WP5 – Grid Regulatory implications with RES-E

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Content

- Introduction: scope of the work
- Transmission grids
- Distribution grids

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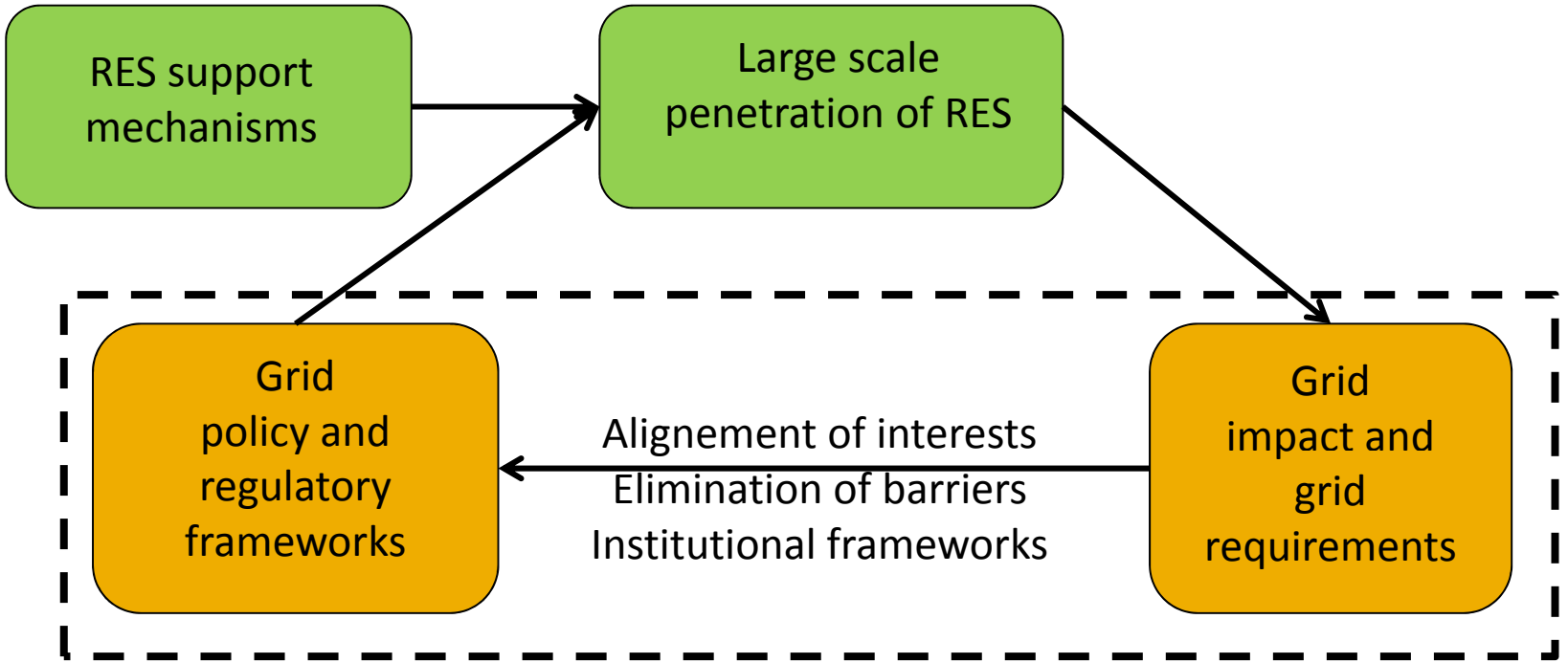
Introduction: Goal and scope of the work at this phase

- Scientific literature review to identify major issues concerning the interactions between RES support schemes and grid policy and regulatory issues



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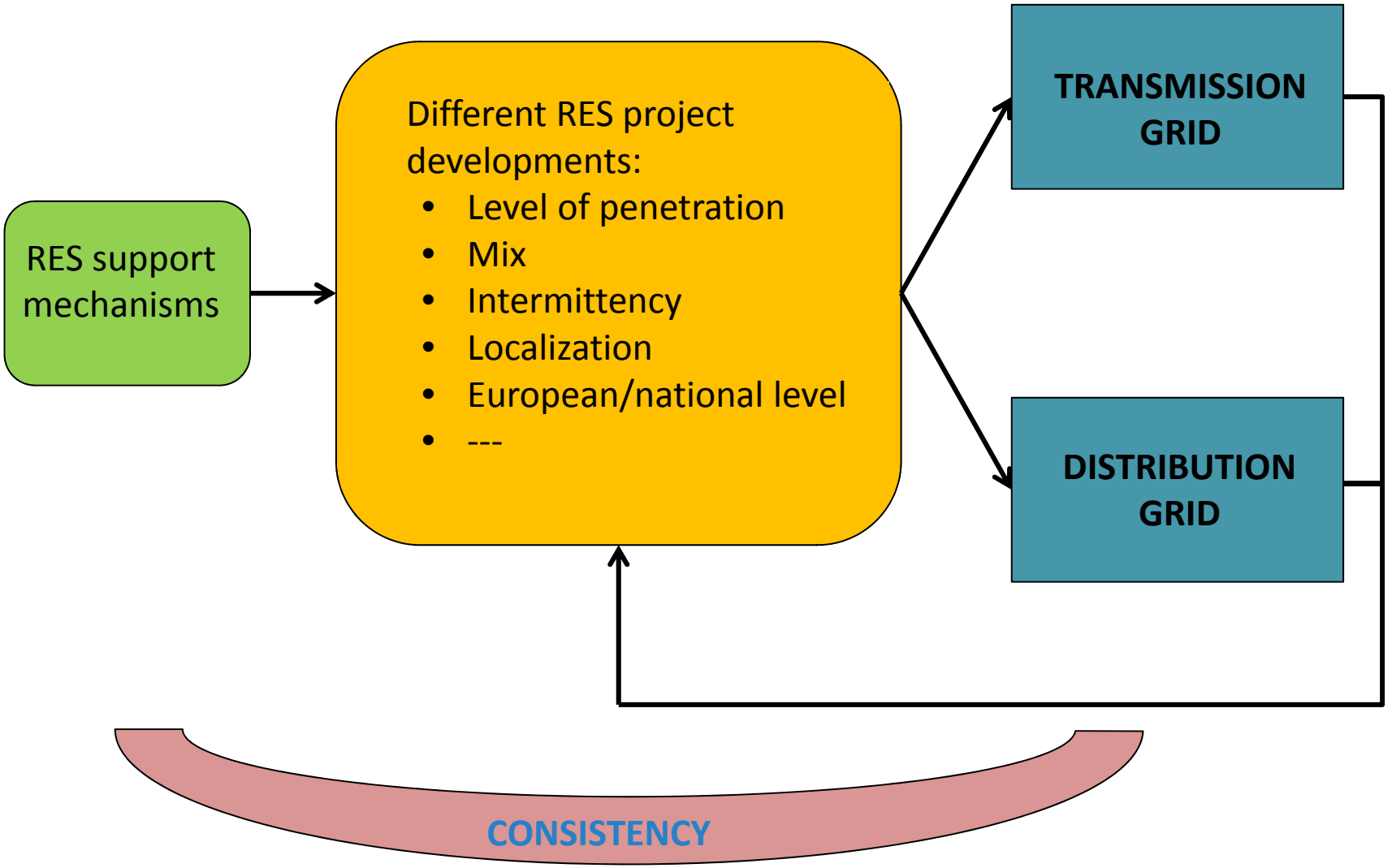
Introduction: Goal and scope of the work at this phase



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Transmission grids

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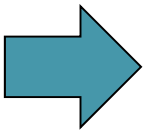
The more challenging case: pan-european supergrid

- Harmonized support mechanisms that may lead to develop
  - Huge locationaly-pretty-centralized production centers of RES generation in Europe or in neighboring areas of Europe
  - to meet large portion of the demand all over Europe
- may be the more efficient and integrated solution
- but will require the reinforcement/building of large transmission network facilities
  - to cope with
    - Large amounts of energy to be carry over long distances
    - With a high variability both in the amount and the direction of flows due to the large intermittency of RES generation outputs
  - and to guarantee, together with storage capabilities, the reliability of supply of such and intermittent generation



Super-grid concept

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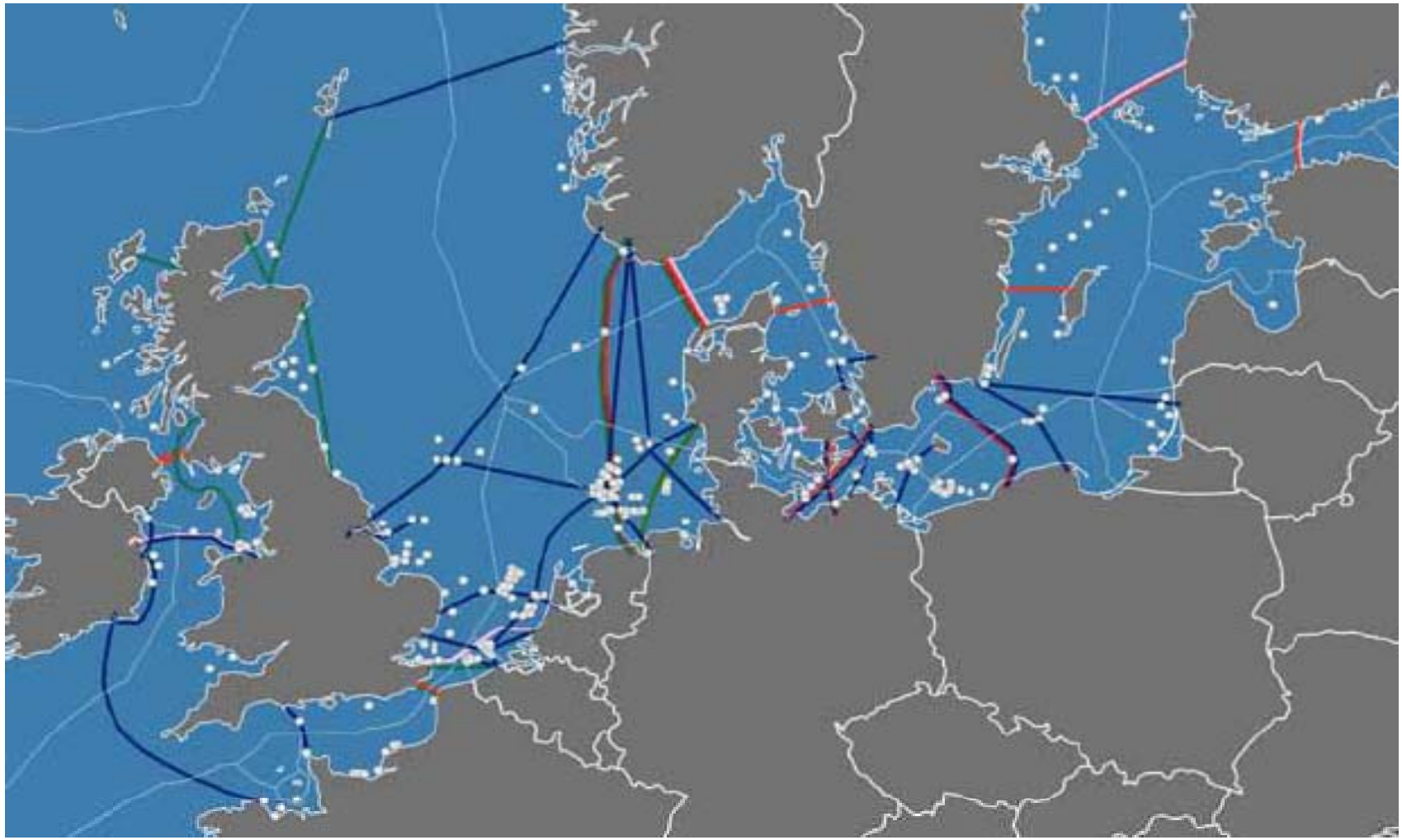
A new approach to the development of the grid



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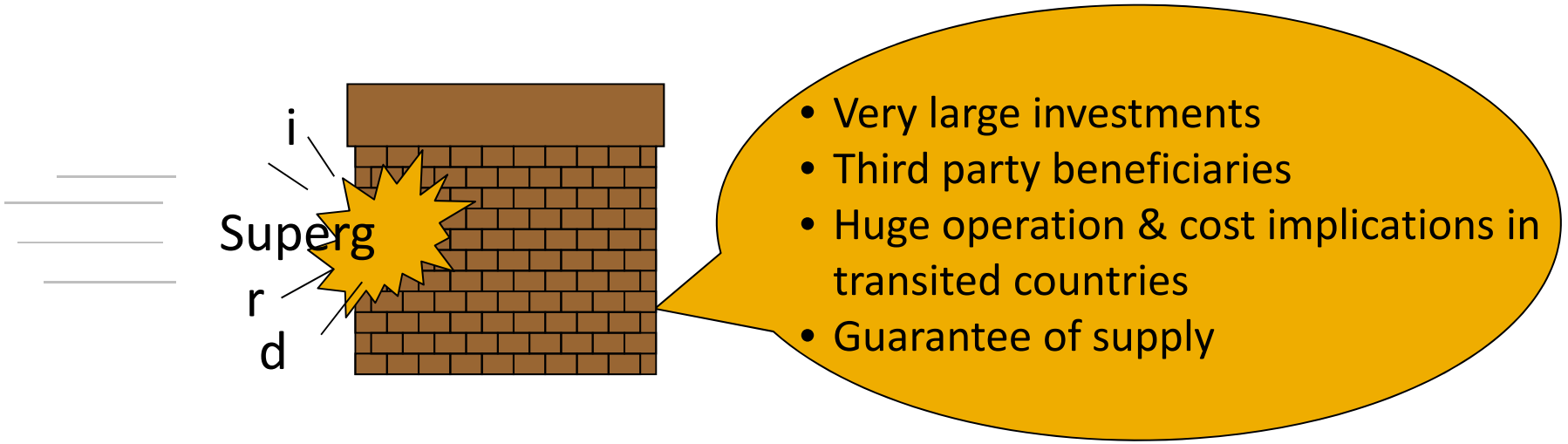
Building and operating a super-grid

- actual institutional frameworks and regulatory approaches for expansion planning, financing, building and operating large cross border interconnections will not be any longer valid.



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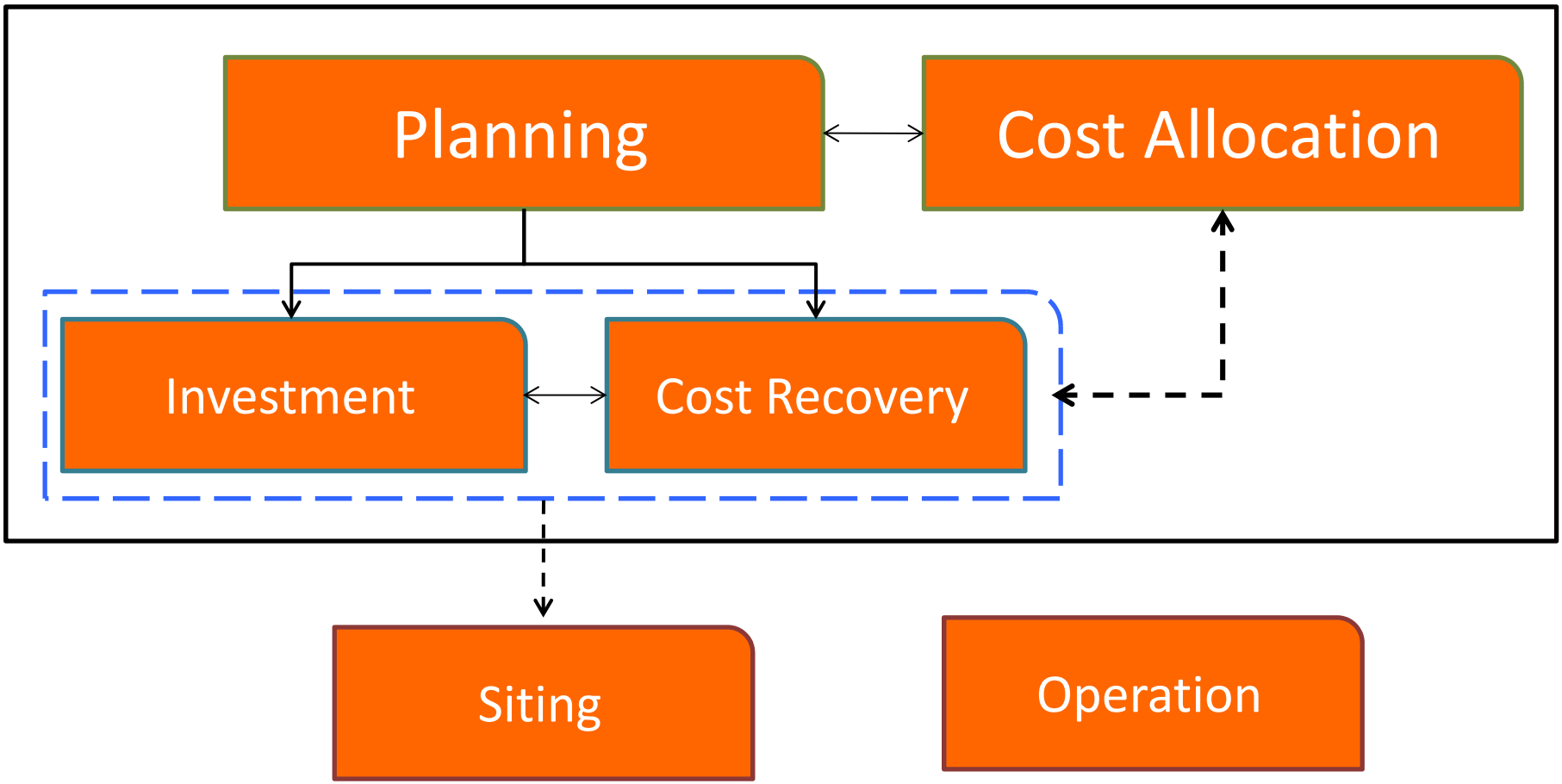
Institutional and regulatory issues



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Expansion planning: whom and how?

- Institutional framework
  - Role of centralized institutions (ACEER – ENTSOE ….) revisited
  - How to reconcile wide interconnection interests with national or local interests
- Expansion planning decision making
  - Whom and how?
    - Central planner under regulated monopoly scheme
    - Role of merchant lines (or mix merchant-regulated schemes)
    - National TSOs role
    - Who come first? RES Generation? Network?
- Financing – Cost recovery
  - Regulatory setting aimed at reducing risk for investors
  - EU financing in PCIs with significant externalities (security of supply, technology demonstration, CO2 reduction?)

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Allocation of grid related costs

- Building and operating a super-grid will produce benefits of different kinds:
  - Market integration
  - Security of supply
  - Environmental sustainability
- and will produce costs of different kinds:
  - Investments costs
  - Operation costs
    - Maintenance, losses and re-dispatch related costs
    - Ancillary services related costs
- Some of these benefits/costs accrue to specific regions/countries, while others are more dispersed
  - Should be taken into account to compute effort sharing

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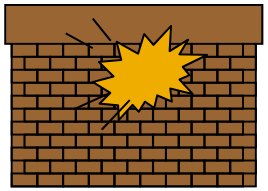
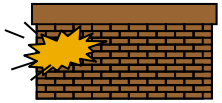
Allocation of grid related costs



- More accurate cost-reflective or beneficiaries cost-allocation based methodologies should be applied in order to align national interests with the global pan-european ones.
  - General framework currently applied is valid!...
    - Cost of cross-border facilities allocated to TSOs
    - Net amount of costs and revenues for each TSO allocated to local network users according to national criteria (subsidiarity)
  - … but methodology implemented not… (which risks blocking critical network investments)
- and
  - How to identify beneficiaries?
  - NIMBY effect?
  - Congestion rents



- Congestion rents
- Operation related costs

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Transmission- other issues

- Novel technologies support
  - HVDC/gas-insulated-cables/superconductors/low-sag-conductors/phase –measurements/FACTS/DC-circuit-breakers
- How to address the coordination of operation
- Spot prices
- Constraint management

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Distribution grids

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Smart grids

- Integration of RES in distribution networks is one of the drivers demanding a profound transformation on the way electricity distribution grids are designed and operated.

Smart grid concept

- Should be encompassed with (the costs/benefits shared by all this applications)
  - Demand side management
  - DG penetration
  - EV penetration
  - Distributed storage capabilities

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Distribution grid impact

- Moving from
  - One pre-set direction flow from upstream to downstream
  - Radially operated networks (although meshed configuration designs in urban areas)
  - Simple and passive mode operation rules (medium and low voltage grids are not monitored or controlled in real time, metering is not used for operation purposes, only commercial and energy settlement ones)
  - “fit and forget” practices
    - investments to supply future peak demand with ample design margins.

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Distribution grid impact

- Towards
  - Intermittent multidirectional flows due to DG (RES production produces intermittency in the flows direction)
  - Demand side management (retailers, aggregators, …).
  - Requirement of much more complex and sophisticated information, communication, monitoring, control and protection systems to enhance the operation and efficient use of networks
    - Larger flexibility and larger use of available resources
  - Possibility of taking advantage of new added-value services

- Therefore
  - New drivers for investment and operation costs
  - New services, new opportunities to enhance efficiency

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Regulatory goals

- Regulation should cope with this new reality
  - Removing regulatory barriers
    - Connection
    - Aggregation to participate in markets (services)
  - Enhancing the use of new services if efficient
  - Aligning distributors interests with the general ones
    - Recovery of incurred costs
    - Making attractive to take advantages of new services to avoid/defer new investments

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Regulatory main issues

- Cost recovery – remuneration (regulated business)
  - Maintain Incentive based schemes
    - But take into account new drivers of costs
      - Investments
      - Operation and maintenance costs
  - Maintain output based incentive schemes
    - But take into account new drivers for
      - Quality of services
      - Losses optimization
- Grid charges
  - Incentivize properly the location and the cost-reflectiveness of each RES unit (DG-demand)
  - Nodal prices (at distribution level)?
  - Use-of-system charges
  - Connection charges (shallow vs deep)

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Regulatory main issues

- Assign roles to
  - Distributors
  - Retailers and energy service companies – aggregators
- In
  - Metering
  - Aggregation of consumers
  - Providing services
  - Requiring services
  - Interaction with the DSO
  - Interaction with TSO
  - Interaction with end-consumers and control of their appliances

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Thank you for your attention

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