

Building Energy Efficiency

Environmental, Social and Governance (ESG) aspects in Infrastructure Asset Management
Dr Ioanna Papanikolaou CEng MICE

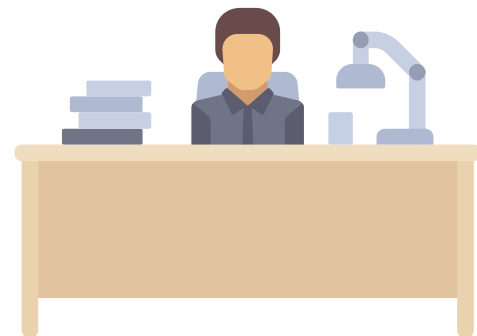
10 March 2023

Session contents:

- 1 - Sustainability definitions and context
- 2 – Sustainability and Infrastructure Asset Management
- 3 - Future Directions of AM

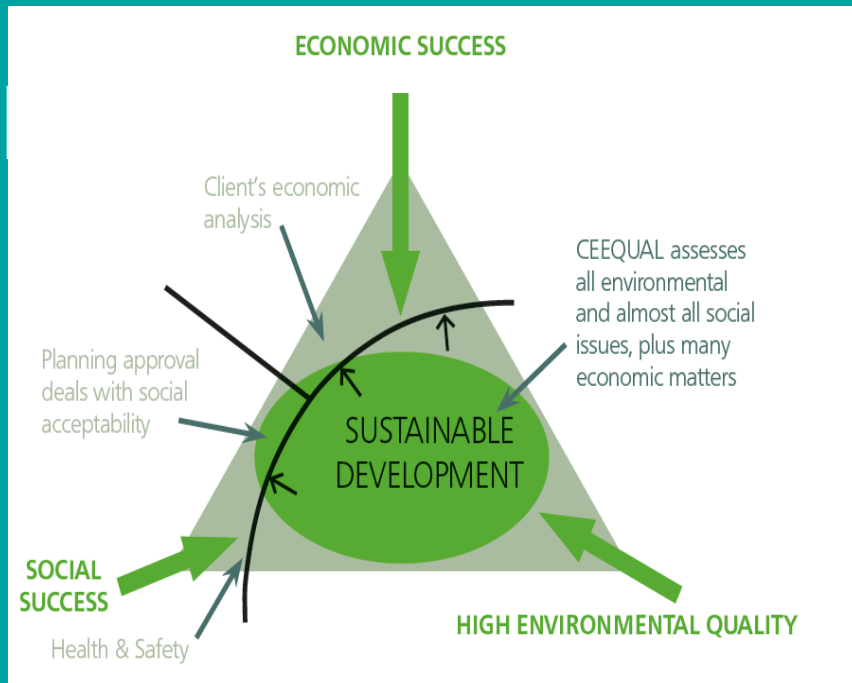


Background and key definitions



Sustainability

3 Pillars = People, Planet, Profits



ESG

Governance and investment framework

E ENVIRONMENT

S SOCIAL

G GOVERNANCE

- 17 sustainability goals
- Call for action by all countries to promote prosperity while protecting the planet



SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD





Climate
Change

Resilience

Biodiversity

Waste

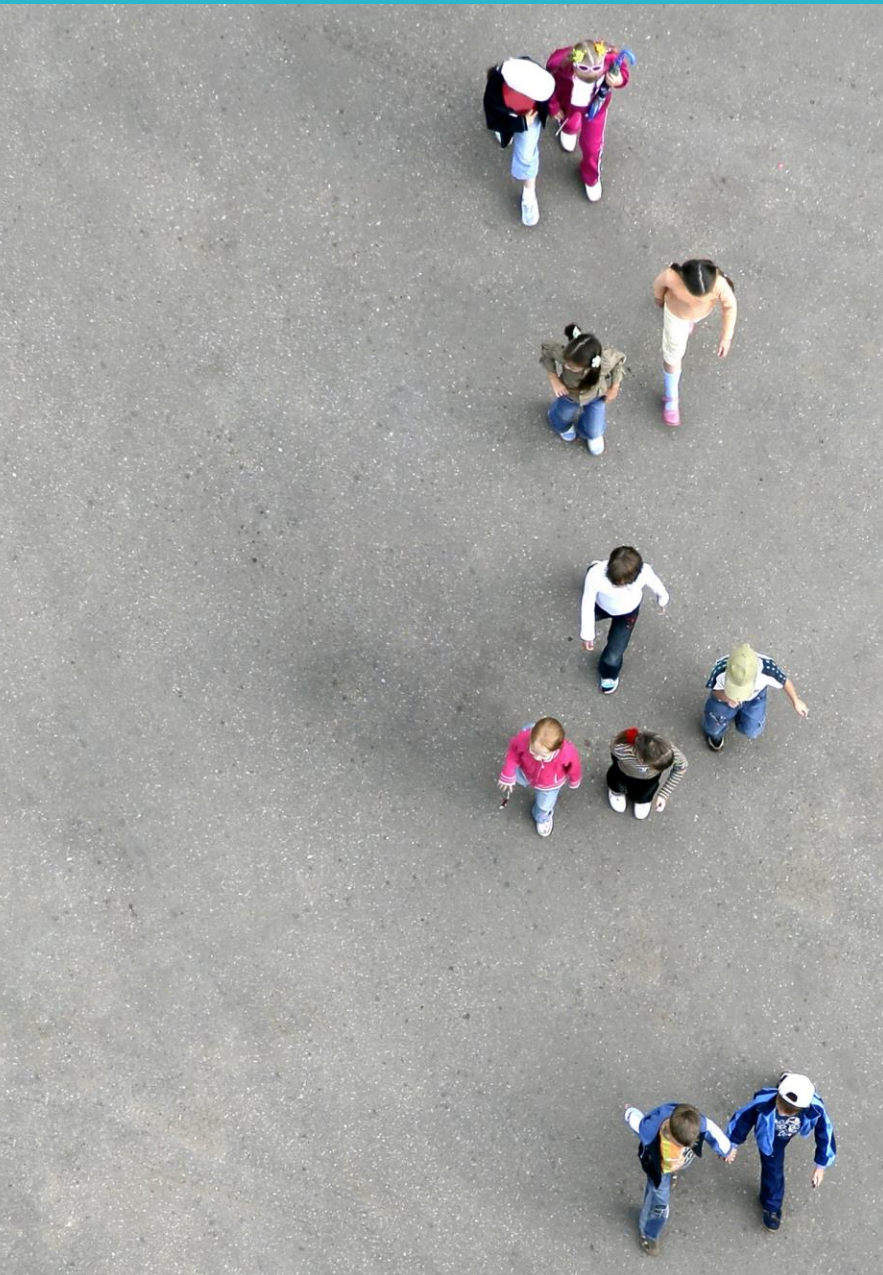
Carbon
emissions

Materials

Circular
Economy

Water
resources

Energy
transition



EDI

Data Security

Ethics &
Integrity

Supply
chains

Social value

Health &
Safety

Financial
access

Wellbeing

Labour



Ethics

Competition

Financial
disclosures

Corporate
Governance

Accounting

Tax

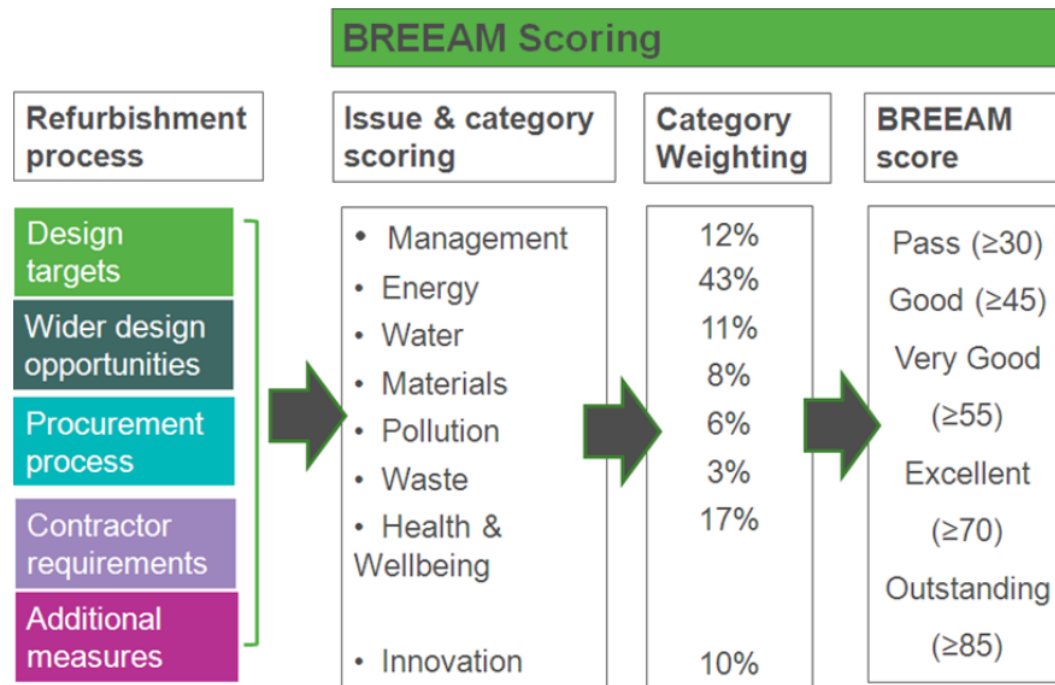
- Continuous drive for incorporating sustainability and environmental stewardship goals as part of IAM
- Stand-alone systems / tools for evaluation of sustainability solutions:
 - Buildings:
 - [BREEAM](#) (UK/Global), [LEED](#) (USA)
 - Infrastructure:
 - [CEEQUAL](#) (UK/Global), [ENVISION](#) (USA), [IS Rating](#) (AUS)
 - New tools incentivised by proliferation of Green finance:
 - [S&P Global Ratings Green Evaluation](#)
- Increasing the sophistication of IAMS in terms of sustainability and environmental stewardship is one of the future directions of IAMS

Sustainability Assessment frameworks: BREEAM

Scoring and Rating

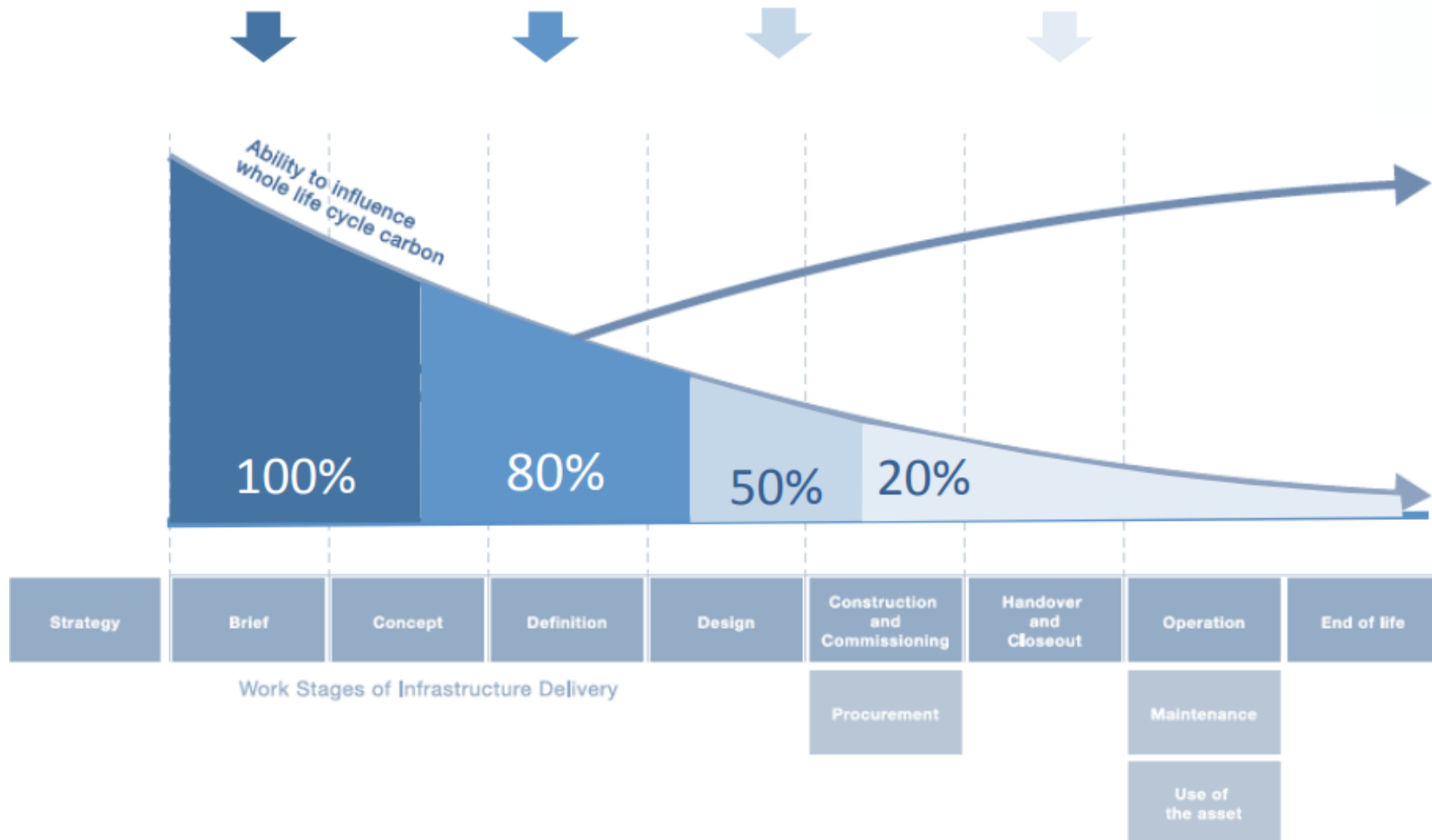
There are a number of elements that determine the overall performance of a domestic refurbishment project assessed using BREEAM. These are as follows:

- The BREEAM rating level benchmarks
- The minimum BREEAM standards
- The environmental section weightings
- The BREEAM assessment issues and credits



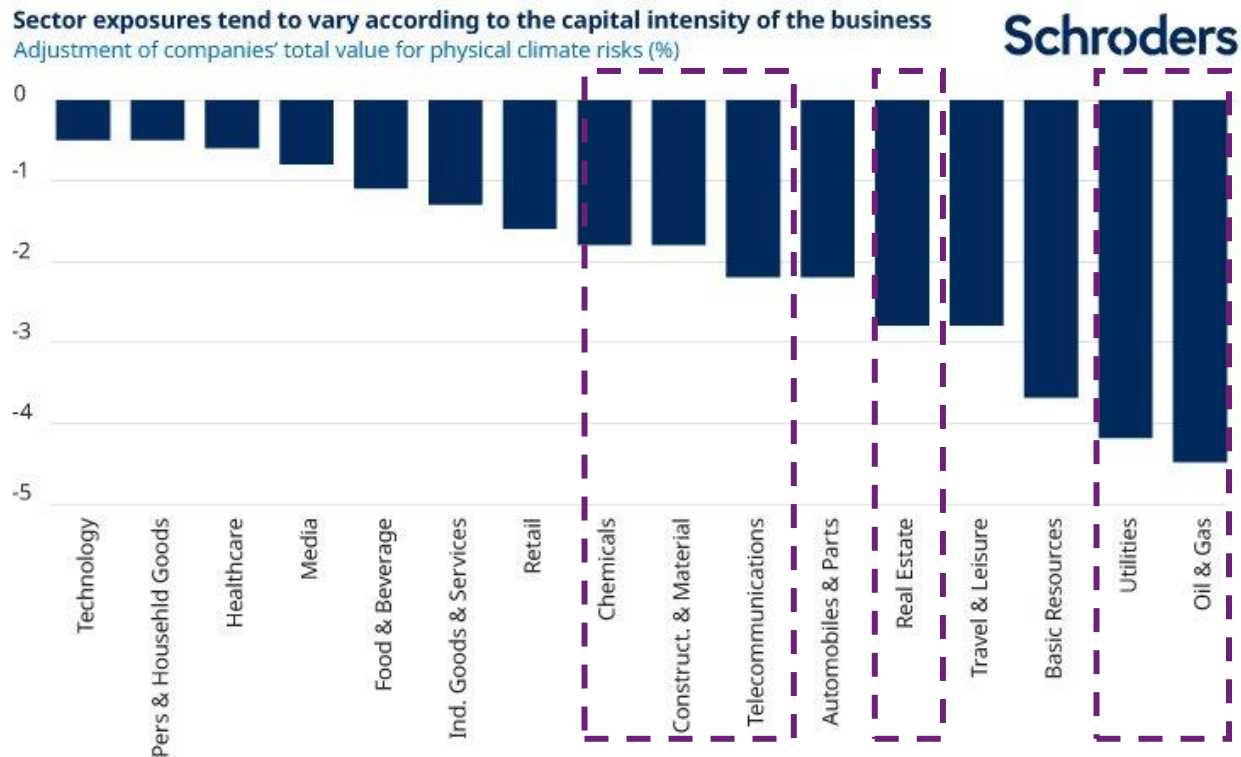
2 – Sustainability and Asset Management

'Build nothing' 'Build less' 'Build clever' 'Build efficiently'



Climate change will disrupt asset-intensive organisations

- Oil & gas and utilities - most exposed to the physical impact of climate change.
- Potential **cost of insuring their physical assets equates to more than 3% of their market values.**



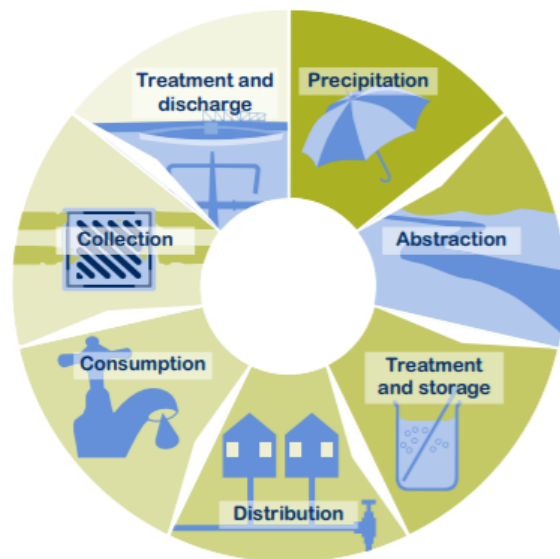
Source: Schroders. Based on most recent data available in March 2018.

We have excluded financial sectors from this summary given the low direct exposure of their fixed assets understates the risk embedded in their assets or liabilities. SCH69706

Asset management has an important and enduring role to play in sustainable development

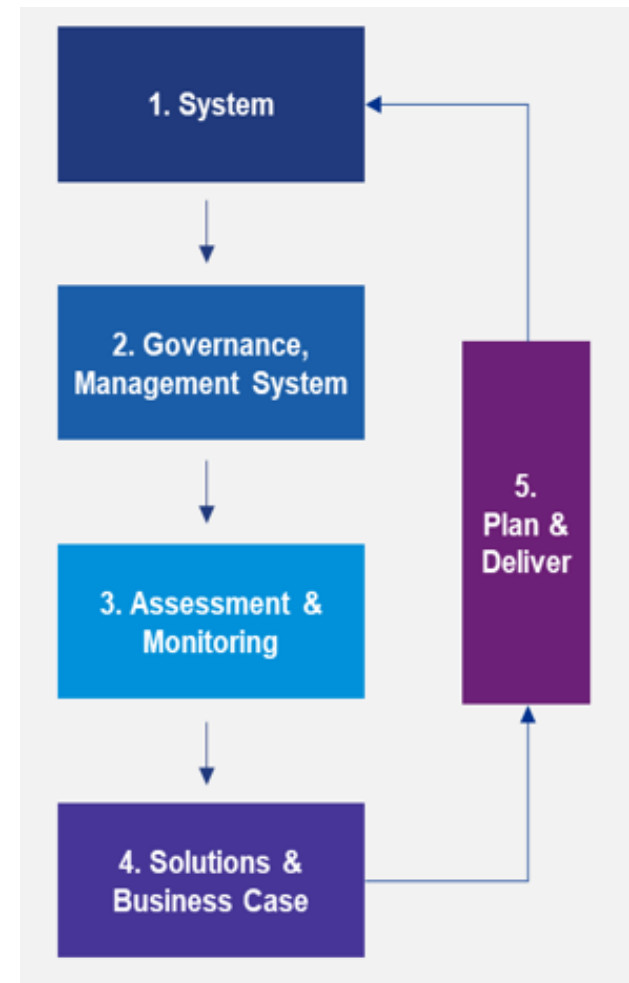
- Effective management of assets can be a key enabler for economic wellbeing and many societal structures
- Potential impact on the environment of assets and asset management activities
- The approach to whole life evaluation of risks and costs and performance of assets

To deliver sustainable water, we need action at every stage of the water cycle



Building **resilience** involves a comprehensive end-to-end approach

- Industries are more inter-connected
- Minor problems in one system can have a big impact
- Example – electricity and transport



Physical risks of climate change

Climate impact

Potential impact on transport system

Increased summer temperatures

- Rail track buckling
- Change in required airport runway length
- Overheating of diesel engines

Increased winter temperatures

- Reducing constraints for road and rail maintenance
- Changed construction seasons

Increased precipitation / flooding

- Flooding of land transport infrastructures
- Embankment collapse,
- Flooding of underground transit systems

More frequent extreme winds

- Damage to infrastructure on roads, railways, pipelines, seaports, cable bridges, etc.
- Disturbance to transport electronic infrastructures, signalling, etc.
- Reduced safety for vehicles driving

Sea level rise and sea storm surges

- Erosion of coastal highways
- Higher tides at ports/harbour facilities
- Low level aviation infrastructure at risk

Change in frequency of winter storms

- Less or more snow / ice for all modes

Reduced arctic sea ice cover

- New northern shipping routes
- Reduced ice loading on structures, such as bridges or piers

Earlier river ice breakup

- Ice-jam flooding risk

Transitional risks of climate change in the Transport Sector

Climate impact

Potential impact on transport system

Policy

- Transition to net Zero
- Car free days/zones
- Increased demand of road user charging
- New regulatory environments

Carbon Tax

- Increased tax for GHG emitting modes of transport
- Allowable solutions

Technology Shifts

- Alternative energy sources
- Electric vehicles
- Provision of charging infrastructure

Market Shifts

- Decentralised energy model
- New revenue models

Reputational Impacts

- Customer and investor expectations



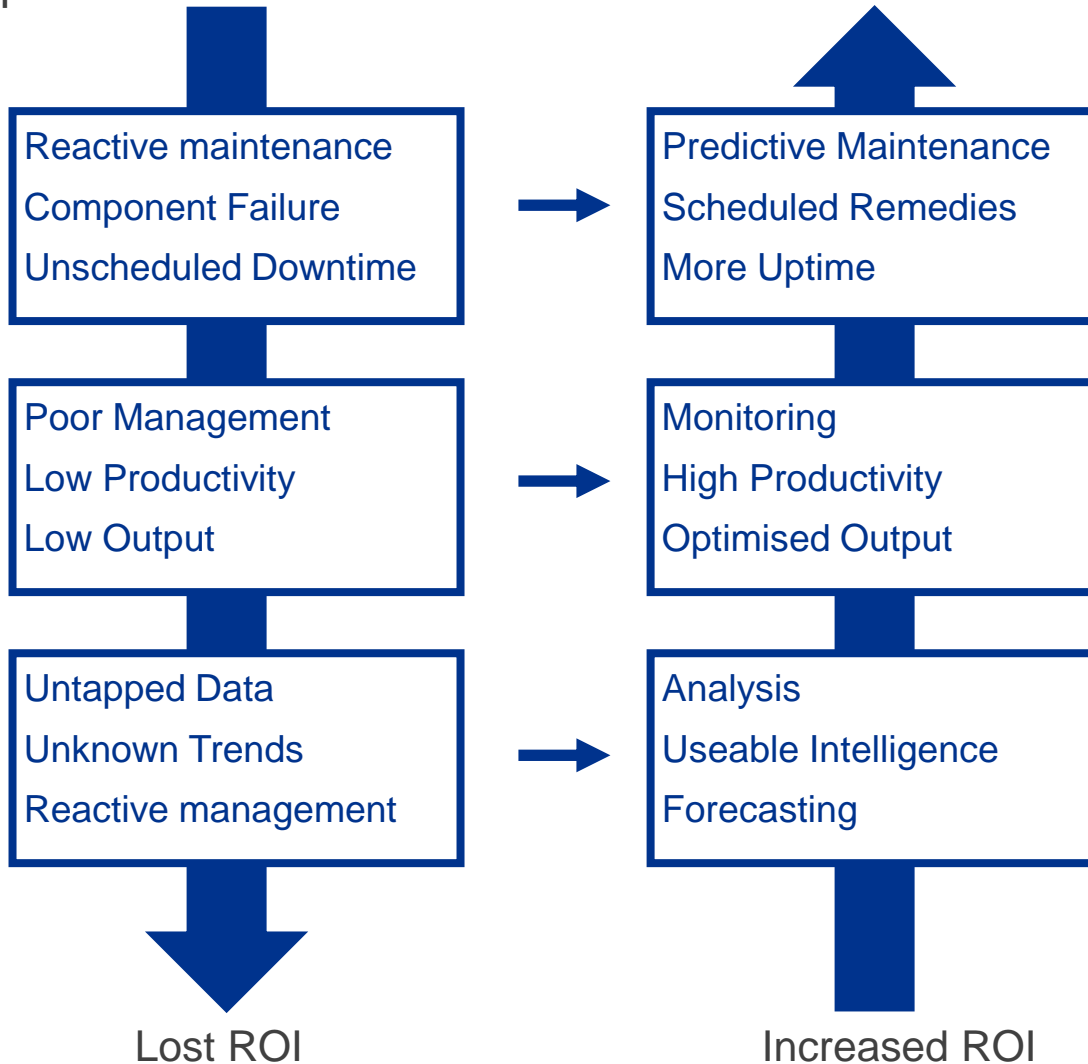
Energy hierarchy of cost-effectiveness

- Energy demand: reducing the need
- Energy-efficient systems: delivering the demand efficiently
- Low carbon energy supply: generating energy minimising CO₂ emissions
- Emerging technologies such as blockchain



AM Solutions and Business Cases

Asset Management can help increasing Return on Investment on your asset portfolio



Asset management main parameters

3 – Future directions of Asset management

- IAM presents opportunities for improvement and advancement due to changes in technology, changing needs and changing user demands
- Improvements due to continued use of IAM such as better performance models, better segmentation, better identification/location, etc.
- Advances in technology with major impact on IAMS:
 - Digital Twins
 - Faster and more convenient databases
 - Smart systems, IoT (sensors)
 - Better communications technology
 - ...
 - *New ideas yet to come*

Future Directions for IAM (2)

- Advances made possible by the use of IAMS:
 - Use of new materials
 - Use of new technologies
 - Institutional improvements
 - Integration of facilities
 - Automated data collection
 - Improved resource allocation
 - ...
- Connectivity and dependence between assets and industries
- Resilience



Questions?

Contact details: Ioanna Papanikolaou

<https://www.linkedin.com/in/dr-ioanna-papanikolaou-0a9b0462>