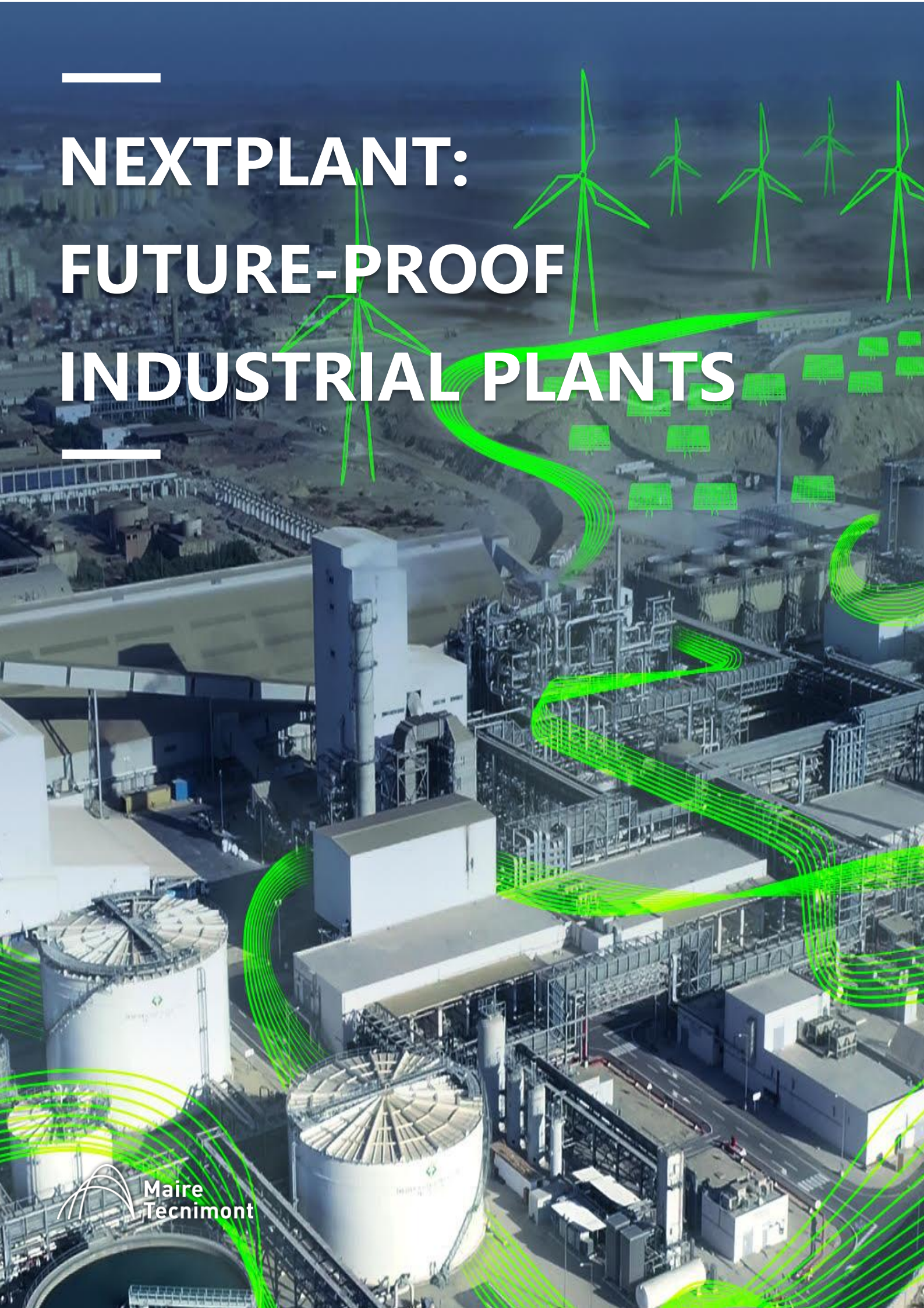


---

# NEXTPLANT: FUTURE-PROOF INDUSTRIAL PLANTS

---





## HOW THE DIGITAL TRANSFORMATION CAN CONTRIBUTE TO THE ENERGY TRANSITION

We are a leading technology-driven multinational group and we help our clients to reach their goals in energy transition leveraging on digital technologies, to be competitive and unlock value for our clients both during the EPC phase as well during plants operation, through our NextPlant platform, which enables them to be fully future-proof.

What do we do?



### Why choose NextPlant?



Next Plant platform is a portfolio of digital solutions and services that enables to design "natively digital" plants starting from the engineering phase thus to unlock value during plants operation.

Maire Tecnimont has a 50-year track record as a leading EPC contractor with a highly technological DNA to create digital transformation solutions.

We design industrial plants with a "cyber security design driven" approach thus to avoid any threat with an end-to-end approach.

### What's in it for you?



All this also allows for a significant CAPEX and OPEX saving, as plants become increasingly "greener" and lighter:

- Less energy consumption
- Less CO<sub>2</sub> emissions
- More efficiency
- More connected and collaborative (OT & IT are converging)

## Yes, we said **more margins**

One of the top priorities for plant owners to adapt to this new business environment is investing in digital technology, which can increase the cost of investment (CAPEX) for new industrial blocks but meanwhile is an enabler to reduce their cost of operation (OPEX) by up to 30% as medium-term market target being effective to minimize the Total Cost of Ownership (TCO).

Plant owners have high expectations from digital technology but 70% of these digital transformations fall short of their goals.

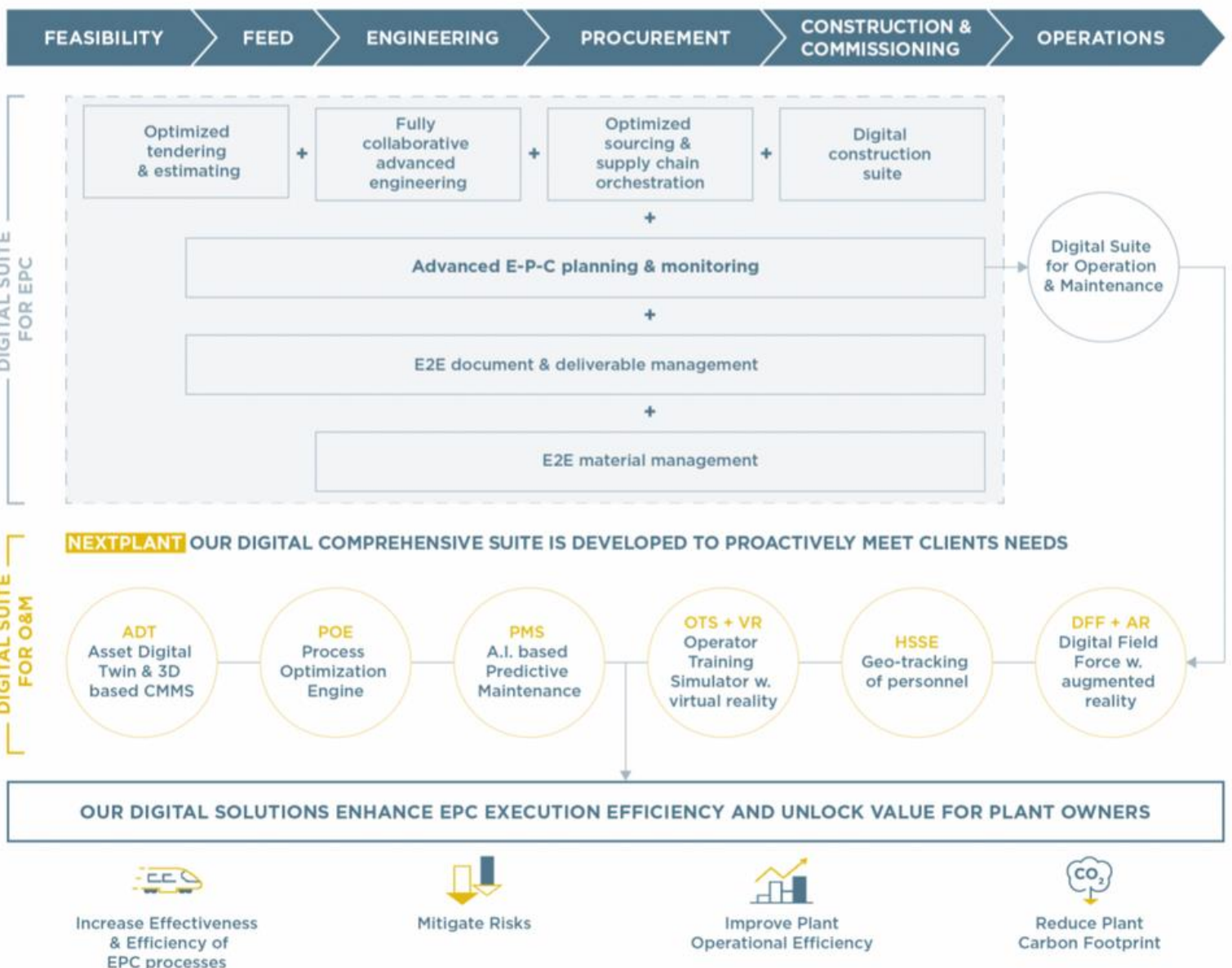
So, what might make digital transformation succeeding?



**Enabler for reducing the Plant OPEX up to 30% within 2030**

# The **Maire Tecnimont** approach to succeed on digital transformation

- Our proposition shall firstly fit with the plant owners' business model, and not the other way around.
- Instead of inventing new solutions or creating a revolution, we aim to streamline the most relevant processes, with the goal of making it simple to make it happen.
- Our aim is to scale up solutions and adopt them by avoiding over piloting.
- We adopt an open innovation approach to what is available on the market and in adjacent industries, to learn from the ecosystem.



# How can we help you become **future-proof**?

## ▪ **Through Project Control Tower for excellent EPC execution**

Project Control tower is a central hub that provides enhanced visibility for short and long-term decision-making and risk-control aligned with strategic objectives, through end-to-end EPC data management.

The main areas of control are :

- Engineering activities status
- Materials management
- Construction activities workforce
- Site Quality & HSE aspect



## *How can you use IoT and AI?*

*The Internet of Things (IoT) and AI are opening new possibilities for industrial plants, in a push that has so far been led by the other sectors (bank, insurance, retail, etc.). Now the energy transformation sector is stepping its digital investment at a moment when several factors besides operational cost savings are combining to make it the right time to shift to digital operations. Evolutions in cloud storage, edge computing, security and enhanced plant connectivity means interconnected plants are much more achievable than ever. The basic requisite to safely adopt such evolution is the "cybersecurity by design" approach.*



## ▪ **Plant connectivity through 5G**



To be future-proof, you need to have tremendous capacity in data collection, storage, integration and analytics.

You need to improve interoperability and coordination among different industrial plants, strengthening their ability to operate in harsh, remote environments.

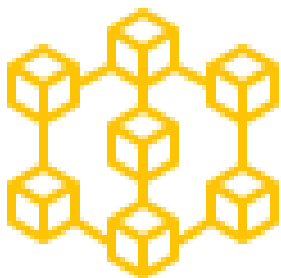
How do you do this? Through 5G, which allows you to have:

- Faster speed
- Lower latency
- Massive connections density
- Less CAPEX by reducing conventional cables application

## ▪ **Blockchain technology and process digital twin**

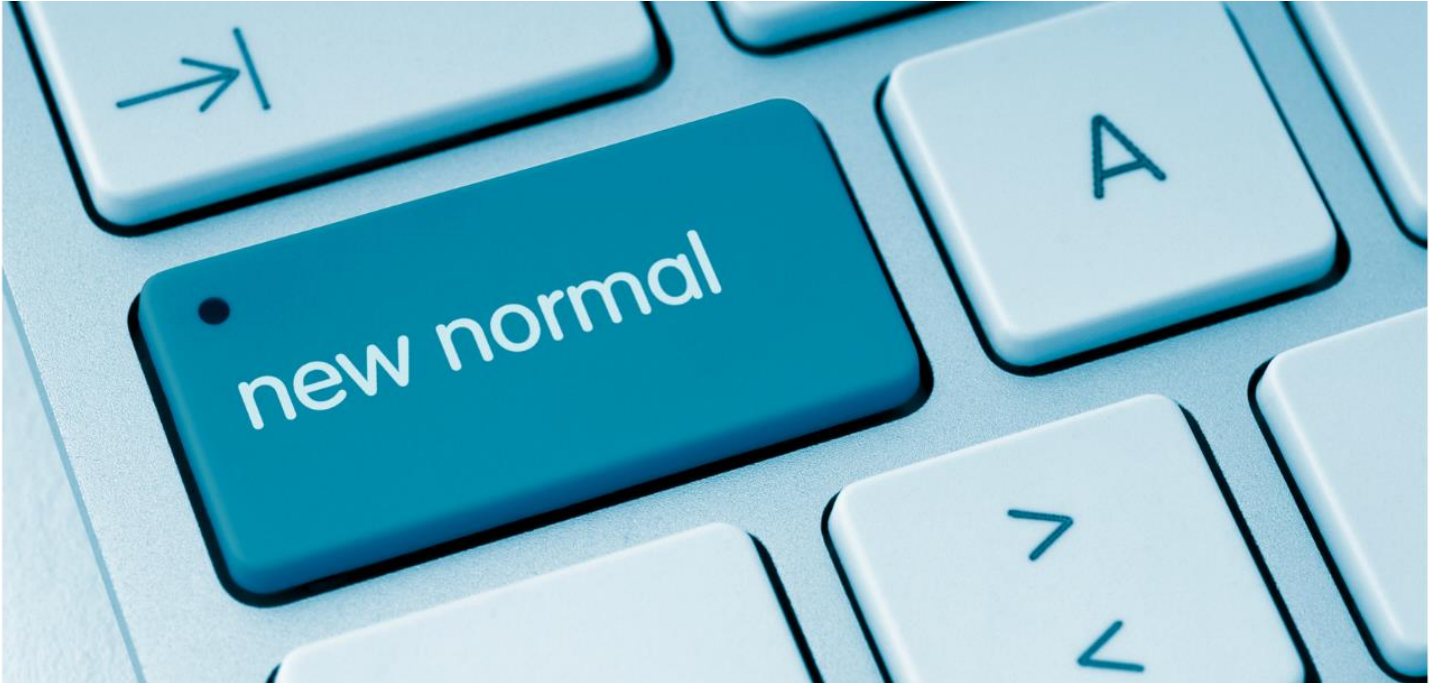
The application of blockchain technology to energy transformation plant is a unique value proposition in the market.

The blockchain combined with Maire Tecnimont process optimization can be used to certify the carbon footprint of the feedstock (to ensure access to incentive and to demonstrate the contribution to decarbonization process for scope 2-3 emissions), meanwhile it can be used to certify output products (to obtain green premium incentives). The process digital twin can be used to optimize yield of plant and reduce emissions (to demonstrate contribution to decarbonization process for scope 1 emissions).



# 1

## BEYOND DIGITAL... THE NEW NORMALITY



After the oil price crash in late 2014, companies had to learn how to cope with the “**new normal**”: though budget cuts helped, they are not enough to cope with the **energy transition**.

Plant owners now need to take a new approach focusing on two main goals. The first is to reduce investment and operating costs. Fortunately, **digital technology** is a powerful tool helping plant owners achieve the cost reductions demanded by the new business environment. The second is to improve environmental performance to respond proactively and intentionally to pressure from public opinion, investors and governments about climate change. Digital technology can help on this front with **advanced analytics** and **Artificial Intelligence (AI)** tools that can run a plant more efficiently, saving energy, and thereby reducing emissions making it easier to achieve sustainability targets.

Energy transformation and petrochemical plants have fallen behind the digitalization seen in other industries like retail, banking, entertainment and manufacturing for three main reasons:

- legacy platforms generate fragmented sets of data in pieces that are hard to assemble into one overview;
- faraway and site-specific plants make it hard to standardize across geographies;
- conventional wisdom and operating models of “what has always worked” is creating inertia, frequently increased by safety concerns on plant operation.

The benefits of digitalization are maximized when executed by an EPC contractor with **fully digitalized** work processes.

Companies that seize the opportunity to reinvent entire process from start to finish, investing in digitalization for the long term, leveraging on key aspects like Artificial Intelligence, are the ones that will end up being the **market leaders**.

Maire Tecnimont aims to act as the single orchestrator of a digital transformation by coordinating with the plant owner and suppliers of the overall ecosystem thus to find solutions aimed at generating **significant value** for plant owners and to make industrial complexes more and more **sustainable** for health, safety and environmental impact perspectives.

## DIGITAL SOLUTIONS TO SUPPORT ESG ISSUES



**75%**

OF SOLUTIONS SUPPORT  
**TRANSPARENCY AND  
INCLUSIVENESS**



**70%**

OF SOLUTIONS SUPPORT  
**HSE AND CO<sub>2</sub> REDUCTION**



**25%**

OF SOLUTIONS SUPPORT  
**ICV/KNOW-HOW TRANSFER**



# 2

## THE DIGITAL SUITE FOR EPC EXECUTION

To harness the **power** of digitalization to make costs and environmental impact more sustainable, plant owners need **EPC contractors** that have already made the leap to redesigning their own work processes by adopting digital solutions **internally**.

Maire Tecnimont has transformed its own capacity to attain more efficient performance as an EPC contractor, thereby increasing its ability to offer its clients a wider and deeper data set and **more reliable scheduling** that make a measurable difference in project execution and cost of investment.

The digital transformation offers a series of opportunities that are **process-driven**, in an industry where there is space for improvement, becoming the “**enabler**” of NextPlant digital portfolio.



**DIGITAL TRANSFORMATION OF MAIRE TECNIMONT CORE EPC PROCESSES HAS BEEN FOCUSED ON INITIATIVES REQUIRED TO ACHIEVE AND SATISFY CONTRACT REQUIREMENTS WITH LOWER MANHOURS CONSUMPTION AND EXCELLENT EXECUTION. THE RESULT IS A “DIGITAL ADVANTAGE” DERIVED FROM MORE ACCURATE SCHEDULING AND FULL TRANSPARENCY, SHIFTING FROM A “DELIVERABLE” WORKFLOW TO “DATA” WORKFLOW MEANS GAINING THE ABILITY TO CARRY OUT PROJECT MANAGEMENT ANALYSIS WITHOUT REPEATING STEPS OR WASTING TIME.**

By using **digital tools** across the overall EPC phases, Maire Tecnimont can achieve up to:

- **20% reduction** in **time spent** for **tendering** process (Market & tendering intelligence);
- **25% reduction** in **time spent** from **documents first revision** to their issue for construction (Collaborative advanced engineering);
- **50% reduction** in **cost of documents** and **deliverables** management;
- **40% reduction** in **cost** for **vendors qualification** (Optimized Sourcing & Supply Chain orchestration);
- **25% reduction** in **cost** for **inspection** of manufactured materials;
- **10% reduction of time/cost** needed for **executing field welds** during piping erection works (Digital connected plant & Construction site 2.0).

Some of the **key digital technologies** that optimize EPC processes are:

- **Robotization** of routine working processes;
- **Outsourcing** of services to improve time and cost control of the activities;
- Use of **advance analytics** and Artificial Intelligence to support cost-driven decisions;
- Use of **design collaboration solution** based on the **3D** modelling;
- Development of **4D** (i.e., 3D model linked to time schedule for constructability analysis) and **5D** (i.e., 3D model linked to materials costs and quantities);
- Use of **remote collaboration** solution to reduce response time for tasks closure;
- **Digitalization** of construction working processes to reduce the overall construction site supervision and to increase the safety of building phase as well as the control of quality on executed work.

Maire Tecnimont's leveraging on Advanced Work Package has made a significant impact on worksite efficiency, in some cases **cutting erection hourly overruns by 30%**.





# 3

## CYBERSECURITY BY DESIGN

*Legislators are responding with new regulations. In Europe, the ongoing discussion about NIS2 Directive (i.e. the Directive on Security of Network and Information Systems) is updating the existing cybersecurity framework and it is extending cyber security standards to new industrial segments with the consequential duties for plant owners. "Security by design" means the plant is protected from security breaches through a full architectural design based on components provided by a selected supply chain and assembled properly from the IT perspective.*



A deep understanding and long experience with **plant design, construction** and **operational management** allows Maire Tecnimont to take a **holistic** and **technology agnostic approach** to cybersecurity over the full life of the plant with an **end-to-end** mindset. The choice is driven by a comprehensive analysis of the client's needs. To leverage on the most advanced state of the art of technologies, Maire Tecnimont forms partnerships with top class technology providers thus to convert client needs into self-standing services.

**DIGITALIZATION BRINGS HUGE ADVANTAGES FOR INDUSTRY, BUSINESSES AND CONSUMERS. THE CONVERGENCE BETWEEN INFORMATION TECHNOLOGY (IT) AND OPERATION TECHNOLOGY (OT) IMPOSES A PARAMOUNT FOCUS ON CYBERSECURITY.**

The natural consequences are the main protocols for cyber security that Maire Tecnimont adopts for protecting its own core processes and that can be extended by designing an industrial digital plant.








**Identity security** in and outside of plant based on a “zero trust” digital signature. This approach calls for a user to be checked with every login and has become the industry standard with the spread of remote working.

**Plant security** using Endpoint Detection and Response software (EDR) that records and stores endpoint-system-level behaviours. This software uses various data analytics techniques to detect suspicious system behaviour, provide contextual information and block malicious activity.









**Behaviour-based security** is a proactive approach in which all relevant activities are monitored so that deviations from normal user behaviour patterns (such as long-on times or places) can be identified and dealt with quickly.



## NIS

 Healthcare	 Transport
 Banking and financial market infrastructure	 Digital infrastructure
 Water supply	 Energy
 Digital service providers	

## NIS2

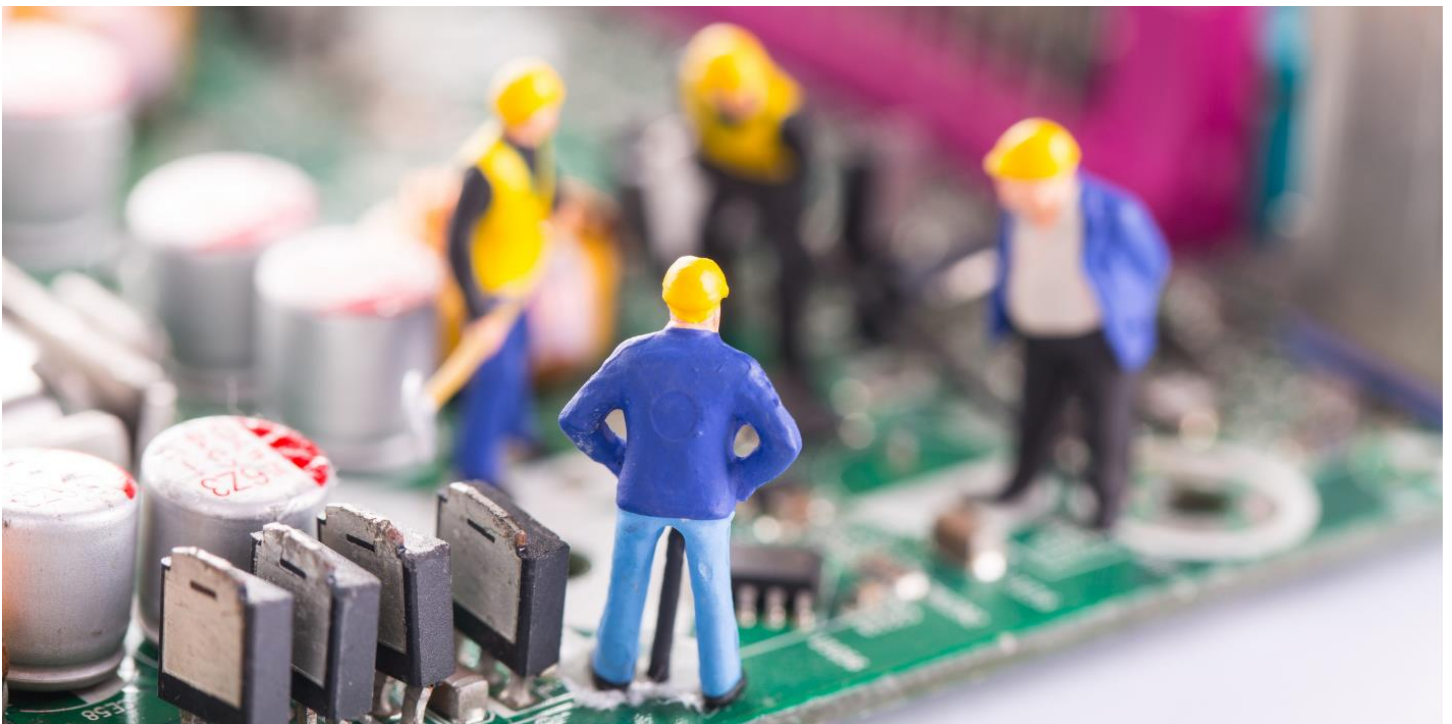
 Providers of public electronic communications networks or service	 Digital services such as social networking services platforms and data center services
 Wastewater and waste management	 Space
 Manufacturing or certain critical products (pharmaceuticals, medical devices, chemicals)	 Postal and courier services
 Food	 Public administration

# 4

## THE DIGITAL SUITE FOR PLANT OPERATION AND MAINTENANCE

Maire Tecnimont engages top class technological partners to deliver **digital advantages** that create real value for clients, becoming the single point of responsibility for plant owners.

*THIS "OPEN INNOVATION APPROACH" LEVERAGES ON TECHNOLOGICAL NEUTRALITY TO FIND THE BEST SOLUTIONS FOR A PLANT OWNER'S PARTICULAR NEEDS OR BUSINESS ENVIRONMENT.*



The results are tangible benefits such as improved production efficiency, more effective maintenance, a safer work environment, easier emissions control and more effective training.

A digital approach can leverage on the following pillars.

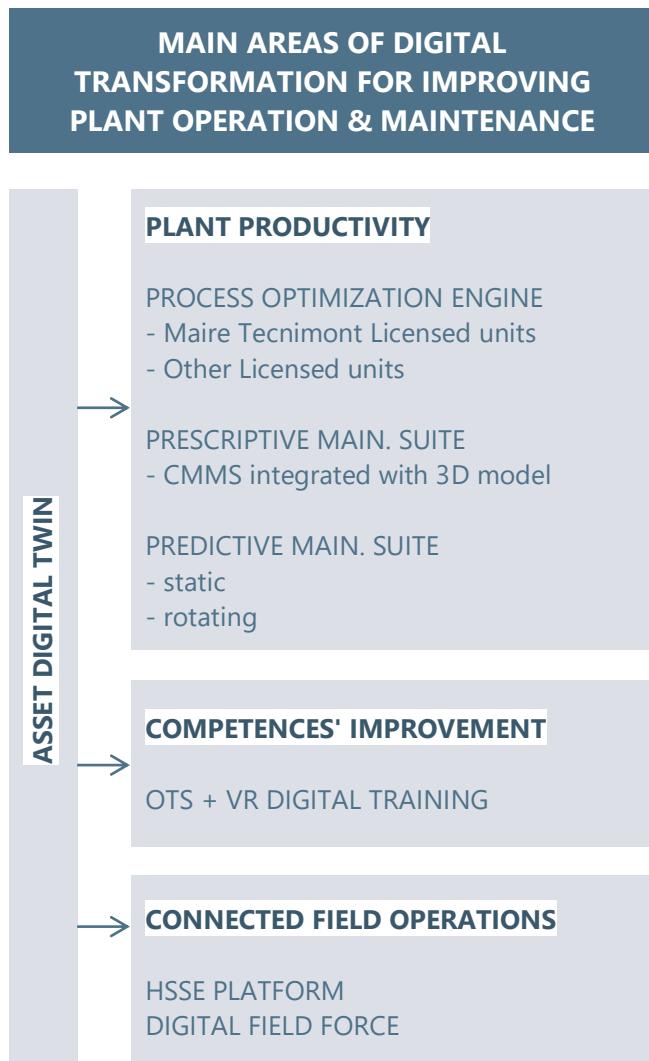
### ASSET DIGITAL TWIN

The Asset Digital Twin (ADT) is the core of digitalization. It consists of a 3D model as a single repository of asset information, based on CHFIOS standard, starting with the technical documents produced during EPC phases. The ADT grows along with the plant lifecycle, to include maintenance plans developed by vendors, and is continuously updated with maintenance and inspection reports, becoming a fundamental backbone for future solutions for plant and people productivity, and connected field operations.

Overall, the ADT has three main benefits:

1. it decreases the level of human errors in planning and execution of field operations;
2. it reduces major turnaround time;
3. it reduces maintenance personnel costs by increasing productivity of day-to-day activities.

The concept of Digital Twin using an open 3D model application as repository of all engineering data and information starts from the first stages of plant design and continues during the overall engineering lifecycle. This approach guarantees that both the EPC contractor and plant owner can have a complete and accurate view of the project at each phase of the detail engineering, construction, commissioning and operations.



The ADT when used during plant operation, keeping it enriched and updated with asset data relevant to maintenance activities, makes operations and maintenance smarter and more efficient.

After the project completion and plant handover by EPC contractor, the plant owner has a useful and powerful tool that enables external suites to access all available data, giving a wide range of opportunities of integration also to existing applications (e.g. tools for scheduling maintenance activities).

The major advantages resulting from an ADT when integrated with other solutions are:

1. access to documentation through a solid 3D model interface
2. simulation of field interventions,
3. clash tests during high-impact field interventions such as turnarounds and revamping.
4. day-to-day maintenance management,
5. it can help during work orders generation, spare parts management and monitoring and workload tracking.

## SQUEEZE MORE EFFICIENCY OUT OF A PLANT WITH A PROCESS OPTIMIZATION ENGINE (POE).

A POE enables plant owners to capture processed data and feed it to a digital replica of plant processes. It leverages not only on thermodynamics but also machine learning models, simulating the process and optimizing its operations as precisely as possible, integrating production programs and economics. As a result, the plant consumes less energy and therefore also reduces its carbon footprint. Our target is to enrich the portfolio of companies belonging to Maire Tecnimont group of POE for licensed units for conventional hydrocarbon processes as well for green chemistry applications.

A **Prescriptive and Predictive Maintenance Suite (PMS)** helps with maintenance planning, spare parts management, workload tracking, work orders management and planning improvements. The improvement to the traditional maintenance suite comes from merging the database typically used to plan maintenance activities with a 3D model of the plant. Moreover, process, machine & environmental parameters can be monitored and analyzed through statistical and machine learning algorithms, to identify abnormal operating conditions and predict failures in advance.

This more sophisticated approach to maintenance (unlocked by a predictive approach) has a beneficial impact on OPEX:

1. It reduces the cost of unplanned maintenance activities
2. It avoids the loss of production due to unexpected shutdowns
3. It also may increase plant safety reducing the risk of unexpected assets failures with consequential risks for human beings and environment.

Training based on **Operator Training Simulators (OTS)** combined with **Virtual Reality (VR) environment** allows plant owners to maximize the effectiveness and efficiency from the very start of plant operation. These tools are the equivalent of a flight simulator and allow staff to be trained in advance to handle plant start-up and operations in a fully immersive 3D environment. The combination of the VR platform with the OTS model and system creates a unique and advanced training environment introducing a more realistic interaction between control room and field operators:

1. This creates new job opportunities and may facilitate and speed up the transfer of competences in case of retirements of expert crews.
2. It delivers real safety benefits by creating a scenario for safe test conditions for any potentially dangerous plant upset status without creating any real risk for human beings and environment.



# CONNECTED FIELD OPERATION

A **Smart HSSE** platform can remotely monitor possible Health, Safety, Security and Environment risks in the field. By connecting smart devices to a central control room (via Wi-Fi, beacons etc.) it is possible to prevent dangerous conditions while maintaining an operator's "regulatory privacy". With this approach the workers are geolocalized and their healthy parameters may be remotely controlled to limit any potential risk of injuries or access to unhealthy or restricted areas without the proper training and authorization, thus reducing the risk of fatalities.



By using a **Digital** Field Force (DFF):

1. Field operators are supported by mobile applications during daily operations in a fully connected plant.
2. All equipment is uniquely tagged, all plant data is saved on a central repository and experts are connected to field force to provide technical support remotely.
3. On a single app, operators can access a range of functionalities to improve the productivity of their day-to-day activities.
4. Maintenance and operation activities of the field team are facilitated because any needed information is available at their fingertips by having an easy access to structured database also leveraging on Augmented Reality (AR) approach, and remote assistance can be easily granted by limiting the circulation of experts across various countries but providing support almost on real time.

*The backbone to unlock any digital field service is the **plant connectivity** characterized by a very wide band and very low latency time. Therefore, new communications paradigms (like **5G** technology) are crucial within the plant.*

# 5

## TAKE AWAYS

Digital transformation is a powerful tool helping plant owners achieve business sustainability during the energy transition. Maire Tecnimont provides technological solutions that can help plant owners save on operating expenses, reduce emissions, and make the plant more economically manageable.

At Maire Tecnimont, digital transformation starts from core EPC processes, reducing hourly overruns and cutting plant delivery times.



***BEING A TECHNOLOGY-DRIVEN CONTRACTOR MAKES MAIRE TECNIMONT THE SINGLE ORCHESTRATOR OF THE EPC VALUE CHAIN TO ENVISION A DIGITAL PLANT THAT WILL MEET PLANT OWNER BUSINESS NEEDS TO GENERATE SIGNIFICANT POSITIVE IMPACTS ON PLANT CAPEX AND OPEX. MAIRE TECNIMONT IS INDUSTRIALIZING CUTTING-EDGE TECHNOLOGICAL CONCEPTS LIKE WIRELESS PLANT BASED ON 5G, BLOCK CHAINS APPLICATION TO INDUSTRIAL COMPLEX, TO BE THE **DIGITAL LIGHTHOUSE**.***

***THE RESULT IS A PLANT THAT IS MORE SUSTAINABLE, BOTH IN TERMS OF TOTAL COST OF OWNERSHIP, AND FOR ITS HUMAN SAFETY AND ENVIRONMENTAL IMPACT.***

# CONTACTS

To find out more, please contact:

Ezio Pasqualon

Digital Transformation Services Head of Department

Via Gaetano De Castilia, 6/A, 20124 Milan, Italy

[ezio.pasqualon@mairetecnimont.it](mailto:ezio.pasqualon@mairetecnimont.it)

[www.mairetecnimont.com](http://www.mairetecnimont.com)

