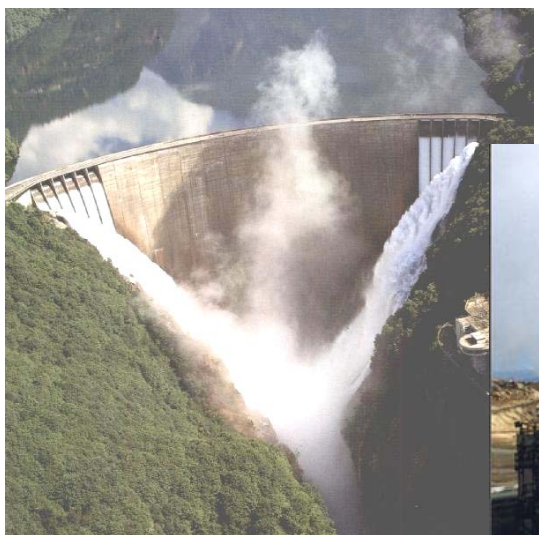
UNIVERSITÉ DE GENÈVE

Electric power supply security and “natural hazard” risks



Franco Romerio and Jean-Jacques Wagner

International Disaster and Risk Conference, IDRC Davos, Switzerland, 24-29 August 2008

PROBLEM

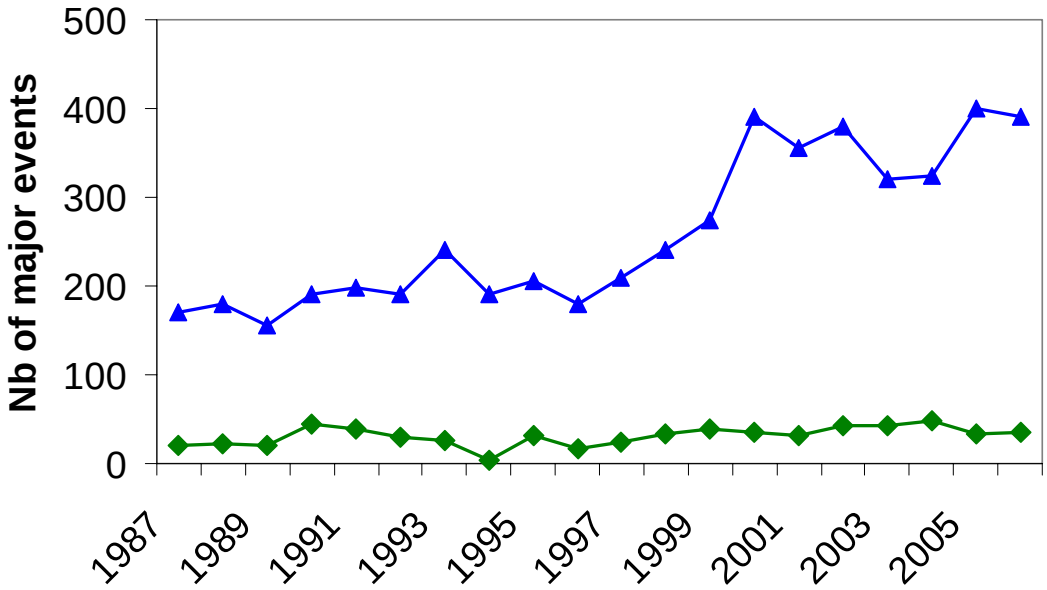
- Electricity supply security (ESS): a challenge for the public and private sector worldwide
- “Natural hazard” risk (NHR), amplified by climate changes: a factor that can jeopardize the ESS
  - Risk management in the electric sector should appropriately integrate NHR
  - In particular, considering the new organisation of the electricity sector (competition)

Floods/dam: Switzerland, 1987

Source: AET

Ice storm/lines: Canada, 1998

Source: Swiss-Re



Hydro-meteorological *versus* Geological disasters

WORLD

Source: Hoyois *et al.,* 2007

Investments of hundreds of billions of EURO at risk

Electricity generation Reference and Alternative Scenarios

WORLD

Source: IEA, *World Energy Outlook,* 2007

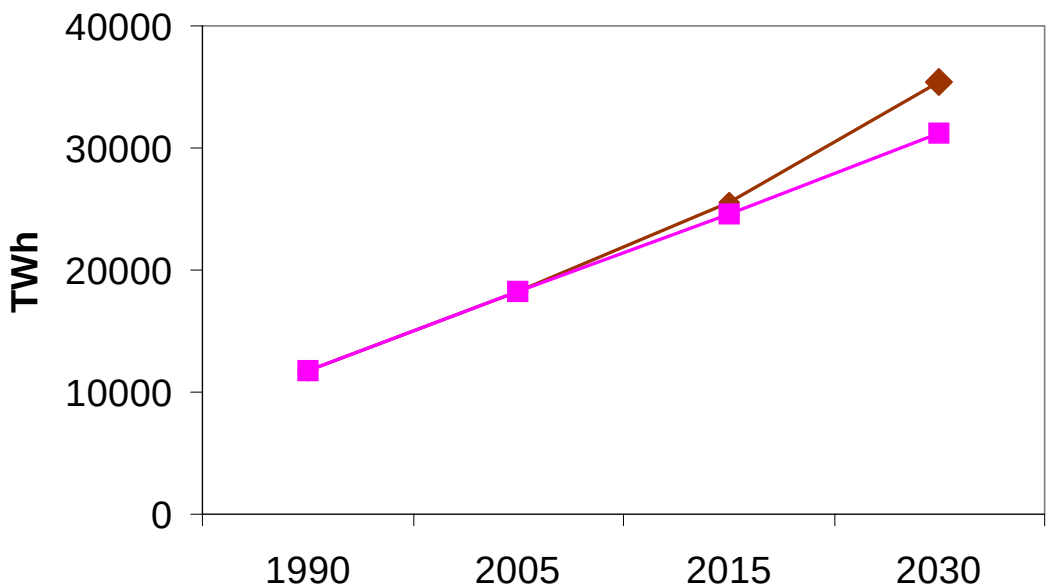


Illustration: Lothar & Martin Windstorms, *France, Dec. 26/28 1999*

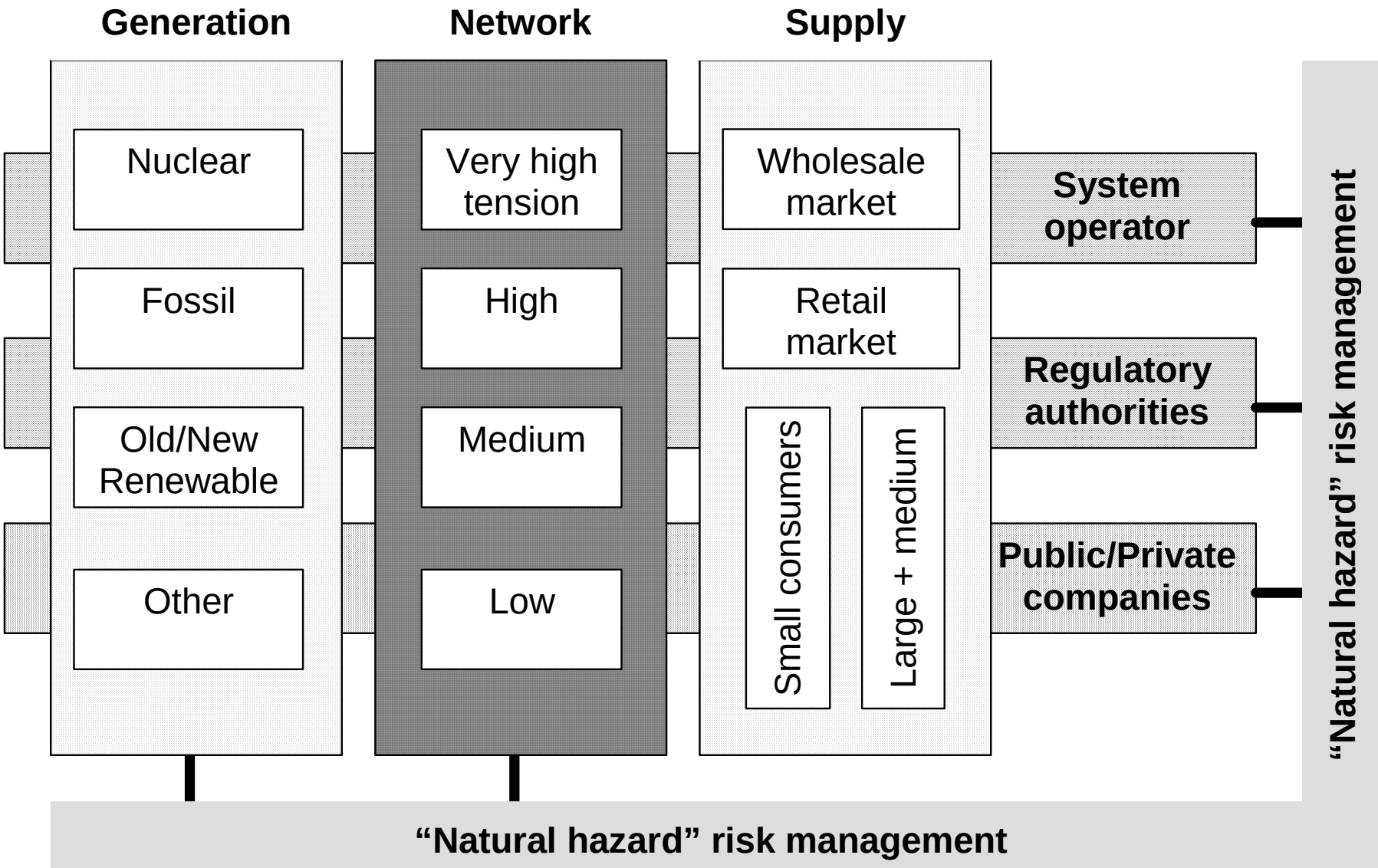
The greatest devastation to an electricity network ever seen in a developed country

- 280 HT transmission pylons toppled
- 36 HT transmission lines lost
- 3.5 million homes and businesses without power
- 10 million people affected
- Power completely restored only after 20 days
- Electricité de France's losses: EURO 1.5 billion (compensations offered included)

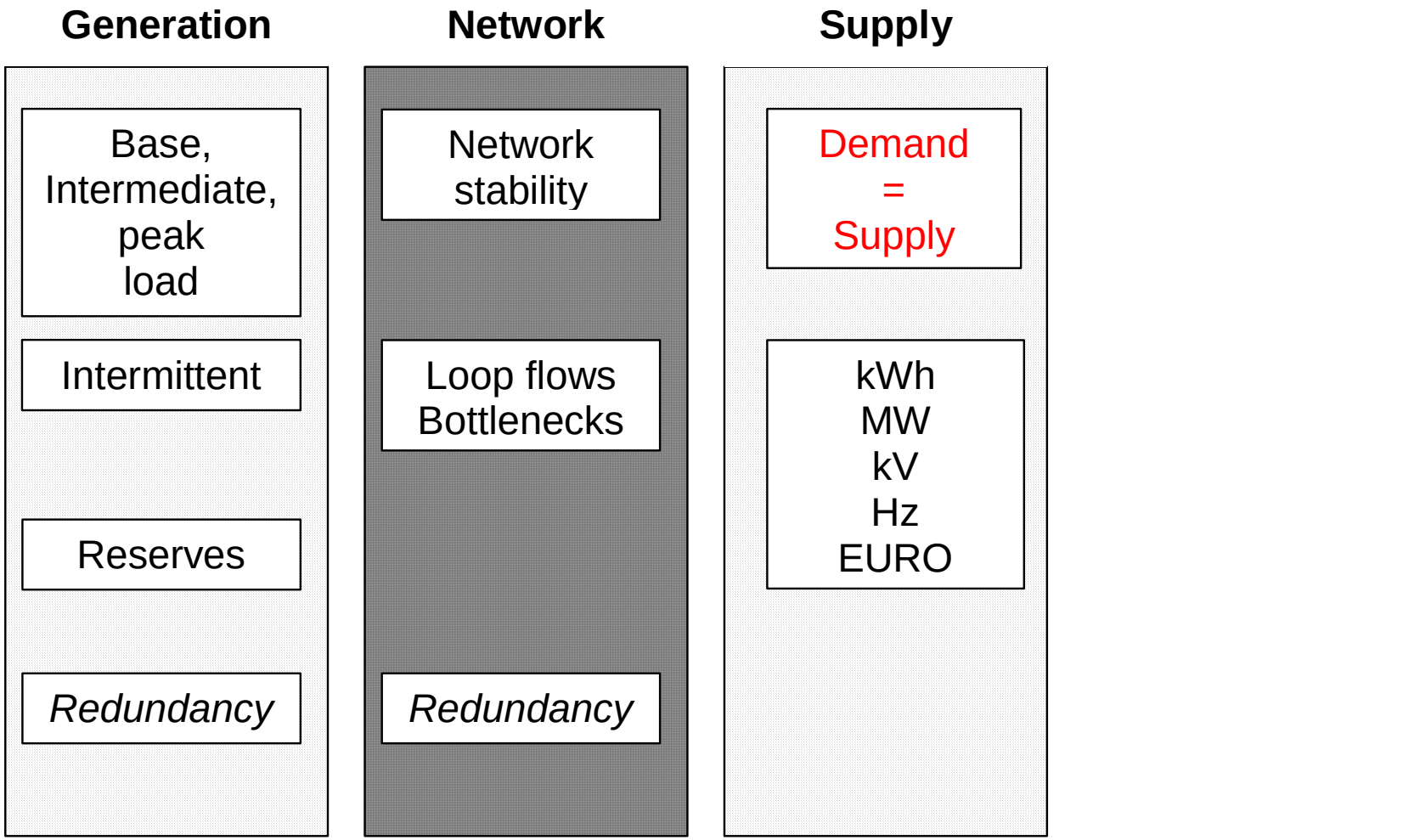
« pylons were not designed to survive wind-speeds above 145 Km/h »

Source: RMS, *Windstorms Lothar and Martin.*

OVERVIEW

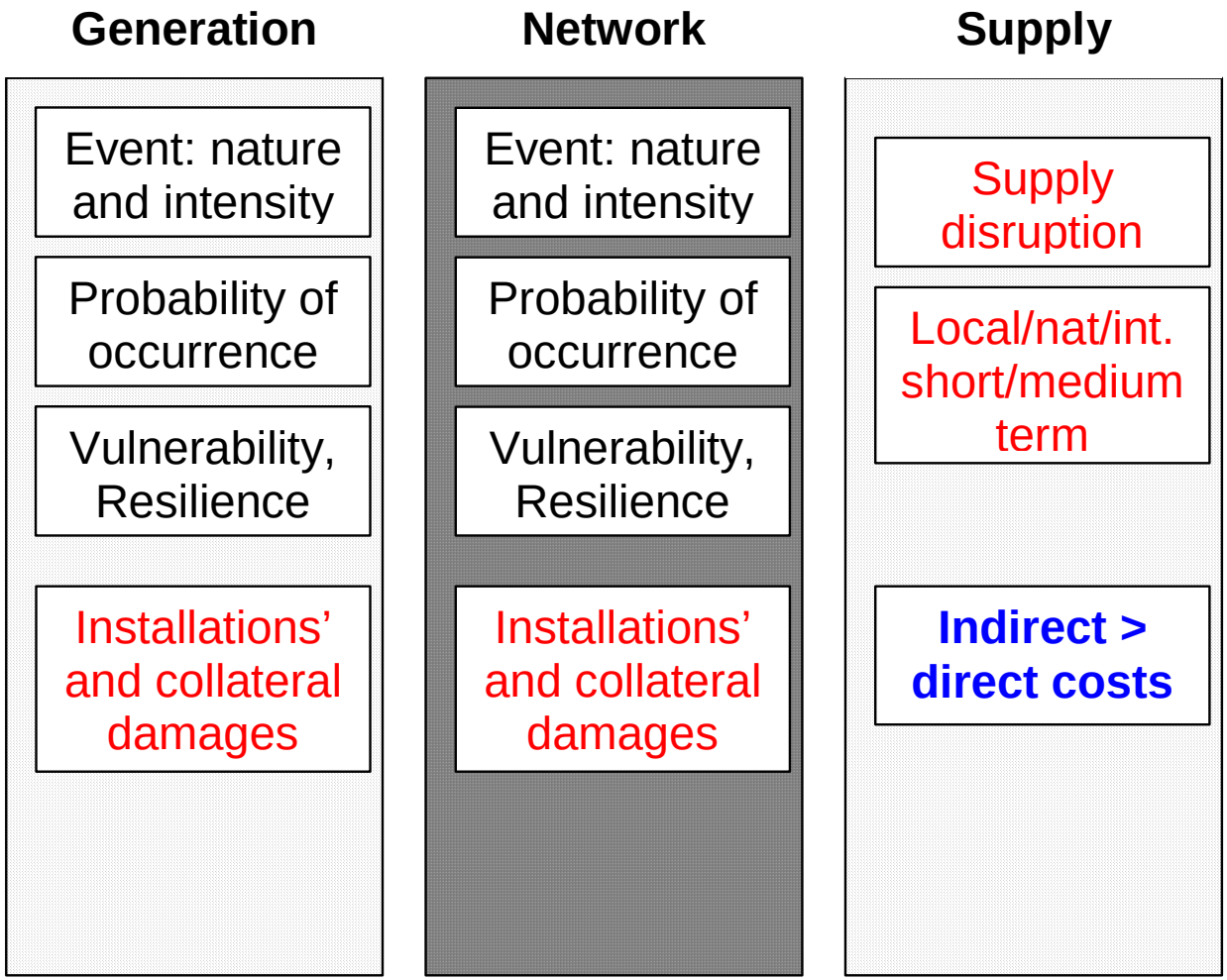

Generation
Network
Supply
Nuclear
Fossil
Old/New Renewable
Other
Very high tension
High
Medium
Low
Wholesale market
Retail market
Small consumers
Large + medium
System operator
Regulatory authorities
Public/Private companies
"Natural hazard" risk management
"Natural hazard" risk management
Competition
Monopoly/Access
Regulation
Business

SUPPLY SECURITY

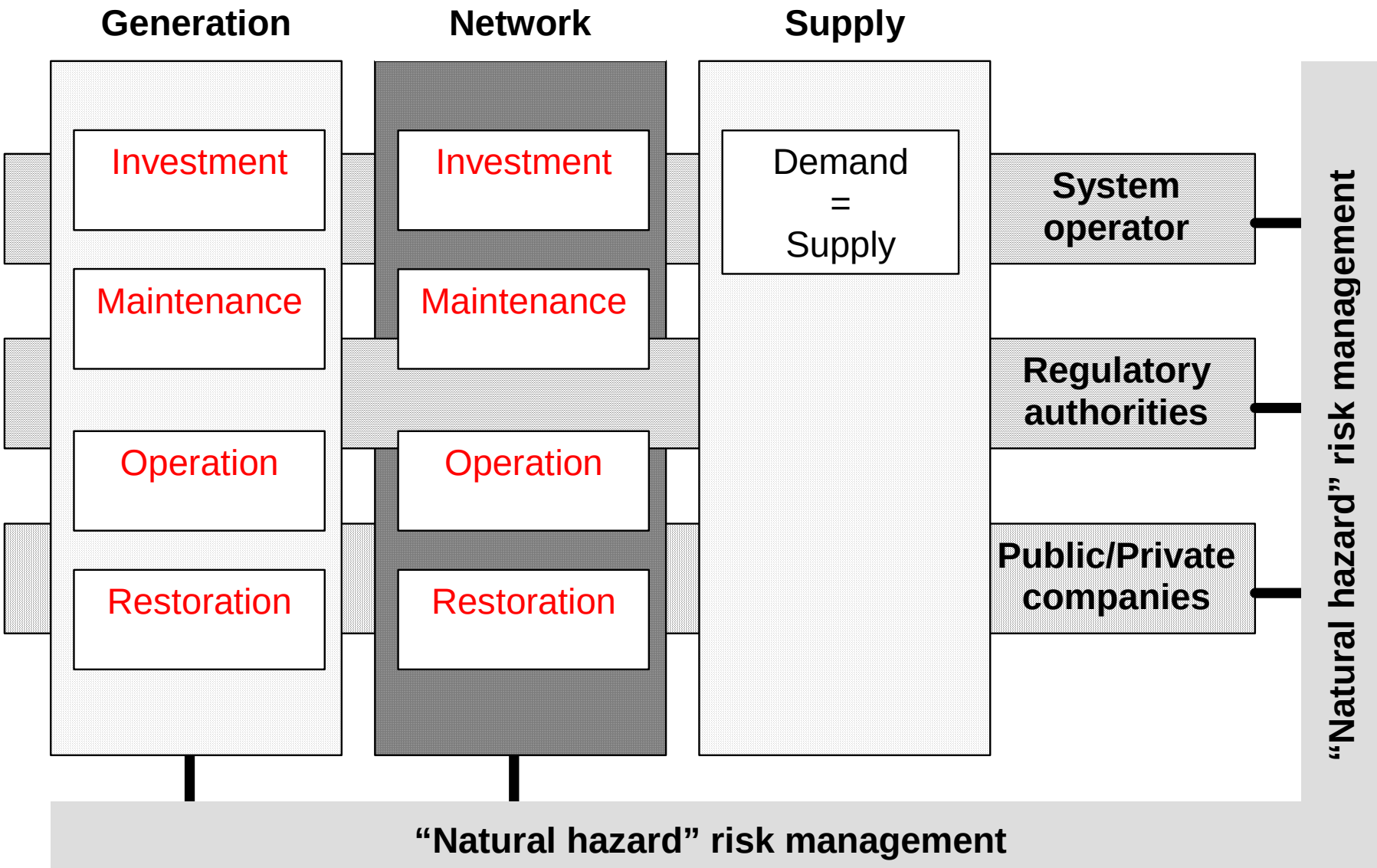


Competition **Monopoly/Access** **Regulation** **Business**

“NATURAL HAZARD” RISK



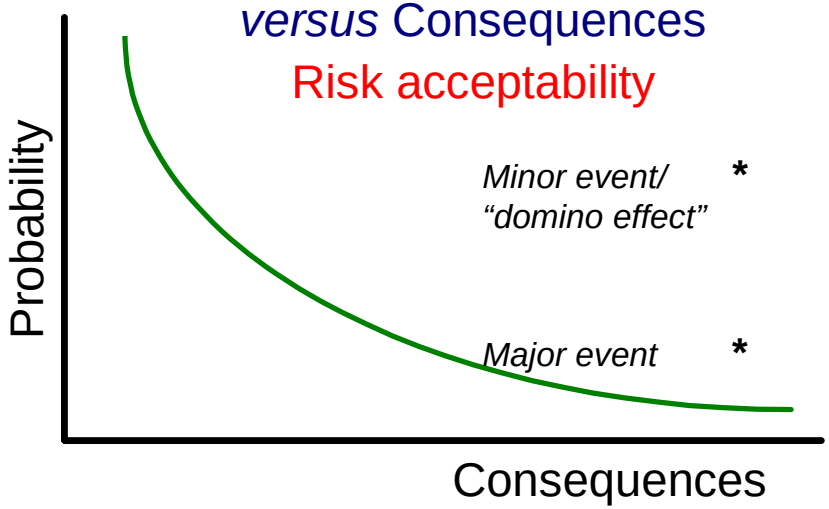
“NATURAL HAZARD” RISK MANAGEMENT



CRITICAL FACTORS

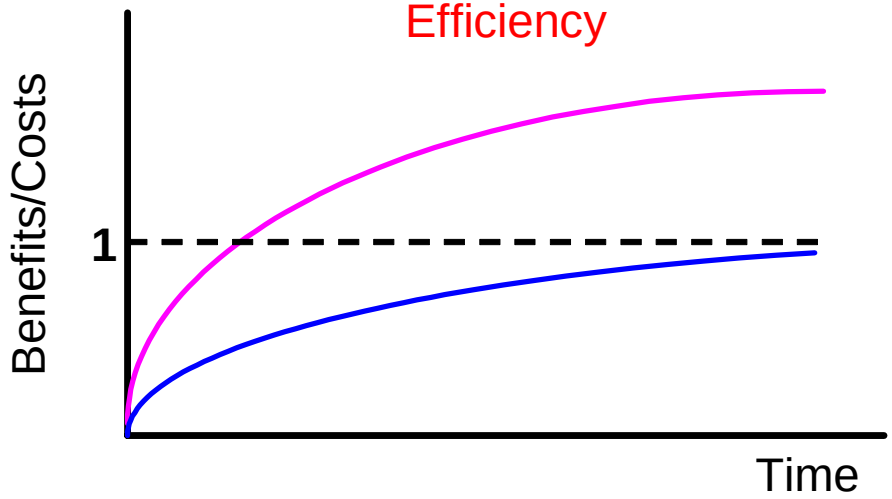
Probability of occurrence
versus Consequences

Risk acceptability



Expected Costs *versus*
Benefits (avoided costs)

Probability of occurrence,
Rate of discount,
External costs/benefits,
Public goods,
Efficiency



"Natural hazard" risk management

"Natural hazard" risk management

Today "Natural hazard" risk management is far from perfect

CONCLUSION

- Risk management: a complex problem: impossible
  - To develop “natural hazard” risk management without taking into consideration the electricity reforms
  - To guarantee supply security without dealing with the “natural hazard” risk
- Trade-off between expected costs and benefits: very useful
  - One should be aware that in several cases, high direct and indirect costs may be avoided at a low price

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