SET PLAN Conference 2015

Research, innovation and competitiveness for the Energy Union

SYSTEM EFFICIENCY

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SESSION 5

Efficient energy systems

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Speaking points

- Three examples of energy systems and a look at efficiency
  - Stand-alone plant
  - Metal-mechanical cross-border value chain
  - City district

- Technology challenges for energy systems
- EU’s competitive position for energy systems
- Societal impact and the impact on consumers
- How to promote investment at system level?
- Gaps in European R&I?
- Scope for synergies and cooperation at EU level?

N°1: Single plant: a data centre

Note: Water storage tanks below the cooling towers ensure that Google has water available whenever they need it.

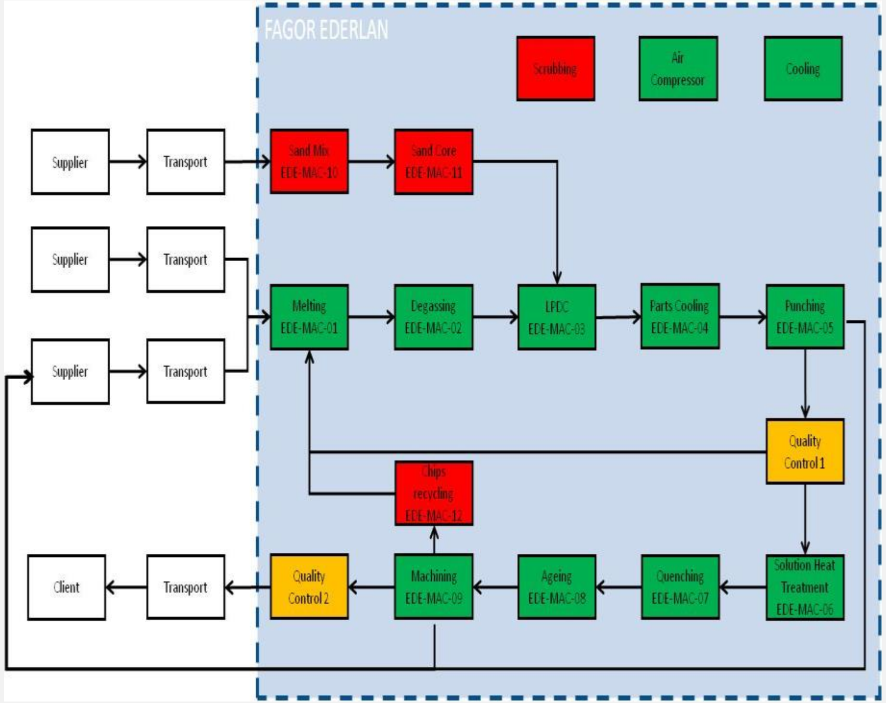
Source: Google

- Google data centers (12 worldwide)
- Google site in Saint Ghislain (Belgium): 550M€ investment, 46M€ yearly operation costs: “highly energy efficient”
- 13 August 2015: four ligthning strikes on local grid, outage, battery drains, data loss
- ➢ Securisation according to probability of risk: very difficult trade-off between investment costs and probability of incidents

➢ A few thousand € of lost load for the electricity retailer, but possibly billions of € for losses from damaged data

➢ System security constraints implies looking at entire value chains including the customer of the customer

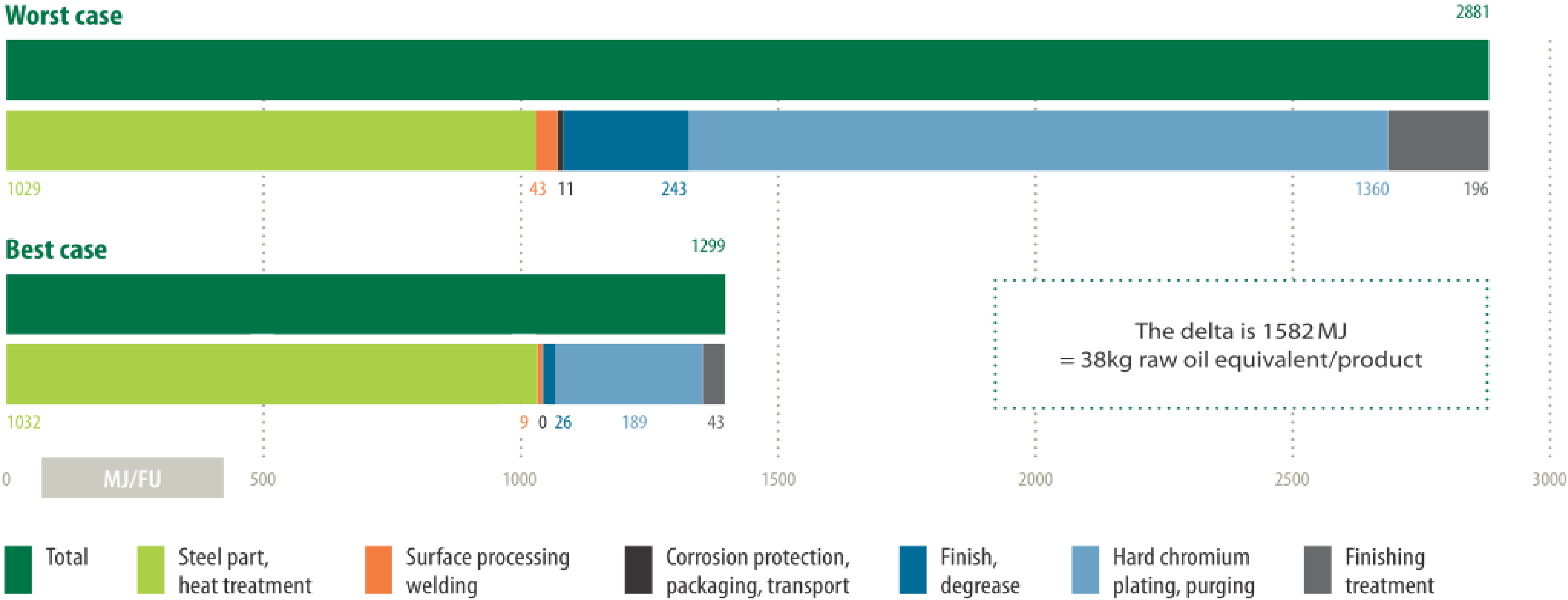
N°2: Metal-mechanical cross-border value chain



MEMAM, an ongoing H2020 FoF project (DG RTD):

Where are the boundaries of efficiency considerations in industry? Energy efficiency or overall resource efficiency?

Value chain resource use optimisation of hydraulic piston rod production



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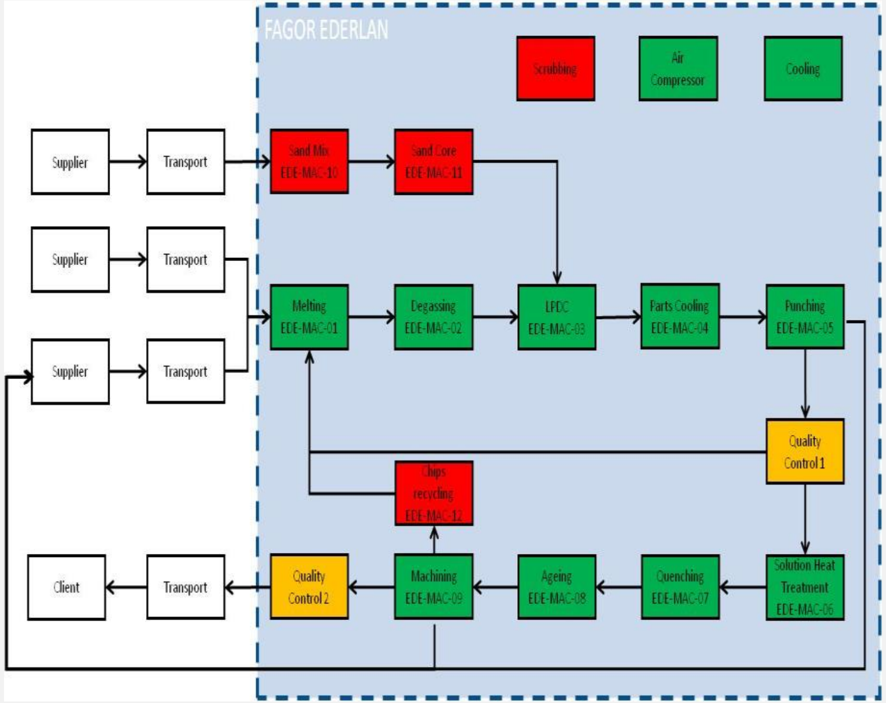
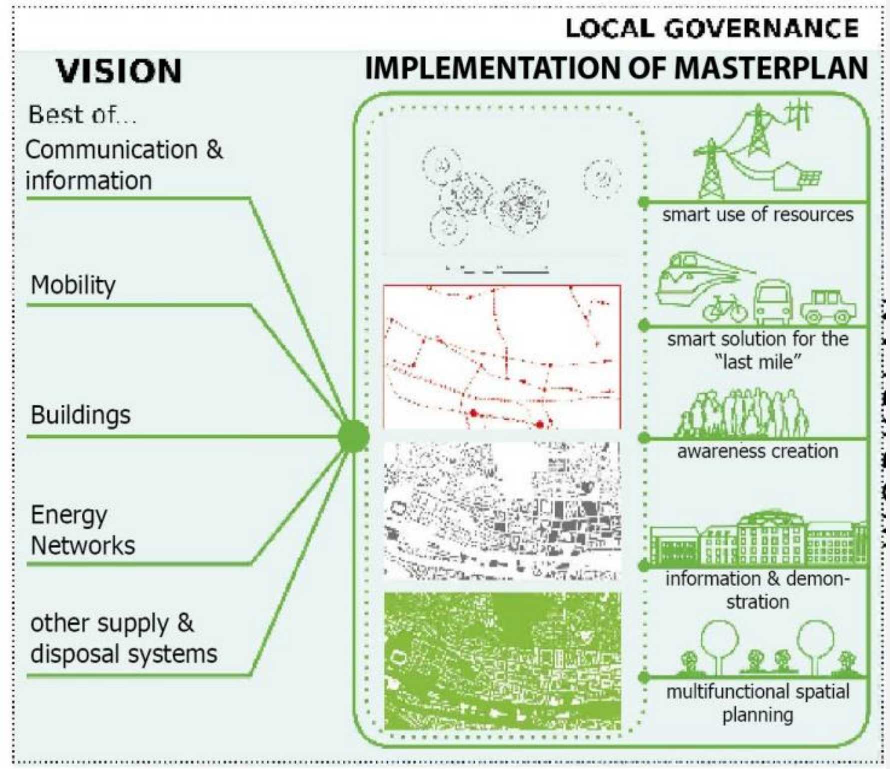


MEMAM, an ongoing H2020 FoF project (DG RTD):

Where are the boundaries of efficiency considerations in industry? Energy efficiency or overall resource efficiency?

- Three cross-border value chains under scrutiny for resource efficiency (Energy, water, materials)
- Cross-border value chain resource efficiency requires:
  - Value chain material flow analyses, circular concepts
  - Tangible joint action plans
  - Collaborative attitudes
  - Governance structures
  - Solving legal issues in different legal systems
- The customer of the customer of the customer…….

N°3: smart district replicability



SINFONIA, an ongoing FP7 Smart City project (DG ENER)

What is our system? The building? No, the district, with several sub-systems.

- District efficiency = looking at entire value chains including the final inhabitants
- District efficiency = integration of electricity, heating & cooling and gas grids
- District efficiency= more than the summed up efficiency of each of the individual components that shape a district

Technology & non-technology challenges

Technology

- Systemic modelling, simulation and optimisation including the impacts of market mechanisms and value of usages for systems covering local, regional, national or pan-European scales
- Techniques to reach resource efficiency, beyond energy efficiency (measuring, real-time data, benchmarking, optimisation)
- Energy storage as one of the reliable and cost efficient integration interfaces within and between systems

Non-technology

- Governance issues (cooperation and cost-benefit distribution among actors within one system)
- Legal and regulatory aspects for cross-border system optimisation
- Consumer / end-user behaviour, motivations, change management necessary for system optimisation

EU competitive position

Addressing resource-efficiency within value chain optimisation will definitely increase EU competitiveness.

Examples:

Automotive & aeronautical value chains!

Societal impacts

- Understanding the end-user value and the behavior of the final consumer is crucial for system efficiency optimization strategies. E.g. “rebound effect”
- Value efficiency and in-effiency better; put a price tag to in-efficient choices
- There might be need for new smart regulation,
  - to rule out the most in-efficient decisions
  - To induce change where market signals are not working / are not sufficiently strong

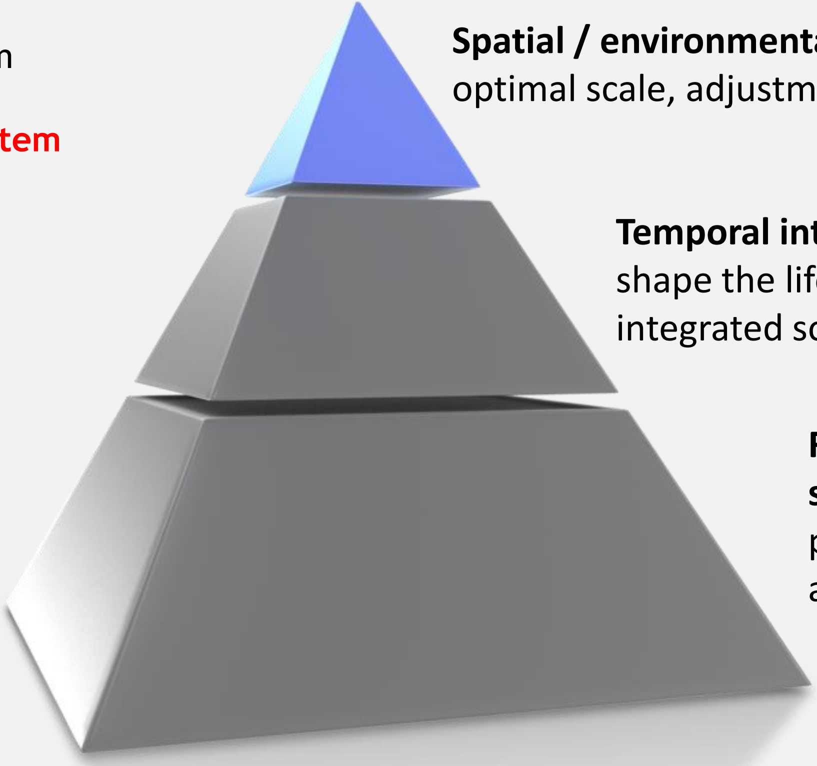
Promoting investment

- Develop innovative regulations that send favourable and long-term predictable signals to investors
  - E.g to encourage investment in energy storage, demand side management, ….
- Avoid political stop & go
- Insecurity about political & legal framework conditions kills investor confidence and drives investors out of the country / the region

Gaps in European R&I

- Innovation addressing system integration issues of technologies maximising **system resource efficiency**

- Focus on maximising **system flexibility** at accceptable security



Spatial / environmental integration
optimal scale, adjustment to local climates

Temporal integration
shape the life cycle cost of integrated solutions

Functional integration solutions into the system
plug and play, not plug and pray

Scope for synergies & cooperation at EU level

- Promote **regional, cross border system innovation** based on resource efficency of **complete value chains**
- Link with EU-supported R&I to complement the public funding support by Member States
- Accompany large scale demonstrations to perform cost / benefit analysis
- Support regulatory evolutions / harmonisation at pan European level

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