GSTC OCTOBER 2024

De-risking for project efficiency

Across the development lifecycle

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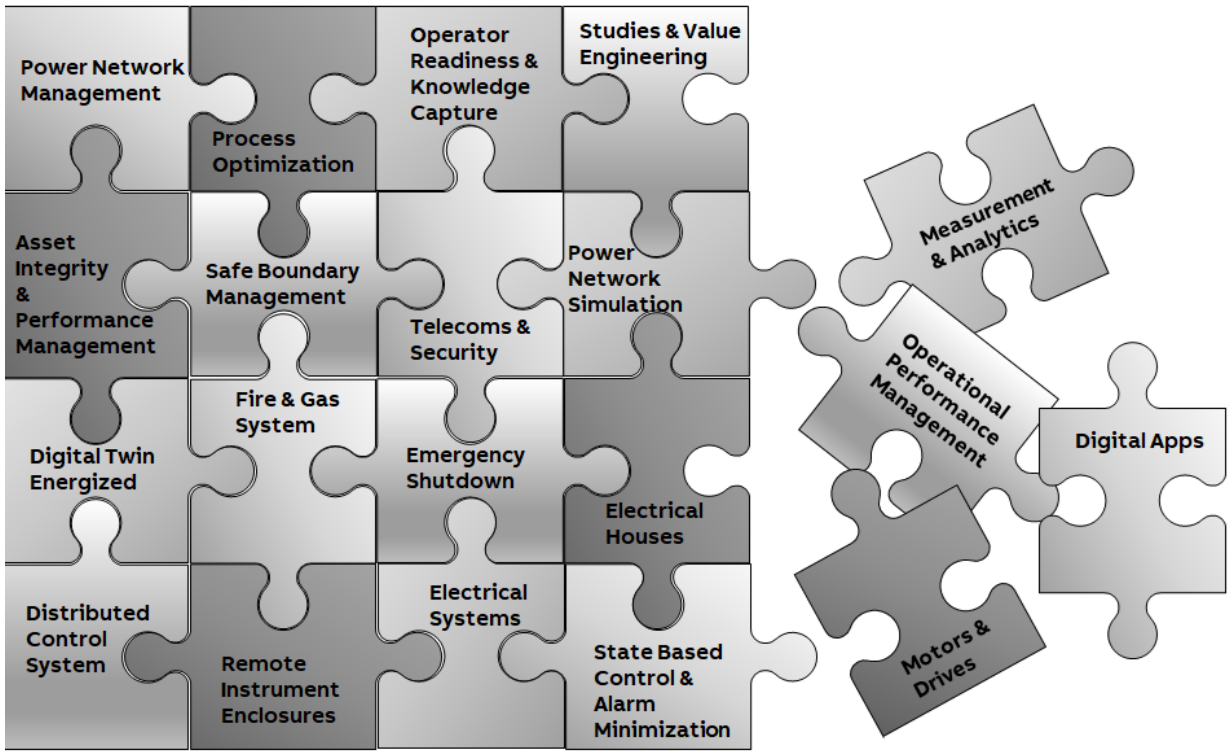
“It’s not easy being green”

- Kermit the Frog, entertainer

ABB Ability™

FEASIBILITY + PREDICTABILITY + PROFITABILITY + SUSTAINABILITY

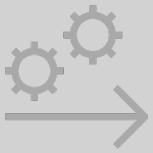


- Minimize CAPEX
- Minimize Start up & Schedule
- Maximize Availability
- Maximize Throughput
- Make all stakeholders look good

Project development RISK

Means different things to different groups

Project execution risk



- ELT experience
- Off-taker agreements
- Stage of permitting
- OEM supplier reliability
- Quality of financial backing
- Corporate comms consistency (i.e. costs, timing)
- …

Operational risk

- Reliability of feedstocks
- Reliability of other inputs
- Reliability of infrastructure
- Physical disruption (hurricane pathway)
- Buffer storage availability
- Regulatory environment
- …

Technology risk

- TRL of critical equipment
- Complexity of plant
- Reliability of critical equipment
- Service agreements on critical equipment
- Obsolescence due to other tech choice
- …

Market risk

- End-demand for product
- End-product price
- Input prices, including CO2 price
- Exposure to subsidy
- Change in subsidy policy
- Interest rate & FX exposure
- Above ground risk
- …

Typical project development

Cost creep, risk creep and schedule creep

Plan

Owner
Process Licensor(s)
Owner's Engineer

- Siting
- Permitting
- Feedstock
- Offtake
- Basic Process Design
- FEL-1

Design

Owner
Owner's Engineer
EPC firm

- FEL-2
- FEL-3 or FEED for FID$'s
- Engineering Wrap for Risk
- Bid Specs
- Bid evaluation
- Bid normalization
- Possible vendor selections

Build

Owner
Owner's Engineer
EPC firm
Suppliers/Vendors

- Detailed Design
- Construction start
- 3 Bids and a Buy
- Schedule Compression
- Scope Creep
- Change Orders
- Schedule Delays
- Commissioning headaches

Operate and Maintain

Owner
Process Licensor(s)
Suppliers/Vendors
Contract O&M or Owner's Personnel

- Process changes
- Operating conditions changes
- Alarming
- Asset performance
- Loop Tuning
- Advanced Control
- Turnarounds
- Process Hazard Reassessments

Focus on Operational Excellence and Asset Performance Management during project development.

Who do you want to be when you grow up?

- ✓ Business strategy
- ✓ Planning strategy
- ✓ Design strategy
- ✓ Operational strategy
- ✓ Maintenance strategy
- ✓ Digital Strategy
- ✓ Carbon Management Strategy

62 % of projects facing cost overruns

79 % of projects facing schedule delays

69 % average project budget overruns

Source: EY Building a better working world

De-risking a project
Where does risk exist throughout the cycle and with whom?

- Where is the risk in planning
- Building and maintaining teams
- Design
- Execution
- Commissioning
- Start up
- Operations
- 5 years later
- 15 years later

Contingency = $$$

Biomass gasification to liquids
First of a kind facilities (FOAKS)

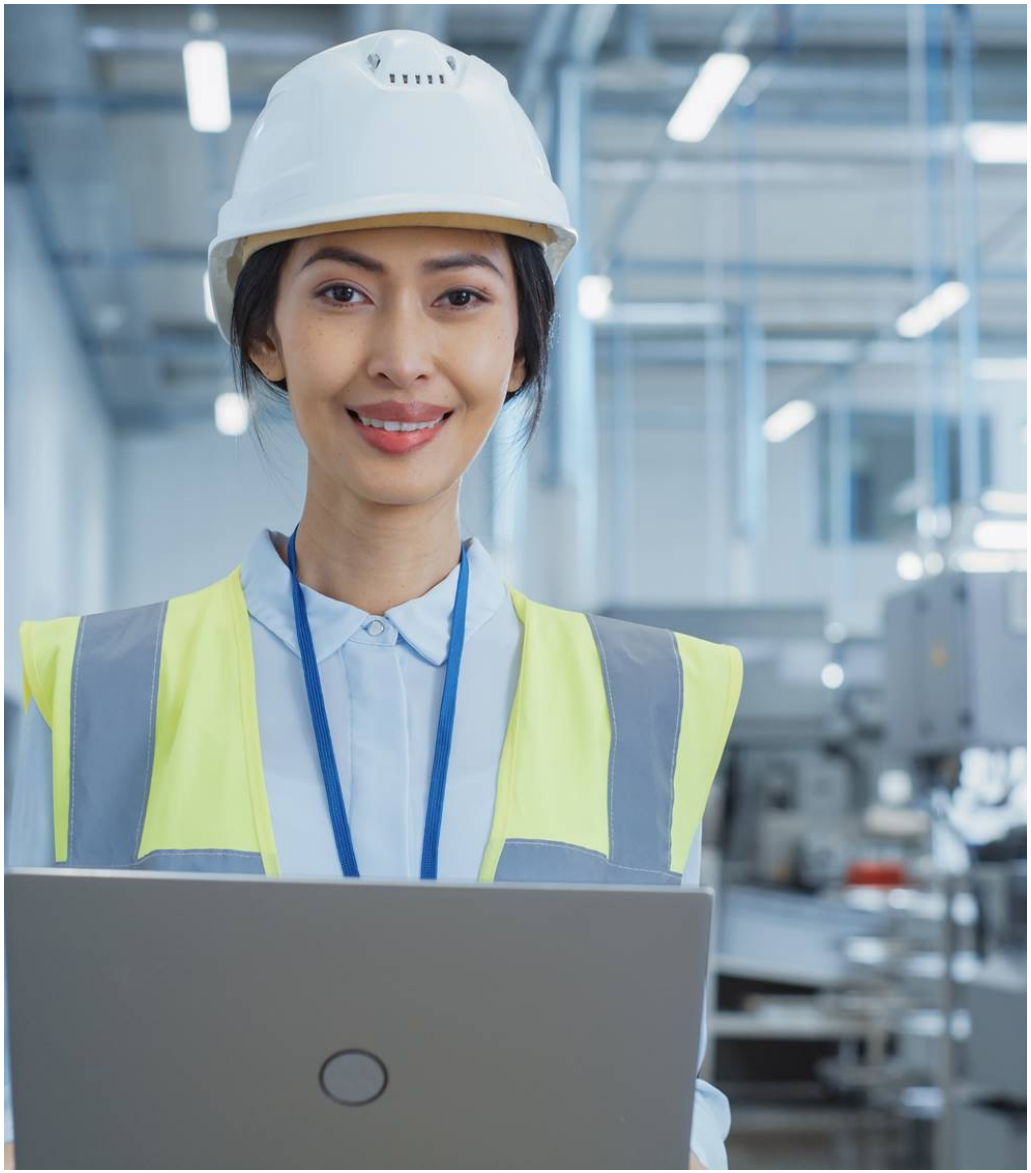
Lowest Carbon Index – Highest CAPEX per volume of production

- Feedstock Receiving
- Feedstock Prep
- Air Separation
- Gasification
- POx/Cooling
- Syngas Cleanup
- Shift Reaction
- Catalysis/Synthesis
- Product Upgrading
- Send out and Reporting

Power generation, CCUS, terminal management, Carbon management, RNG, Hydrogen, water and waste water treatment

What is efficiency in project development?

- ✓ Efficient use of capital
- ✓ Efficient design of systems to aid construction and engineering
- ✓ Faster installation
- ✓ Faster commissioning
- ✓ Faster start-ups
- ✓ Faster production milestones



Integration of systems in Process Plants
Integrated not interfaced

- **Process Control**
- Process Safety
- Process Fire and Gas
- Electrical Control
- **Power Management**
- **Operator Training Simulator**
- Machine monitoring
- Compressor control
- Turbine control
- Terminal Management
- Maintenance and Operations Management System(s) or MOMs
- Enterprise Asset Management
- Plant communications (4-7)
- **Carbon Tracking and Reporting**

How many systems will be in your control room?

Collaborative partner for project life cycle

Proven technologies for minimizing cost, schedule and risk through the project lifecycle

Plan
With
ABB

Intelligent projects improve speed and quality of project execution through single source integration.

Design
With
ABB

Build
With
ABB

ABB's integrated automation and electrical approach lowers risk and price for projects.

Operate and Maintain
With
ABB

Collaborative Operations transform existing operations through actionable insights to optimize performance in real time.

Electrification | Instrumentation | Automation | Rotating equipment | Telecommunications | Services

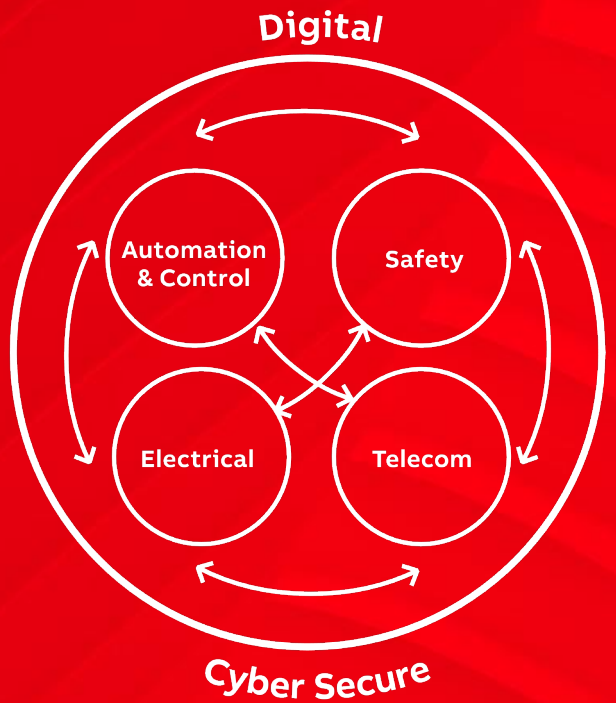
Over 1,800 service professionals in 28 countries to keep plants running and optimizing performance.

Engineering	Infrastructure	Applications	Services
Intelligent projects		Collaborative Operations	
Ergonomic Control Room Design		E-house Design/optimization	

Complete integrated project solution

In the past, “built to last” was a guiding principle.

Today, “built to adapt” delivers optimal results.



Seek collaborative partners aligned with you to help you succeed Before, during and after

Projects require:

- Open communications, transparency in operations and costs
- Shared risk and reward
- Partnerships with licensors, suppliers and engineering houses and more
- Specialized domain and technology expertise
- Increased attention to regulations