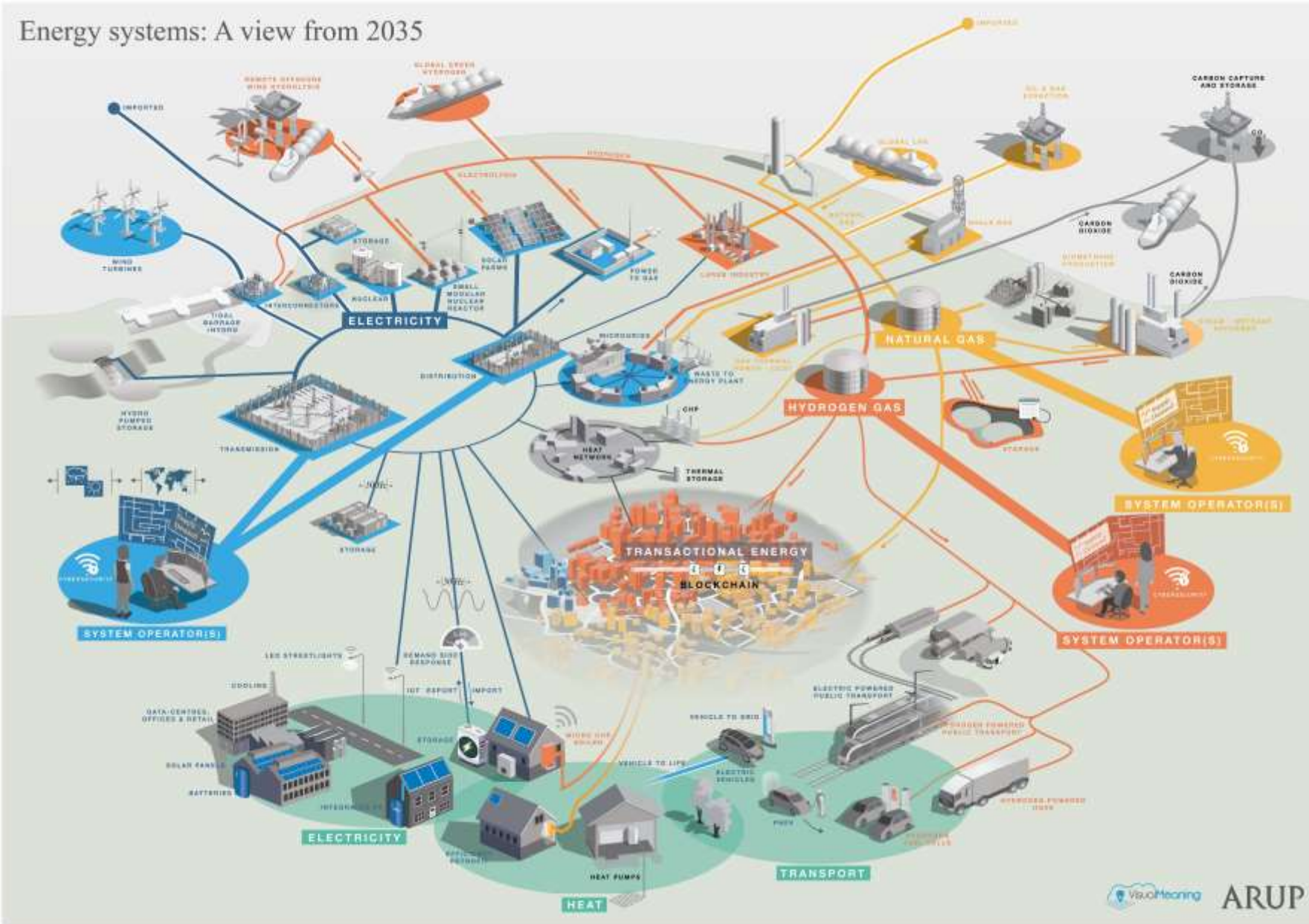


Alan Thomson, Director
Global Energy Systems Business Leader

Just Transitions Summit, New Plymouth, New Zealand
Thursday 9th May 2019

Ratcliffe on Soar 4 x 500MW coal
Nottinghamshire, United Kingdom

Energy systems: A view from 2035



- Electricity
- Natural Gas
- Hydrogen
- Heat / Cool
- Demand



Visualizing ARUP



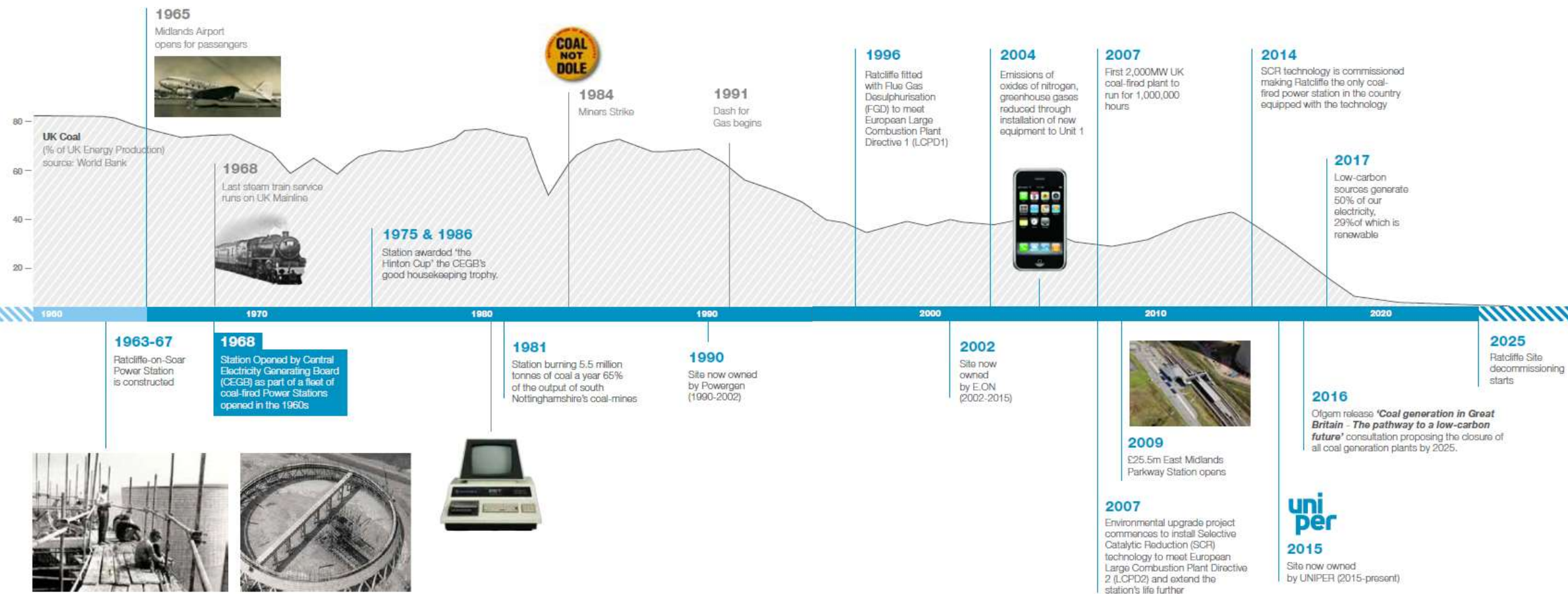
Ratcliffe on Soar
Strategic Options



CIRCL-E
for ENEL



Prospering from the
Energy Revolution



TECHNOLOGY TRENDS

DECARBONISATION

Electric vehicles Renewables Heat pumps

DECENTRALISATION

Microgrids Prosumers

COST OF RENEWABLES

Solar Wind Fuel cells Energy storage

SMART ENERGY

IOT Demand side Response Blockchain

AI & ADVANCED MANUFACTURING

Autonomous Vehicles AM Modular construction 3D Printing

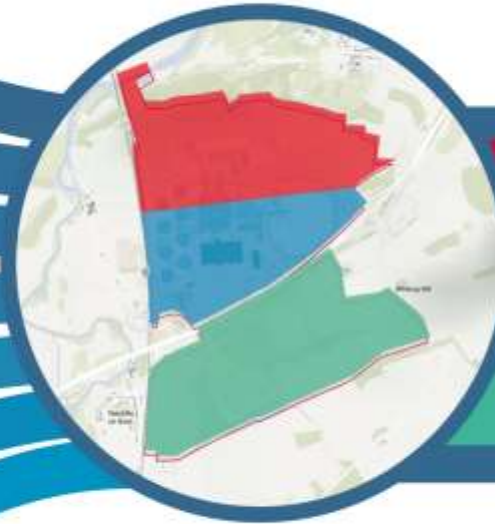
ACCESSIBILITY, CONNECTIVITY & DATA

Public Transport Data Centres

NEW ENERGY GENERATION TECHNOLOGIES

Bladeless Turbines Nuclear Integrated Energy

SITE DEVELOPMENT



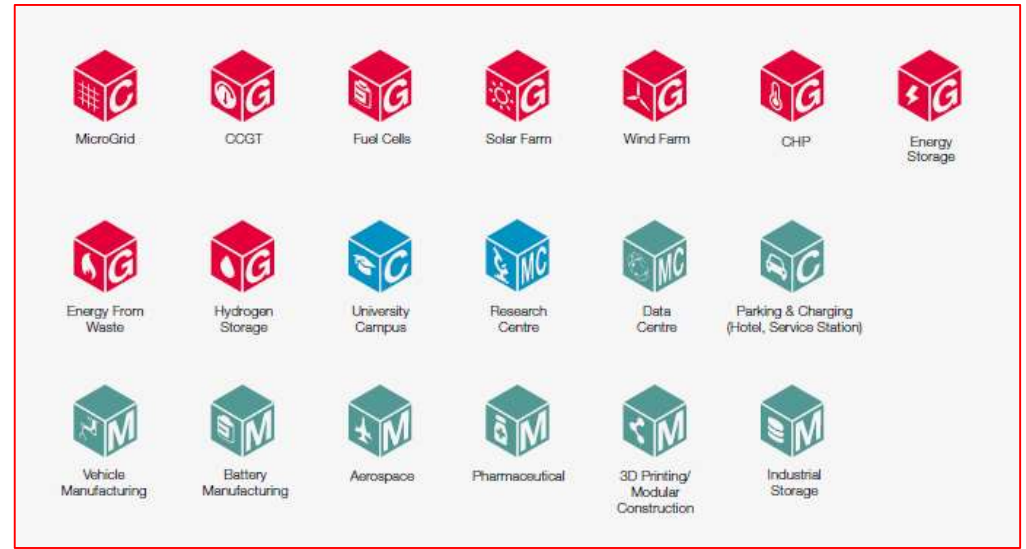
Tailored to site use / site participants

MANUFACTURING
Cost Certainty & Efficiency

MISSION CRITICAL FACILITIES
Security & Resilience

COMMERCIAL RESIDENTIAL
Compliance & Attractiveness

**Integrated
Energy
Masterplan**



BUILDING BLOCKS DEFINED BY BUSINESS OBJECTIVES

- Alignment with Uniper's core business** - Could compliment other energy generation and storage solutions.
- Strategical alignment** - Supplementary to a proposal of a technology focused site.
- Large use of space and energy** - Complimentary user to a proposal of energy production on site.
- Divestment** - Use not aligned with Uniper's core business.

BUILDING BLOCKS DEFINED BY SITE USE

- Mission Critical Facility**
- Commercial Residential**
- Manufacturing**
- Power Generation**

coexist with state of the art premises for energy intensive industries. The map illustrates possible land uses, considering the benefits of the site and the possible timeframes for its development. Examples of similar facilities developed or under development across the world are included.



ADVANCED MANUFACTURING

**DAIMLER CAR PLANT
MOSCOW, RUSSIA**

30ha	7.5MW	1500
Site Size	Energy Consumption	Employee (FTE)



ENERGY FROM WASTE

**KELMSLEY WASTE TO ENERGY,
KENT UK**

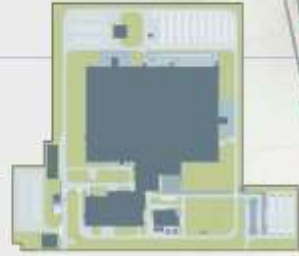
7ha	45MW	550k t/yr
Site Size	Energy Generation	Processing capacity



ENERGY INNOVATION CAMPUS & BUSINESS PARK

CORE SECTION OF HARWELL SCIENCE PARK
(INCL. PUBLIC HEALTH ENGLAND, BAE SPACE, SATELLITE APPLICATIONS CATAPULT, EUROPEAN SPACE AGENCY AND DIAMOND LIGHT-SOURCE)

32ha	225+
Site Size	Organisations
6,000	
Jobs in site	



ADVANCED MANUFACTURING

**HOLSTEN BREWERY,
HAMBURG, GERMANY**

7ha	200 approx	5 MW
Site Size	Employees	Energy Consumption



MATERIALS MANAGEMENT FACILITY

**INCINERATOR
BOTTOM ASH
FACILITY**

10,000 M²
Site Size

**SOLID
RECOVERED
FUEL**

7,500 M²
Site Size
2,000 T/YR
Recovered

**MATERIAL
RECOVERY
FACILITY**

8,500 M²
Site Size
100,000 T/YR
Recovered



ENERGY STORAGE AND POWER

**HORNSDALE ENERGY RESERVE,
JAMESTOWN, AUSTRALIA**

2ha	100MW/ 129MWh	30,000
Site Size	Energy Generation	Home Powered at peak output



DATA CENTRE

DATA CENTRE, CONFIDENTIAL

3.4ha	50MW	30MW
Site Size	Energy Consumption	Heat Reclaim

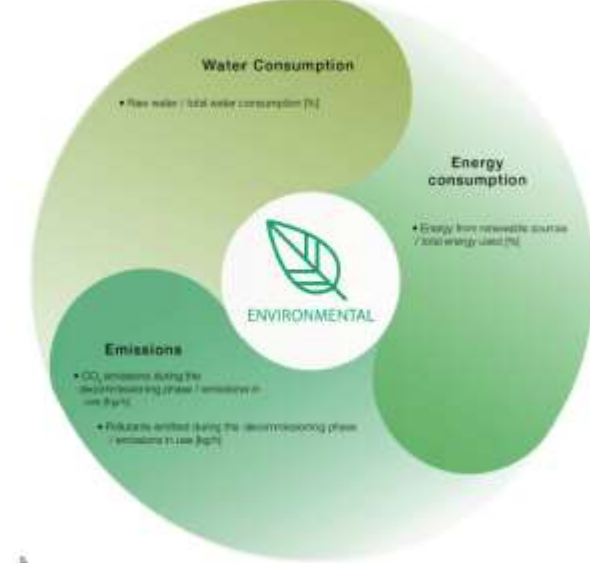
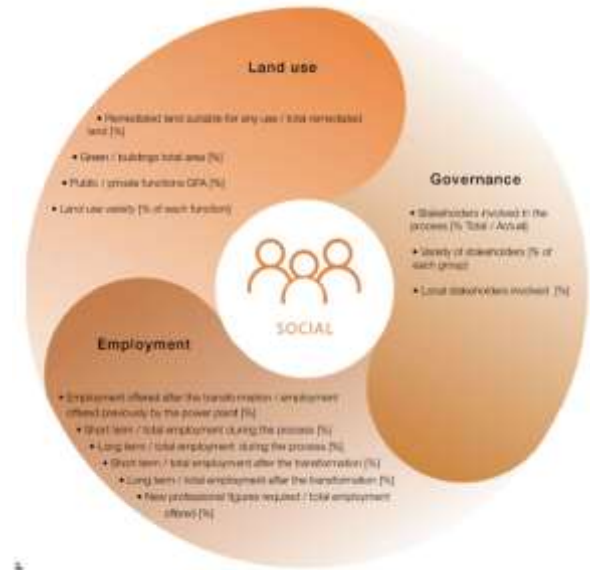
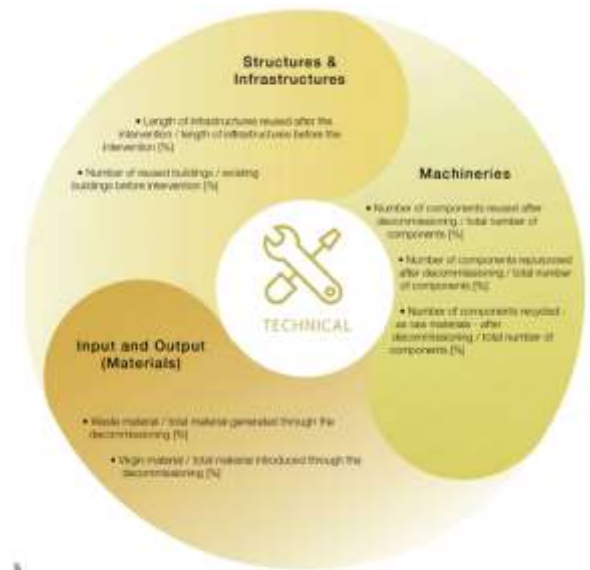


ADVANCED MANUFACTURING

**JAGUAR LAND ROVER, ADVANCED ENGINE
FACILITY, WOLVERHAMPTON, UK**

45ha	19MW	1400 approx
Site Size	Energy Consumption	Employee (FTE)







Progress / first nine months:



UK Research and Innovation