

Supporting Economic Recovery through Innovation and Digitalisation

Vienna Energy Forum

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Towards Sustainable Digital Transformation



Covid-19 has put digital technologies in the centre of society:

- Accelerated the digital adoption
- Changed behaviour for goods and services
- Made us rethink business models
- Mainstreamed new tools: 5G, IoT, Machine Learning, AI, blockchain, Additive Manufacturing, Big Data, Automation, Cloud Computing, ...

However, Covid-19 has slowed even further down the energy efficiency progress!

How can innovation and digitalisation enhance Energy Efficiency?

Building Management Systems



Additive manufacturing, big data, IoT, automation...



Smart and efficient appliances



Smart cities



Electrification of energy uses



Last mile logistics



How can innovation and digitalisation enhance Energy Efficiency?

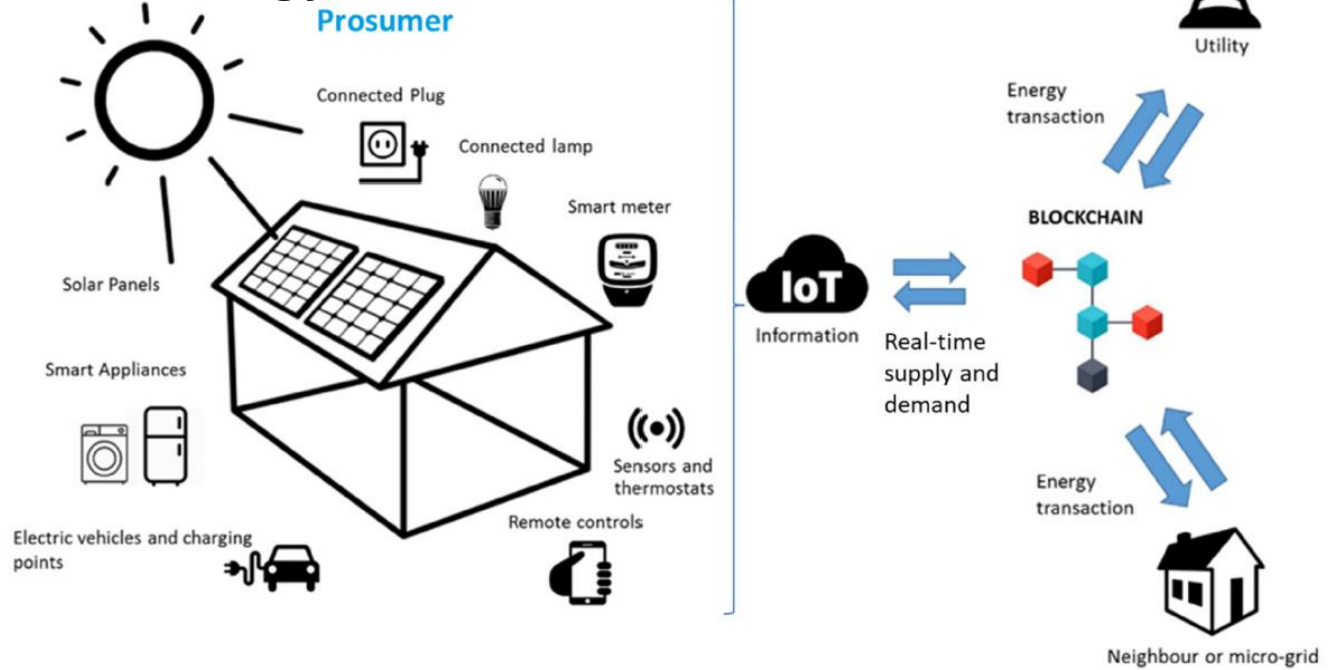


Figure 1. Blockchain-based decentralised P2P energy trading system.

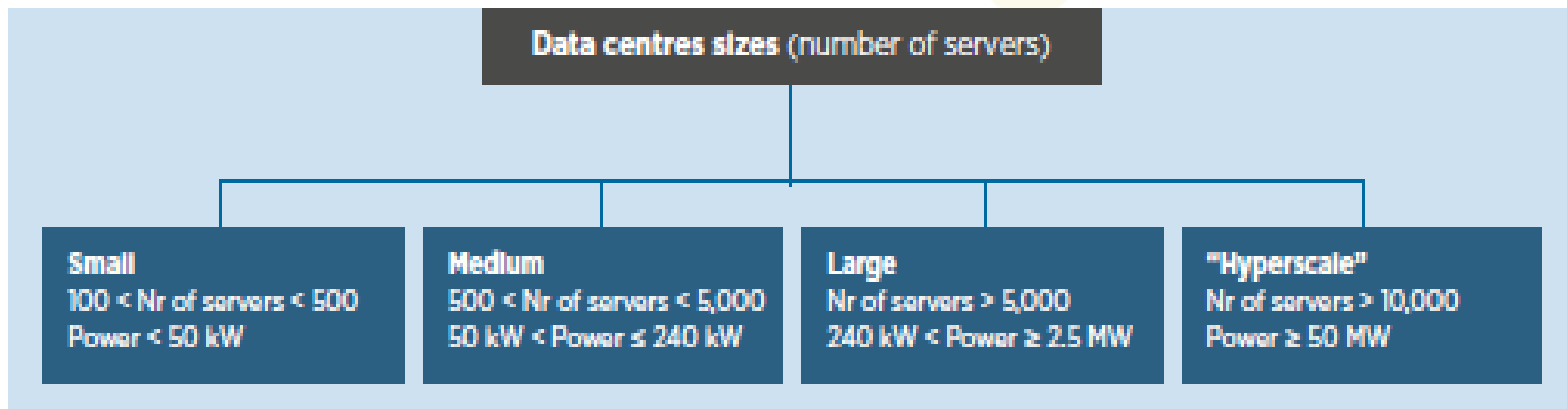
From: Schletz, M.; Cardoso, A.; Prata Dias, G.; Salomo, S.; (2020) *How Can Blockchain Technology Accelerate Energy Efficiency Interventions? A Use Case Comparison*. Energies. 13(22).

How can innovation and digitalisation enhance Energy Efficiency?



- Predict supply and demand
- Measure in real time
- Remote monitoring
- Improve analysis and decision making
- Increase transparency

The backbone and drawbacks of digital infrastructure - Datacentres



- 1% to 1,5% of worldwide energy use (2019)
- Energy use increase of 6% between 2010-2018
- Computing instances with 550% growth 2010-2018
- Datacentres require 10 to 100 times more energy than other commercial building types



How does a datacentre use energy?

- From chips to servers
- Routers, switches and cables
- Direct power, backup and storage
- Cooling and ventilation
- Control and security systems

What are the challenges to innovation and digital economy?

Rebound Effects

Direct Rebound Effects

Indirect Rebound Effects

Environmental Impacts

Carbon Emissions

Energy Demand

E-waste & resource inefficiency

Governance

Cyber Security & Data Protection

Digital Divide & Digital Access

Regulation & Standards

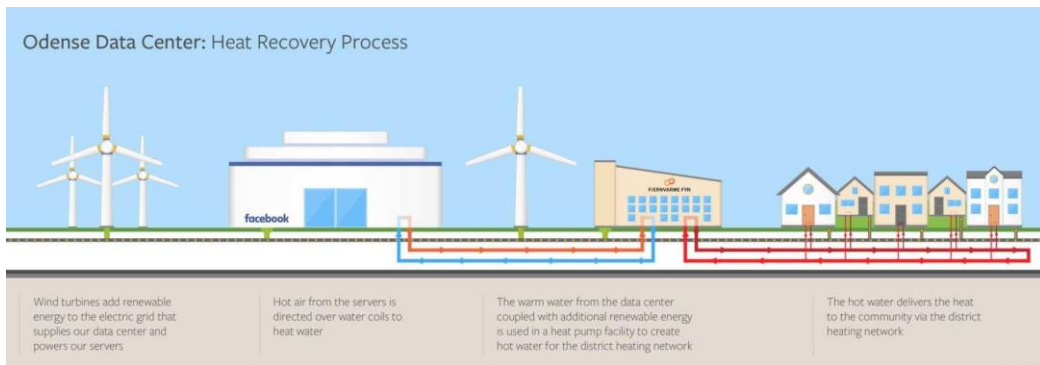
Economic Disruptions

Examples of technical solutions



Innovative Data-Centre Cooling Technologies in China - Liquid Cooling Solution

Renewable energy and heat recovery to district heating



Fuel cells & green hydrogen



Underwater datacentres



Placing digital and energy efficiency at the heart of NDCs, SDGs and recovery packages

- Boost public digital infrastructure investment
- Develop regulatory frameworks, standards and policy & planning. Beware: technology (hardware and software) develops faster than regulation!
- Bet on re-skilling and upskilling of professionals
- Support SME's on digital transformation: commercial, industry, agriculture, forestry
- Test innovation and fund R&D
- Promote global collaboration and digital toolkits for developing and emerging economies
- Promote information, communication and behaviour change (use gaming and streaming entertainment for the effect)

COPENHAGEN CENTRE FOR ENERGY EFFICIENCY

DATA CENTRE BEST PRACTICE FEBRUARY 2012




REPORT 1 Environmental sustainability of data centres: A need for a multi-impact and life cycle approach

KEY MESSAGE

- The current low energy use of data centres is not sustainable in the long term for several reasons:
 - The data centres are located in areas with high energy costs.
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 - The data centres are located in areas with high energy costs.
- Designing data centres for environmental sustainability requires a multi-impact and life cycle approach.
 - The data centres should be designed to minimize their environmental impact throughout their entire life cycle, from construction to operation and decommissioning.
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DATA CENTRE BEST PRACTICE JULY 2012



REPORT 2 Data Centres: Digitalisation Powerhouse and Energy Efficiency Potential

KEY MESSAGE

- The digitalisation of the economy results in a significant increase in the demand for data centres.
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 - The digitalisation of the economy results in a significant increase in the demand for data centres.
 - The digitalisation of the economy results in a significant increase in the demand for data centres.
- The main challenge for the energy use of data centres is to reduce the energy consumption per unit of data processed.
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DATA CENTRE BEST PRACTICE SEPTEMBER 2012



REPORT 3 Reducing the energy use of video gaming: energy efficiency and gamification

KEY MESSAGE

- Video gaming is a growing industry and is expected to continue to grow rapidly.
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 - Video gaming is a growing industry and is expected to continue to grow rapidly.
- The energy use of video gaming is high and is expected to continue to increase.
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DATA CENTRE BEST PRACTICE JANUARY 2013




REPORT 4 Innovative Data-Centre Cooling Technologies in China - Liquid Cooling Solution

KEY MESSAGE

- The demand for data centres in China is growing rapidly.
 - The demand for data centres in China is growing rapidly.
 - The demand for data centres in China is growing rapidly.
 - The demand for data centres in China is growing rapidly.
- The energy use of data centres in China is high and is expected to continue to increase.
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Latest Technology Developments in Consumer Electronics and Their Impacts on Household Energy Use and the Design of Policies and Programmes in Developing Countries

Xianli Zhu
Technical University of Denmark


JANUARY 2012

Digital Climate Emergency Series




Zero Carbon Emissions in Digitalization

03 March 2020




DANISH DATA CENTER PROGRAMME

Digital Climate Emergency Series



Beyond Energy Efficiency - Life Cycle Based Data Centre Sustainability

02 July 2020



DANISH DATA CENTER PROGRAMME

Thank you.

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Please visit our knowledge Management System at:

<https://c2e2.unepdtu.org/>

