LNG Value Chain Value Propositions
Driving safety, business performance & energy efficiency

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Schneider Electric, the Global Specialist in Energy Management and Automation

€24.7Bn
FY 2016 revenues

~ 5%
of revenues devoted to R&D

~160K+
people in 100+ countries
Oil and Gas Overview
Key trends put pressure on OPEX and CAPEX decisions in the Oil and Gas Industry

Keeping employees and assets safe in a high risk industry

Addressing industry trends like the ageing workforce and price volatility

Adopting new technologies and prioritizing investments

Meeting sustainability compliance and social license to operate

In the United States alone, 10,000 baby boomers will retire every day from now until 2030 – Pew Research Center
Three emerging priorities address the challenges

Focus on excellence in operations and execution performance

Efficiency and sustainability strategies as a top executive priority

Collaboration with suppliers to re-define architectures
Driving efficiency, integration and optimization at every level
Efficiency gains will come from IT/OT convergence
EcoStruxure Platform

**Onshore**
- Apps, Analytics & Services
  - Industry Solutions
    - Process Modeling & Optimization
    - SimSci
- Offshore
  - Operations & Data Management
    - Wonderware
- Pipeline Management
  - Predictive Maintenance
    - Avantis
  - Operator Training
    - Eyesim
- Refinery and Petrochem
  - Pipeline Management
    - ePLMS
- LNG and Gas Processing
  - Planning & Scheduling
    - Spiral
- Fuel Supply Chain
  - Fuels Supply Chain Automation
    - DTN

**Connected Products**
- Edge Control
  - IPPM
    - Integrated Power and Process Management
  - Operations Control
    - SCADA
      - InduSoft Web Studio, InduSoft IoTView, Prometheus
  - Power Management
    - PowerStruxure
  - Energy Control
    - Telemetry & Remote SCADA
      - SCADAPack
  - Continuous Process & Safety Control
    - PlantStruxure
      - Modicon, Foxboro, Triconex
  - IT Management
    - Pre-fabricated datacenter
      - Smart Bunker

**End-to-end Cybersecurity**
- Cloud and/or On Premise
  - IPMCC
    - Intelligent Power & Motor Control
  - Uninterruptible Power Supply
    - Gutor, Galaxy Symmetra
  - LV Drive Systems
    - Altivar
  - MV Switchgear
  - Smart Breakers
    - MasterPact MTZ
  - Pre-fabricated E-house
    - Power Distribution
  - Telemetry
    - Scadapack
      - Accutech Weather Stations
  - Measurement
    - Control
      - Foxboro
  - Mobile
    - Inspections
      - Inteliarc
  - Security Cameras

**For Oil and Gas**
- Innovation At Every Level
EcoStruxure gives us competitive strength in the market with the ability to combine products, edge control and software/apps/analytics across Energy / Power, Industry & Software
Oil and Gas Value Chain Solutions

- Offshore
- Onshore
- Pipeline Management
- LNG and Gas Processing
- Refining and Petrochemical
- Fuel Supply Chain
Our solutions deliver value throughout the entire O&G value chain

1. Offshore:
We reduce offshore project CapEx by up to 5% and OpEx by up to 6%.

2. Onshore:
By optimising resource utilization, we increase production efficiency by up to 5% while also maximising recovery.

3. Pipeline operations:
We are the only company that provides an integrated software platform within our architecture that enables safe, reliable, and efficient operations from the field to the enterprise.

4. LNG and gas processing:
We remove risk and complexity from a project’s critical path, ensuring on-time and on-budget execution.

5. Refining and petrochemical:
We are the global leader in process safety, and our integrated simulation and control solutions reduce operating cost and increase availability by up to 5%.

6. Fuel supply chain:
Improve efficiency with industry-leading supply chain automation and business intelligence tools.

Addressing critical Oil and Gas challenges
- Keeping employees, assets, and environment safe in a high-risk environment
- High cost of offshore staffing
- Finding efficiencies that improve business performance and optimise production
- Deploying smart oil and gas field technologies
- Deploying digitisation and IoT technologies
- Aging workforce/lack of skilled workforce, knowledge transfer
- Difficulty optimising throughout supply chain

Why Oil and Gas customers partner with Schneider Electric
As a worldwide leader, we intimately partner with our customers, listen to their unique requirements find the right solutions that mitigate risk and drive results, and ensure best-in-class global delivery and project management.
Gas Processing & LNG: Overview

1. Natural gas well
2. Gas Processing
3. Transmission pipeline
4. Liquefaction & Storage
5. Shipping
6. Receiving and regasification
7. Market

Processed Gas is cooled to -162 Celsius, turning it into a liquid. Reducing the volume by 600 times, gas is stored in huge tanks. Once it arrives, gas is warmed and returned to its original state. From there, it’s piped to end users.
Overview of LNG Liquefaction Plant
Overview of Regasification plant

1. Electrical Distribution
2. Process Control
3. Emergency Shut down
4. Instrumentation
5. Process Modeling & Optimization
6. Transverse Solutions

- Unloading Arm
- Storage Bank
- Regaseifier
- Flare
- Field services
- Control Center

Confidential Property of Schneider Electric
…With our key solutions for LNG and Gas Processing

Software
Simulation, modeling, asset management, and business intelligence software

Safety Systems
Complete abnormal situation management

Energy and Outage Management
Custom power distribution solution, including control systems in customized E-Houses

Instrumentation
Full range of reliable instrumentation for greenfield/brownfield projects

Process Automation
Reliable, safe, and cost-effective process automation

Life cycle Services
A suite of services from energy and sustainability, to consulting and modernization
What is Process Modeling & Optimization?

- Chemical Process Modelling is the construction of a computer operable mathematical model of a chemical process that takes into account rigorous laws that govern the chemical process including conditions, laws of thermodynamics etc.

- The modelling helps to understand and predict the process, the sizing of equipment, and the operation under static and dynamic conditions.

- At the plant design stage, use of the models is for sizing and scaling of plants.

- In an operating plant the operational parameters are fed to the modelling system to fine tune the process for better consistency in production / optimization to improve profitability.

- During commissioning stages the model assists in early stabilization.

Customer needs and challenges.

- Design of an optimized plant at economic cost.

- Ensuring the maximization of yield from plant for given feedstock under varying demands for finished products.

- Early stable production.
SimSci provides a suite of applications that help improve chemical process design, dynamic and steady state operations and advanced training on real system for the Oil & Gas industry.

**Customer challenges**

- How to manage
  - Thermodynamic property prediction
  - Unit operations such as distillation columns, heat exchangers, compressors, reactors as found in the chemical processing industries.
  - Training of operators
  - Early stabilization of plants

**Solutions by Schneider Electric**

- **SimSci** provides applications that help improve chemical process design, asset performance and utilisation with integrated simulation, optimisation, training, and process control software and services that are extensively used in for process design and operational analysis in the petroleum, natural gas and polymer industries. These solutions are:
  - **PRO/II** from SimSci is steady-state process simulator for process design and operational analysis for process engineers in the chemical, petroleum, natural gas, solids processing, and polymer industries.
  - **ROMeo** Rigorous Online Modelling and Equation Based Optimization is an advanced online chemical process and refinery optimizer of SimSci
  - **DYNSIM** is field-proven dynamic process simulation program enabling the designing and operating a modern process plant safely and profitably by simulating dynamic and transient operations. The training module enables training of operators on the real system.

**Solution benefits**

- Rigorously evaluate process improvements before committing to costly capital projects
- Improve plant yields through the optimization of existing plant processes
- Cost effectively assess, document and comply with environmental requirements
- Accelerate process troubleshooting
- Detect and remedy process bottlenecks
- Train the operators
We address the full LNG architecture...

- Asset Management
- Optimization
- Energy Management
- Production Management

Data Management

- Process Control
- Historian
- Measurement

DCS
- ESD
- EMCS

Network / Communications

- Local HMI, Control
- Equipment & Process (LV,MV,MCC, LV- MV Drives, Power Gen)

- Instruments & Meters
- IED’s, Security

Energy/ Sustainability and Field Services
We address the full LNG architecture...

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*We address the full LNG architecture in the following categories:*  
- **Enterprise Management, Simulation, Optimization, and Operations Software**  
- **Data Collection, Control and Visualization**  
- **Field Equipment**
The Schneider Electric Difference