EnMS and Digital Technologies for Energy Efficiency and Productivity at Novartis

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Novartis Ringaskiddy Ltd.
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Novartis in Ireland

**Over 1,500 People Employed**

In 2 manufacturing plants in Cork & commercial operations in Dublin

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**26 Clinical Trials**

In partnership with 20 Irish hospitals giving over 800 Irish patients access to new therapies

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**€4,000,000 spent in R&D**

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**4,302 People Tested for AMD**

Provided access to spirometry testing since November 2012

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**5,033**

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**1,700 Hours**

Novartis Ireland employees give to community projects in 2014
Health Safety and Environment at NRL

Site Context

• 22 Years continuous accreditation EMAS (European Commission Eco-Management and Audit Scheme)

• Multiple awards for energy efficiency and innovation within Novartis Network

• Continuous improvements in energy efficiency and reduction in GHG emissions

Drivers of Energy Efficiency

• Corporate commitment on GHG emissions
  – -30% 2020 v. 2010 (-20.5% achieved to 2015 v. 2008)
  – Corporate HSE site-specific target for 2017 GHG emissions -4%

• Local budgetary constraints: -20% last 3 years

• Can internal carbon price of $100 / tonne be enabler of projects?
Impact of CapEx Projects and EnMS

-27% in 10 years

-43% in 7 years
Site District Heating using Waste Heat from Incinerator Scrubber
Why Digital Technology for Energy Management at NRL?

• Mature site - 1994 – metering of all utilities and process parameters installed from Day 1
• Distributed Process Control System (Bailey)
• Process Information (PI) database
  – Process data / historian
  – Trends / graphics – Performance monitoring
• Broad interdisciplinary EnMS team
  – Production, engineering, projects, finance
• Continuous improvement tool
  – Corrective action
  – Online shared energy savings opportunity list
  – Input into upgrades and construction projects
• Reporting system is evolving from simple consumption reports to ‘normalised’ reporting
Energy Management at NRL

PI DATA BASE
- Over 200 relevant energy meters

M&T REPORTS
- Separate the signal from the noise
- Now developing ‘normalised’ reports

Drivers
- Site environmental targets
- Site budgets
- Corporate targets

SITE ENERGY MANAGEMENT GROUP

EXTERNAL CONSULTANT SUPPORT
- Maintain energy saving opportunity list
- Develop baselines/reports

ACTIONS
- Daily corrective actions
- Bi-weekly meetings
- Energy saving initiatives

SAVINGS
Example of Automated Site Report

Overview of utility energies and costs

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>TARGET</th>
<th>CONSUMPTION</th>
<th>SAVINGS</th>
<th>COST</th>
<th>AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>last 7 days</td>
<td>last 7 days</td>
<td>%</td>
<td>YTD</td>
<td>last 7 days</td>
</tr>
<tr>
<td>CICLO: Thermal</td>
<td>4,923 kWh</td>
<td>5,309 kWh</td>
<td>-5.2%</td>
<td>€775</td>
<td>€7</td>
</tr>
<tr>
<td>CICLO: Flow</td>
<td>3,412 m³</td>
<td>3,680 m³</td>
<td>-5.2%</td>
<td>€107</td>
<td>€1</td>
</tr>
<tr>
<td>DIOVAN: Thermal</td>
<td>22,495 kWh</td>
<td>38,438 kWh</td>
<td>-34.7%</td>
<td>€8,088</td>
<td>€1,857</td>
</tr>
<tr>
<td>DIOVAN: Flow</td>
<td>11,442 m³</td>
<td>13,472 m³</td>
<td>-12.3%</td>
<td>€858</td>
<td>€15</td>
</tr>
<tr>
<td>PEPTIDES: Thermal</td>
<td>589 kWh</td>
<td>605 kWh</td>
<td>-20.9%</td>
<td>€8,067</td>
<td>€0</td>
</tr>
<tr>
<td>PEPTIDES: Flow</td>
<td>5,753 m³</td>
<td>-1,558 m³</td>
<td>-23.9%</td>
<td>€87</td>
<td>€81</td>
</tr>
<tr>
<td>PB1: Thermal</td>
<td>77,221 kWh</td>
<td>138,339 kWh</td>
<td>-14.8%</td>
<td>€24,078</td>
<td>€2,940</td>
</tr>
<tr>
<td>PB1: Flow</td>
<td>12,476 m³</td>
<td>7,588 m³</td>
<td>-15.3%</td>
<td>€1,082</td>
<td>€70</td>
</tr>
<tr>
<td>PB1A: Thermal</td>
<td>21,309 kWh</td>
<td>45,337 kWh</td>
<td>-10.0%</td>
<td>€6,680</td>
<td>€1,223</td>
</tr>
<tr>
<td>PB1A: Flow</td>
<td>8,998 m³</td>
<td>10,037 m³</td>
<td>-5.3%</td>
<td>€217</td>
<td>€6</td>
</tr>
<tr>
<td>TOTAL Thermal</td>
<td>126,547 kWh</td>
<td>246,080 kWh</td>
<td>-6.7%</td>
<td>€25,540</td>
<td>€6,027</td>
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<tr>
<td>TOTAL Flow</td>
<td>43,085 m³</td>
<td>33,320 m³</td>
<td>-9.3%</td>
<td>€1,917</td>
<td>€130</td>
</tr>
</tbody>
</table>

Red:  Higher than expected consumption
Yellow: Lower than expected but higher than target
Green: Savings ahead of target
Next Step - Regression Analysis – ‘Normalised Consumption’

Energy use for this Production Unit is normalised based on 5 different variables (5 product steps)

**Diagram:**
- **Electricity**
  - Actual weekly consumption VS Expected weekly consumption (kWh)
  - Actual: blue line, Expected: red line

- **Electricity**
  - Actual Savings VS Target Savings (kWh)
  - Actual: blue line, Target: green line

Target = 5%
Site Status – Site-Wide Visualisation

**ELECTRICITY 2017**
-0.87%

**NATURAL GAS 2017**
-21.21%

**WATER 2017**
-2.44%

**TOTAL SAVINGS 2017 (€)**
-€ 461,568

**TOTAL SAVINGS 2017 (tCO2)**
- 2,227 t
Attitude to Technology Adoption
Novartis Digital Strategy

• Novartis is on a journey to adopt more digital technologies

• Robotics Process Automation pilots currently being rolled out in diverse business processes including FRA, Procurement and Product Release

• Digital technologies seen as key to
  – Reduced processing time for repeatable high volume transactions
  – Improved quality of output
  – Supporting business decisions
  – Managing increasing workloads
  – Meeting expectations of regulators
  – Delivering innovative medicines more quickly to more patients
Key Benefits of Digital Technologies in EnMS at Novartis

• Data, Analytics and Connectivity – Scalable and Flexible
• Enables fast response to consumption anomalies
• Provides visibility on budget and emissions target tracking
• Enables participation in ‘Smart Grid’ initiatives such as demand response
• Low and falling costs
  – e.g. Recently installed digital power meters on all electrical distribution boards reporting directly to PI data-base via RS 485 / Ethernet interfaces
Thank you