Advances in the Digitalisation of the Process Industries

OCTOBER 2021

# How to drive down the Digitalisation Highway to Sustainability

Roy Calder – Presales Engineering Director

AVEVA

# Agenda

Who are AVEVA?

Sustainability – Delivering a Future for our Children

The Digitalisation Highway

A Green Sustainable Scenario

Thoughts & Conclusions

# Who are AVEVA?

# AVEVA - Shaping a Sustainable Future Together

Your Partner in Digital Transformation

# We empower you to be agile in a rapid market transformation

## Market Environment

- Fluctuating commodity supply/demand
- Competition and market evolution
- Environment, society, governance considerations
- Geopolitical change
- Generational changes and pandemic
- Acceleration of digital transformation

## Imperatives

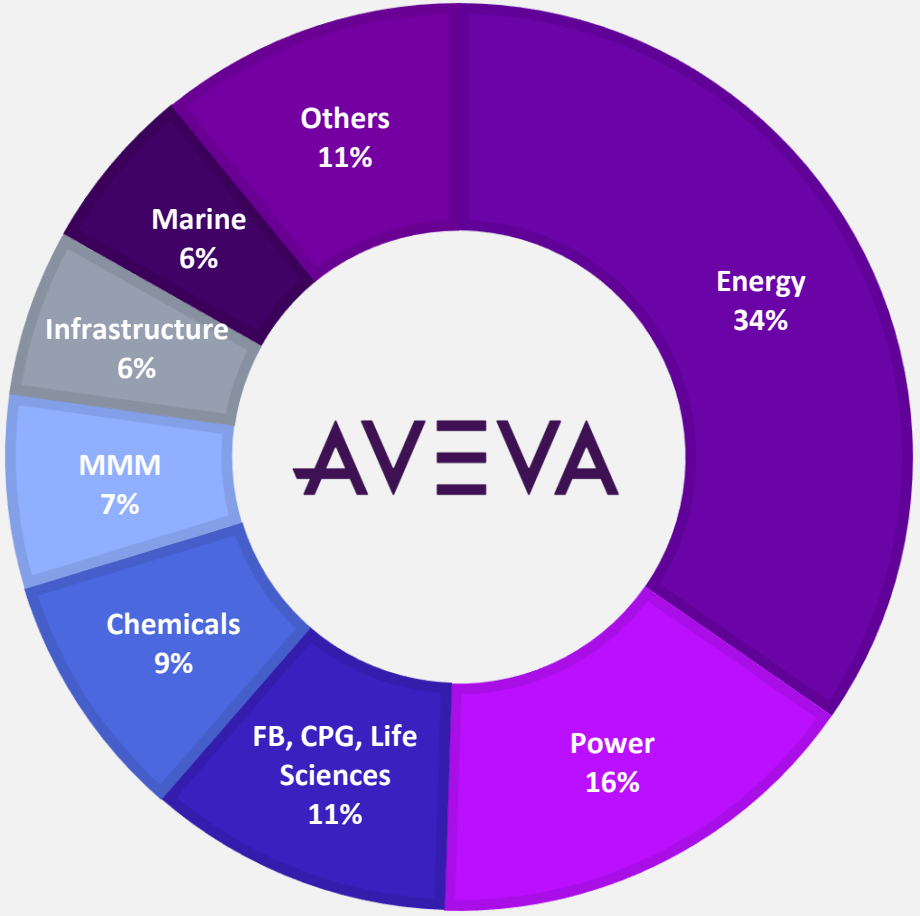
- Capital expenditure and time constraints
- Operational efficiency and agility to drive profitability
- Asset reliability and availability
- Enhance energy efficiency and sustainability
- Empowering the digital connected worker

## Technology Trends

- Cloud
- Industrial IoT/Edge
- Big Data
- Digital Twin
- Artificial Intelligence
- Extended Reality

# AVEVA is a leader in industrial digital transformation

- AVEVA has come together with OSIsoft, unifying world-leading operational data management with our industrial software
- FTSE 100 listed on the London Stock Exchange
- Schneider Electric is a 60% shareholder and strategic partner
- Growing recurring revenue and margins
- Cloud growth accelerated with an increase of over nearly 200% in TCV YoY
- Market capitalization > US $13BN
- Revenue > US $1.6BN



# Our commitment to supporting sustainable industries

FTSE4Good

BSR®

UN GLOBAL COMPACT

United Nations Global Compact

We aspire to a world where economic growth supports environmental sustainability, with better living standards for the communities where we and our customers operate.


AVEVA LIFE

Limitless Possibilities | Integrity Always | Flexibility Together | Excellence Every Day

AVEVA

# We offer a powerful combination of technology and teamwork

**10+**
R&D Centers

**22+**
Project Centers

**2,000+**
R&D Capacity

**16%**
of Revenue reinvested in R&D

**85%**
Projects include Next-Gen tech

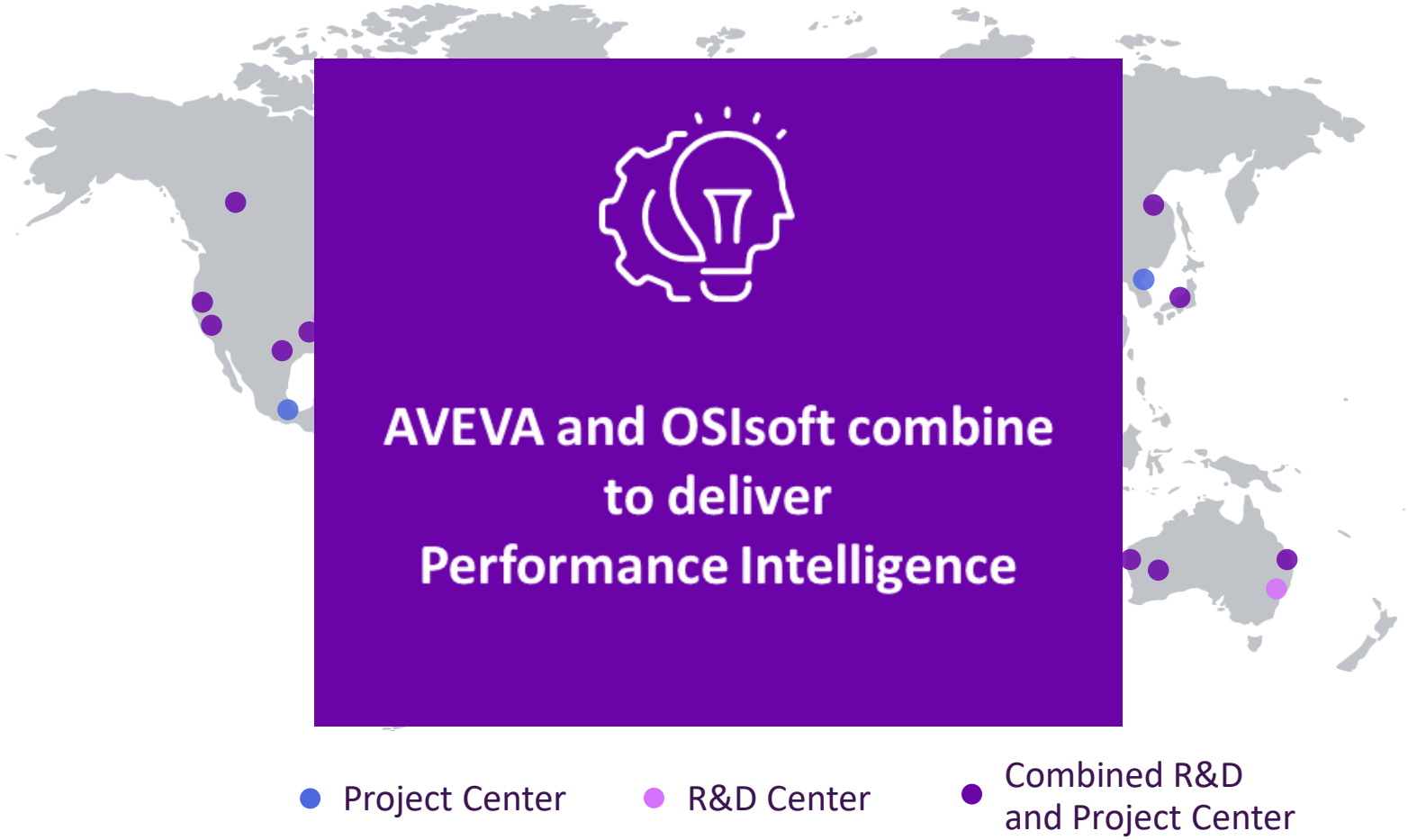
**6,500**
Employees

**4,300**
SI Partners

**120+**
Sales Partners

**250+**
Tech Partners

**20+**
Alliance Partners



# Sustainability – Delivering a Future for our Children

# What is Sustainability?

**Sustainability is the capacity for Society to endure in a relatively ongoing way across various domains of life.**
**In the 21st century, it refers generally to the capacity for Earth's biosphere and human civilization to co-exist.**

**Today Sustainability is at the CORE of many company's view of the future and, by general definition, this covers:**

- Society
- The Economy
- The Environment

**The principles that can be used to deliver these can encompass, but not be limited to:**

- Net Zero Commitment
- Circular Economy

# How do Engineers Deliver Sustainability?

Today while Sustainability is central to an Engineer's thinking, it is not always easy to understand where they can "Make a Difference"

The Net Zero Commitment that many large Corporations have signed up for can often mean a major change in direction for engineers and may not necessarily lead to Investment and Development of existing Process Assets

The Circular Economy is an area where, by addressing specific Sustainability Issues across Business Operations a definite difference can be delivered by Engineers supported by acceptable Capital Investment

# Circular Economy Concept

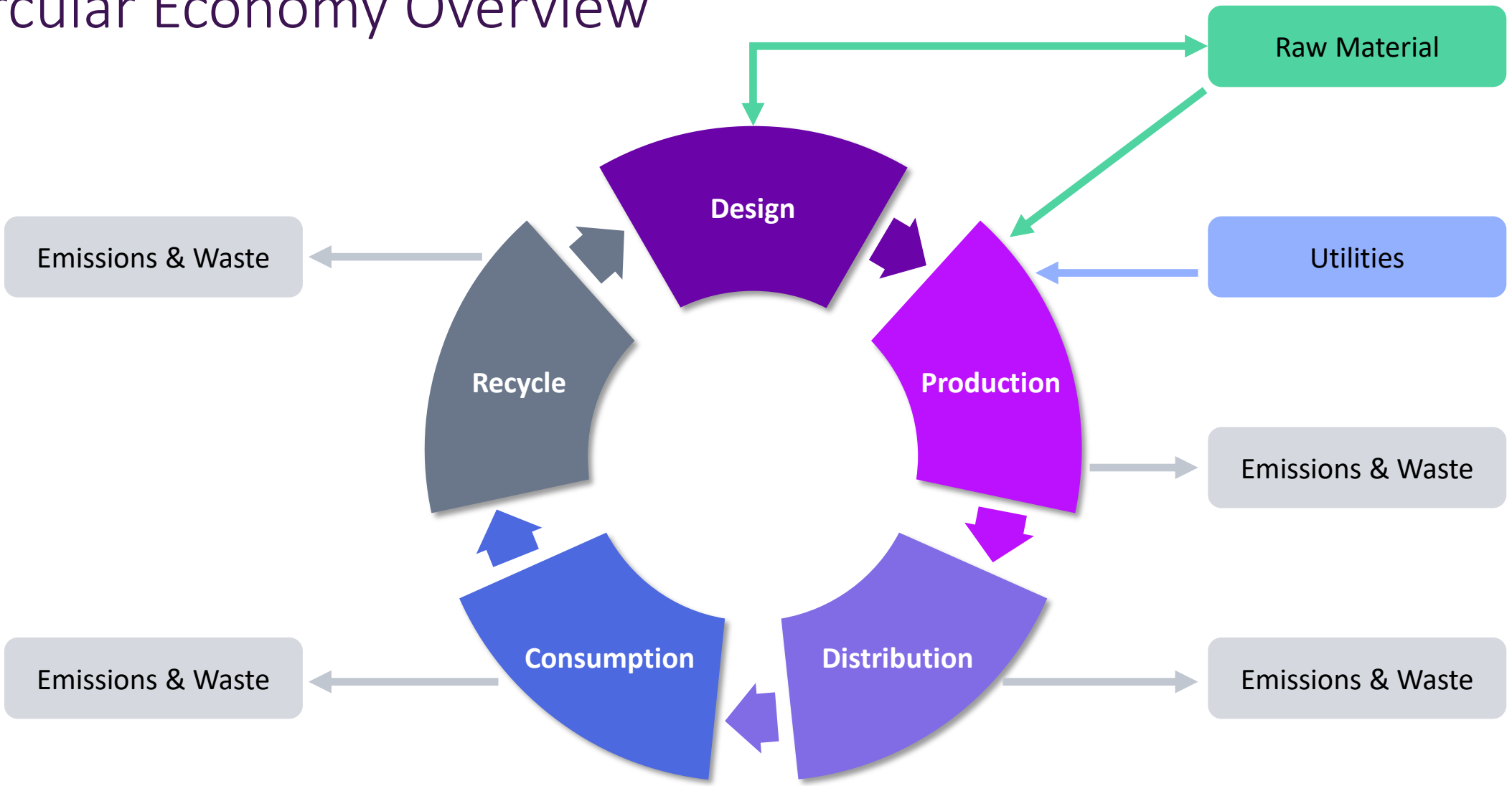
DEFINITIONs:

- A circular economy is an economic system that tackles global challenges like climate change, biodiversity loss, waste, and pollution
- A linear economy business takes a natural resource and turns it into a product which is ultimately destined to become waste because of the way it has been designed and made

From Traditionally Engineers can normally address the “waste” and “pollution” aspects from both a design and operations point of view utilising standard tools

Dependant on the industry AVEVA’s footprint “CAN” be applied to an end-to-end Circular Economic approach, possibly, with Technology partners

# Circular Economy Overview



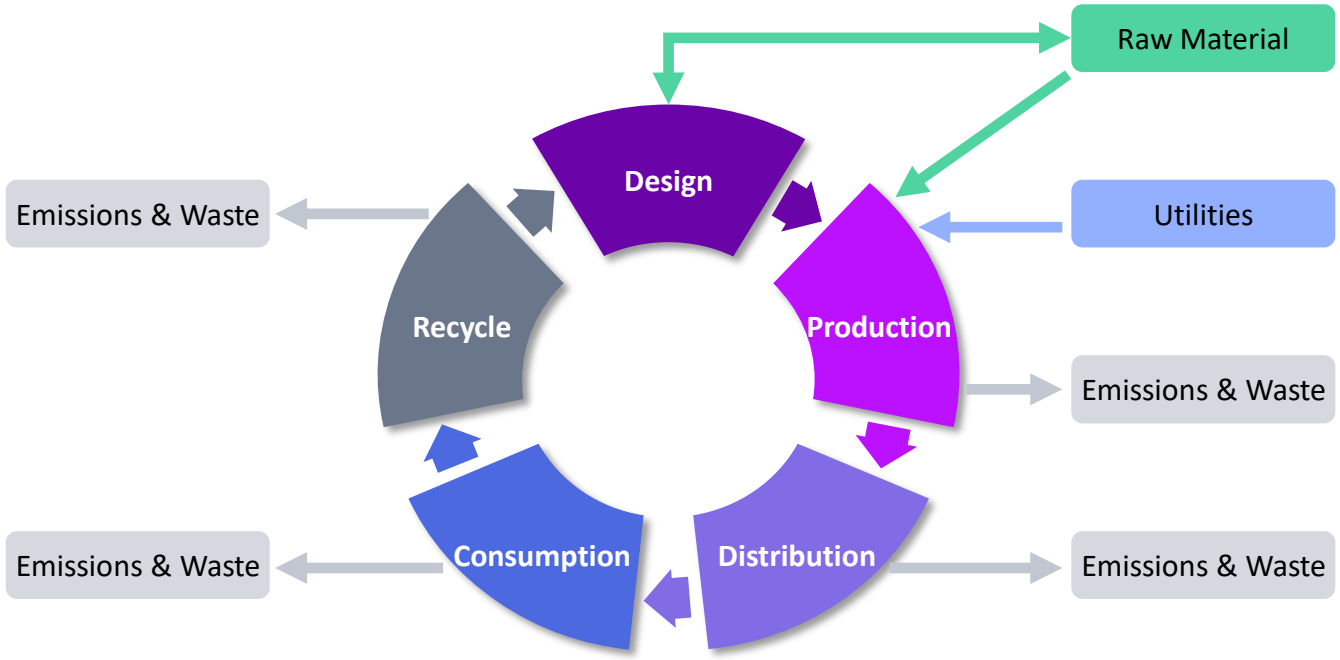
# Circular Economy Overview

**Sustainable Goals**

**Minimise/Eliminate Emissions & Waste By Design**

**Minimise Emissions & Waste By Monitoring & Control**

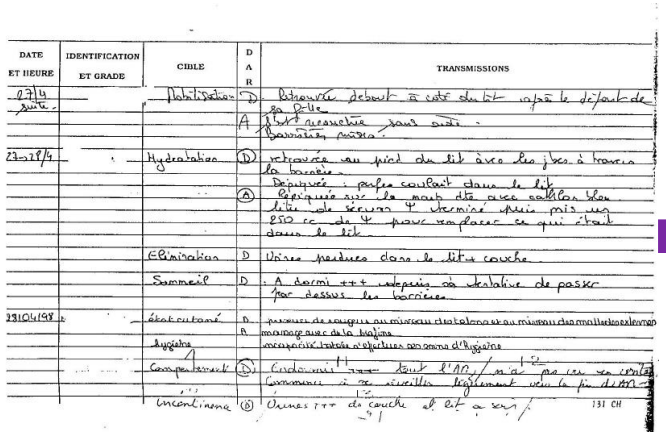
**Minimise Emissions & Waste By Multi Party Monitoring**

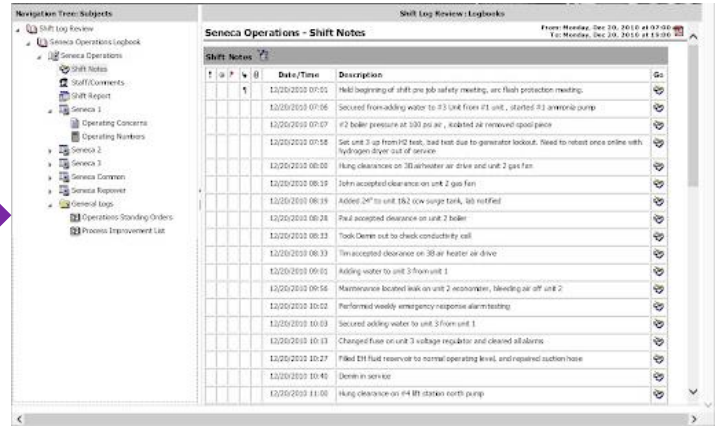


# The Digitalisation Highway

# Digitalisation – a first Step

## Does removing Paper mean we are more Sustainable?





- Traditional systems have, in the main, been replaced by both computers and hand held devices
- However that is NOT digitalisation in today's world.
- Digitalisation HAS TO encompass ALL possible sources of DATA, even ones that we don't traditionally consider in the process environment:



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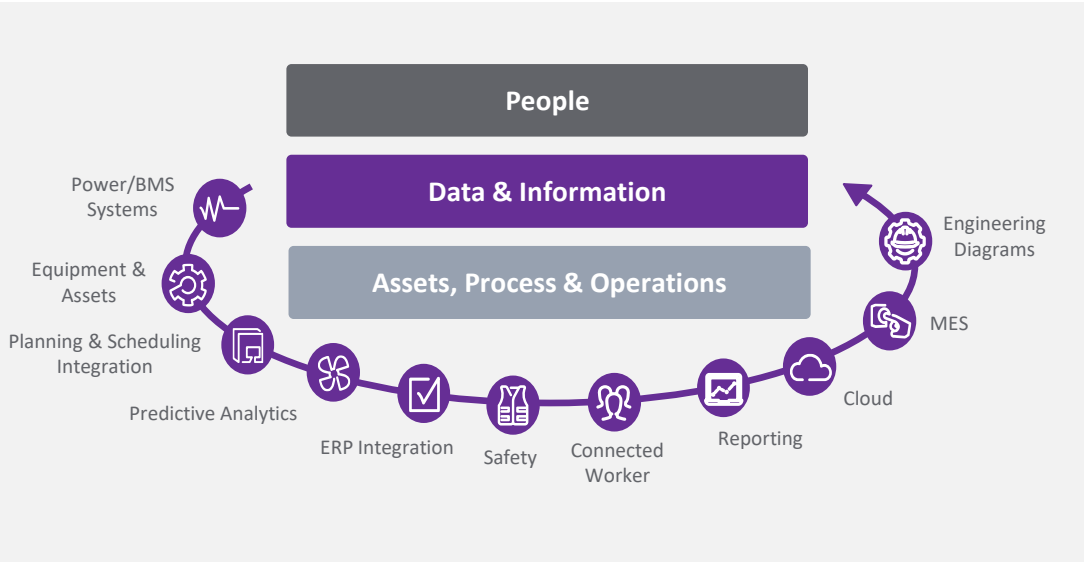
# Digitalisation – a first Step

## Does removing Paper mean we are more Sustainable?


- Simulation
- Engineering
- Operations Data
- Maintenance Data
- Production Data
- Supply Chain Data
- Market Data
- Weather Data
- Security Data

# Single Pane-of-Glass Enterprise Data Visibility

## Drive Sustainable Operations Through Open Data Access




- Collaborative working in a Common Data Environment leads to improved Operational Efficiency
- Having Data and Tools structured in one Environment also facilitates Sustainable Operations
- The fundamental layer supporting this Environment is the DIGITAL TWIN



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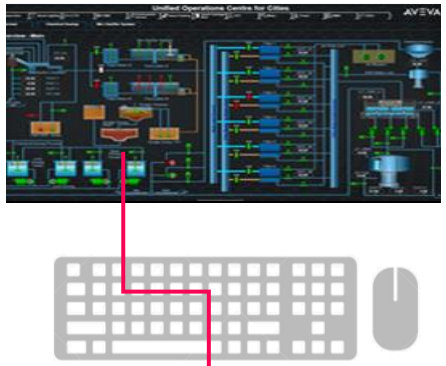
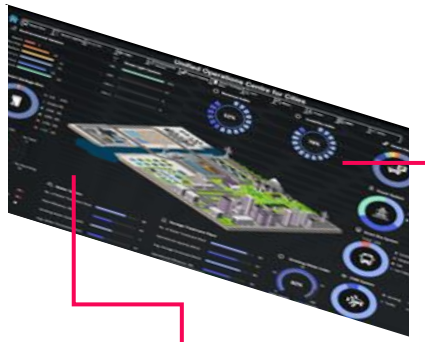
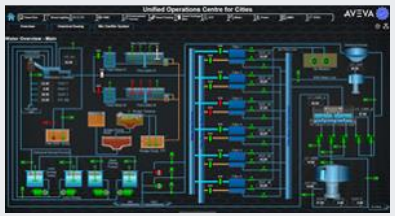
# Digital Twin System of Systems Approach

## Verifies Engineering Design THEN replicates the Operating Plant with a Sustainable Overview





Simulation, Engineering, 1D-2D-3D Schematics, Documents



HMI/SCADA, Historians, MES, Workflow

Financial, ERP

Third-party Databases, Weather, Market Data

Maintenance, EAM, CMMS, Connected Worker

**DIGITAL TWIN ENVIRONMENT**

Ensure Compliance

Maintain Uptime

Minimise Emissions & Effluent

Mitigate Costs

Manage Complexity

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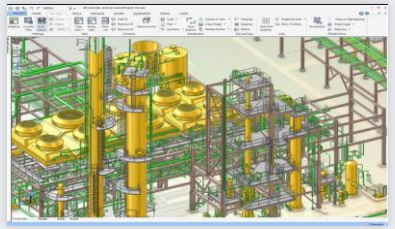
# Sustainable Digital Twin

## Verifies engineering design THEN replicates the operating plant with a Sustainable Overview

### 3D Engineering Data

A repository for all engineers to collaborate keeping all data in one place. Based on data not drawings.

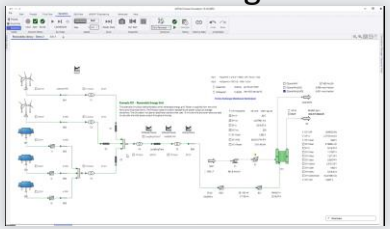


### Engineering Digital Twin

- ✓ Design “OUT” GHG Emissions
- ✓ Design verification and validation
- ✓ Global cloud collaboration
- ✓ Warnings if plant does not operate as expected
- ✓ Automated case execution

### Process Simulation

Single simulation that perform all types of modeling.



### Operating Digital Twin

- ✓ Troubleshoot past operations
- ✓ Provide soft sensors
- ✓ Improve future operation and efficiency
- ✓ Predict equipment degradation and failure

### Live /Archived Plant Data

A repository of historical data that explains how the plant is actually operating

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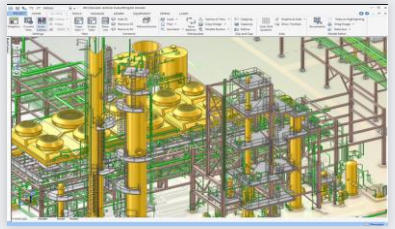

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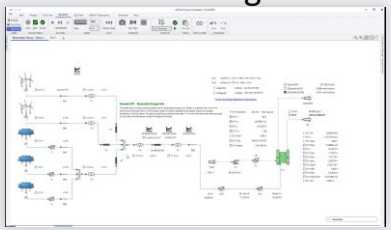

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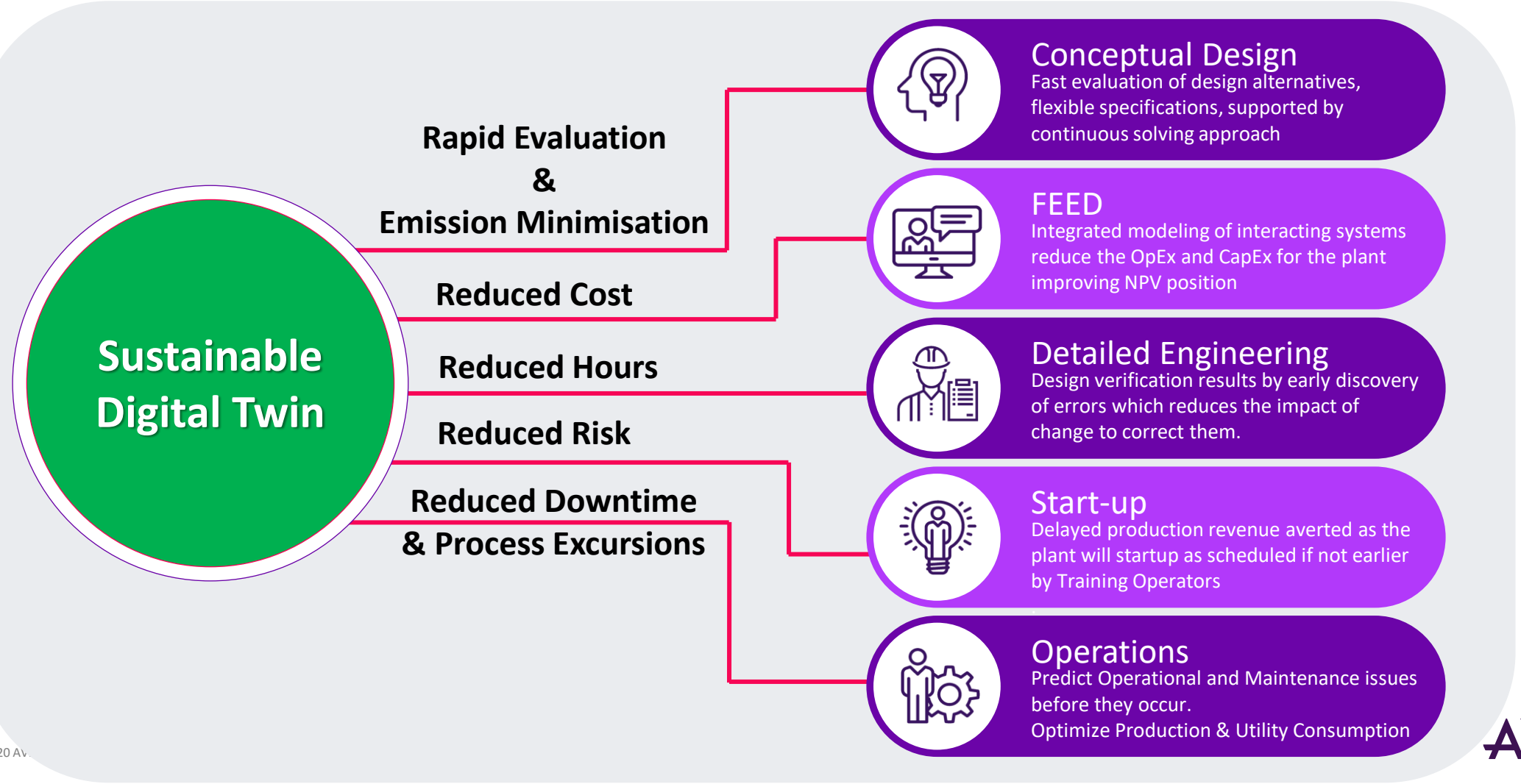
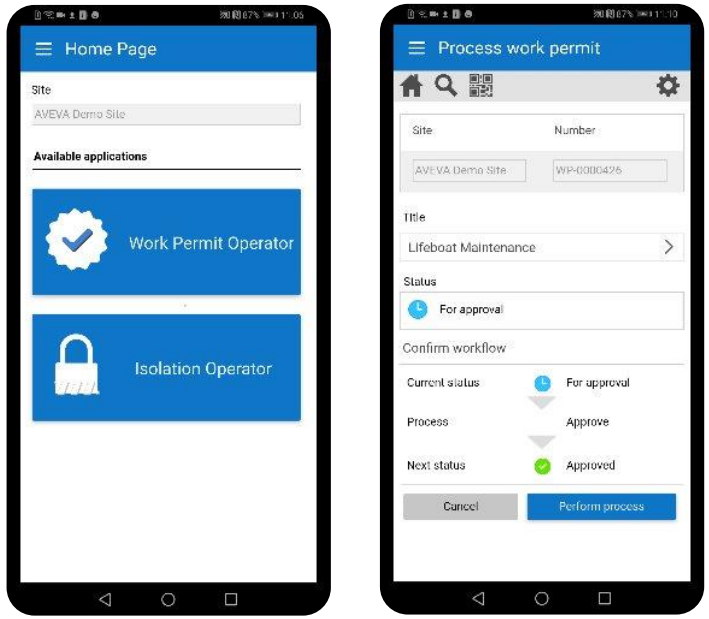
# Simulation-Driven Engineering & Operations

## The Sustainable Digital Twin Driving Digital Transformation of Industry



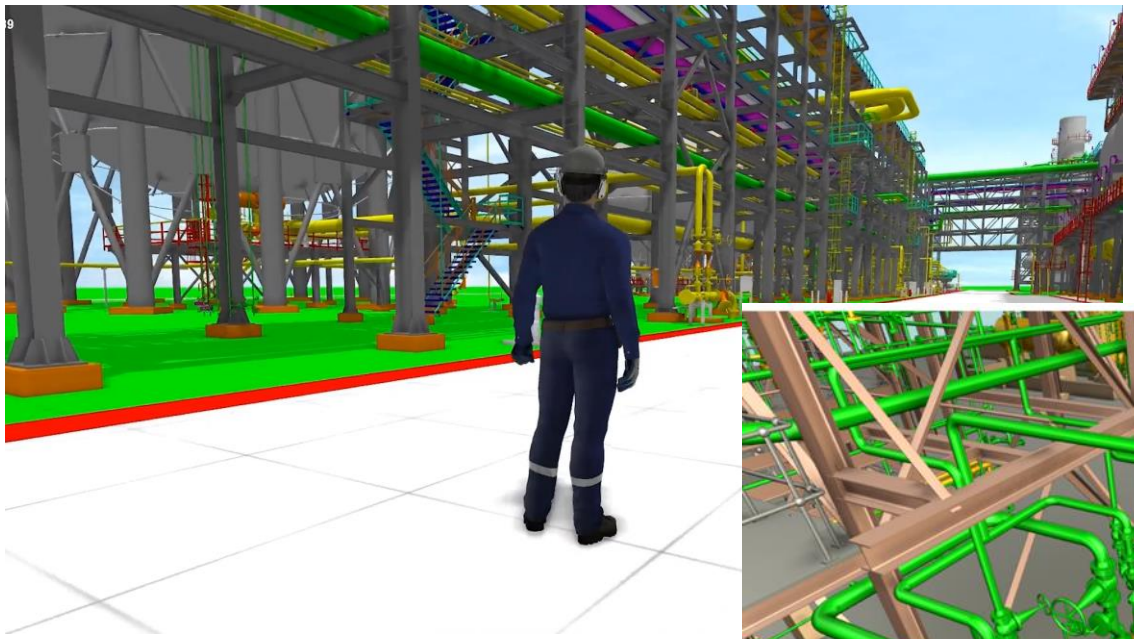
# Connecting the Workforce to the Digital Twin

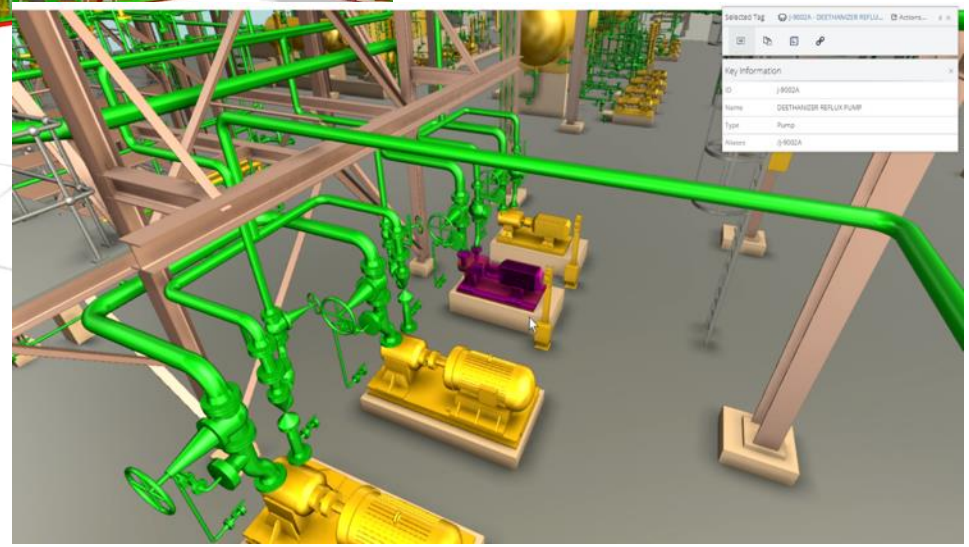
## Making Data Work for EVERYONE!











- The Digital Twin facilitates open communication both inside the working environment but also, via the CLOUD, to authorised external parties
- As simulation, engineering, maintenance and process data can be made available live in the field, the ability to understand what is happening as well as what each individual has to do is supported and driven by the Digital Twin

# A Green Sustainable Scenario

# The Simulation Foundation

**Process Simulation**

- Past - Engineering Tool with Little use in Operations
- Now – Core to predicting Operation Performance (including emissions)

**Simulation in Engineering**

- Integrating Simulation with Engineering can Reduce Emissions and Waste & Carbon Footprint of a design
- Improved engineering efficiency can increase NPV by 15 -25%

**Simulation in Operations**

- Simulation forms the foundation for Operator Training
- Simulation, linked to the SDT, offers Operation Predictive capability to maintain the Sustainability Envelope

# The Hydrogen Circular Economy

**Circular Economy**

- The Blue-Green Hydrogen model is a good example
- Illustrates how a Multi-Party Engineering & Operational environment works

**Sustainable Digital Twin in Engineering**

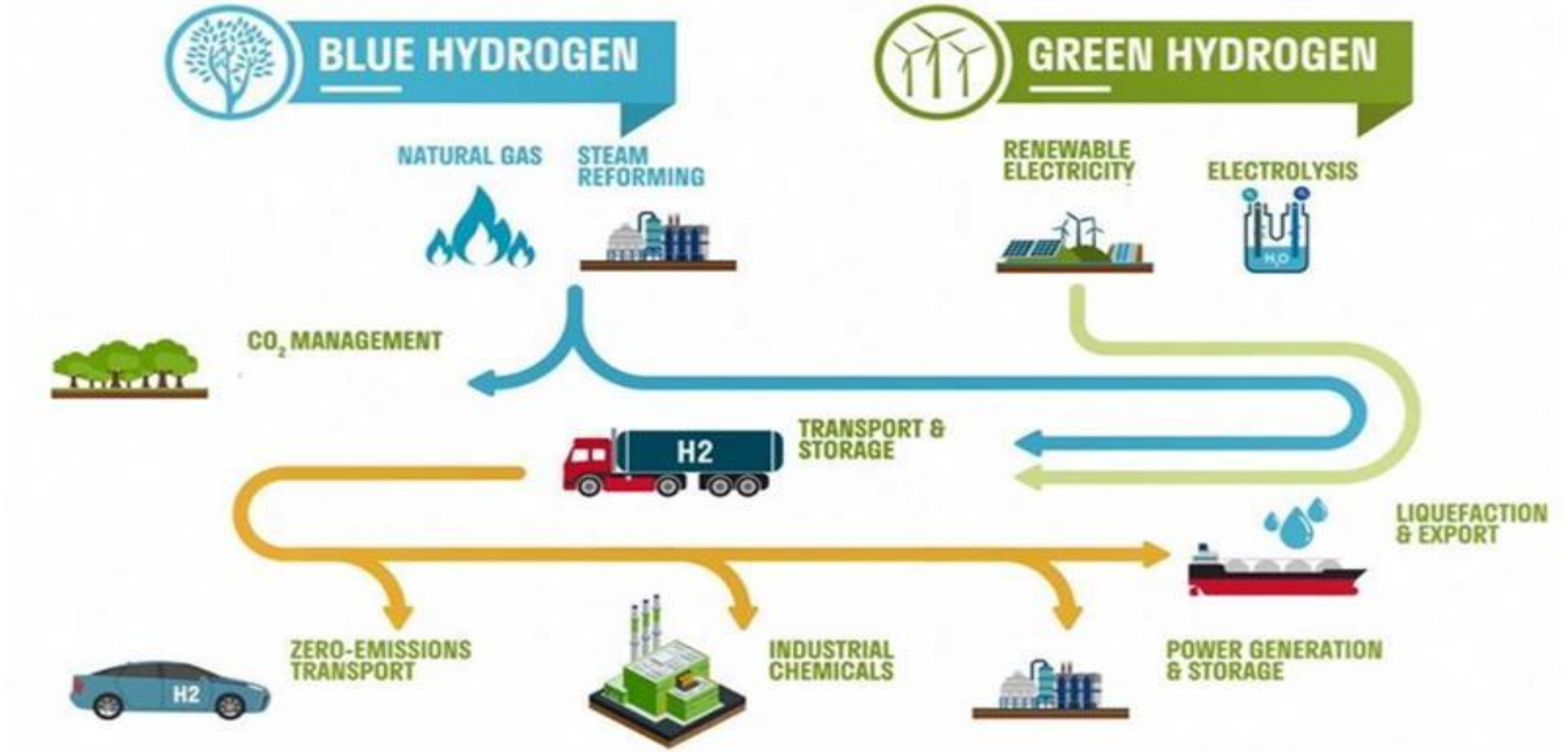
- Engineers from multiple organisations can all work collaboratively in one environment
- Facilitates modular, repeatable Engineering

**Sustainable Digital Twin in Operations**

- A Unified Control Centre can seamlessly, enable Visualisation of the entire supply chain
- Users from all departments and companies can all work in a unified environment

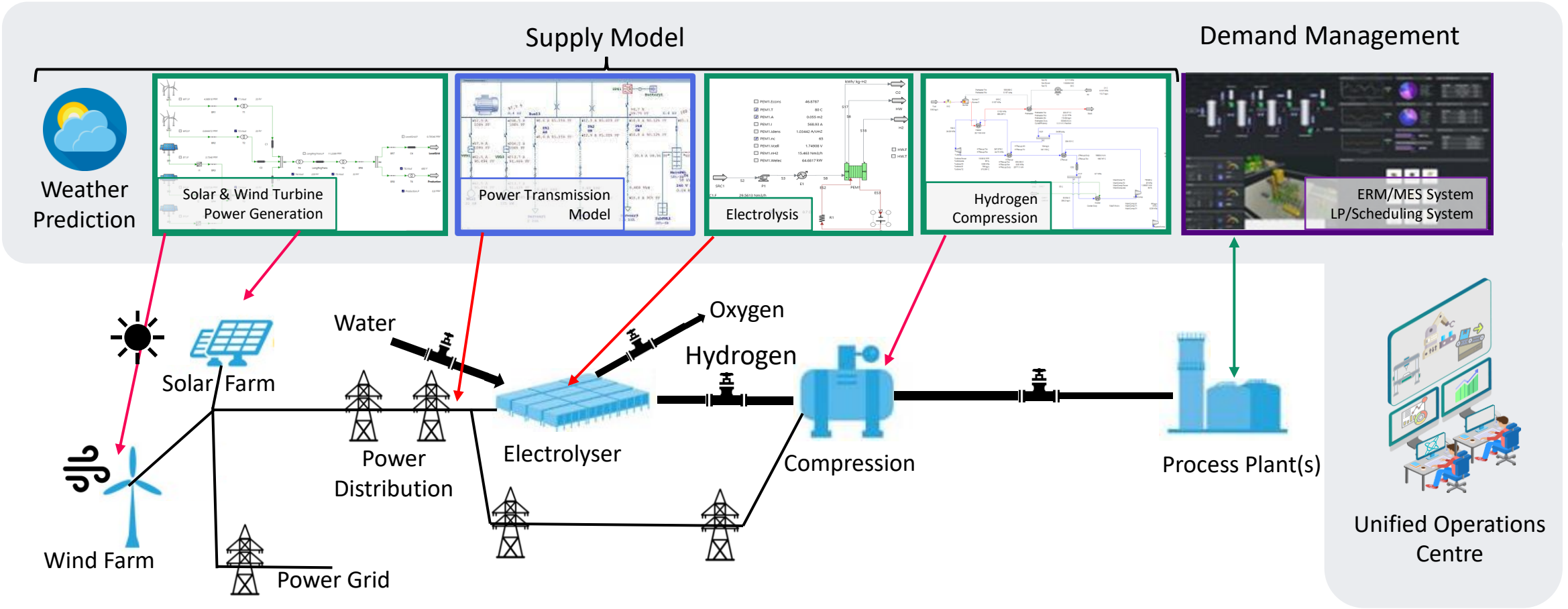
# Foundation to a Digital Twin For Entire Hydrogen Value Chain

## Using Simulation to deliver both fundamental Engineering Design as well as Operational Insight



# The Hydrogen Supply & Demand Model

## Integrating Modelling and Prediction inside a Unified Operations Centre



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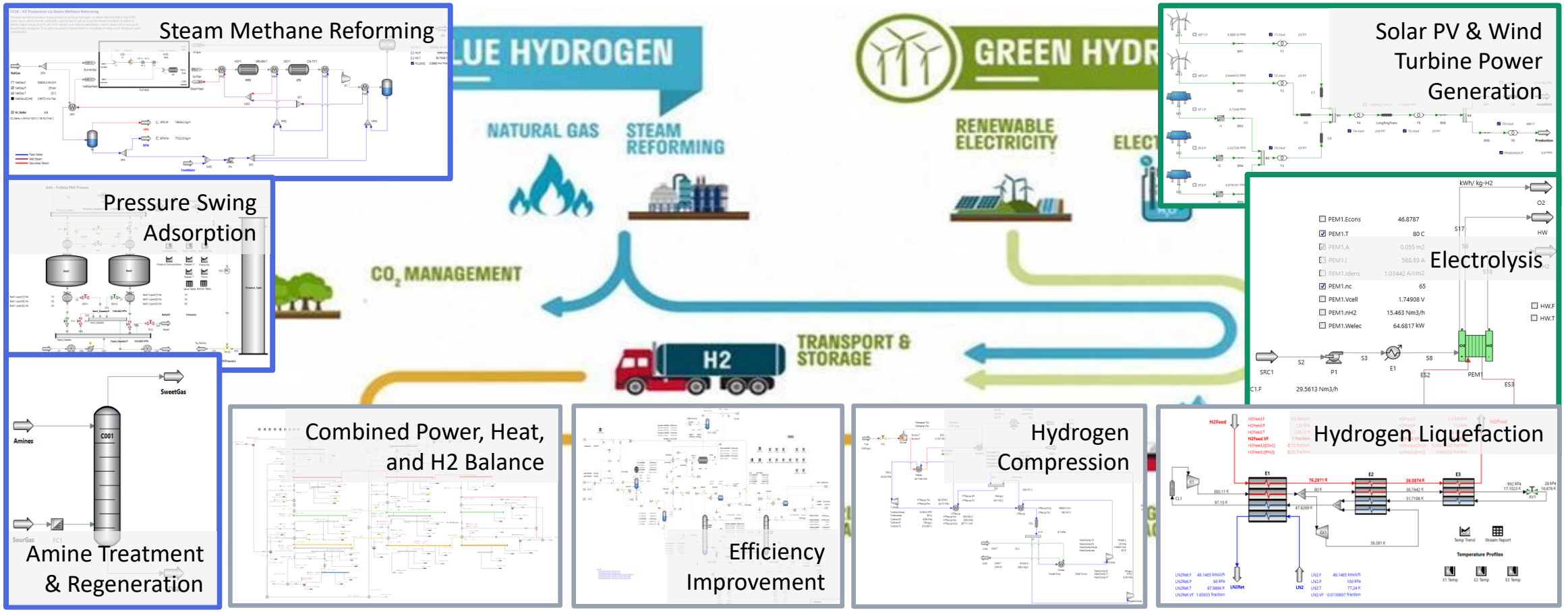
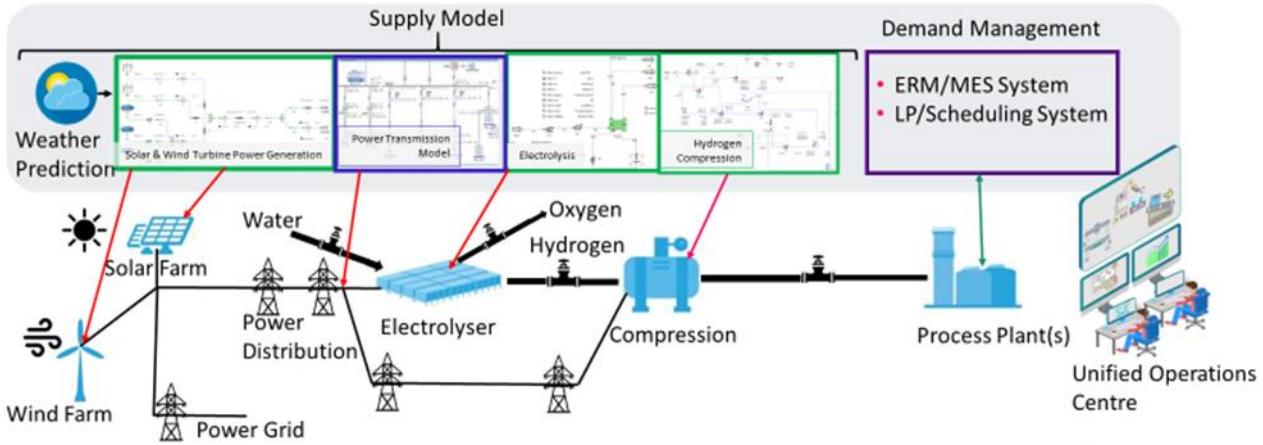


# System Description




- As described previously the AVEVA Unified Operations Centre is the depository and Visualisation system for data from all parts of the system as well as from external sources such as Weather Prediction
- The data collected is then utilised to deliver a Supply Side model, primarily, based on Multiple Renewable Energy Sources within the SHELL Network

- Each part of the Hydrogen Generation system is modelled in AVEVA Process Simulation with the Power Distribution being modelled in a 3rd Party software tool
- The Weather Data, from an external supplier, is then applied to the model to give a moving Supply Side model based on an agreed time step and Look-Ahead period
- This model is then compared to the Hydrogen Demand forecast which is supplied from the Process Plant
- Similarly where required the operation of the Electrolyser can be altered to ensure that efficiencies can be maintained under low load conditions by reducing the number of cells in operation
- Where necessary, any shortfall in power can then be made up from the Power Grid

# Thoughts & Conclusions

# Is the Future Green and Sustainable?

**Is Hydrogen a Cure All?**

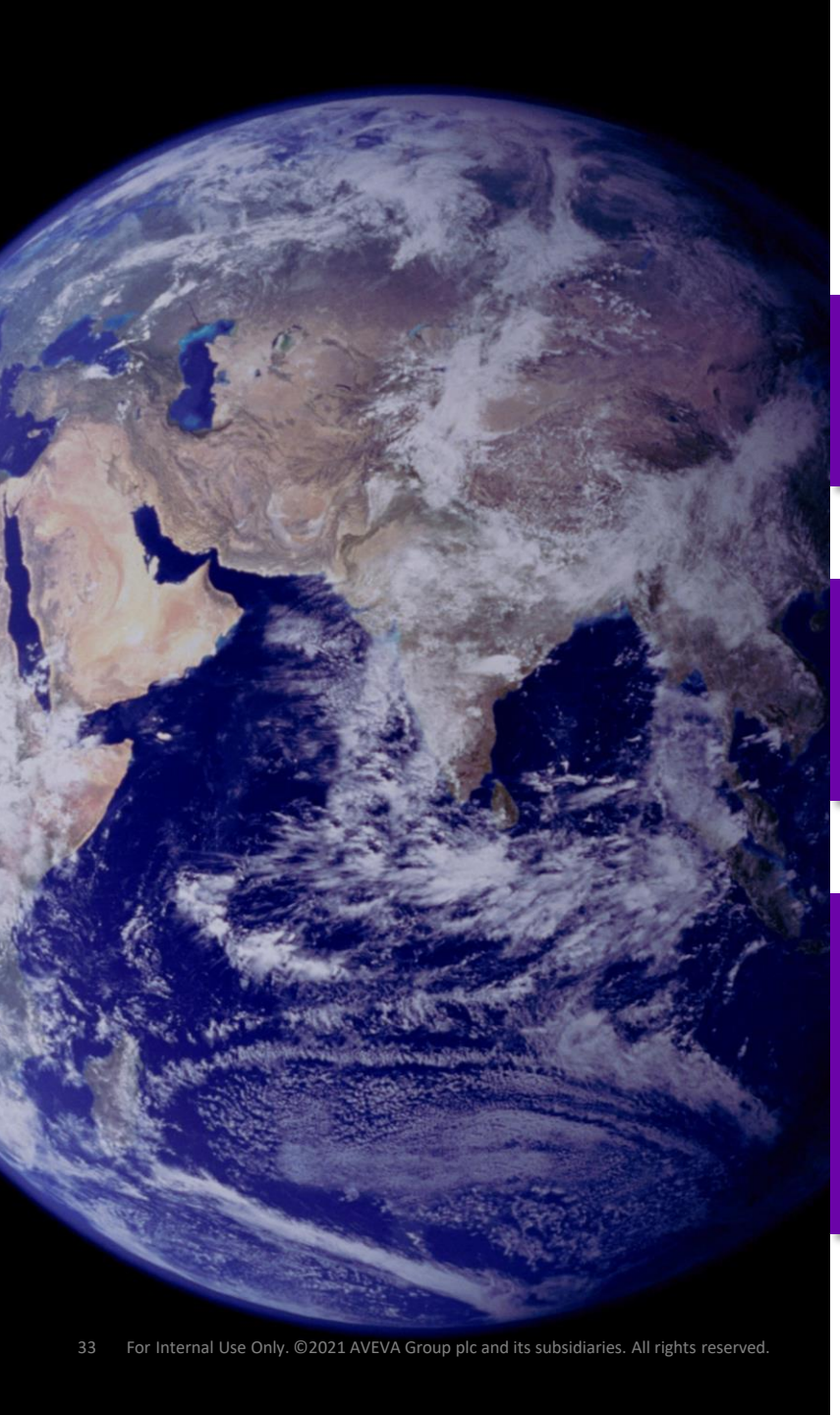
- Hydrogen is going to be increasing important in the near future
- To deliver Industry's need a multi party collaborative approach where engineers, process licensors, suppliers or operators; can work

**Meeting the Net Zero goals**

- Traditional technologies will remain key to Industry's needs in the short term
- New technologies will need to be developed and integrated with existing plants and greenfield developments

**Moving Faster and Smarter**

- The engineering community, needs to gear up to take new concepts quickly and efficiently to fruition
- Engineers will need Collaborative environments, like the **Sustainable Digital Twin**, to provide the technical foundation to drive Industry to a **GREEN SUSTAINABLE** future



# Quo Vadis

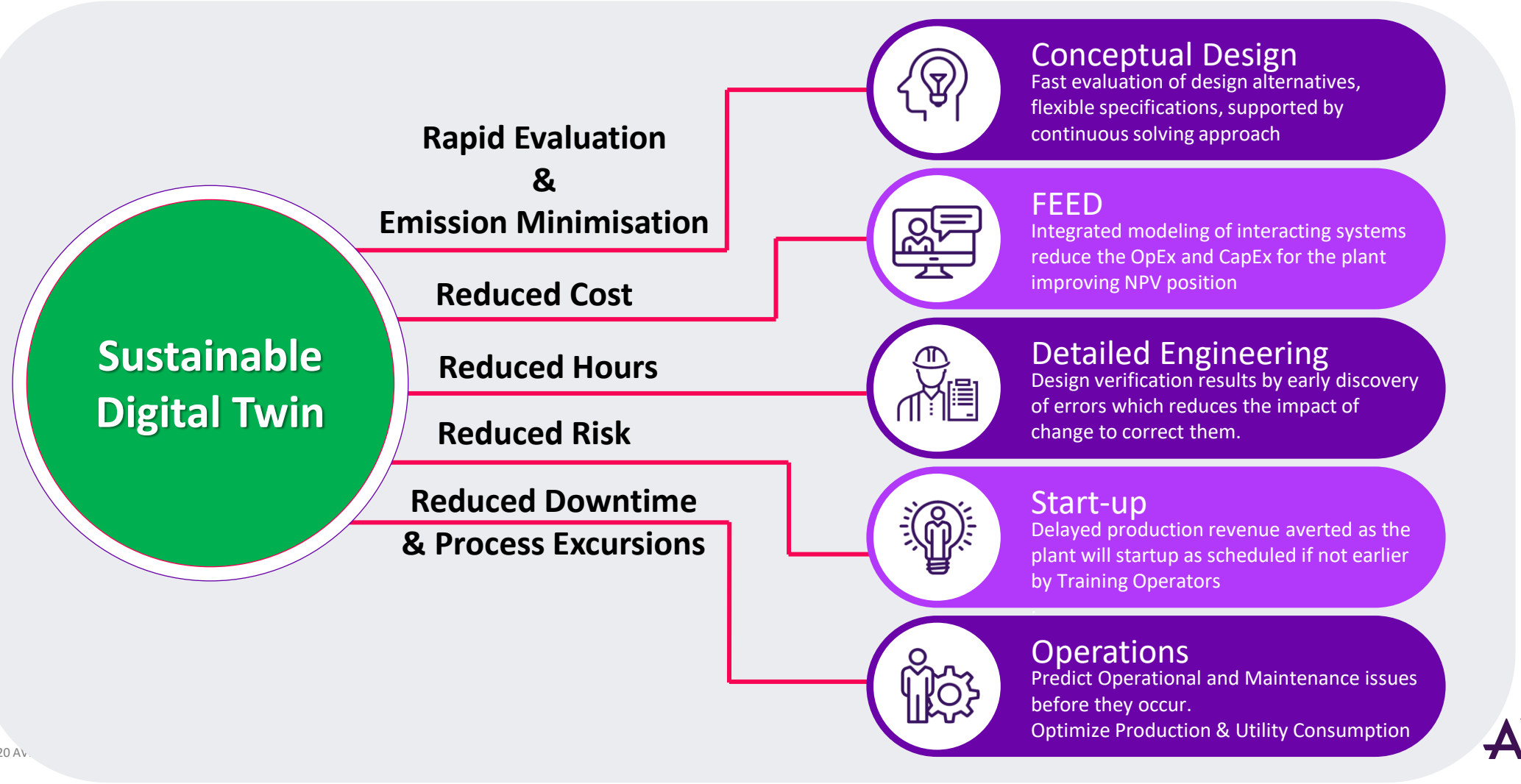
The Sustainable Vision, as outlined herein, is a major work in progress; driven by a number of AVEVA's Key Clients from both the Engineering and Operations Communities

There is a growing focus from Industry towards the Circular Economy, which has led to an increased growth in looking for Collaborative approaches that deliver capabilities of multiple parties across the Value Chain working collaboratively, and remotely, in Sustainable Hubs

The open and collaborative nature of **AVEVA's Sustainable Digital Twin** today, provides the platform and access to all the necessary tools to take us from Basic and Detailed Design, through Construction and Hand Over to Operations & Maintenance, and eventually End of Life; all underpinned by the necessary **SUSTAINABLE Net Zero** operations .

# Simulation-Driven Engineering & Operations

## The Sustainable Digital Twin Driving Digital Transformation of Industry



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AVEVA is a global leader in industrial software, driving digital transformation and sustainability. By connecting the power of information and artificial intelligence with human insight, AVEVA enables teams to use their data to unlock new value. We call this Performance Intelligence. AVEVA's comprehensive portfolio enables more than 20,000 industrial enterprises to engineer smarter, operate better and drive sustainable efficiency. AVEVA supports customers through a trusted ecosystem that includes 5,500 partners and 5,700 certified developers around the world. The company is headquartered in Cambridge, UK, with over 6,500 employees and 90 offices in over 40 countries.

Learn more at www.aveva.com



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