Resource Efficient and Cleaner Production
from global necessity to local business opportunity

Rene VAN BERKEL
Chief, Cleaner and Sustainable Production Unit
United Nations Industrial Development Organization

delivering industrial efficiency and competitiveness
Business as Usual is Not an Option

Global material consumption would nearly triple between 2008 and 2050 to 180 billion ton assuming that per capita consumption would globally average current OECD levels from 2030 onward.
Business as Usual is Not an Option

Unused material extraction from metal mining: +100%

CO2 from fossil fuel burning: +260%

CO2 from cement production: +190%

Water use in industry: +50-80%
Business as Usual is Not Necessary

The economic benefits from resource efficiency for energy, water, land and steel are estimated at 2.9 trillion USD annually by 2030.
Business as Usual is Not Necessary

Up to 85 percent of the productivity opportunities are in developing countries

% of total productivity opportunity by resource and region
The Challenge

Challenge:

- Decouple economic growth from the use and consumption of natural resources and energy
- *Do more with less* – provide more value with less environmental impact and better economic and ecological efficiency

Response:

- **Increase**
  - Health, income, quality of life

- **Reduce**
  - Resource use, pollution, waste, impact on nature

**Sustainable industrial development**
Green Industry

- Greening of Industry
  - Continuous improvement of resource productivity and environmental performance of industries in all sectors
    - Cleaner Production
    - Energy Efficiency
    - Chemicals Management
    - Etc.

- (Creating) Green Industries
  - Industrial supply of environmental goods and services
    - Waste management
    - Resource recovery
    - Renewable energy
    - Etc.
Green Industry = Development Priority

- Triple bottom line development benefits
  1. Income and employment creation
  2. Competitive and sustainable business
  3. Innovative and value-adding products
  4. Natural resource security
  5. Mitigation and adaptation to climate change
  6. Environmental management
  7. Industrial and chemical safety
GI Flagship:

Resource Efficient and Cleaner Production

- Continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment

- RECP addresses three sustainability dimensions individually and synergistically:
  - Production efficiency
    - Through improved productive use of natural resources by enterprises
  - Environmental management
    - Through minimization of the impact on nature by enterprises
  - Human development
    - Through reduction of risks to people and communities from enterprises and supporting their development
### Heritance Kandala Hotel

#### Principal Options Implemented

<table>
<thead>
<tr>
<th>Resource Use</th>
<th>Pollution Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water:</strong> operating equipment at full capacity, investing in new equipment, segregation of waste water flows and installing new filters and water reuse</td>
<td>Reduction of water consumption by ~ 6,500 m³</td>
</tr>
<tr>
<td><strong>Energy and GHG emissions:</strong> replaced light bulbs, control of chiller water temperature, controlled steam flow. Carbon off set through 80ha forest</td>
<td>Reduction of waste water by &gt; 6,100 m³</td>
</tr>
<tr>
<td><strong>Waste:</strong> segregation of waste into 16 categories, composting of organic waste, return or return packaging</td>
<td>Energy use reduction of 551,000 MJ</td>
</tr>
</tbody>
</table>

Measures taken enabled >50% increase in guest nights, while still reducing water and energy use by 8 and 3% respectively.

Assisted by the Sri Lanka National Cleaner Production Centre – a member of the global network for Resource Efficient and Cleaner Production (RECPnet)
### Principal Options Implemented

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Economics</th>
<th>Resource Use</th>
<th>Pollution Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Investment</td>
<td>Annual Savings</td>
<td>Additional recovery of 34.7 t of lead/year, and 19% less lead in the slag.</td>
</tr>
<tr>
<td>Change of refractory bricks from 31% to 50% Al₂O₃ and installation of a hood on the furnace</td>
<td>$2,500</td>
<td>$17,400</td>
<td></td>
</tr>
<tr>
<td>Change of burner and optimization of residual fuel and diesel, and improved fuel mixing</td>
<td>$1,000</td>
<td>$1,200</td>
<td>Decrease of residual oil use by 2.66%</td>
</tr>
<tr>
<td>Warming of the fuel taking advantage of the residual heat of the oven</td>
<td>$300</td>
<td>$200</td>
<td>Decrease of electricity use by 5,760 MJ</td>
</tr>
</tbody>
</table>

**Additional Information**

- Assisted by Centre de Ecoefficiencia y Responsabilidad Social Peru – a member of the global network for Resource Efficient and Cleaner Production (RECP.net)
National Cleaner Production Centres

- Established to foster adaptation and adoption of Cleaner Production

1. Information and awareness creation
2. Professional training
3. Plant level assessments and demonstrations
4. Policy advice
5. Technology transfer and investment

- Programme launched in 1994 and since expanded to 50 countries
Institutional Perspective

- NCPCs/RECP Service Provision
  - Enterprise service delivery and public good functions
  - Benefit from tri-partite, national ownership
    - (National) Government, Business Sector and Civil Society
  - Typically hosted by or operating as service unit of:
    - Business Membership Organization
    - University and/or Technical Institutes
    - Non Governmental Organizations
- United globally in RECP.net to foster knowledge management, innovation and advocacy
RECP Assessment Tools

- **Aim**
  - Identification and evaluation of RECP opportunities based on assessment of process flows
    - Input/output analysis for materials, energy, water, chemicals
    - Embedded source and root cause analysis
    - Existent in different versions
      - Cleaner Production Toolkit (for experts)
      - Resource Efficiency Toolkit (for SMEs)
      - National and sector specific specific versions
RECP Assessment

- Feasibility Analysis:
  - generate CP options
  - conduct cause diagnostics
  - material and energy balance

- Detailed Assessment:
  - Environmental Policy
  - list and implement "easy fixes"

- Cross Functional Tasks:
  - Assessing Training Needs
  - Documentation

- Initial-Assessment:
  - Preparation of Process Flow Chart
  - prepare basic consumption and production data
  - I/O Analysis, Legal Register, KPI's

- Planning and Organisation:
  - obtain commitment of top management
  - organize an CP - Team
  - compile/prepare basic information organizational chart, site map
  - identify barriers and solutions to the assessment process

- Implementation and Continuation:
  - prepare action plan, project controlling
  - management review, project evaluation and documentation, re-assessment

- Continuous Improvement:
  - select options, document the assessment phase
  - conduct economic, social and environmental evaluation

www.unep.org

24 April 2013 World Chambers Conference (Doha)
# RECP Assessment

![RECP Assessment Diagram](image)

## Plan
- **PHASES**
  - Top Management Commitment
  - Core RE Team Formation
  - Pre Assessment
  - Options and Program

## Do
- **PHASES**
  - Detailed Assessment
  - Evaluation of RE Options/Program
  - Awareness & Technical Trainings
  - Implementation of RE Options / Program

## Check
- **PHASES**
  - Key Performance Indicators
  - Monitoring
  - Controlling
  - Modifications and Revisions

## Act
- **PHASES**
  - Lessons Learnt
  - Continual Improvement
  - Management Review
  - Rewards & Recognition
RECP Assessment

http://www.unep.fr/scp/presme/resource_kit.htm

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RECP Indicators

- **Aim**
  - Measure and track resource productivity and environmental performance at enterprise level
    - Input-output accounting at enterprise level in physical units
    - Absolute indicators
      - Inputs: consumption of energy, materials and water
      - Outputs: air emissions, waste water and waste
    - Relative indicators
      - Resource productivity
      - Environmental performance

http://www.unido.org/index.php?id=1001348
RECP Indicators

- Resource Productivity
  - Product Output
    - Energy Use
    - Material Use
    - Water Use

- Pollution Intensity
  - Air Emissions
  - Waste Water
  - Waste

Tools

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RECP Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Baseline (B) (Before RECP intervention)</th>
<th>Year 1 A (After RECP implementation)</th>
<th>Change (C) C2<em>100</em>(A-B)/B [%]</th>
<th>Year 2 A2 (After RECP implementation)</th>
<th>Change (C2) C2<em>100</em>(A2-B)/B [%]</th>
<th>Difference Between A2 and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy Use</td>
<td>kWh/yr</td>
<td>2,667,097.00</td>
<td>2,380,250.00</td>
<td>-10.76</td>
<td>238,000.00</td>
<td>-10.76</td>
<td>-287,097.00</td>
</tr>
<tr>
<td>Materials Use</td>
<td>t/yr</td>
<td>1,673.00</td>
<td>1,753.00</td>
<td>4.78</td>
<td>1,500.00</td>
<td>-10.34</td>
<td>-173.00</td>
</tr>
<tr>
<td>Water Use</td>
<td>m³/yr</td>
<td>2,925.00</td>
<td>3,709.00</td>
<td>28.85</td>
<td>3500.00</td>
<td>19.66</td>
<td>575.00</td>
</tr>
<tr>
<td>Pollution</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon dioxide</td>
<td>ton CO2-eq/yr</td>
<td>238.24</td>
<td>212.62</td>
<td>-10.76</td>
<td>150.00</td>
<td>-37.04</td>
<td>-88.24</td>
</tr>
<tr>
<td>Waste Water</td>
<td>m³/yr</td>
<td>361.00</td>
<td>293.00</td>
<td>-18.88</td>
<td>250.00</td>
<td>-30.75</td>
<td>-111.00</td>
</tr>
<tr>
<td>Waste</td>
<td>t/yr</td>
<td>3.40</td>
<td>2.10</td>
<td>-38.24</td>
<td>2.00</td>
<td>-41.18</td>
<td>-1.40</td>
</tr>
<tr>
<td>Production output: P</td>
<td>ton/yr</td>
<td>2,680.00</td>
<td>3,162.00</td>
<td>17.99</td>
<td>3400.00</td>
<td>26.87</td>
<td>720.00</td>
</tr>
</tbody>
</table>

RESOURCE PRODUCTIVITY (change in %)

- Energy Productivity: Year 1: 32%, Year 2: 42%
- Materials Productivity: Year 1: 13%, Year 2: 41%
- Water Productivity: Year 1: 6%, Year 2: -8%

POLLUTION INTENSITY (change in %)

- Carbon Intensity: Year 1: -24%, Year 2: -50%
- Waste water Intensity: Year 1: -31%, Year 2: -45%
- Waste Intensity: Year 1: -48%, Year 2: -54%

Tools

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In conclusion

- Resource efficiency is both a necessary step towards achieving sustainable development as well as for improving SME competitiveness.
- SMEs are typically poorly equipped to take advantage, whilst also facing difficulties in accessing advice, technology and finance.
- Good practices and tools exist but require scaling-up and mainstreaming, using and building upon existing networks and capacities.
- Partnerships with business membership organizations.
Thank You

r.vanberkel(a) unido.org
+43 1 260 26 3945
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