

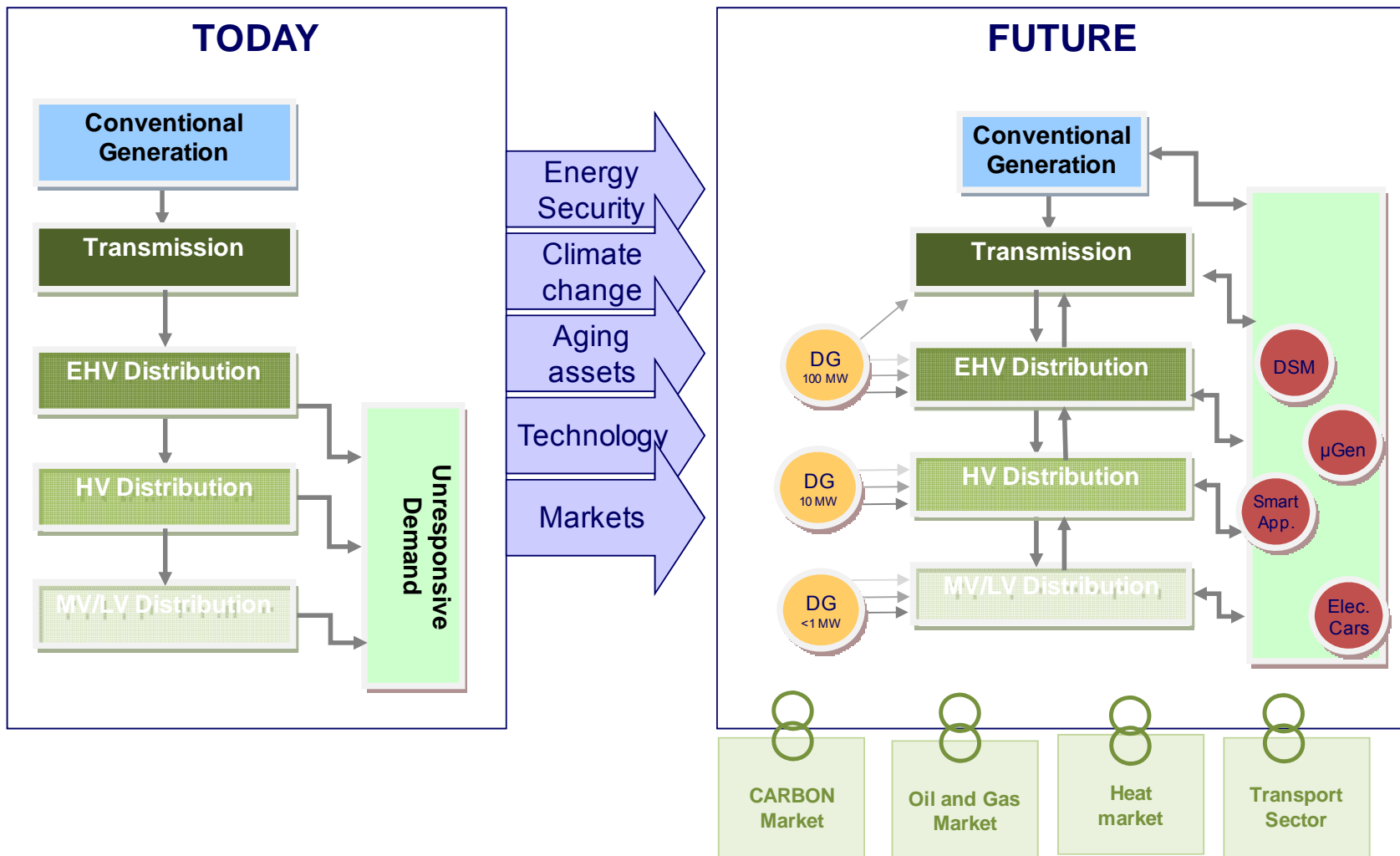
*MORE MICROGRIDS Workshop*

Paris, 29 January 2010

# **System Economics and Regulatory Challenges for Micro Grids**

**Goran Strbac**

# Background: Electricity system in transition



# “Predict and provide”: philosophy of the present system design and operation



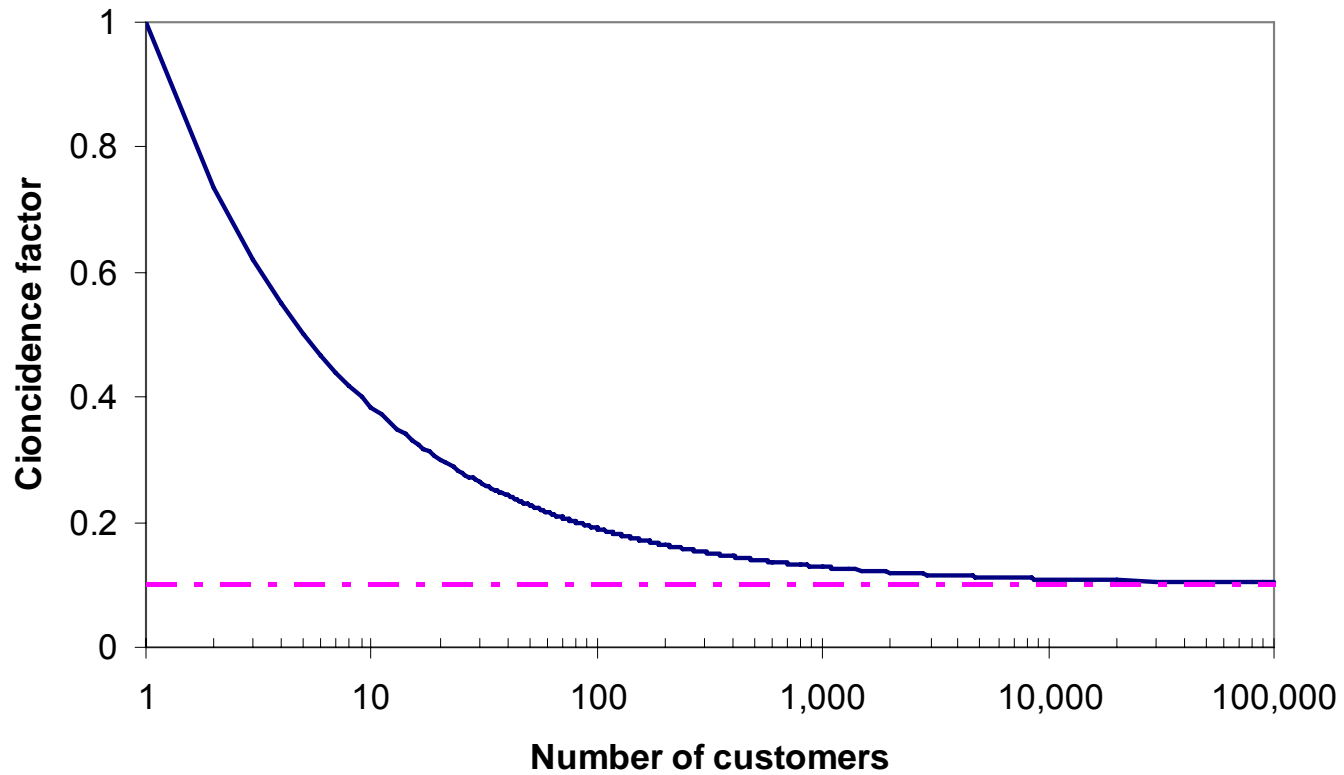
- **Control tasks**
  - Balancing of demand and supply
  - Power flow control
- **Control sources**
  - Large generators only, demand and DG uncontrollable
- **Control**
  - Preventive, local
- **Achieving reliability of supply**
  - Redundancy in generation and network assets

# Statistics of a typical EU electricity system

- Generation capacity utilisation: 55%
  - Efficiency: CCGT ~60%, coal 35%
- Network capacity utilisation less than 30 - 50%
  - Typically 75% of all network costs in LV/MV networks
- Distribution networks contribute more than 90% of interruptions;
- Losses in transmission 2%, distribution 7%

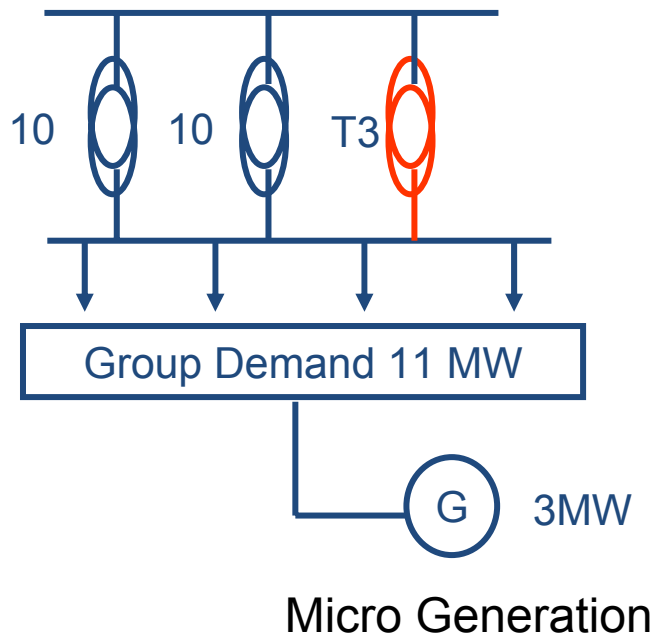
***Significant scope for improving system investment and operational efficiency through microgrids***

# How big should the power system be?

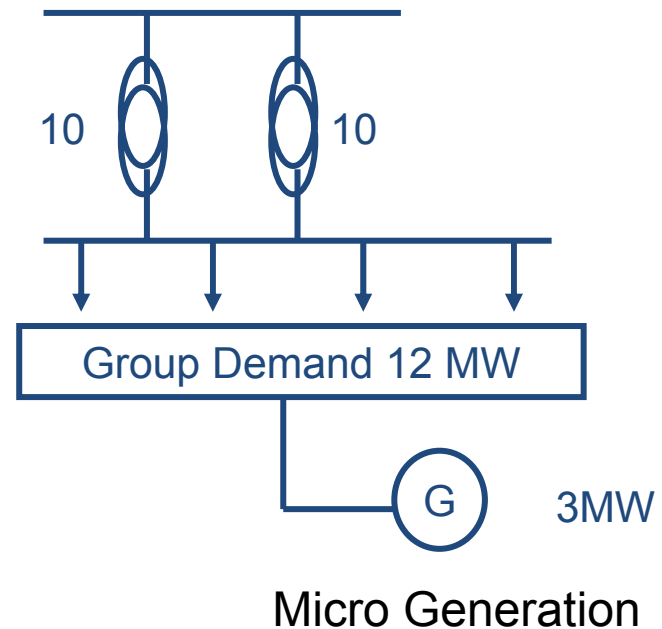


# MicroGrid can postpone network reinforcements

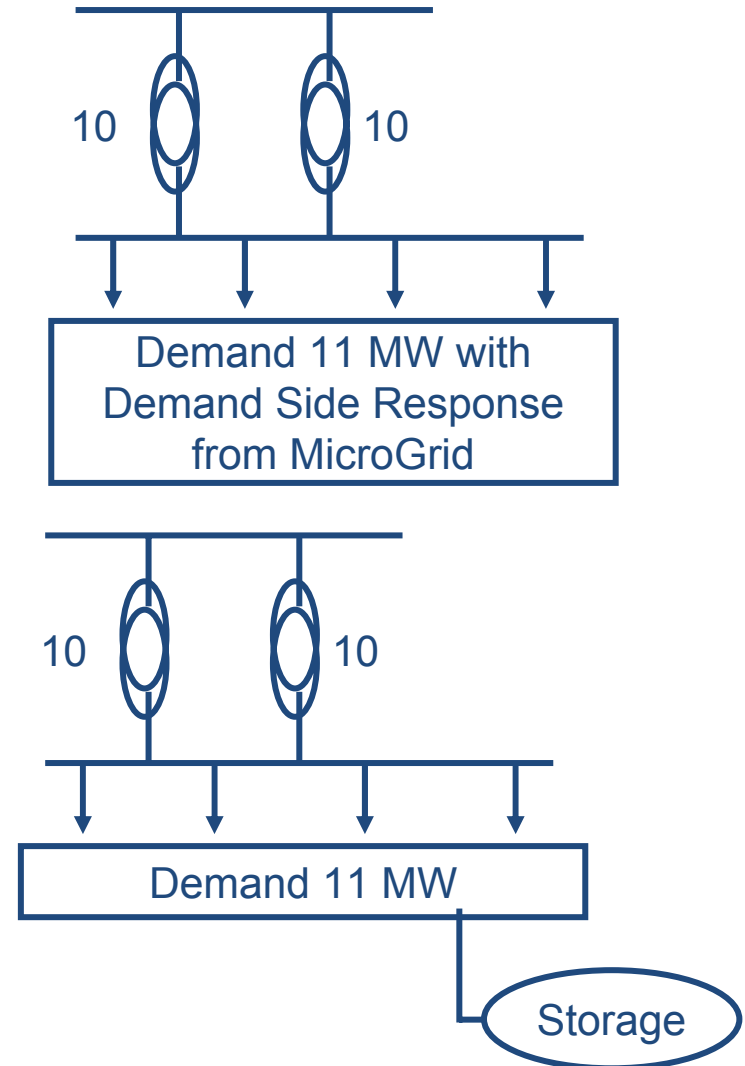
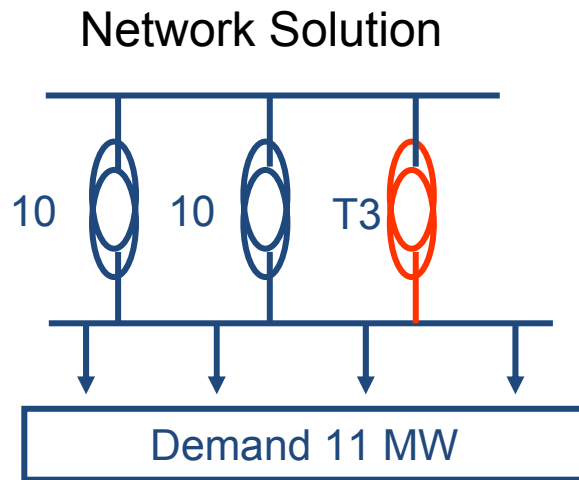
- Micro Generators contribution ignored



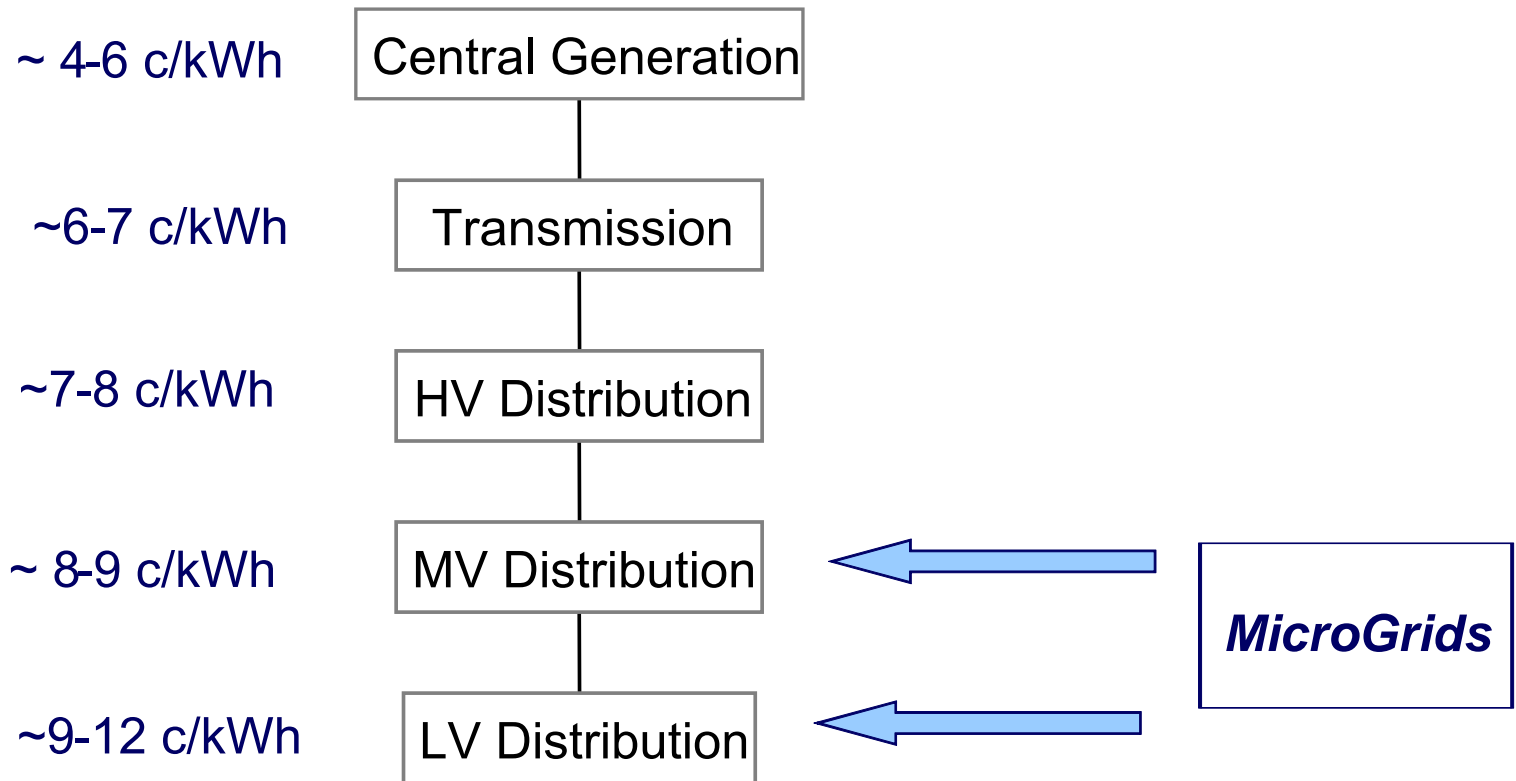
- Micro Generators contribution recognised



# Integration: Solving Network Problems through demand and storage



# Competitiveness of microgeneration





# Regulation: investment and operational incentives framework

- MicroGrids have the potential to increase utilisation of existing infrastructure and substitute for reinforcements.
  - MicroGrids characterised by increased interaction between energy and networks
- However, the existing regulation incentivises investment over operational alternatives
- This may prevent implementation of technically effective and economically efficient ‘non-network’ solutions, such as MicroGrid, as an alternative to the conventional network asset reinforcement based solutions.
  - Integration of microgrids will lead to increase in network loading
  - Being “smart” may reduce revenue to network operators while potentially increasing risks
  - Efficient solutions are commercially unattractive

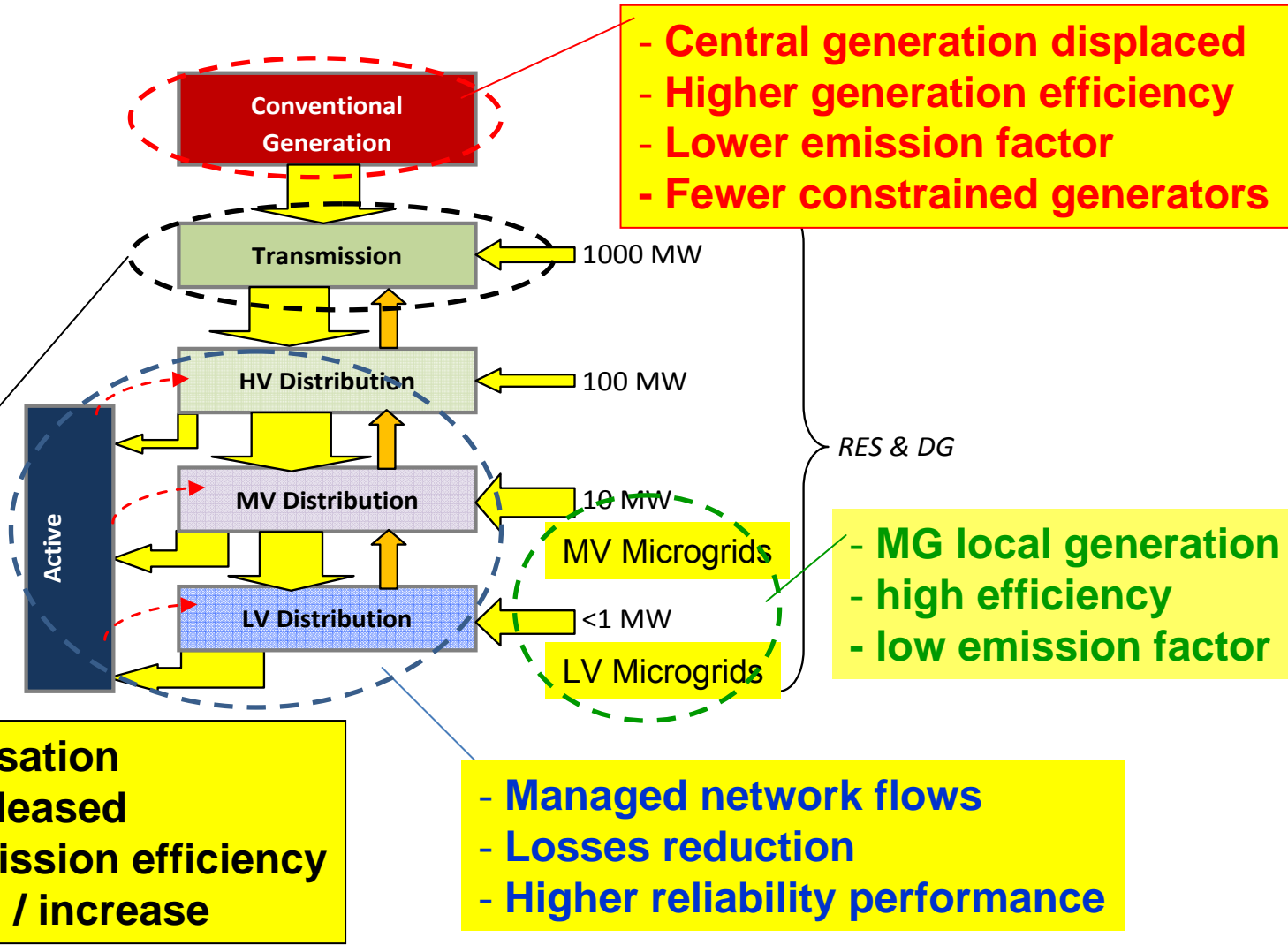
# Network regulation: need for change

- The overarching concern is that the present network regulation framework favours the release of new network capacity through network asset reinforcements and this may slow down implementation of MicroGrids concepts and technologies and undermine innovation
- MicroGrids, through local generation and demand based solutions, can play a vital role in enhancing generation, and distribution infrastructure utilisation and hence facilitating an efficient delivery of low carbon future;

# Research Objectives

- Develop **representative models** of transmission and distribution networks and **evaluation tools** to quantify the ability of Microgrids to displace network assets
- Quantify **overall system benefits** of Microgrids in typical EU systems
- Consider **business model** for Microgrids
- Consider **regulatory barriers** for Microgrids

# Benefits of microgrids



Present commercial and regulatory framework does not allocate cost and benefit efficiently

# Key recommendations

- Open access
  - Energy market
  - System management
- Standards
  - Recognition of DER in network design
  - From deterministic to cost benefit
- Regulation
  - Incentivise operational solutions
- Commercial
  - Pricing

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