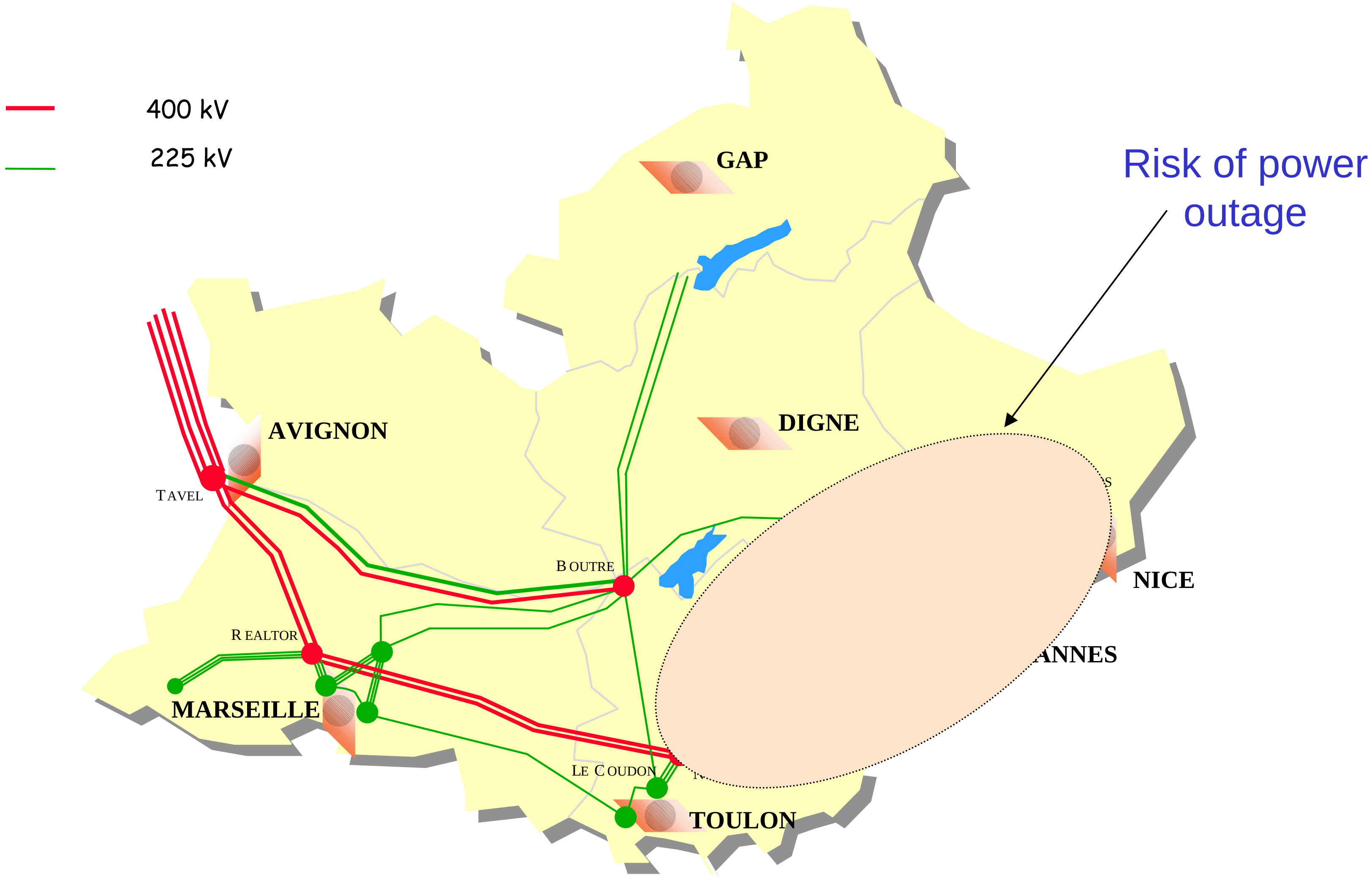
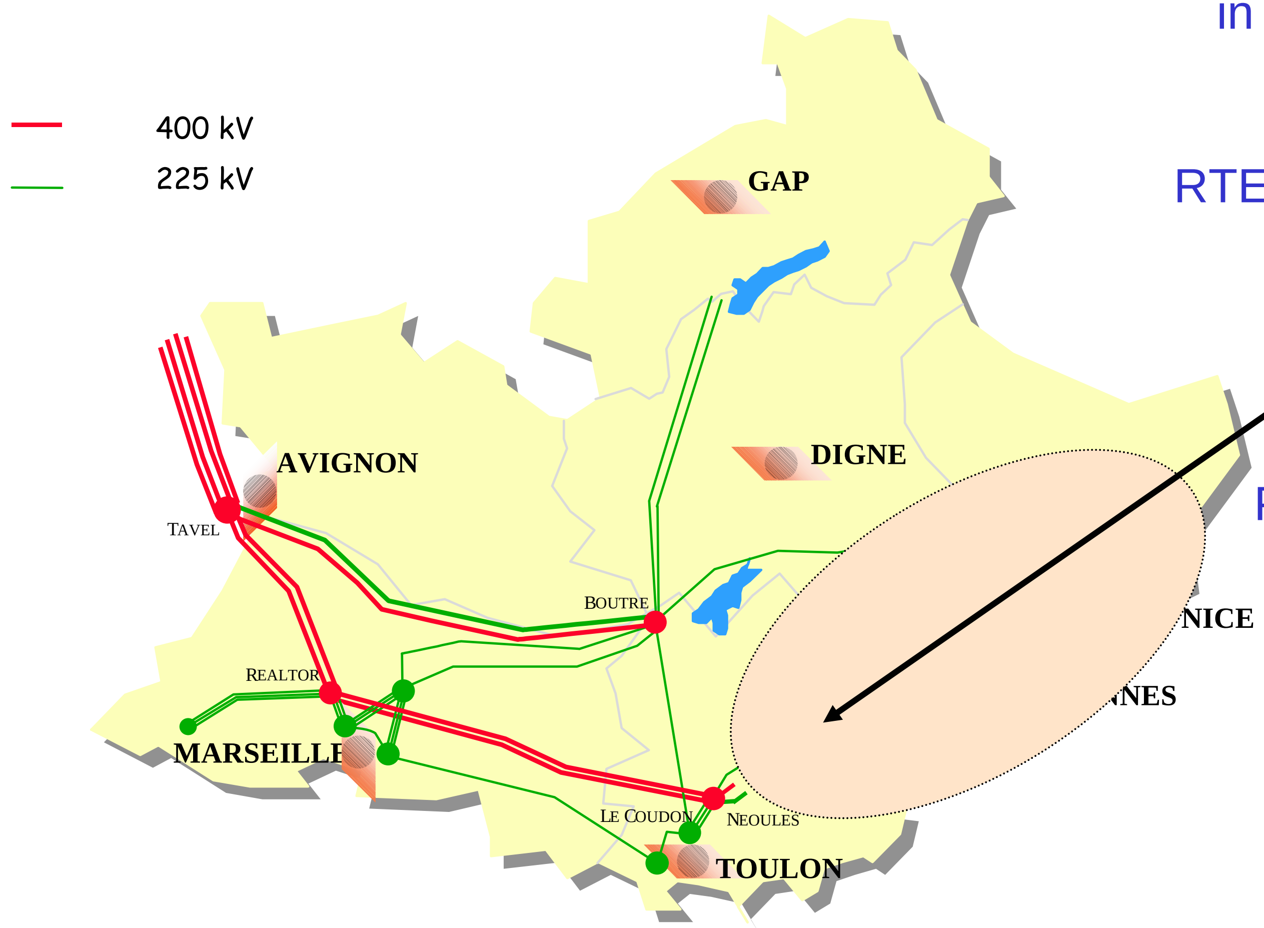
Measuring the value of a Network-driven DSM Program

The transmission Network-driven DSM project in the french Riviera

Outage risk in winter : N-1



Outage risk in summer : N-2

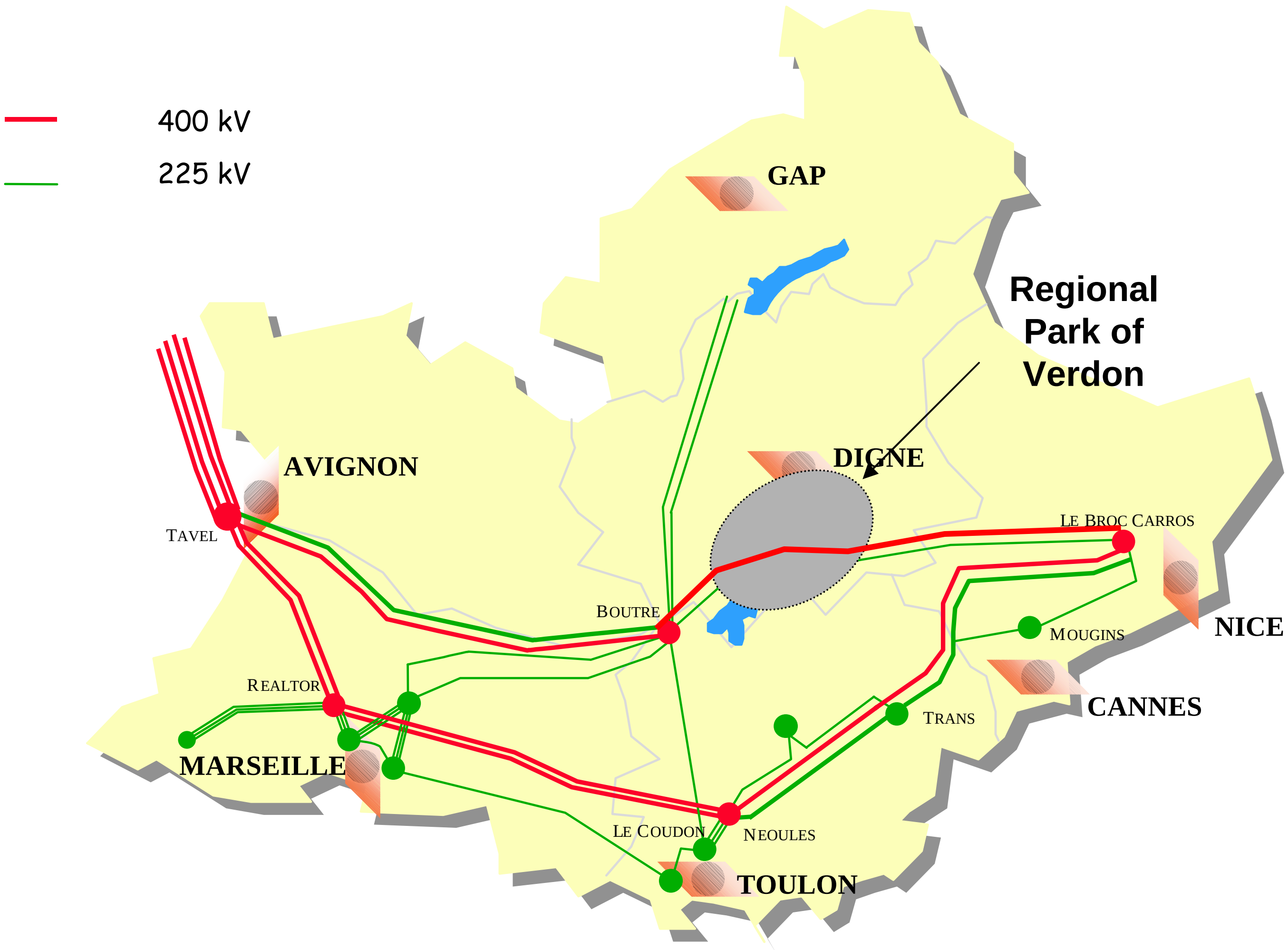


Summer 2003, large Forest fires in the « massif des Maures »

RTE had to switch off some EHV lines

Power outage for 400000 households

From a double circuit to a single 400 kV line

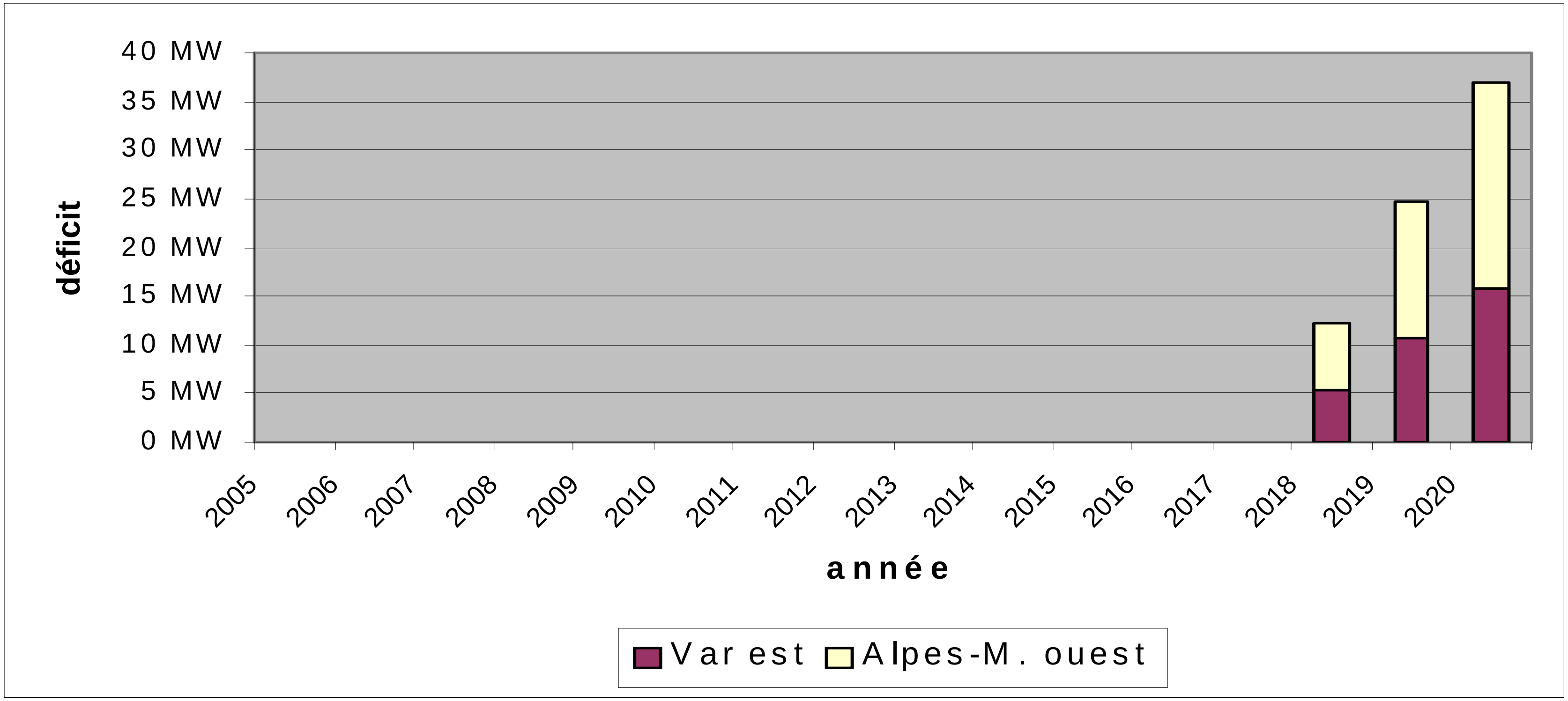


- Project born in the eighties
- Strong oppositions to this project
- In 1998, a public debate is organized
- In 2000, an alternative solution is decided : reinforcement of the existing 225 kV line by a 400 kV line (1 circuit) and implementation of an ambitious DSM and DG program to slow down the increase of the demand

- **Objective of the DSM & DG program :**
  - deferring the construction of a new transmission line after 2020
  - Implementing of the major part of measures as soon as possible
- **First stage : studies in 2001 with the objectives :**
  - To know the evolution and the structure of the demand
  - To quantify the level of capacity needed in 2020 in order to avoid constraints, with the new single line build in 2007
  - To quantify the potential of DSM & DG
  - To describe a detailed program of DSM & DG measures

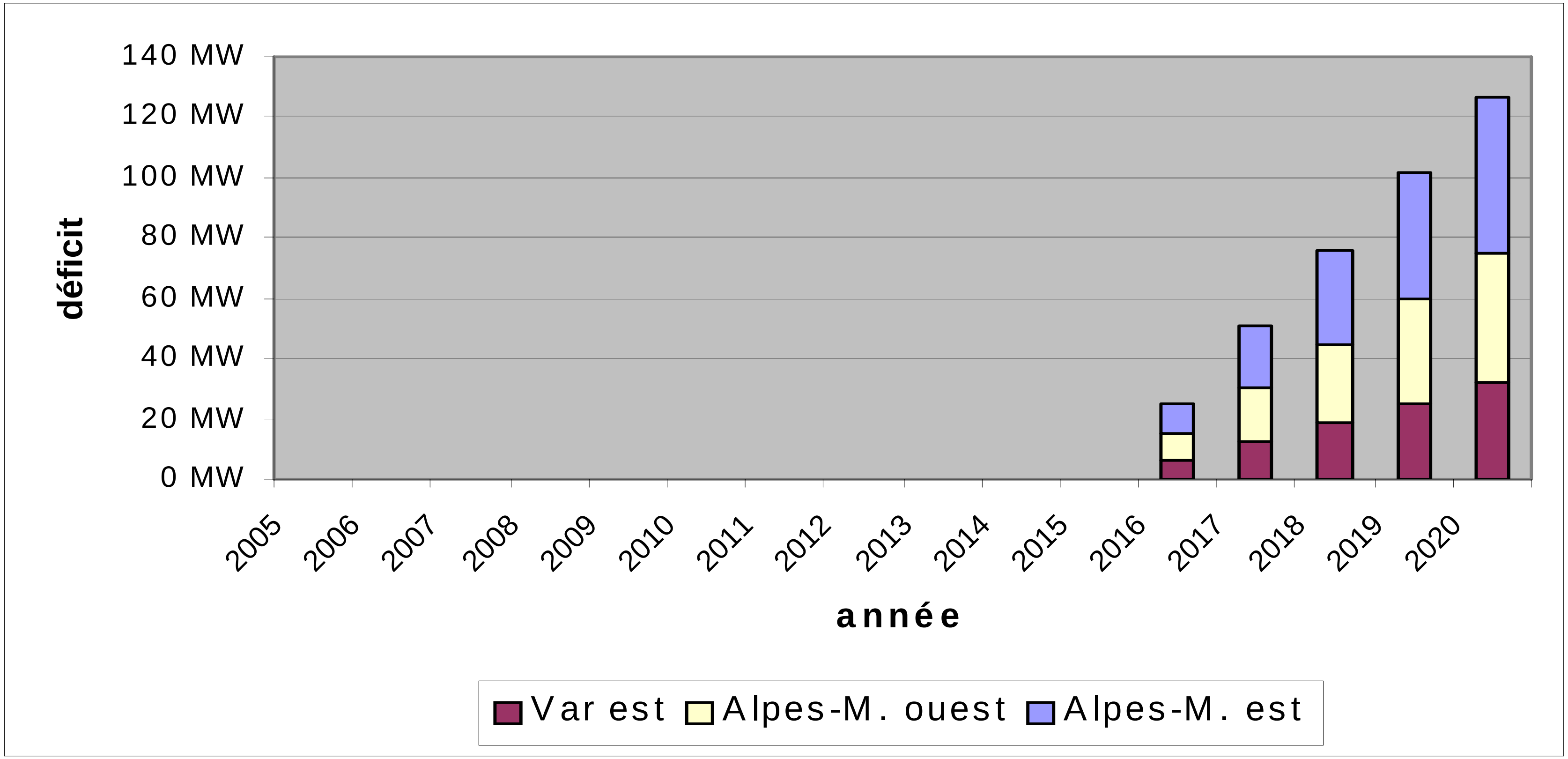
Fault risk N-1 in winter with the new single line

- With the new single line build in 2007, constraints reappear in 2018
- The objective of the DSM&DG program is 35 MW in winter to avoid a new network augmentation before 2020



Fault risk N-2 in summer with the new single line

- With the new single line build in 2007, constraints reappear in 2016 in summer
- The objective of the DSM&DG program is 130 MW in summer to avoid a new line before 2020



Impact of each DSM & DG measure

	impact winter peak MW	impact summer peak MW	impact consumption GWh	public funding (in M€ Cumulated by 2010)
communication, information				2,9
awareness, training of engineering departements, installers				3,6
State, local authorities, institutional, EDF, ADEME are a model of good energy management	26	5,5	52,5	4,6
Specific measures for new residential and tertiary buildings	1,2	0,1	2,5	7,6
Large dissemination of CFL in social sector	2,3	0,5	6	2
Promotion of efficient lighting in tertiary sector	24	12	72	1,8
Promotion of CFL & white goods	57	8	115	3,6
Refurbishment in dwellings and tertiairy sector	41	11,5	125	9,1
Refurbishment in tourism sector	3	2,3	9	2,6
Residential hot water		15	5	3,3
Wood heating	8		7	2,1
Specific measures for big I&C consumers	16,5	11		2,3
CHP, biogas, hydro	45	23		3
PV	0	0,3		0,9
evaluation				3
Total	**224**	**89,2**	**394**	**52,4**

Measuring the value of the program

1) Method 1 : The Program Administrator Test

1.1) Principle used

The program administrator consists in a Project Steering Group including EDF and ADEME and the regional administration.

RTE : subsidiary of EDF

RTE's interests in the program :

- the network augmentation deferral
- the reduction of thermal losses on the network
- the reduction of the costs of the generation scheme.

Reduction of supply costs

Because of limited network capacities, RTE requests the use of more expensive, but better located generation units $\Rightarrow$ Additional costs

Measuring the value of the program

1.2) Costs taken into account:

The total costs of the program .

The funds are provided by the Project Steering Group and are public funds

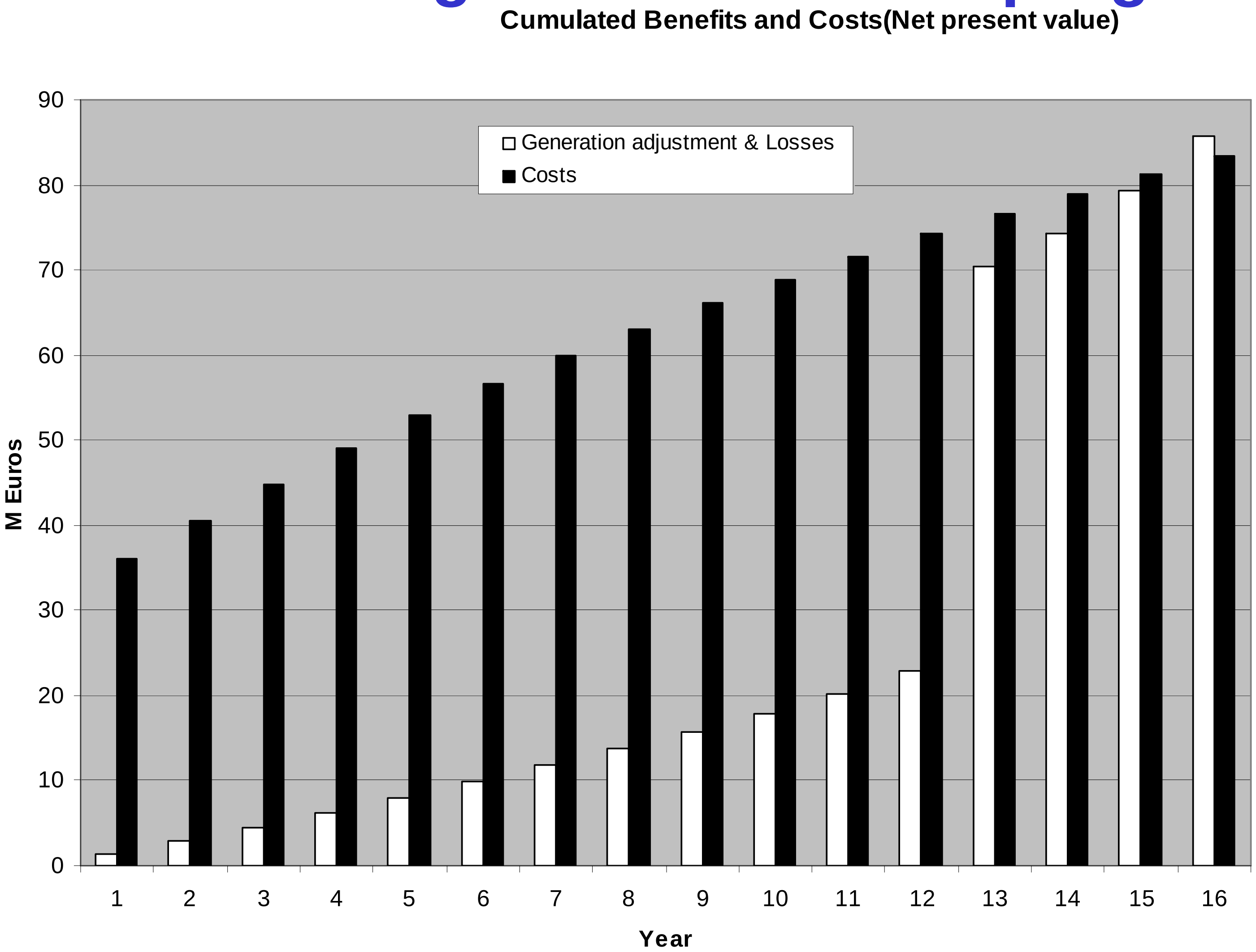
1.3) Benefits taken into account:

- Network augmentation deferral

- Reduction of thermal losses : valued by RTE at 30 Euros/MWh

- Reduction of generation scheme costs : valued at the marginal price of each generation means

Measuring the value of the program



Net present value on the whole time span : The benefits balance the costs in the end

Measuring the value of the program

Observations on Method 1 :

- High costs during the first years to launch the program, in public funds

- The network augmentation deferral cost plays a major part in the DSM program's cost efficiency

- But the avoided supply costs have to be added to the network augmentation deferral cost to meet the DSM program's cost efficiency requirements

-The benefits are sufficient to recover the costs only in the long term

- The DSM program must be considered as a multi-year program

Measuring the value of the program

2) Method 2 : Test based on reliability benefits

2.1) Principle used

- Probabilistic Unserved Energy =

Frequency of network tripping **x** Expected Unserved Energy during the outage

- Value of curtable load (Euros/year) =

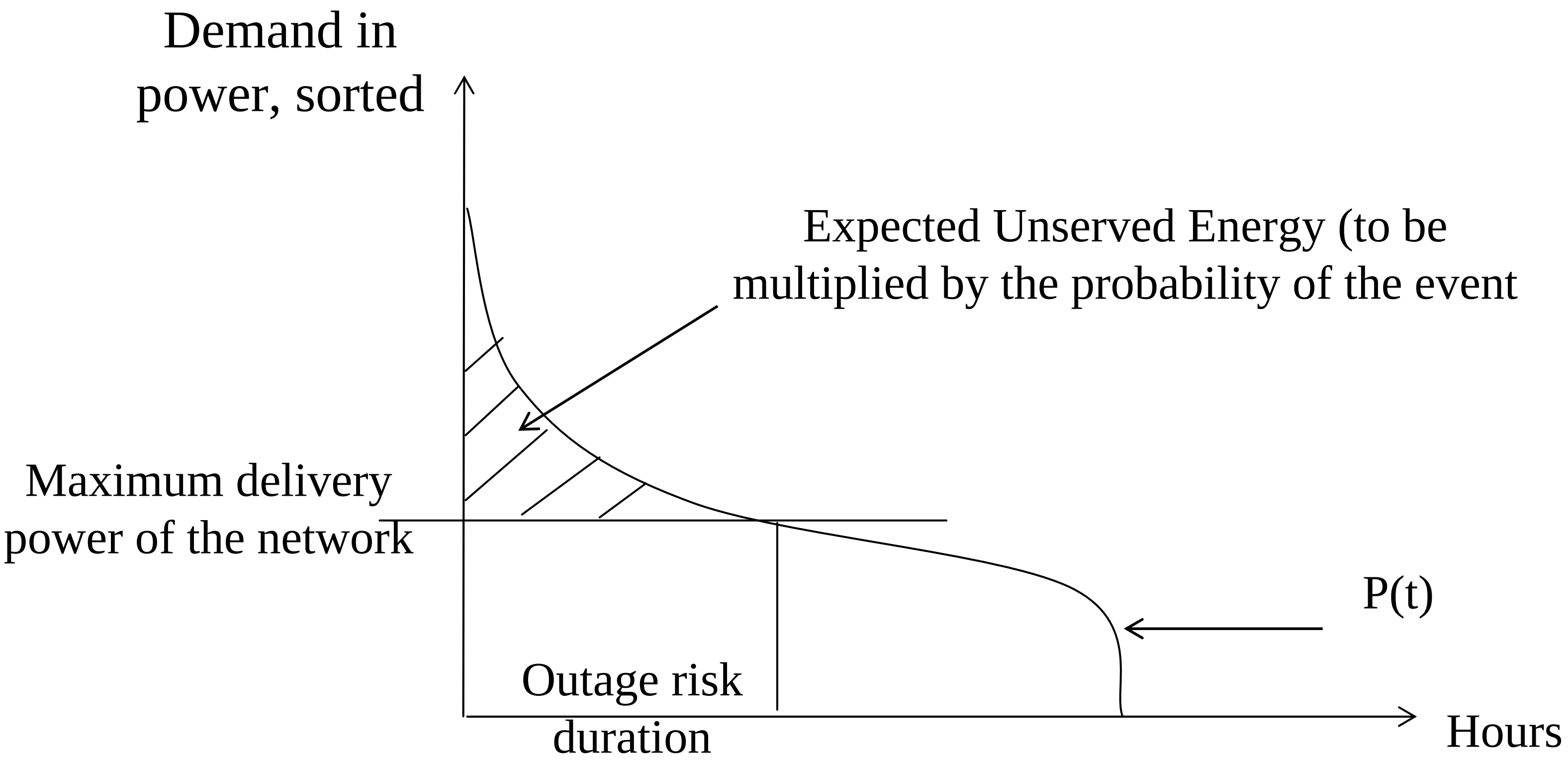
Probabilistic Unserved Energy **x** Value of lost load

- Value of the DSM program : Reduction of the Value of curtable load

VS. Cost of the program

Measuring the value of the program

2.2) Expected Unserved Energy during the outage



Measuring the value of the program

-The shape of the sorted demand curve is adjusted to the features of the studied area (depending on electrical heating penetration)

- The peak demand value in future years is estimated from forecasts

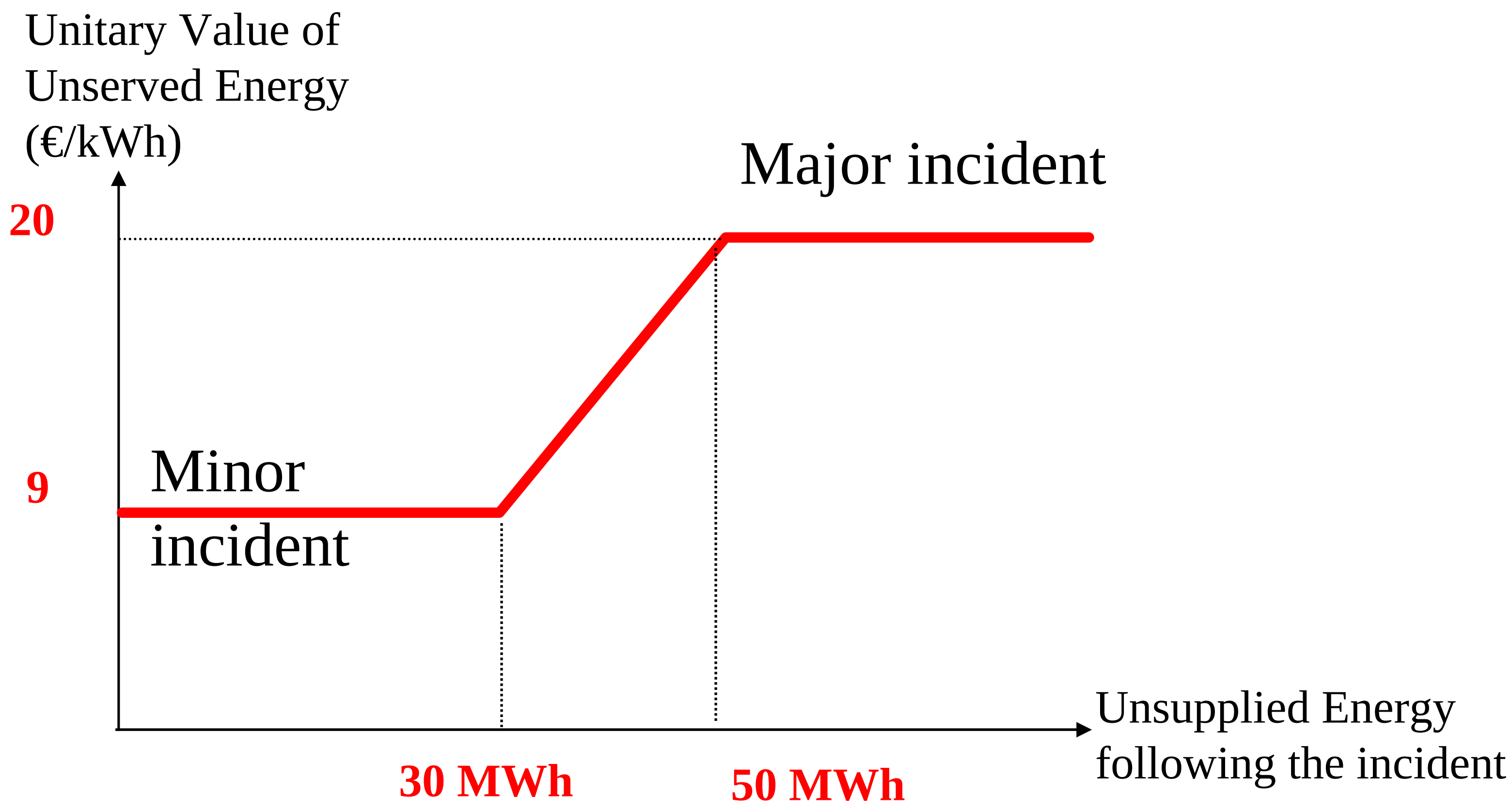
- This is is done with and without the DSM program

2.3) Frequency of network tripping

Derived from statistics on RTE's grid

Measuring the value of the program

2.4) Value of lost load



Measuring the value of the program

- The unitary value of the unserved energy used by RTE

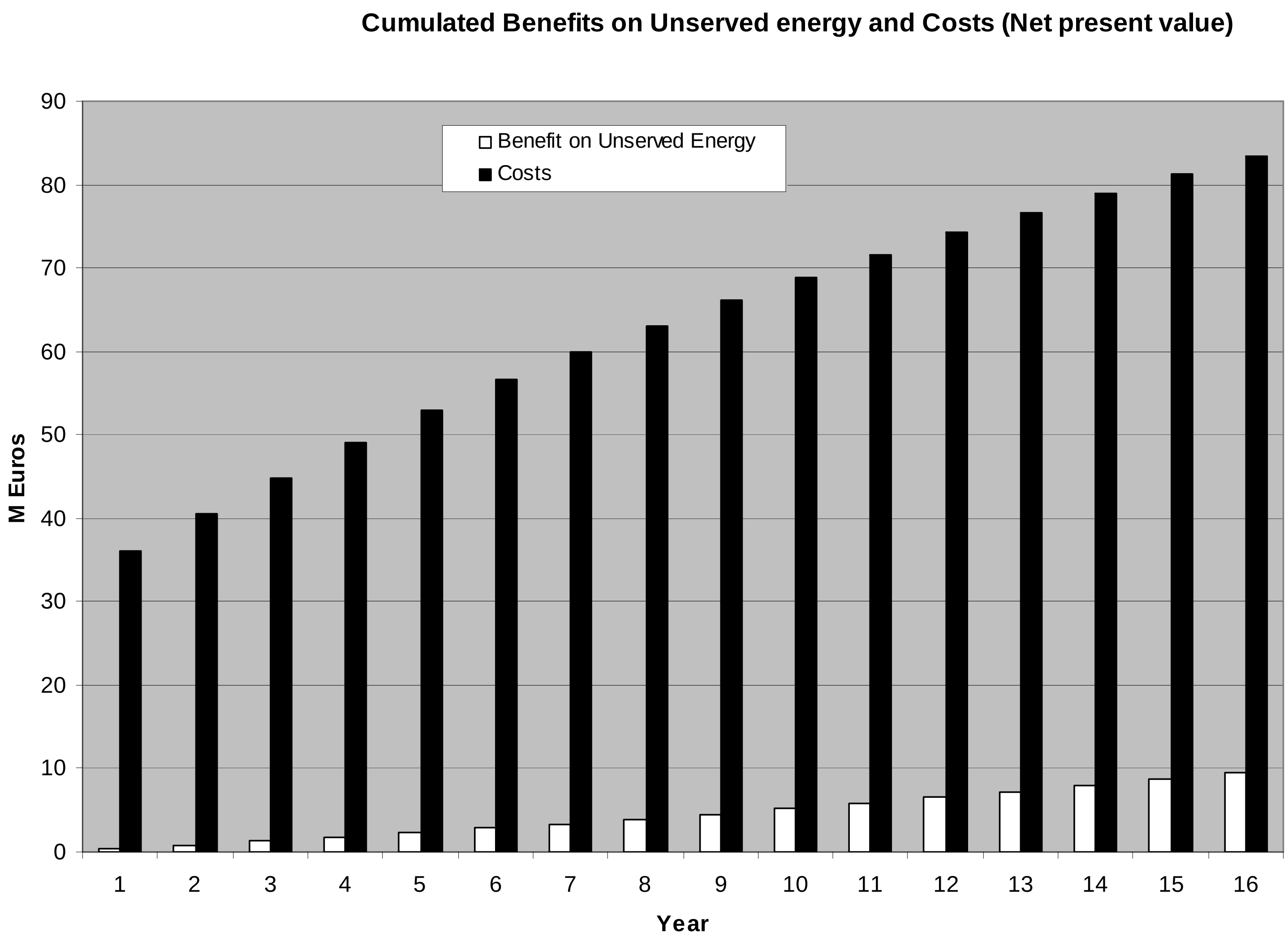
a) Taking into account the actual impacts of the cut-offs on the consumers (« external approach »)

→ two-levels shaped curve

b) Focusing on some non-quality resorption objectives (« internal approach »)

→ setting the two levels to the right values (9 Euros/kWh and 20 Euros/kWh) to meet these objectives

Measuring the value of the program



Measuring the value of the program

Observations on results from Method 2 :

-The value of the avoided unserved energy alone is not enough to prove the DSM program's cost efficiency

- The implicit value of the lost load would have to be as high as 130 Euros/kWh

Measuring the value of the program

Comparing the Program Administrator Test & the Reliability benefits method

P.A. test :

-one part only of the benefits are accounted for (customers' benefits aren't integrated). The DSM program's cost efficiency may be difficult to prove

- EHV network-driven DSM program : the network augmentation deferral is the main part of the administrator's avoided costs

Reliability benefits method :

-Difficulty to assess to the value of 1 kWh of lost load

- Estimating the implicit value necessary to assess the program's cost efficiency and start discussions from there ?

Measuring the value of the program

Comparing the Program Administrator Test & the Reliability benefits method

Those methods aren't supposed to reflect all the good reasons to launch a DSM program

Additional benefits that should be considered

- The reduction of greenhouse gases (CO_2) emissions, thanks to less power demand and the use of more efficient techniques

- The political aspect of the program

Thanks for your kind attention !