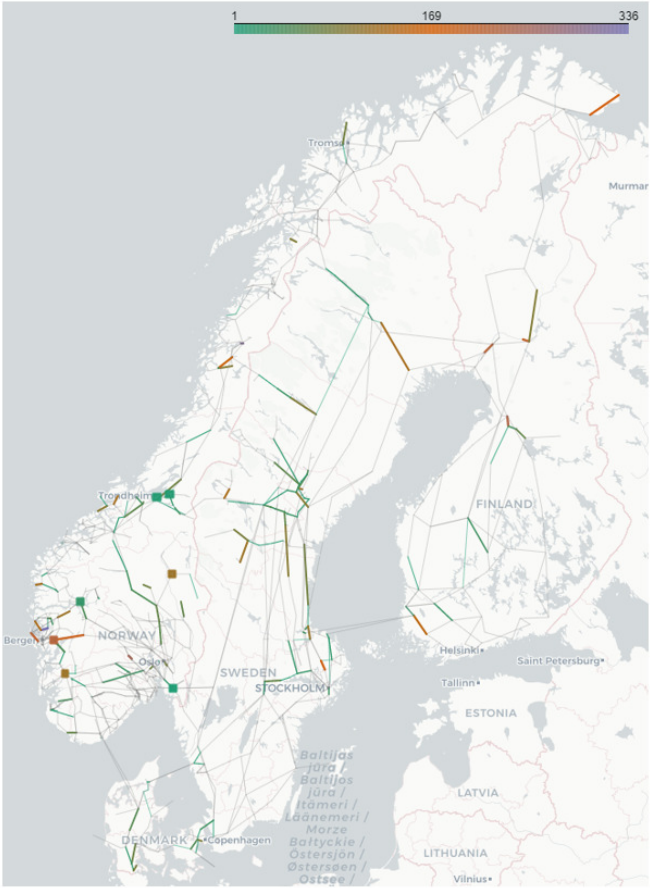


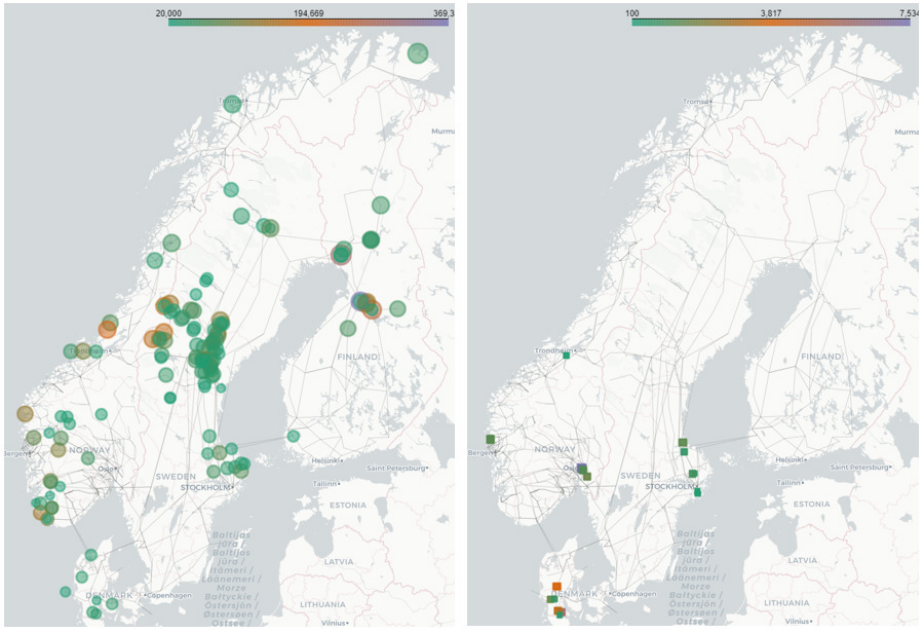
Results of the planning process

Northern Countries - 2050

FlexPlan

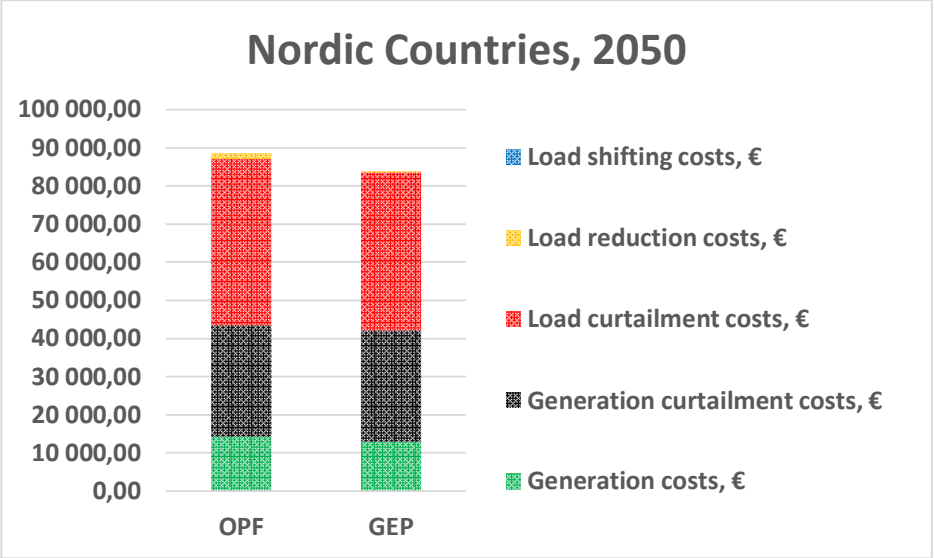
Overloaded lines and transformers





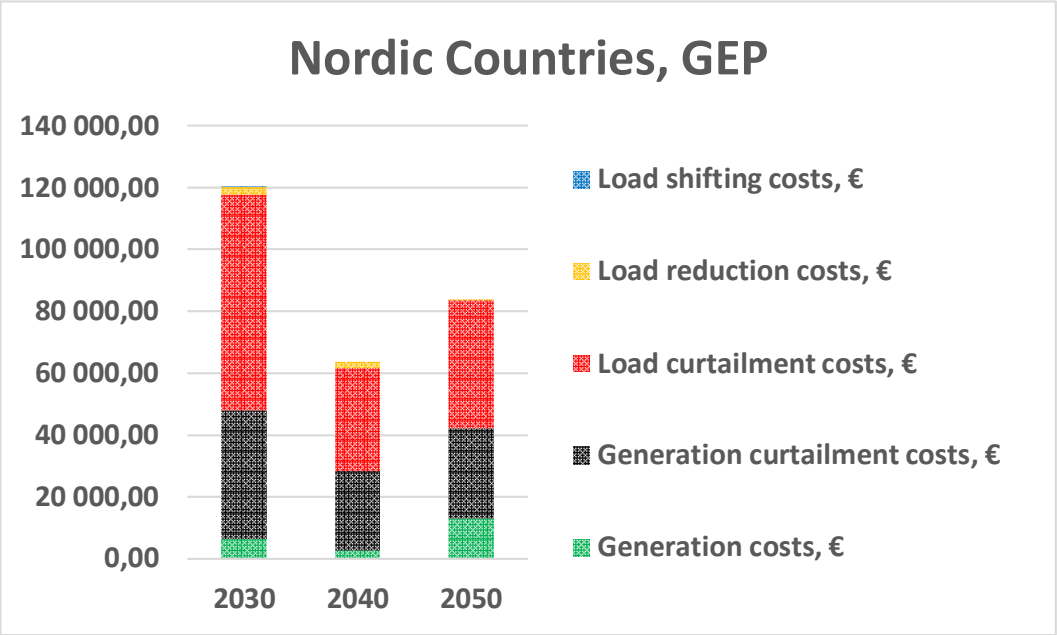
Curtailed generators (circles) and loads (squares)

Type	AC Branch	Transformer	Storage	Flexibility load	Total
Number of candidates	79	0	2	19	100
Investment decisions	5 (T)	0 (T)	2	0 (T)	32
	12 (D)	0 (D)		13 (D)	
Investment rejected	2 (T)	0 (T)	0	0 (T)	68
	60 (D)	0 (D)		6 (D)	



Results of the planning process

Northern Countries



Year	2030	2040	2050
Carbon Footprint impact assessment, %	0.273	0.229	1.761
Air Quality impact assessment, %	0.002	0.001	0.006

Results of the planning process

FlexPlan

Summary and comparison

- Number of congestions:
  - Increased with each time horizon
    - Increased load and/or generation profiles
    - Limiting the number of candidates

- Number and type of investment decisions:
  - Conventional grid reinforcement (lines and transformers)
    - Percentage in transmission does not exceed 37.1%
    - Approval rate for transmission candidates does not go below 42.9% (exception – French network with 0% approved)
    - Approval rate decrease or keep the same with each time horizon (exception – Italy RC and Northern Countries RC)
      - ✓ Italy RC: limiting the number of candidates and increase of load and RES generation
      - ✓ Northern Countries RC: difference in location of congestions
  - Flexibility resources (storages and flexibility loads)
    - Tendency to increase the approval rate with each time horizon for storages
    - Average approval rate of flexibility loads is 64%, the values vary from 6% (BeNeLux 2030) to 100% (in many cases)

- Variations of the costs before and after GEP:
  - 4 RC out of 6 – increase of the total costs throughout the years
  - 2 RC out of 6 – total costs of 2030 higher than 2040
    - BeNeLux due to increase in RES generation in 2040, whereas the load profile does not increase so drastically in 2040
    - Noridc RC due to approving candidates in the focus area with high density of congestions and area partially relieved from overloads in 2040

- Environmental impact assessment:
  - Carbon footprint plays more significant role
  - Maximum value of carbon footprint is 69.8% (Balkan RC in 2040)

Agenda

- Power system modelling
- Details of the scenario
- Model simplifications
- Results of the planning process
- Role of storage and demand flexibility

Role of storage and demand flexibility

FlexPlan

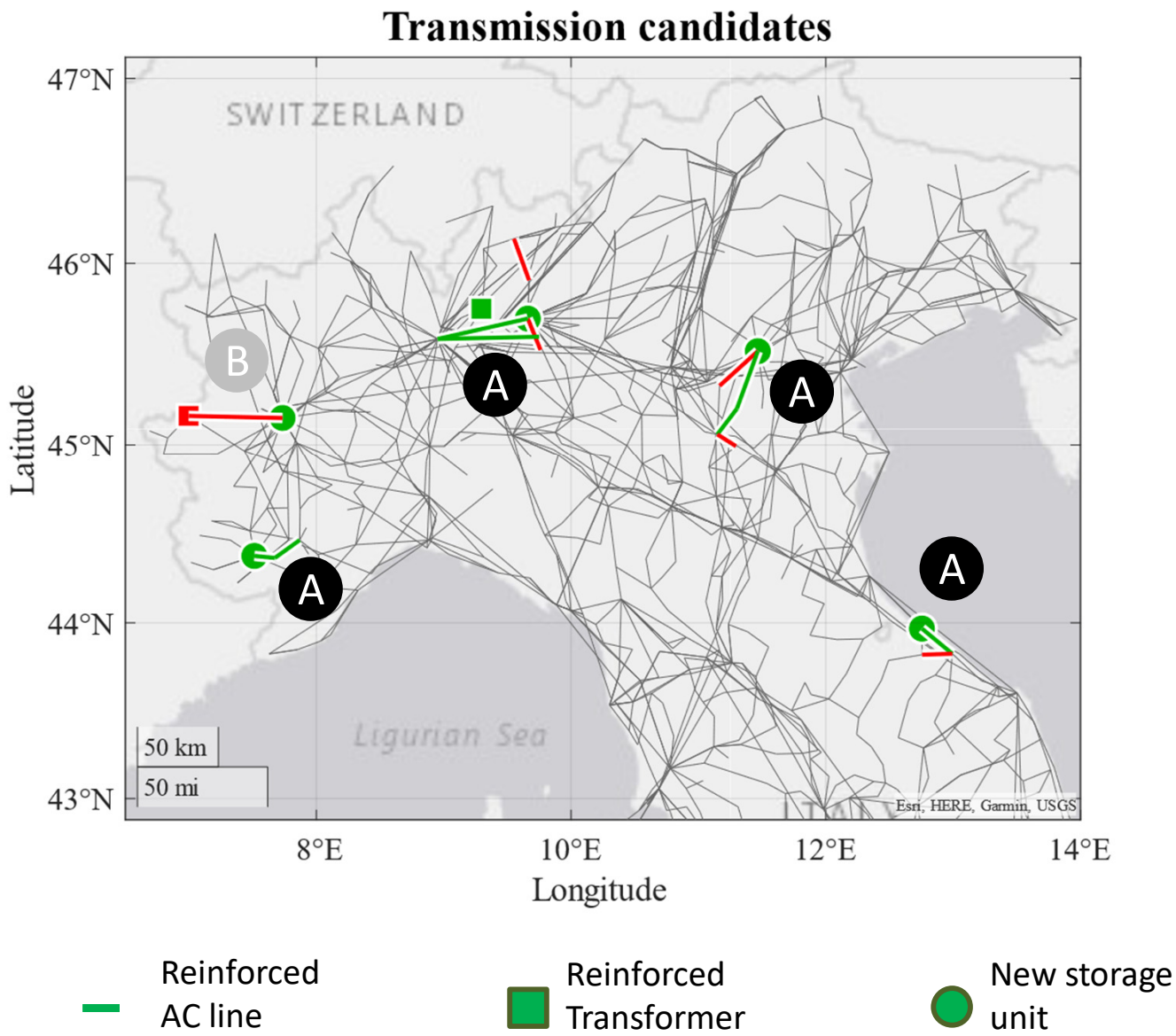
Storage support to grid planning (transmission)

For the most severe congestions expected at transmission level, the preprocessor proposes:

- ❑ **A set of lines and transformer reinforcements** (corridor related to the selected congestion)
- ❑ **A storage unit** (which size and technology depends on the severity/frequency of the congestion)

CASE A

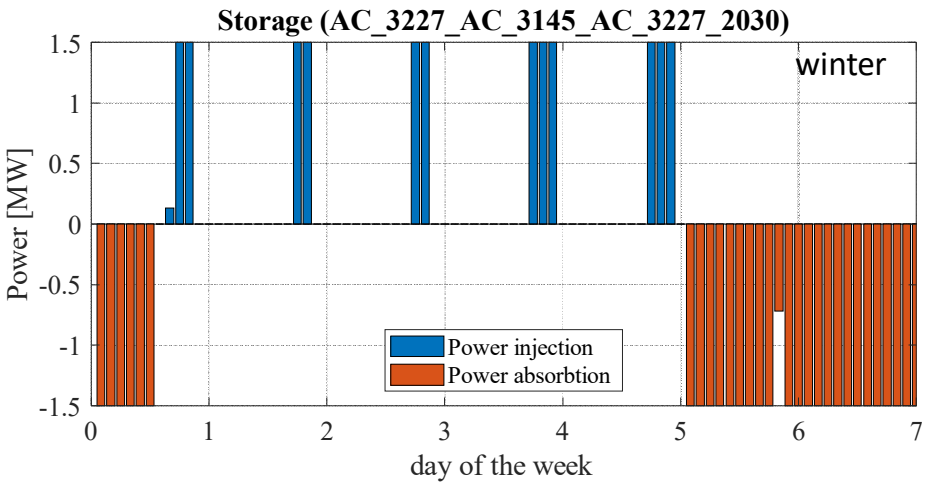
- In most of the cases, storage units are selected together with corridor reinforcement:
  - Line reinforcement solves the persistent overloading and significantly decreases the related congestion severity
  - Storage units are working in synergy with enhanced lines and support the management of periodic (and short-duration) congestions

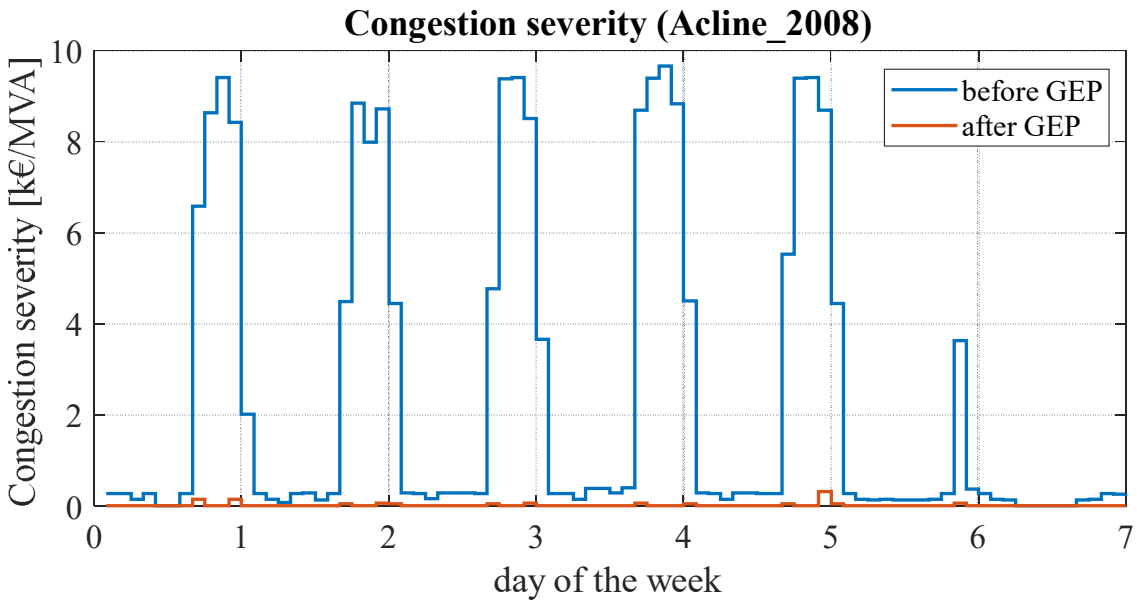


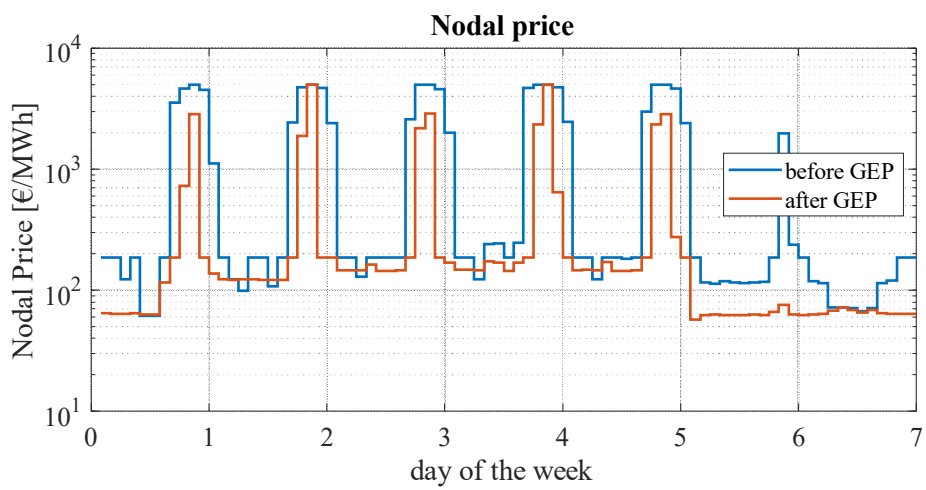
Role of storage and demand flexibility

Storage support to grid planning (CASE A)

FlexPlan





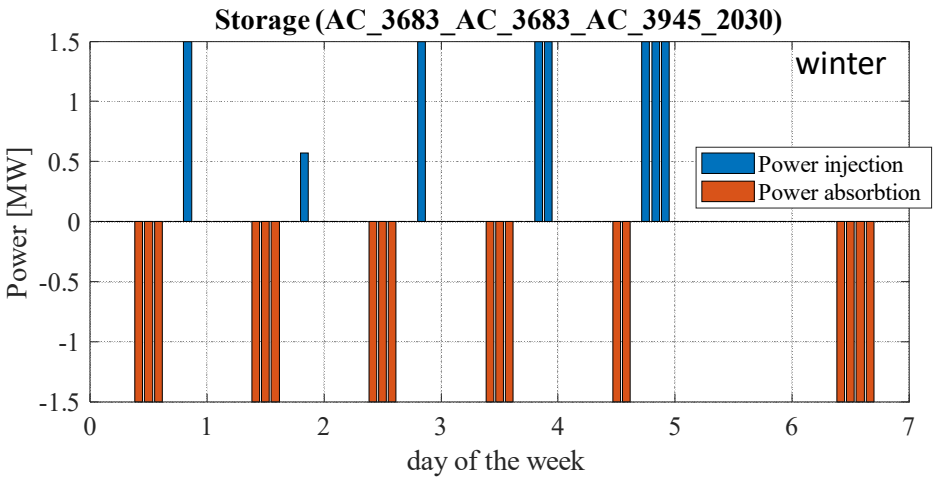


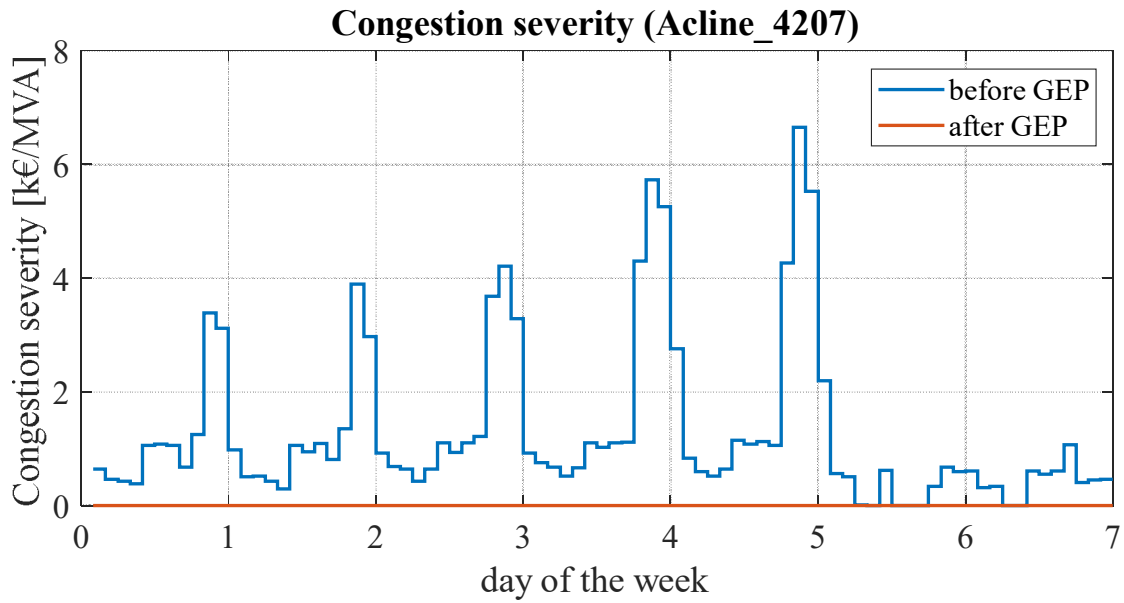
- The congestion severity goes to zero, thanks to the synergy of both line reinforcement and storage (which power contribution matches the time instants of previous congestions)
- Another congestion persists on the grid, and it causes a periodic curtailment of local load (high local price in evening hours)

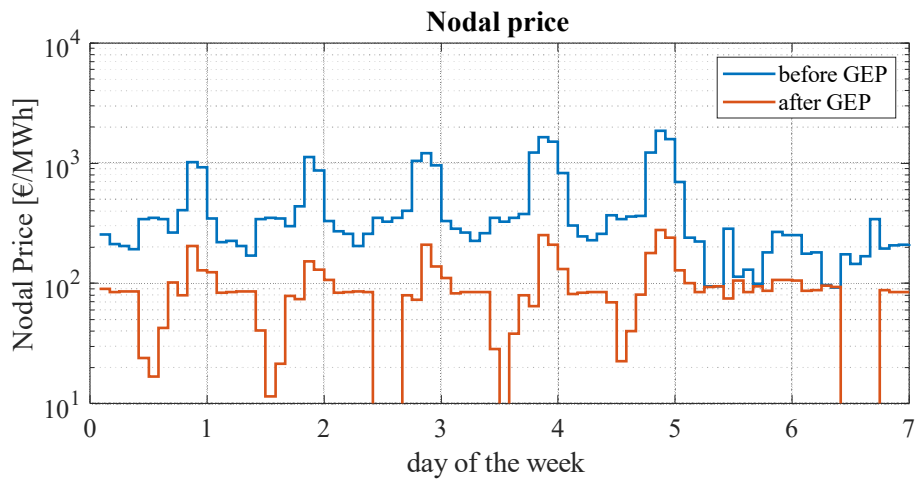
Role of storage and demand flexibility

Storage support to grid planning (CASE A)

FlexPlan







- The congestion severity goes to zero, but this time the main credit is attributed to line reinforcement
- In this case storage is selected by the GEP process in order to perform arbitrage functions
  - It stores energy during photovoltaic peak hours (nodal price=0), while it injects power when the nodal price is higher
  - The revenue of arbitrage is sufficient to justify storage investment

Role of storage and demand flexibility

FlexPlan

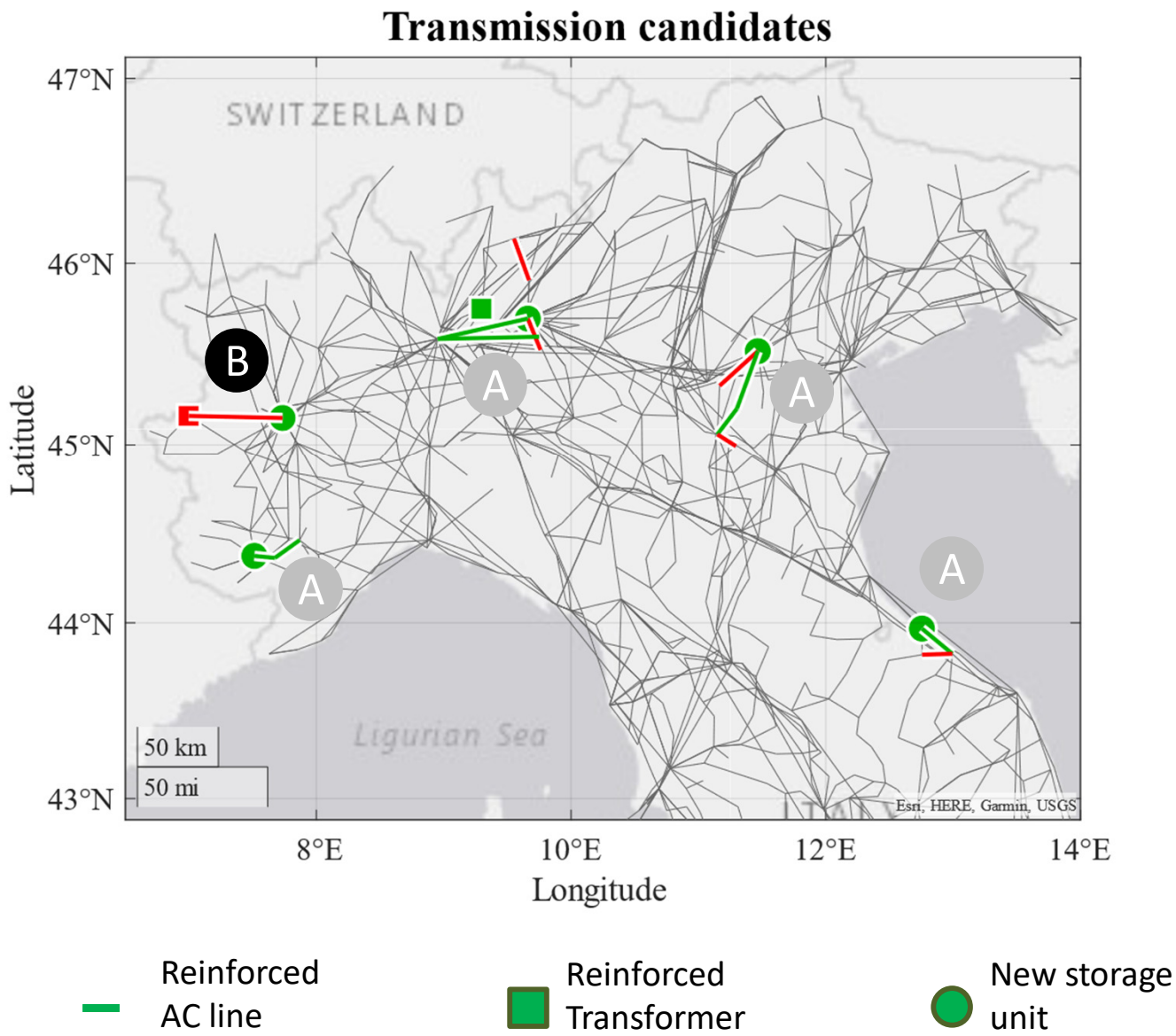
Storage support to grid planning

For the most severe congestions expected at transmission level, the preprocessor proposes:

- ❑ **A set of lines and transformer reinforcements** (corridor related to the selected congestion)
- ❑ **A storage unit** (which size and technology depends on the severity/frequency of the congestion)

CASE B

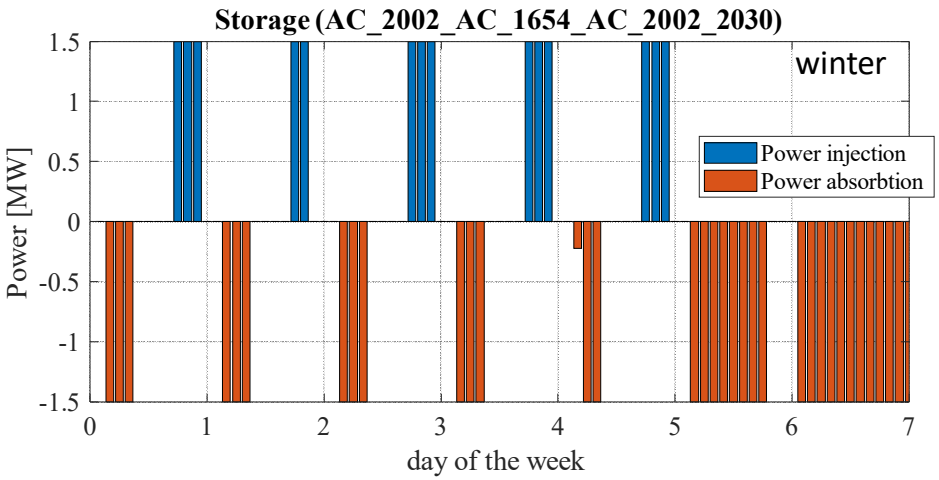
- In one circumstance, a storage unit is selected without the reinforcement of the corresponding corridor:
  - In this case, the corridor includes transformer which significantly increases the cost of the conventional grid reinforcement
  - The interested line are congested for a limited number of hours (curtailment of evening load during business days)

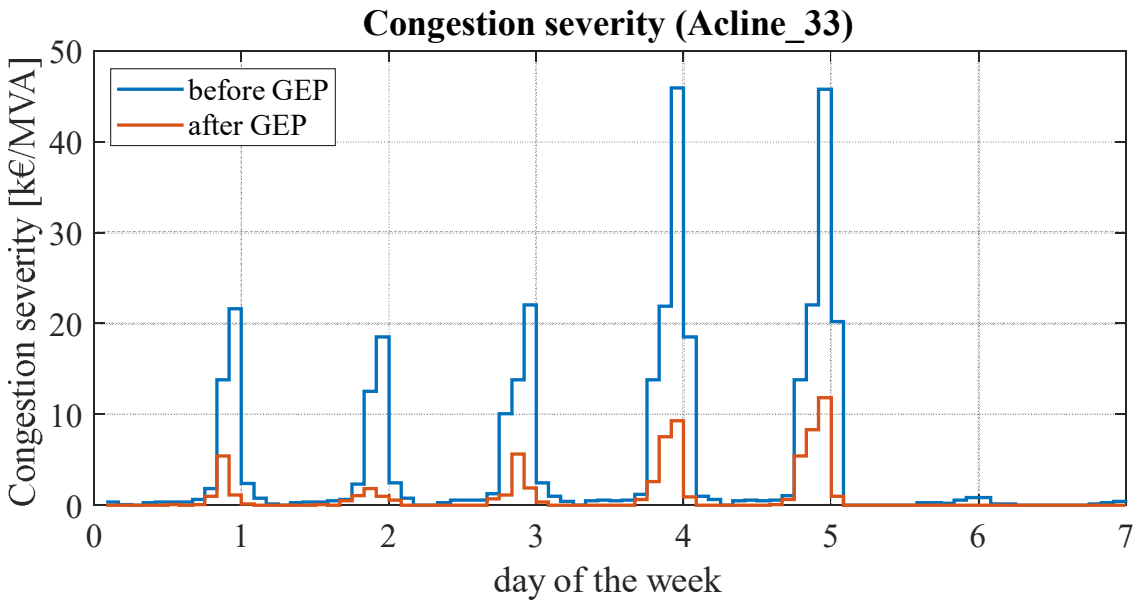


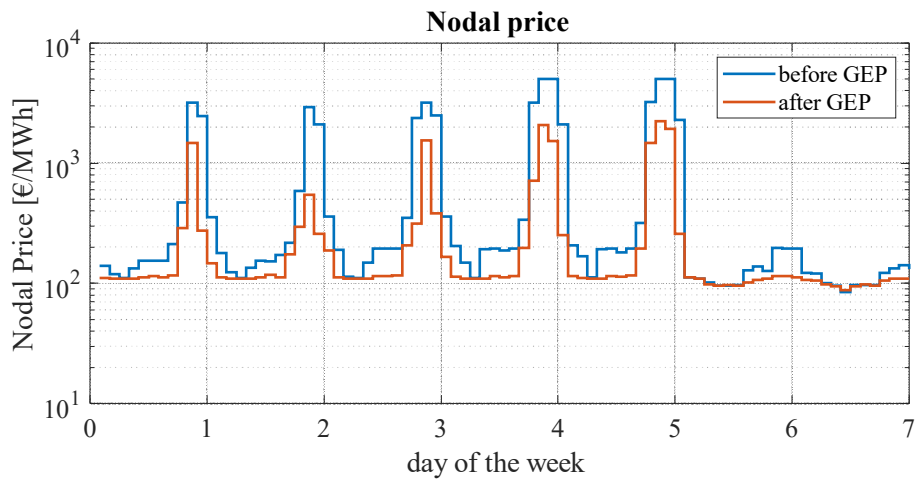
Role of storage and demand flexibility

Storage support to grid planning (CASE B)

FlexPlan





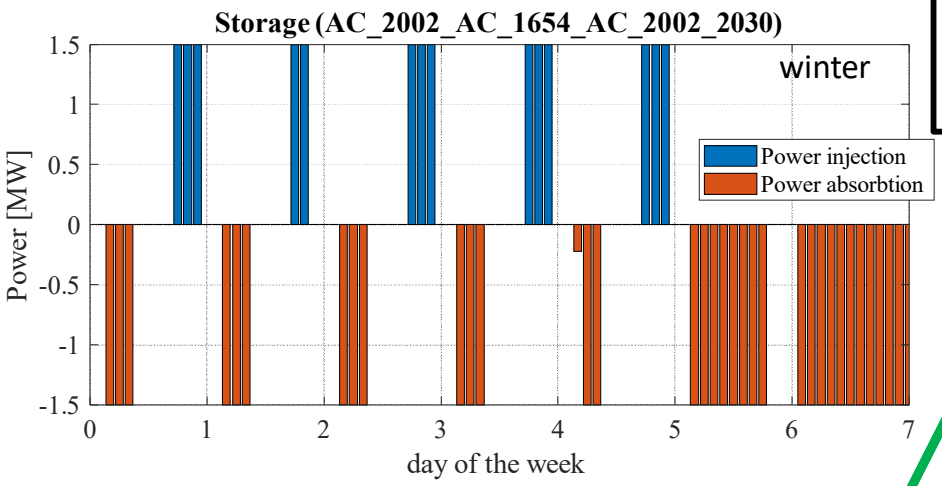


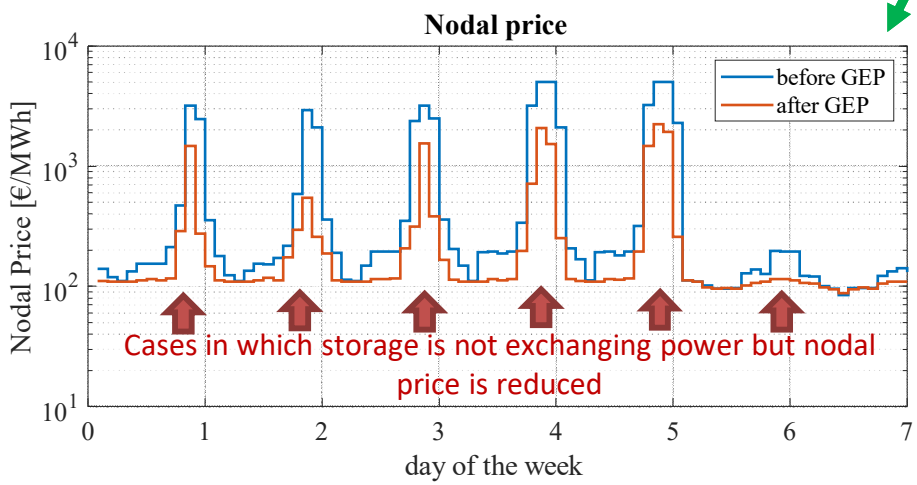
- Nodal price evolution indicates load curtailment during business-day evenings (for a few hours in the evening)
- Storage is selected in order to supply energy to local loads:
  - It reduces the level of congestion of the corresponding corridor
  - The nodal price is still high: its power capacity is not sufficient to entirely supply the local curtailed demand

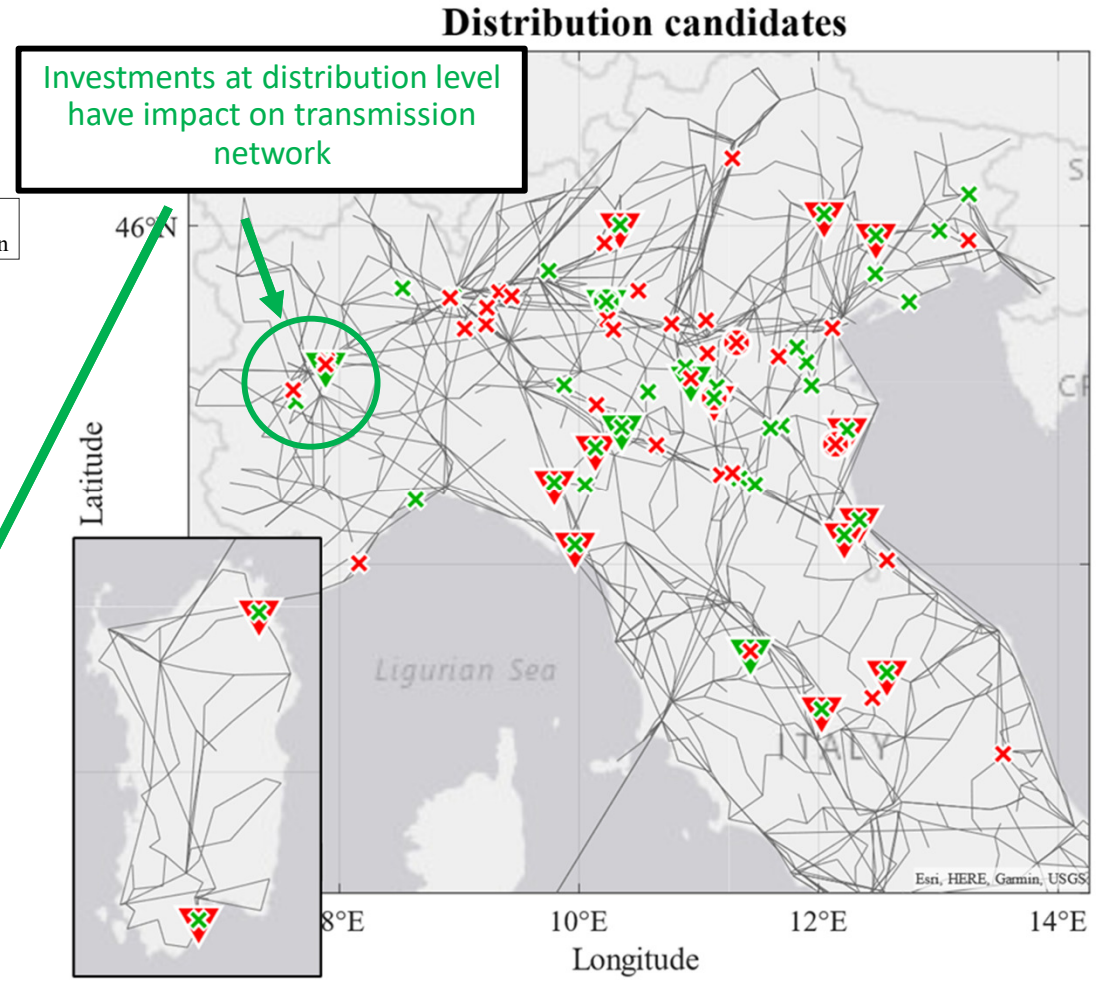
Role of storage and demand flexibility

Storage support to grid planning (CASE B)

FlexPlan







Role of storage and demand flexibility

FlexPlan

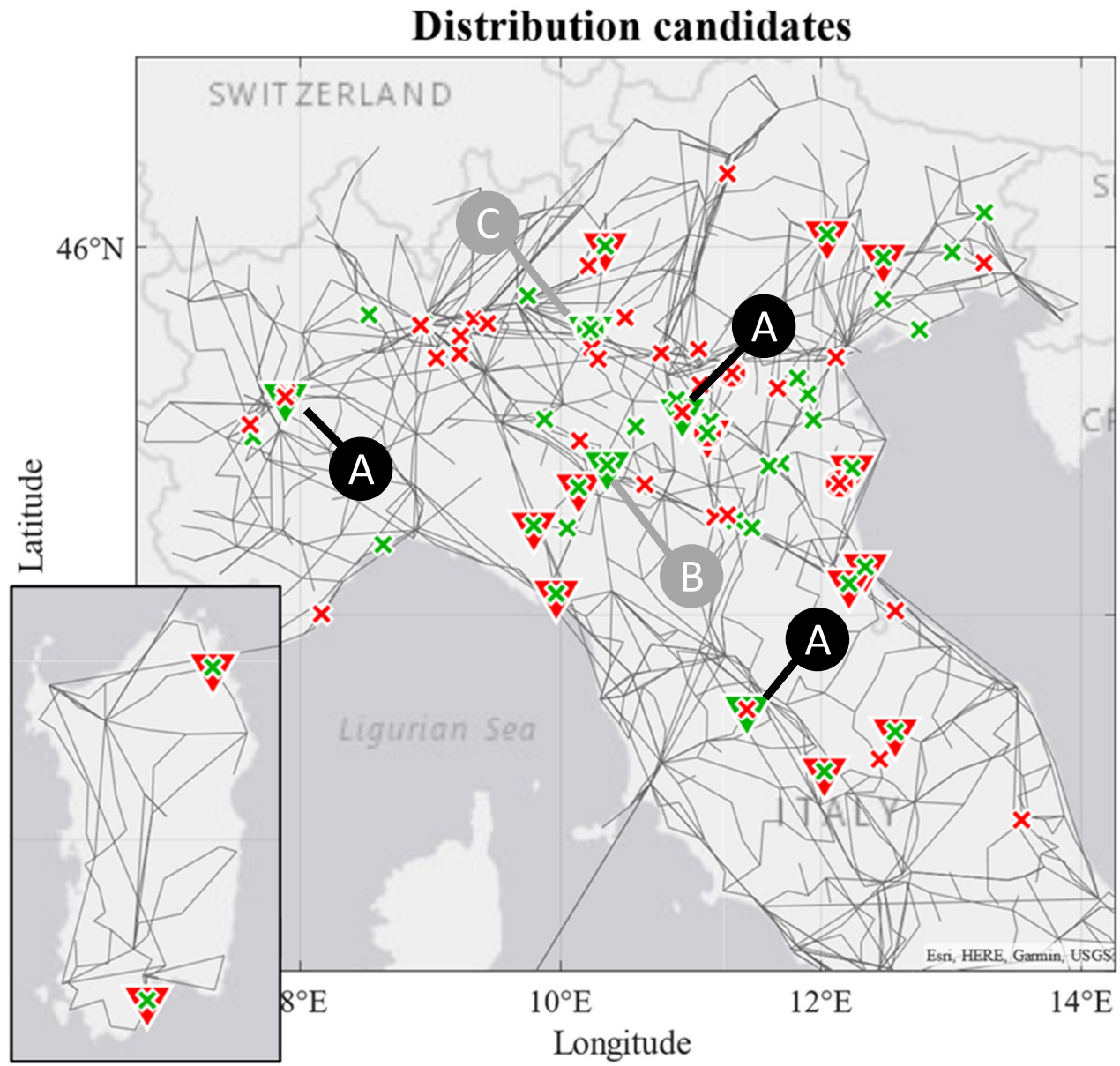
Flexibility support on grid planning – distribution (CASE A)

For the most severe congestions expected at distribution level, the preprocessor proposes:

- ❑ **A set of lines and transformer reinforcements** (corridor related to the selected congestion)
- ❑ **Flexibilization of existing load** (in case of specific intermittency and severity of the congestion)
- ❑ **A storage unit** (which size and technology depends on the severity/frequency of the congestion)

CASE A

- Both line reinforcement and load flexibilization are proposed as planning candidates
- Only load flexibilization is accepted



Reinforced AC line

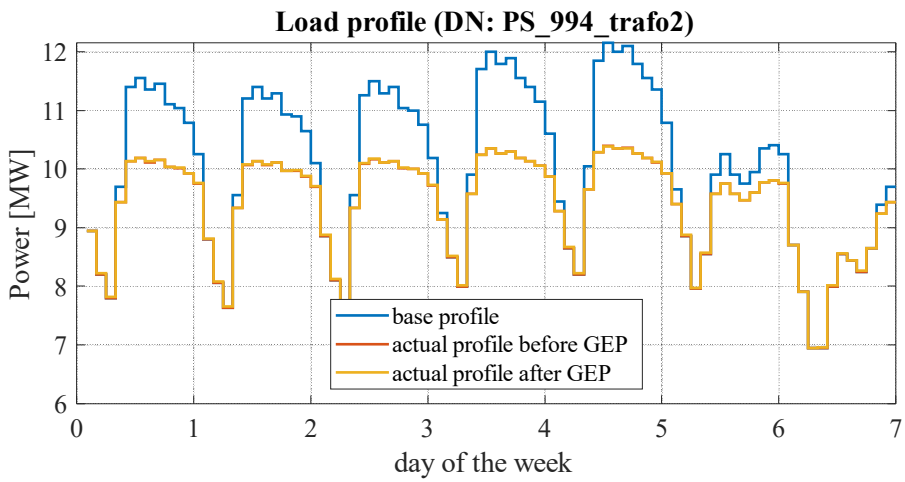
Flexibilization of existing load

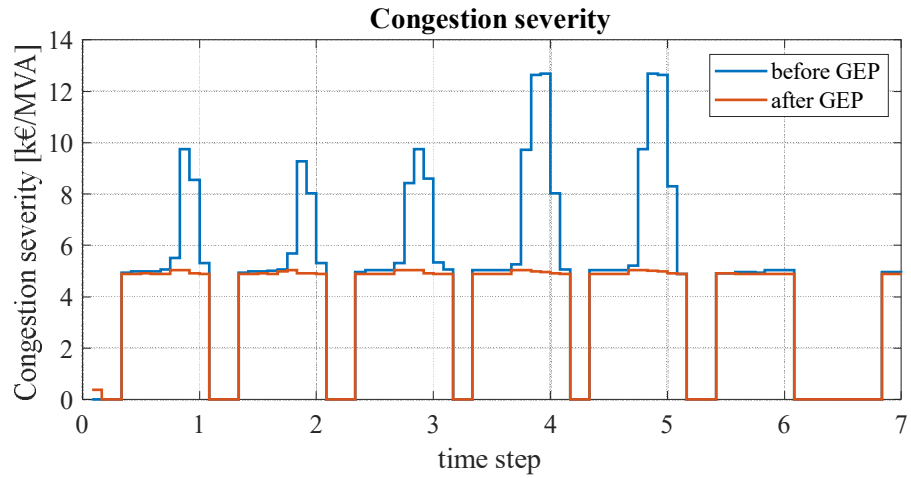
New storage unit

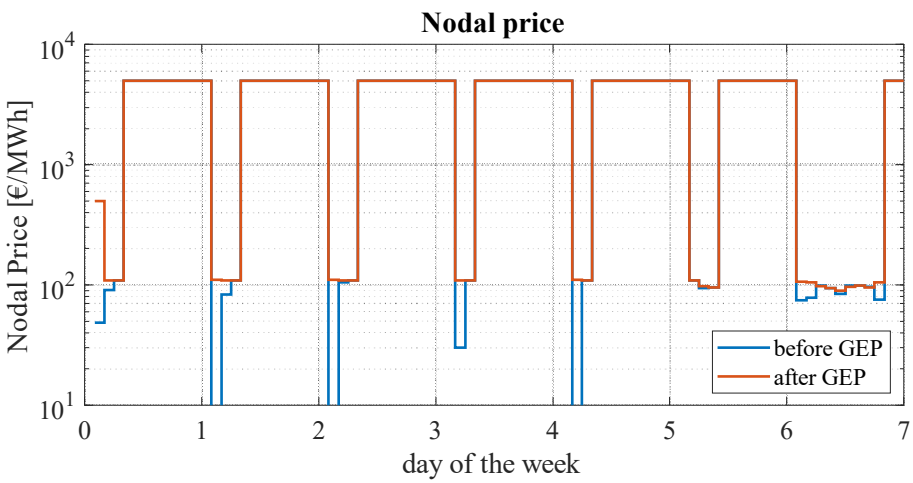
Role of storage and demand flexibility

FlexPlan

Flexibility support on grid planning – distribution (CASE A)



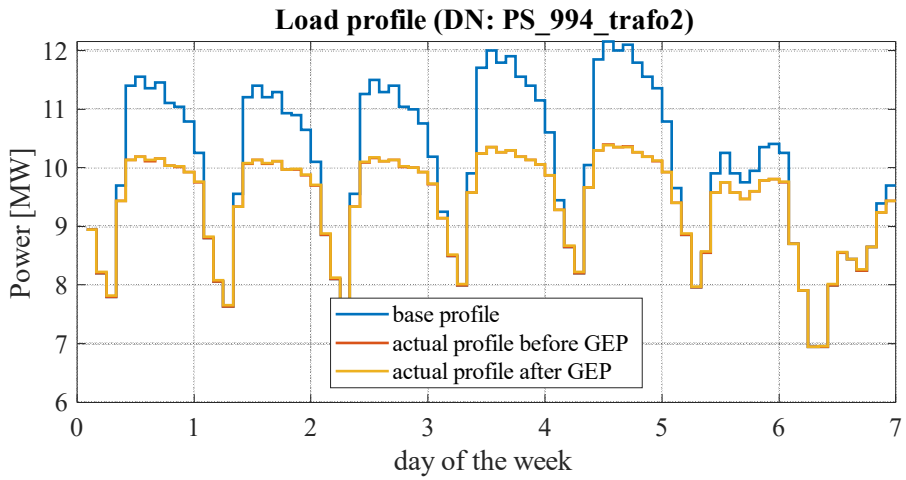


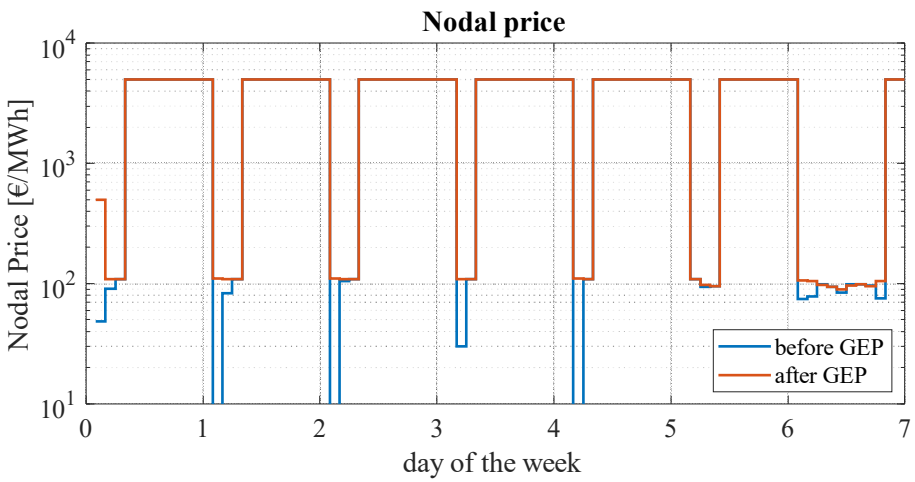


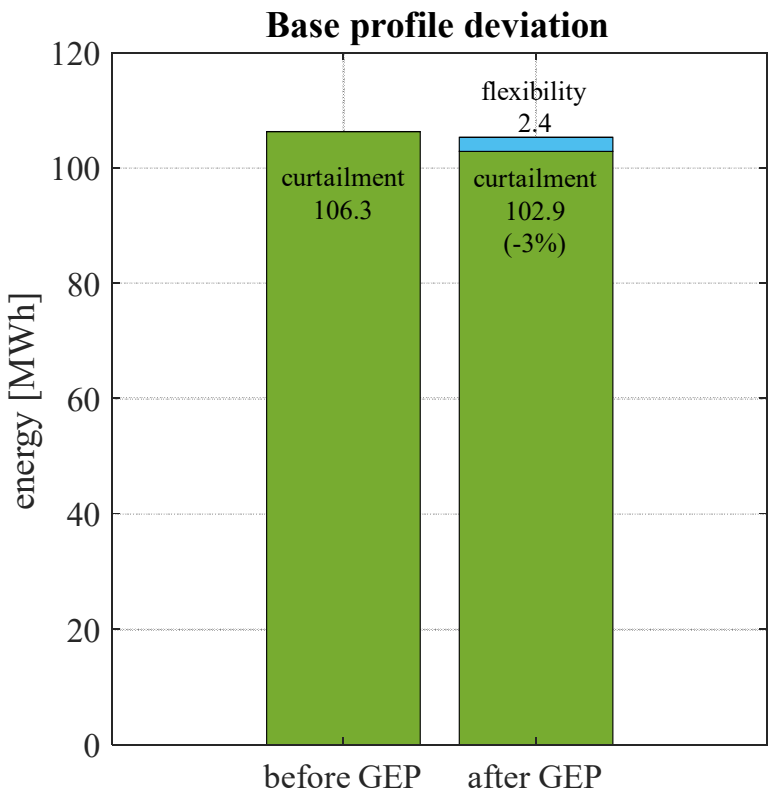
- The evolution of nodal price indicates that flexible load is not sufficient to clear the existing congestion and load curtailment persists
- Contribution of load flexibility:
  - It reduces the nodal price during the early morning, since it optimizes the consumption of local renewable energy sources
  - It contributes to the reduction of congestion severity during evening hours

Role of storage and demand flexibility

Flexibility support on grid planning – distribution (CASE A)







Role of storage and demand flexibility

FlexPlan

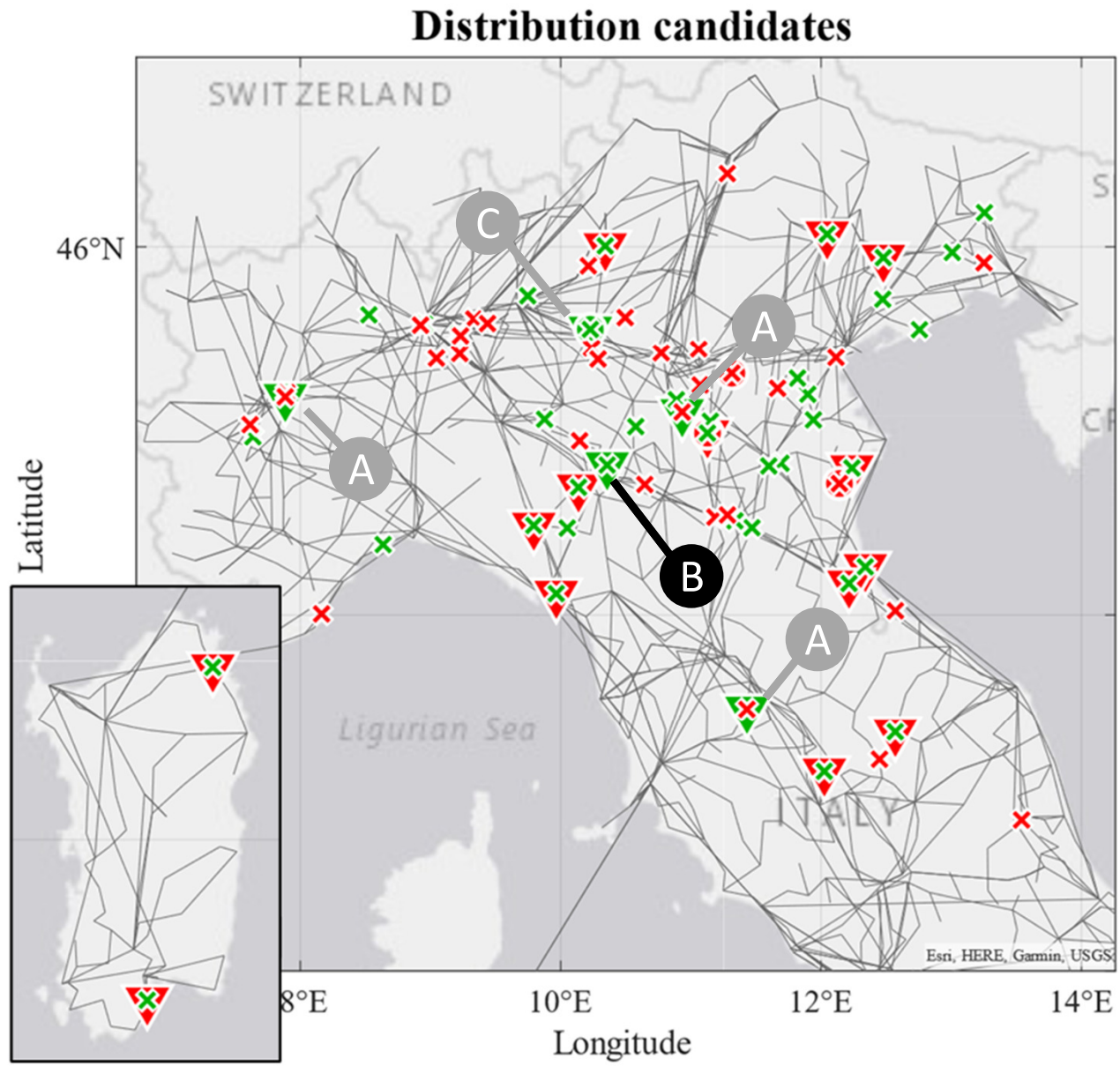
Flexibility support on grid planning – distribution (CASE B)

For the most severe congestions expected at distribution level, the preprocessor proposes:

- ❑ **A set of lines and transformer reinforcements** (corridor related to the selected congestion)
- ❑ **Flexibilization of existing load** (in case of specific intermittency and severity of the congestion)
- ❑ **A storage unit** (which size and technology depends on the severity/frequency of the congestion)

CASE B

- Both line reinforcement and load flexibilization are proposed as planning candidates
- Both the options are selected



Reinforced AC line

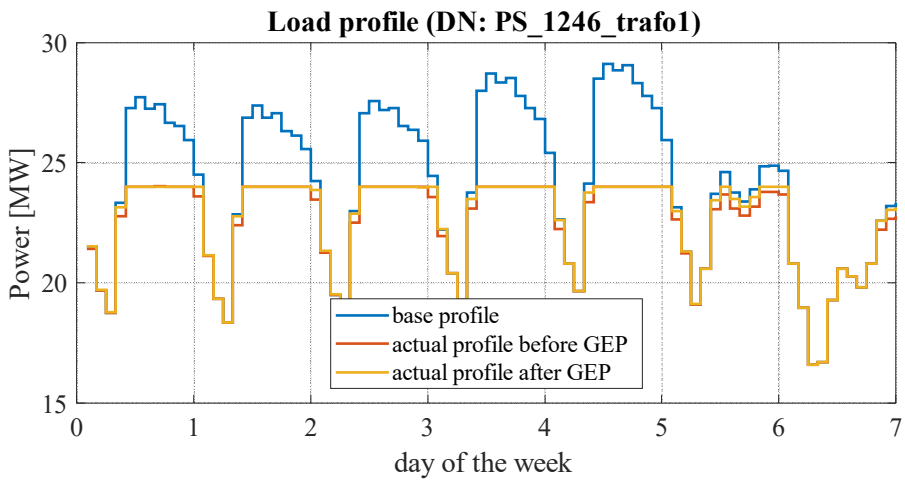
Flexibilization of existing load

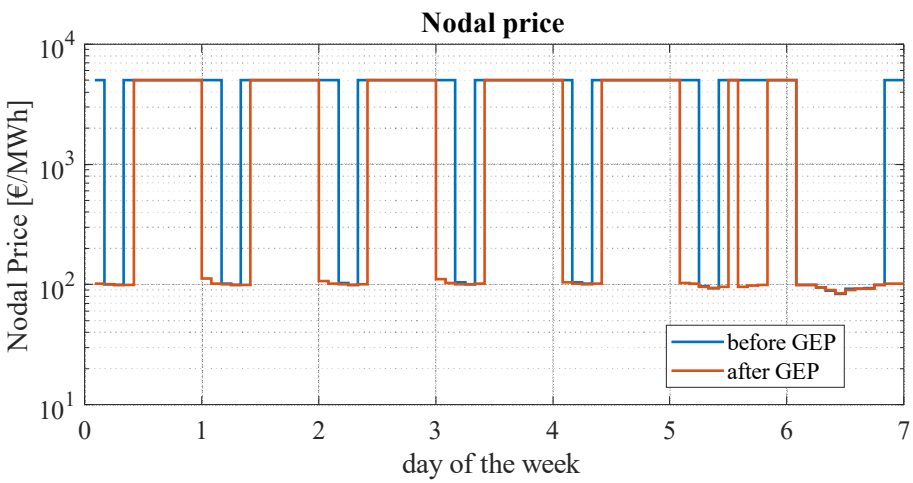
New storage unit

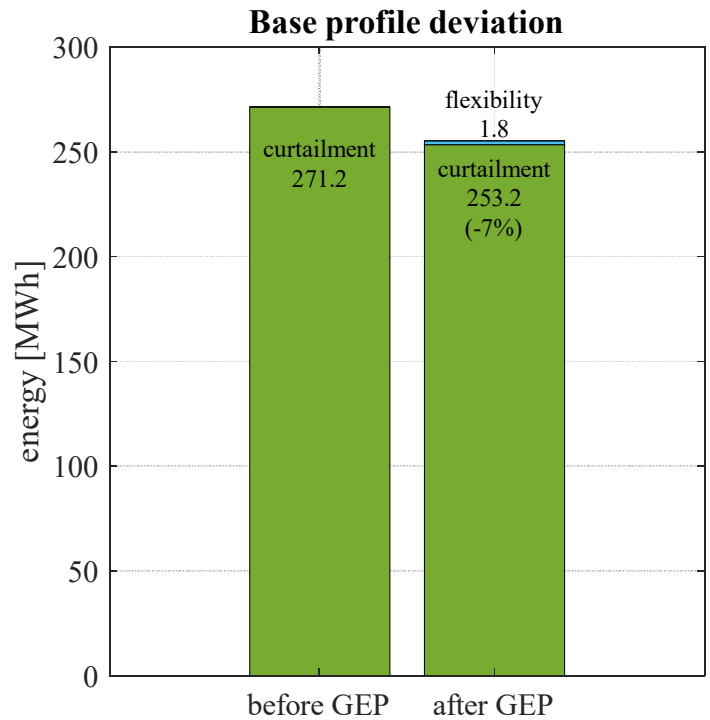
Role of storage and demand flexibility

FlexPlan

Flexibility support on grid planning – distribution (CASE B)







- The reinforcement of the congested line is not sufficient to avoid load curtailment for the selected network (other congestions persist on it)
- In this case, the most evident contribution is attributed to the line reinforcement:
  - It clears the congestion in during the early morning
  - Load flexibility marginally reduces the nodal price during the non-congestion time steps

Role of storage and demand flexibility

FlexPlan

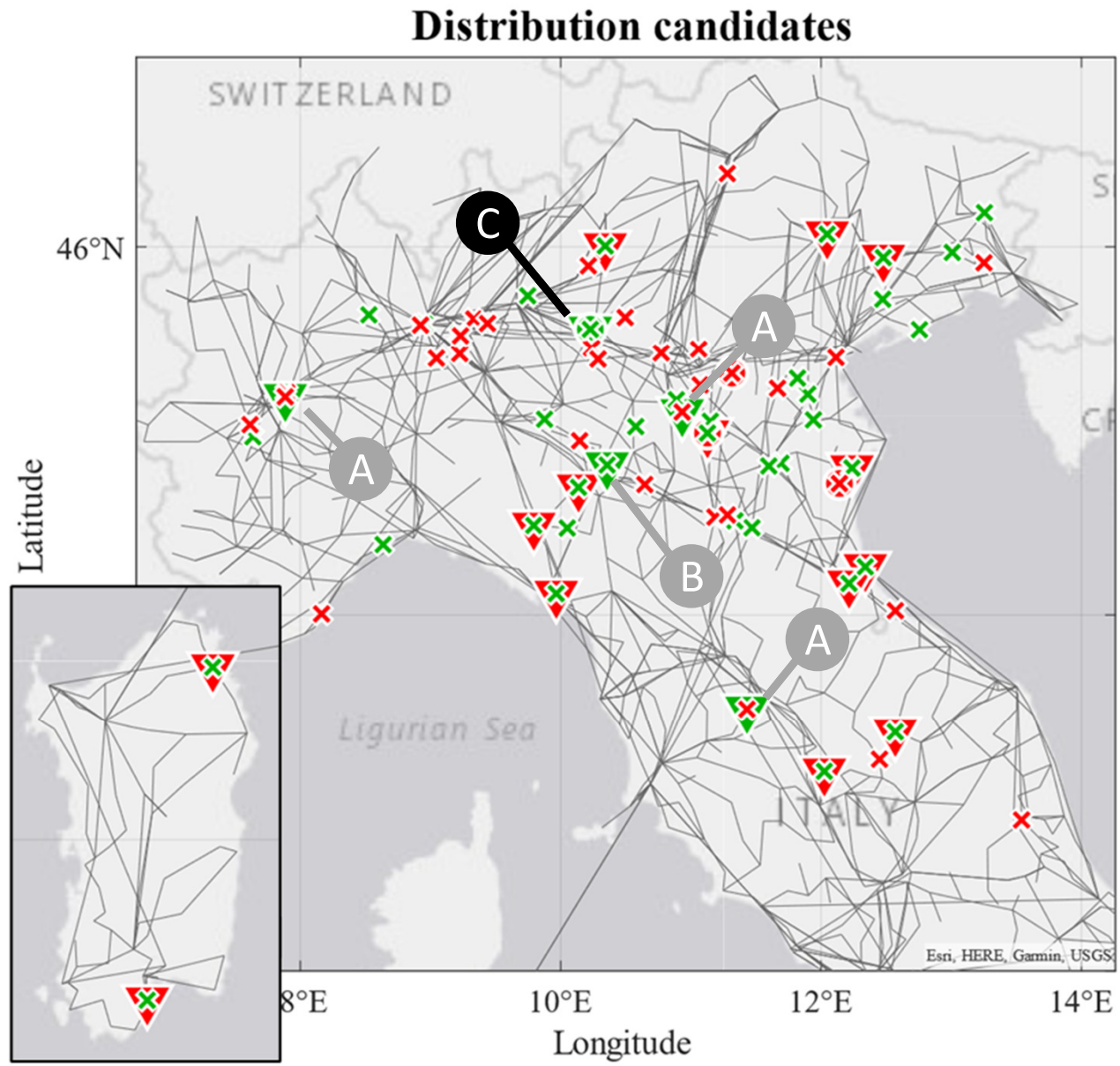
Flexibility support on grid planning – distribution (CASE C)

For the most severe congestions expected at distribution level, the preprocessor proposes:

- ❑ **A set of lines and transformer reinforcements** (corridor related to the selected congestion)
- ❑ **Flexibilization of existing load** (in case of specific intermittency and severity of the congestion)
- ❑ **A storage unit** (which size and technology depends on the severity/frequency of the congestion)

CASE C

- Line reinforcement, storage and load flexibilization are proposed as planning candidates
- All the options are selected



Reinforced AC line

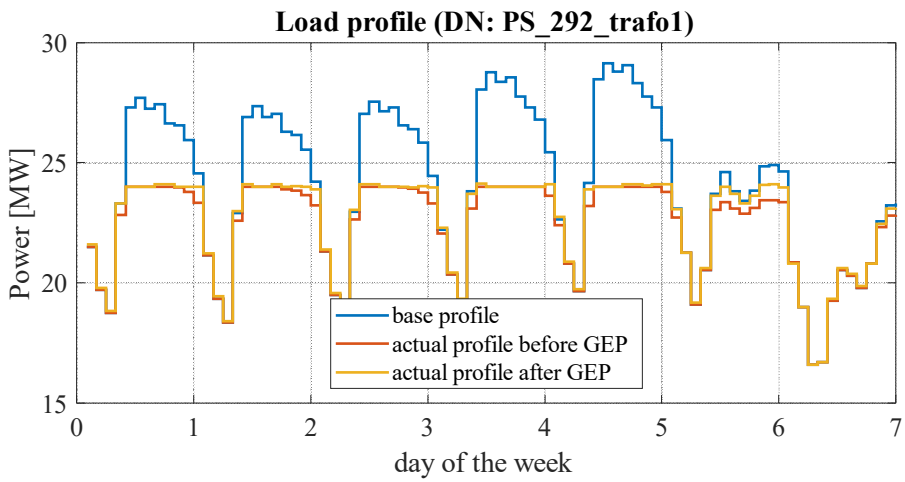
Flexibilization of existing load

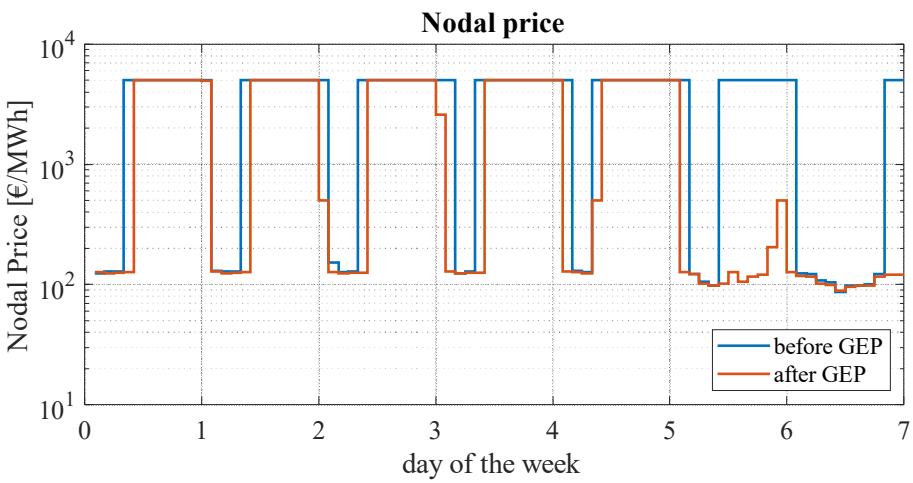
New storage unit

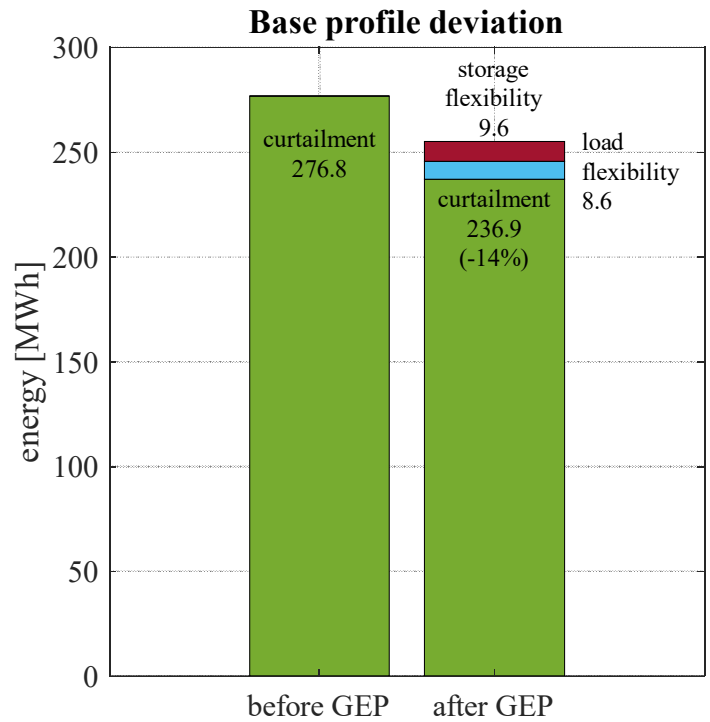
Role of storage and demand flexibility

FlexPlan

Flexibility support on grid planning – distribution (CASE C)





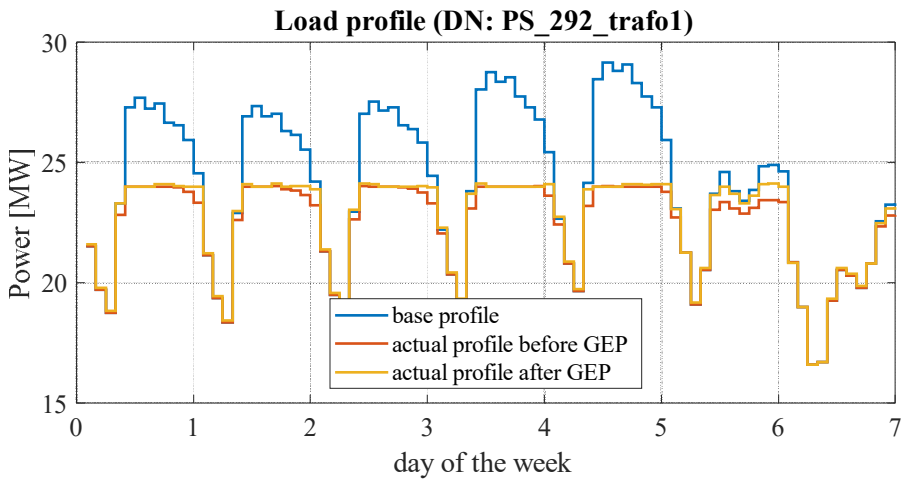


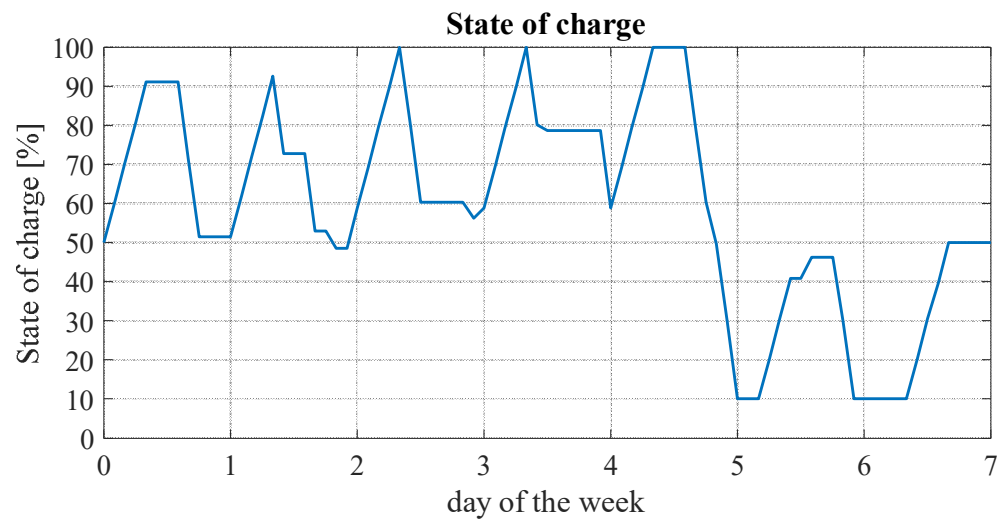
- In this case, the selected candidates (line reinforcement, storage and load flexibilization) support the reduction of load curtailment (even though network congestions are not entirely solved)
  - The largest benefits are attributable to line reinforcement
  - Flexible load and storage equally contribute to the reduction of load curtailment

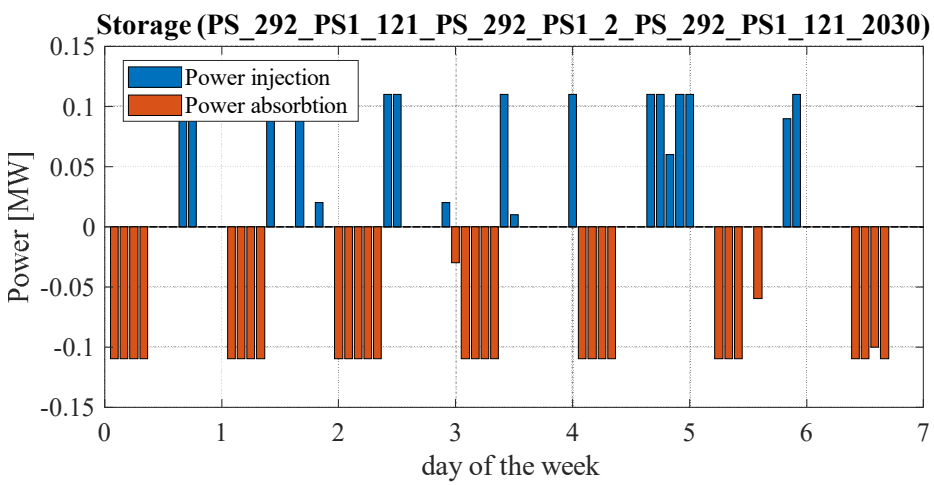
Role of storage and demand flexibility

FlexPlan

Flexibility support on grid planning – distribution (CASE C)







- Storage usage is proportional to the severity of the congestion
  - It injects energy mostly during the second half of Friday, when load curtailment is maximum
- The contribution of storage is limited by both the power and energy capacity of the selected device

Thank you…

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