



# Towards Zero Pollution Communication Networks

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EU GREEN WEEK 2021 PARTNER EVENT

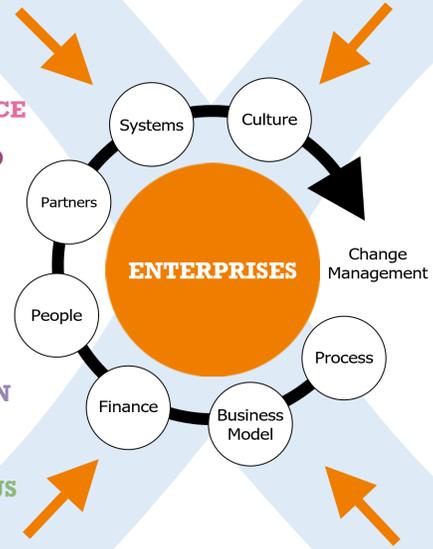
**ZERO** #EUGreenWeek  
**POLLUTION**  
for healthier people and planet

# Introductions

## TECHNOLOGIES

- INTERNET OF THINGS**  
Telematics • Machine-to-Machine • IoT Platforms  
Industry 4.0 • Operational Technology  
Smart Factory • Sensors
- HYPER-CONNECTIVITY**  
5G • LTE • 3G • 2G • Narrowband • LoRa • Sigfox • NB-IoT  
NFV/SDN • Visible Light Communications  
Private networks • Bluetooth • Fibre • WiFi • WiFi6  
WiFi HaLow • Personal Area Networks • 802.15.4 • RFID
- HUMAN-MACHINE INTERFACE**  
AR • VR • Screens • Video Processing • Neural Sensing  
Haptics • Natural Language Processing • Quantified Self  
Motion Control • Proactive Interfaces • Exoskeletons
- ARTIFICIAL INTELLIGENCE**  
Machine Learning • Deep Learning • Machine Vision  
Cognitive Computing • Semantic Web  
Artificial Narrow Intelligence • Artificial General Intelligence  
Superintelligence • Neural Networks • Data Ontologies
- DISTRIBUTED LEDGER**  
Distributed Data Storage • Blockchain  
Proof-of-Work • Smart contracts
- DATA SHARING**  
Big Data • Data Lake • Data Analytics • Data Exchanges  
Data Trading Platforms • Security-by-Design • Privacy & Trust  
Personal Digital Information Management • Data Sovereignty  
Data Streams • Data Anonymisation • Digital Identities
- PRODUCT LIFECYCLE MGMT**  
Digital Twin • Manufacturing Process Management  
CAD/CAM • Knowledge-Based Engineering  
Predictive Engineering Analytics • System Modelling  
Incremental Materialisation • Physical Twin • Circular Economy
- ROBOTIC PROCESS AUTOMATION**  
Task Automation • Virtual Assistants • Bots  
ERP • CRM • AI-assisted RPA
- EDGE COMPUTING**  
Cloud • Hybrid • On-Premises • Compute Edge • Device Edge  
Fog Computing • Software Edge • Software Containers  
Hypervisors • Datastream Processing
- AUTONOMOUS ROBOTIC SYSTEMS**  
Autonomous Driving • Nanobots • Drones/UAVs  
Swarm Robotics • Precision Robotics
- 3D PRINTING & ADDITIVE MANUFACTURING**  
Agile Production • Nano-factories • Biological Printing  
Perishable Goods Printing • Molecular Assembly  
Rapid Prototyping
- FUTURE TECHNOLOGIES**  
Graphene • Quantum Computing • Human Re-engineering  
Superconductivity • Nano Particles • Smart Materials  
Ofactory Technology • Energy Harvesting • Smart Dust

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## USE CASES

- BUSINESS EFFICIENCY**
  - Data Analysis: Customer Behaviour Analysis • Demand Forecasting  
Knowledge Management & Horizon Scanning  
Data Scrubbing • Customer Segmentation  
Business Process Forecasting • Geophysical Analysis  
Risk Analysis • Compliance Analysis • Feedback Analysis
  - Process Optimisation: Churn Management • Inventory Management  
Personalised Marketing • System Optimisation  
Logistics & Transport Optimisation • Workflow Optimisation  
Recommendation Engines • Dynamic Pricing
  - Decision & Automation: Fraud Detection • Computer Assisted Diagnostics  
Trading Strategies • Intelligent Recruitment and HR  
Assisted Decision Making • Smart Customer Support  
Repetitive Process Automation
- DATA-CENTRIC BUSINESS MODELS**
  - Data Stream Processing: Threat Detection • Intrusion Detection • Video Processing  
Still Image Processing • Complex Image Analysis  
Machine Translation • Predictive Maintenance  
Sentiment Analysis • Traffic Monitoring
  - User Interaction: Next Generation Search • Voice Authentication  
Quantified Self • Chatbots and Digital Assistance  
eGovernment
  - New Data Economy: Cryptocurrency • Smart Contracts • Proof-of-Work  
Digital Identity • Supply Chain Audit • Immutable Records  
X-as-a-Service • Data Exchange • Data Monetisation
- CONNECTED THINGS**
  - Machine-to-person: Personal Monitoring & Tracking • Connected Vehicles  
Portable Information Terminals • Office Equipment  
IT Infrastructure • Payment Terminals • White Goods  
Personal Assistance Robots • Smart Speakers/Media Devices
  - Autonomous Systems: Asset Tracking & Monitoring • Remote Process Control  
Inventory Management & Monitoring • Smart Grid  
Remote Diagnostics & Maintenance • Autonomous Vehicles  
Real World 'Visualisation' • Precision Specialist Robots
  - Smart Environment: Alarms • CCTV • Access Control & Intercomms • HVAC  
Building Management Systems • Lighting  
Parking Space Monitoring • Environmental Monitoring  
Public Information/Advertising Screens • Road Infrastructure



**Jim Morrish**  
**Founding Partner**  
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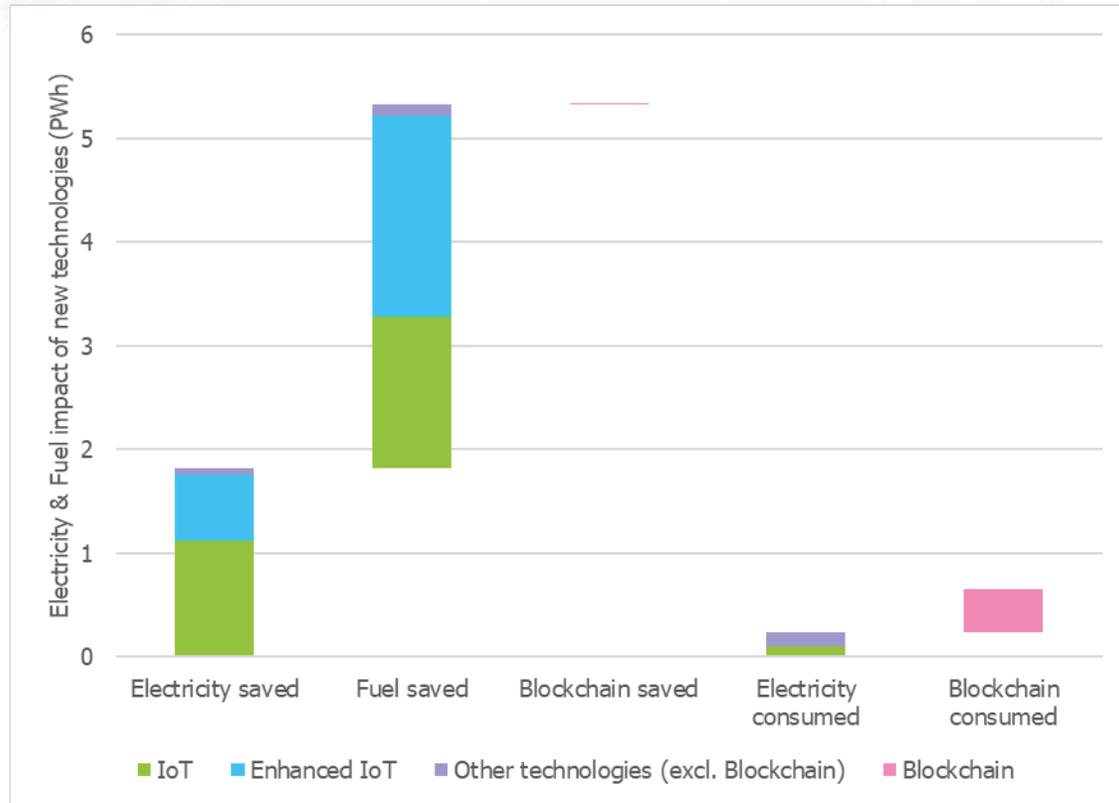
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## In aggregate, new technologies are good for the planet

### Electricity and Fuel impact of emerging technologies, 2030

[Source: Transforma Insights, 2021]



- Significant sustainability from IoT and 'Enhanced IoT' (with AI): energy savings of >5PWh in 2030.
  - Net electricity savings: 1.6PWh
  - Net (hydrocarbon) fuel savings: 3.4PWh
- Also water consumption reduced by 230 billion m<sup>3</sup> in 2030.
- All IoT applications are dependent on communication networks.

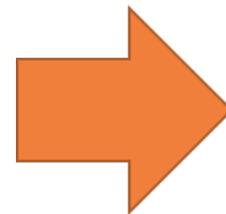
# Sustainability from the perspective of a communications network

## Many things can be done ...

- Next Generation Mobile Networks (NGMN): Powering down aspects of mobile networks when demand allows.
- Implementing AI to increase efficiency of data centre cooling.
- Power efficient (and data traffic efficient) connected devices and applications.
- Edge computing and AI to redact traffic.
- Locate servers where green power is available.
- Consumer choice: don't watch 8k Ultra HD quality services on-demand (and delete all 'cat' videos from the internet)!

## But some things shouldn't ...

- Communications traffic can be reduced by:
- Not implementing edge-based (MEC) vehicle traffic management solutions.
  - Travelling to business meetings instead of using web-conferencing.
  - Not implementing smart building management and HVAC solutions.



- ***Aiming for zero pollution communications networks is a good thing.***
- ***But this goal needs to be analysed in context.***