Solutions for Water & Waste Water

Smart Water Solutions technology leader enhancing key processes & applications across the water cycle

Schneider Electric’s IoT & Smart Water Solutions
Efficiency gains will come from IT/OT convergence
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Schneider Electric, the Global Specialist in Energy Management and Automation

€26.6Bn
FY 2015 revenues

~ 5%
of revenues devoted to R&D

~160K+
people in 100+ countries
...with Balanced Geographies

27% 26% 29% 18%
North America Western Europe Asia Pacific Rest of the world

FY 2015 Revenues
IoT-enabled solutions that drive operational & energy efficiency

**SMART system** - sensing, actuation & control that describe & analyze a situation - making decisions based on available data in a predictive or adaptive manner
Water & Wastewater

Apps, analytics and services

- Power Management
  Plant Energy Performance / Power Monitoring Expert
- Energy and Sustainability Management
  Resource Advisor
- Integrated Software Systems
  Water loss management
  Water network optimization
  ClearSCADA
- Operations Control and Management
  System platform Historian
  Mobile data collection
  Dashboards and data analysis
- Asset Management
  Condition manager

Edge control

End-to-end cybersecurity

Cloud and/or On Premise

- Power Monitoring and Control
  PowerStructure™
- Discrete Process
  PlantStructure Modicon, PES
- Continuous Process
  PlantStructure Modicon, Forexo

Connected products

- Communication Infrastructure
  ConextXum
  Trio
- Field Devices
  Foxboro
  Accutech
- Variable Speed Drives
  Altivar
- Uninterruptible Power Supply
  Gutor
- Electrical Distribution
  Masterpact MTZ
  Smart Panel
  iP MCC
Solution to help optimize shop floor to top floor across the full water cycle

Products, solutions & services from field to enterprise

**Plant & Network optimization**
- Pump optimization, pump asset monitoring, network operation optimization, temperature optimization

**Plant & Network management**
- Energy monitoring, GIS, water network online simulation, cooling/heating network online simulation, EAM, NRW management, mobile asset management, weather services

**Automation & Control**
- SCADA/HMI, DCS, telemetry, PAC/PLC, instrumentation, motor control, communications

**Electrical Distribution**
- Power monitoring and meters, substation automation, LV, MV, power protection and control

**Critical Power and Cooling**
- Secure power, racks and enclosures, IT room management

**Facility Security & Safety**
- Video security, access control, fire and life safety, emergency lighting

**Business management**
- Energy and sustainability services, performance contracting, field services, cyber security, system integration, business intelligence systems, data historian

You deserve smart water

- Up to 20% savings on OpEx & CapEx
How do we make a system SMART…

sensing, actuation & control that describe & analyze a situation - making decisions based on available data in a predictive or adaptive manner

Managing entire Water Cycle

Services

- Installation services
  - Systems integration
  - Installation & commissioning
- Field Services
  - Support & update
  - Corr. & preventive maintenance
  - Managed services
  - Retrofit
- Consulting and Expert Services
  - Performance contracting
  - Engineering & Design
  - Business Performance
  - Operations, Concessions

Business Software Solutions

- Water Loss Management
  - Leak Detection
  - Non-revenue Water
  - Pressure Management

- Operational Efficiency
  - Energy Management
  - Operations Optimization
  - Water Quality
  - Storm Water Management

- Maintenance Response Centre

- Consulting and Expert Services
  - Performance contracting
  - Engineering & Design
  - Business Performance
  - Operations, Concessions

Software Apps

- Hydraulic Modelling
- GIS
- EAM
- Enterprise Integration bus: Analytics, Workflow, Algorithms, Connectivity
- Historian
- Real-time Integration bus: Information Server, Visualization, Web, Mobility, OPC, Alarms, Events

Software Platforms

- SCADA
- Historian
- Enterprise Integration bus: Analytics, Workflow, Algorithms, Connectivity
- Historian
- Real-time Integration bus: Information Server, Visualization, Web, Mobility, OPC, Alarms, Events

Hardware

- Sensors
- Automation & Controls
- Communication
- Electrical Distribution
- CCTV
- Meters
- Etc.
- Pumps
- Valves
- Pipes
- Tanks / Reservoirs
- Plants
- Etc.
References & related solutions

Examples of references with current solution implementations
Customer Challenge
• 43% leakage level - appx 1.3 million m³ of drinking water lost every day

The Solution
• Dividing distribution network into 1400 sections/models using Aquis
• Detailed network models support & verify the establishment of approximately 600 DMZs (Demand Meter Zone = Pressure zone)

Customer Benefits
• Full overview of hydraulics & water quality of the entire distribution network of 24,000 km
• Planning tool for future development & pipe replacement in the rapidly growing urban & rural areas of Kuala Lumpur, Putrajaya & Selangor

The Results: Life is On with...

supporting the NRW system 5% - 9% progressive reduction

SYABAS, Malaysia
Support NRW reduction - state of Selangor, Kuala Lumpur & Putrajaya

Over 6 million consumers of drinking water across Selangor, Kuala Lumpur & Putrajaya

More than 1400 network models, with 6000 reservoirs, 500 pump stations

Currently taken over by the state govt under Air Selangor - major improvements in NRW%, plant & network.

Life Is On
Schneider Electric
Safe to close valve!!!
State without Water Network Optimization: Scattered Data >> No Analytics for Decisions

Water Utility Issues:
- Lack of Coordination
- Lack of full visibility
- Deep hydraulic knowledge

End up reactive decisions rather than anticipation

20% инвестиции \(\leftrightarrow\) 80% инвестирования

Hydraulic Dept.
- Offline / Theoretical Model
- Pump and Reservoir Usage
- Pressure Calculations
- Leak / Loss Assumptions

GIS

SCADA Operators

CRM/Billing

Management

Field Team
Work Orders
Water Network Management Team: System Without WNO >> Pain Points

Pain Points:
- How to Reduce Water Loss / Leakage (NRW)
- How to Reduce risks of Low pressure and water quality issues
- How to Optimize energy and chemicals usage
With WNO: Water Network Management Addresses Issues & Pain Points

**AQUIS**

Hydraulic Model
- Simulation and Real-time Modeling
- Pump and Reservoir Optimization
- Pressure Optimization
- Leak / Loss Detection

WFLOW

- Workflow Management

Visualization and SCADA Platform

- ANALYTICS

- Past
- Present
- Predictions

- Schneider-Electric
- WNO

- SCADA Operators

- Reduces risks of low pressure and water quality
- Reactive to Proactive management
- Energy savings and chemicals usage optimization
- Enhances real-time network supervision
- Ease of operations: SCADA operators get Analytics & Decision support

Up to 15% Reduction of leakage (NRW)
Up to 20% Reduction of energy costs
Up to 20% Reduction of CO2
Potential 25% Operational Efficiency Increase
Pressure in the network – Current Situation

Pressure in the network – Predicted Situation
Customer Challenge

- Pumping water from different sources; areas over provinces - ensure constant pressure & volume
- Control pressure & volume to be sufficient, efficient & continuous while keeping the costs (operation & energy) competitive
- Manage water stably & sustainably without interruption

The Solution

- Real-time control from a control center, allowing to control the pumping system
- Enables control & access to all information of pumping system, water pipeline network & distribution stations as well as status of water sources.

Customer Benefits

- Reducing loses within the system - costs of pumping & water lost, instant problem rectification 24hrs/day
- Energy saving by 5% of electricity cost - main cost of water pumping

The Results: Life is On with...

- Reduction in detecting losses 5% in electricity pumping cost

East Water, Thailand

Water management solution - supporting Eastern industrial estates in Rayong, Chonburi & Chachaengsao

Largest supplier of untreated water in the eastern region of Thailand

East Water has 15 pumping & distributing stations. Pipeline is approximately 400 km long, connecting important water sources in the eastern region: Nong Pla Lai, Dok Rai, Klong Yai, & Prasae reservoirs in Rayong, Nong Khor & Bang Phra reservoirs in Chonburi, & Bangpakong River in Chachaengsao, making a solid water grid.
An architecture serving different use cases

- **Plant Energy Performance**
  - Power Monitoring Expert (PME) software
  - **Services**
    - Technical support & application services
  - **Software**
    - Specific energy management application for WWTP
  - **Metering**
    - Metering options for mains down to loads
  - **Plant Floor**
    - Process units industrial loads

- **Process Control System**
  - Wonderware System Platform
  - Existing SCADA
  - PAC
  - Real-time data
  - Historical data

- **Process instruments & existing meters**

- **Additional basic or smart meters**
Main KPIs Monitored and Measurable through Plant Energy Performance

<table>
<thead>
<tr>
<th>Plant-wide energy indicators</th>
<th>Key equipments / loads efficiency</th>
<th>Sub-processes efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plant specific electrical consumption (kWh/m³ of water treated)</td>
<td>• Pump xxx specific energy (kWh/m³ of water pumped)</td>
<td>• Raw wastewater lifting specific energy (Wh/m³)</td>
</tr>
<tr>
<td>• Electricity usage ratio (by area/sub-process)</td>
<td>• Aeration efficiency (kWh/ Nm³ of air forced)</td>
<td>• Aeration efficiency (kg DO/ kWh)</td>
</tr>
<tr>
<td>• Gas usage ratio (process / non production)</td>
<td>• etc.</td>
<td>• BOD removal specific energy (kWh/kg of BOD removed)</td>
</tr>
<tr>
<td>• Specific chemical product xxx consumption (kg/m³ of water treated)</td>
<td></td>
<td>• Sludge dewatering specific energy (kWh / kg of dry sludge produced)</td>
</tr>
</tbody>
</table>

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<tr>
<th>Energy related costs</th>
<th>Onsite energy production</th>
<th>Sustainability (carbon footprint)</th>
</tr>
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<tbody>
<tr>
<td>• Purchased electricity cost (LCU*)</td>
<td>• Electricity production from Biogas (kWh)</td>
<td>• Energy use related emissions (tCO₂e)</td>
</tr>
<tr>
<td>• Specific energy cost (LCU/ m³ treated)</td>
<td>• Electrical autonomy from Biogas (%)</td>
<td>• Chemical use related emissions (tCO₂e)</td>
</tr>
<tr>
<td>• Purchased energy cost by area</td>
<td>• Heat production from Biogas (kWh)</td>
<td>• Specific emissions - from energy + chemical use (tCO₂eq / m³ of water treated)</td>
</tr>
<tr>
<td>• etc.</td>
<td>• Backup generators production (kWh)</td>
<td>• etc.</td>
</tr>
<tr>
<td>* LCU: Local currency unit</td>
<td>• Biogas valorization ratio</td>
<td></td>
</tr>
</tbody>
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* LCU: Local currency unit
Energy Costs Estimates dashboard

- Purchased electricity cost
- Total energy cost
- Purchased energy cost by area
- Specific energy cost
Plant Electrical Consumption Dashboard

Focus on electrical energy used at plant level

Dedicated to
Plant manager

- Electricity ratio (electricity use distribution)
- Total electrical consumption
- Quantity of water treated
Aeration Process Energy Performance dashboard

Monitor energy performance of some energy intensive processes or sub-processes. Allow benchmarking between similar process lines.
Telemetry is incredibly important to us. We’ve got a very large geographical area…and several thousands assets spread across that and we have to monitor them and to make sure they are working and working effectively.

Chris Boucher
Dir. of Information Services, Anglian Water

Customer Challenge
- Maintain position as leading innovator in leakage control and water resource protection
- Detect leaks quicker and improve response times
- Reduce the cost of outsourced leak detection
- Regulatory compliance
- Reduce the cost of ownership

The Solution
- Water Management Suite
- Struxureware SCADA Expert ClearSCADA

Customer Benefits
- Improved decision-making
- Improved water loss management
- More efficient and effective operations

The Results: Life is On with...
500,000 connected telemetry data points

Anglian Water, UK
Water Loss Solution detects leaks for system reliability and operational efficiency

25 years of data to inform decision-making

Struxureware SCADA Expert ClearSCADA
Water Management Suite

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SUMMARY

• 3 levels of innovation help drive full IoT integration across the water cycle
  • connected products
  • edge control
  • apps, analytics & services
• Maximize the value of data - helping to translate data into operational & energy efficient, actionable intelligence & better business decisions
• Key trends towards SMART water management
  • Water Network Optimization
  • Operation Command Center (OCC)
  • Plant & Network Energy Performance
  • Cyber Security
  • Asset Performance Management