Digitalization & Energy

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Digitalization has the potential to reshape, modernise, transform demand-side sectors; policies are needed to maximise benefits and reap energy saving opportunities.
Impacts on road transport energy demand

- Automation, connectivity, sharing, and electrification (ACES) to dramatically reshape mobility
- Impacts on energy demand difficult to predict

I) Optimistic scenario: "Have our cake and eat it too"

II) Pessimistic scenario: "Dystopian nightmare"


Road transport energy demand could halve or double from automation and connectivity depending on how technology, behavior, and policy evolve.
Supply: oil and gas, coal, and power

**Oil and gas**
- Increased productivity, improved safety and environmental performance
- Could decrease production costs by 10-20%; recovery could be enhanced by 5%.

**Coal**
- Coal mining can expect to see improved processes and reduced costs as well as improved environmental performance

**Power**
- Power plants and electricity networks could see reduced O&M costs, extended life time, improved efficiencies and enhanced stability
- Savings of USD 80 billion per year

Energy companies have been adopting digital technologies for years, to increase productivity, reduce costs, improve safety and environmental performance
Supply: Key role of Data and analytics

Digitalization in the power sector

Data and analytics:
- Provide for predictive maintenance, planning and operational changes

Connectivity:
- Enables broad structural change

- Reduced O&M costs
- Improved efficiencies
- Reduction of unplanned outages
- Extended asset lifetimes

- Reduced investment needs
- Reduced fuel consumption and costs
- Reduced CO₂ emissions
- Improved system stability
- Reduced investment needs

*Green = benefit to asset owner, red = system benefits and consumers, blue = global environmental benefits

Digital data and analytics in existing systems can deliver benefits to the owners of power sector assets, the wider electricity system, consumers and the environment
The digital transformation of the energy system - connectivity

Pre-digital energy systems are defined by unidirectional flows and distinct roles
Pre-digital energy systems are defined by unidirectional flows and distinct roles, digital technologies enable a multi-directional and highly integrated energy system
Demand response programs – in buildings, industry and transport - could provide 185 GW of flexibility, and avoid USD 270 billion of investment in new electricity infrastructure.
Building digital resilience

- To date, cyber disruptions to energy have been small
- But cyber-attacks are becoming easier and cheaper – malware, ransomware, phishing / whaling, botnets
- Digitalization also increases the “cyber attack surface” of energy systems
- Full prevention is impossible, but impact can be limited:
  - Raised awareness, cyber hygiene, standard setting and staff training
  - Coordinated and proactive preparation by companies and governments
  - Design digital resilience in technologies and systems
- International efforts can help raise awareness and share best practices
No-regrets policy recommendations

1. Build digital expertise within their staff.
2. Ensure appropriate access to timely, robust, and verifiable data.
3. Build flexibility into policies to accommodate new technologies and developments.
4. Experiment, including through “learning by doing” pilot projects.
5. Participate in broader inter-agency discussions on digitalization.
6. Focus on the broader, overall system benefits.
7. Monitor the energy impacts of digitalization on overall energy demand.
8. Incorporate digital resilience by design into research, development and product manufacturing.
9. Provide a level playing field to allow a variety of companies to compete and serve consumers better.
10. Learn from others, including both positive case studies as well as more cautionary tales.