UN Economic Commission for Europe

‘Policy Maker Meets the Engineer’ Workshop

Geneva, 18 January 2017

Energy Efficiency at Nestlé

Peter Jaggy, Head of Corporate Engineering
Nestlé in Numbers

Nestlé Group 2015:
• Group sales: CHF 88.8 billion
• Trading operating profit: CHF 13.4 billion
• 436 factories in 85 countries
• 335'000 employees
• Capital Investment approx. CHF 4 billion / year

Environmental impact:
• Energy consumption: 94 PJ
• Water consumption: 140 million m³/year
• CO₂ emissions: 7 million tons/year
• Waste water discharge: 82 million m³/year

Our Top 10 markets (sales in CHF billion)

- United States: 25.3
- Greater China Region: 7.0
- France: 4.8
- Brazil: 3.9
- United Kingdom: 3.0
- Germany: 2.9
- Mexico: 2.7
- Philippines: 2.6
- Italy: 1.9
- Canada: 1.8
Environmental and Societal Sustainability are Business-critical for Nestlé

Creating Shared Value

“For a company to be successful over the long term and create value for shareholders, it must create value for society.”

Peter Jaggy, Nestlé
Environmental Indicators

- Energy: +7%
- Water withdrawal: -12%
- GHG emissions: -14%
- Water for disposal: -62%
- Production volume: +42%
Environmental Indicators

- Energy consumption/t: -29%
- Water withdrawal/t: -41%
- GHG emissions/t: -43%
- Water for disposal/t: -75%

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Nestlé’s Energy Consumption Mix

**Electrical Energy**
- 30% (8% Renewable)
- Grid electricity from non renewable: 22%
- Green Power: 3%
- Grid electricity from renewable: 5%
- Biomass & Solar: 8%

**Renewable Energy (15.5%)**

**Thermal Energy**
- 70% (8% Renewable)
- Natural Gas: 43%
- Petroleum: 12%
- Coal: 4%
- Purchased Steam & Hot Water: 3%

**Energy Source Breakdown**
- Biomass & Solar: 8%
- Green Power: 3%
- Grid electricity from non renewable: 22%
- Grid electricity from renewable: 5%
- Coal: 4%
- Petroleum: 12%
- Natural Gas: 43%
- Purchased Steam & Hot Water: 3%
Setting Priorities the Nestlé Approach: Going after Largest Users first

Cumulative Energy Consumption 2014

Cumulative Water Consumption 2014

170 factories

66 factories

34 factories = 50% of water withdrawal
Energy Target Setting (ETS) Methodology

Two week energy & water site assessment with a team of experts to issue an action plan with energy & water savings projects to be implemented

A clear methodology:

- Team staffing: Factory/Market Nestlé specialists External consultants
- Kick off: Agenda Objectives Accountabilities Administration
- Follow up: Progress & Achievements Knowledge sharing Issues & Next steps I-Neters reporting
- Prework done: EnMatrix Completed Official NEMT Model Water mapping GI 294.1
- Factory Nomination: Factory Mant Commitment Energy bill > 5 mio CHF/year Business continuity mandated

Specific Milestones during the two weeks:

1. Info on Teamroom
2. List of opportunities to be pursued
3. Complete Summary XLS file ($, GJ, etc.)
4. Final presentation
5. Factory data for calculations
6. Chart with all projects
7. Projects descriptions & calculations on
ETS Methodology

ETS team work with our Knowledge partners who participate in the site assessments.

Preparations Before ETS
- 60 days Explaining ETS Process to Market
- 45 days Teamroom Formation and Up-loading Factory Data
- 30 days Ordering to Knowledge Partners
- 15 days Kick Off Process
Onsite 2 weeks

Onsite Activity During ETS
- Day 1 Factory Presentations and Tour
- Day 2 Data Collection, NMET / NET Enmatrix
- Day 3-8 Project Identification and detailing
- Day 9 Consolidation of Projects
- Day 10 Final Presentation and commitment

Knowledge Partner

Achievements
- Energy Saving of 11 Mio GJ (11.7% of Group)
- Water Saving of 18 Mio m3 (12.8% of Group)
- GHG Reduction 913,000 Tons (12.2% of Group)
- Energy Cost Saving 203 Mio CHF

+129
Energy Target Setting
Renewable Energy - Strategy and Drivers

- **Renewable energy Decision making Tool**
- **The right Renewable at the right Place for the right Process**

**The Drivers**
- Biomass boilers
- Renewable electricity through PPAs

**Nestlé Potential Energy Roadmap 2010-2020**
to deliver 2°C pathway according to Sectoral Decarbonization Approach

LESS Usage
- 4% annual volume growth
- 1% annual usual efficiency gain

MORE Renewable
- -5% non-renewable
- From 17% to 32% renewable electricity
- From 10% to 21% renewable fuel

From 2010 to 2020
Renewable Thermal Energy

☑️ Biomass ❌ Biofuel

What we do:
• Grounds burned in 23 Nescafé factories
• 15 factories burn biomass (Wood, saw dust, coconut shells), ensuring sustainability meaning:
  o Not competing with Food chain
  o Not contributing to deforestation
  o Limited transport distances (CO2 impact)
Benchmarking Factories, Unit Operations and Equipment?

<table>
<thead>
<tr>
<th>Waterfall Inputs</th>
<th>Current Consumption</th>
<th>Optimal operation (zero loss)</th>
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<tr>
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<td>Water loss</td>
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<td>Electrical loss</td>
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| Design           | 65                  | 63                           |
| Heat recovery - Water reuse (internal) | 56 | 5 |
| Heat recovery - Water reuse (external) | 63 | 3 |
| Vapour compression - Water recycle | 48 | 18 |
| Different process | 38                  | 15                           |

Minimum Consumption (perfect design) = 38

Perfect design based on the Best Available Technology working without losses. (*)

Less efficient current technology used in Nestlé including all operational losses. (*)

The nexus D-E represents the mid point between Min-Max. (*)
Benchmarking Factories - Soluble Coffee Business

Energy Dashboard

CO₂ Dashboard

Water Dashboard
Benchmarking Factories - Soluble Coffee Business
- Roadmap

from 39 GJ/T in 2010 to 7 GJ/T in 2020
Benchmarking Unit Operations - Spray Drying
- Energy Dashboard

**Energy Rating**
- Energy GJ/t final product
- Includes:
  - Air heater primary fuel
  - Primary fuel for steam
  - Electricity consumption of directly related equipment
  - Electricity for any cooling uses

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<th>C</th>
<th>D</th>
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More Efficient

- A
- B
- C

Tutbury Potential, with heat recovery and high Tc drying

- D
- E
- F
- G

Tutbury Existing Operation

5.1

7.0

8.6
The Role of the Regulator

- Create an ‘even’ playing field:
  - No subsidies for ‘non-renewable’ power or thermal energy
- Create the future infrastructure:
  - Enabling micro grids
  - Competitive landscape
- Focus on CO2:
  - Penalize / discourage greenhouse gas emissions
  - My waste may be your treasure
- Subsidize R&D in ‘efficiency’
- Remove hurdles and administrative barriers
Thank you