Implementation of ChL at national level

UNIDO’s ChL programme has been successfully implemented in close cooperation with the National Cleaner Production Centres (NCPCs) of mainly 6 countries: **Colombia, Egypt, Mexico, Russia (St. Petersburg), Serbia and Sri Lanka**

In 2011 new initiatives have started in **Brazil, Croatia, Ukraine, Russia (Volga region) and Nicaragua**

**National Cleaner Production Centres are partners of the UNIDO/UNEP Global Resource Efficient and Cleaner Production (RECP) Network**

→ **It includes nearly 50 National Cleaner Production Centres globally**
Defining Roles

**Role of UNIDO**

- Act as a catalyst and facilitator
  - global networking
  - tools development
  - coordination of NCPCs

- Act as national focal points
  - national networking
  - training + PR
  - demonstration projects

**Role of NCPC/National Partners**
Chemical Leasing: Concept

**Economy:**
- Air pollution
- Water pollution
- Waste load
- Costs users
- Costs producers/suppliers of chemicals
- Costs others

**Environment:**
- Emission reduction

**objectives**

**Economy:**
- Added value

**Chemical Leasing**
suggests new forms of payments for chemicals that direct the economic interests of all partners towards process optimization and reduction of chemicals consumption

**Players**
- Producers/suppliers of chemicals
- Users of chemicals
- Recycling companies
- Equipment suppliers
- UNIDO, NCPCs
Provides mainly chemical services (functions performed by chemicals)

Payment not for the chemical itself, but for the benefits of the chemical (e.g. not for tons of solvents used, but for number of pieces cleaned!)

... amount of produced chemicals will decline as chemicals volume turns from a factor for earnings (“the more you sell the more you earn“) to a cost driver (“less is more“)
Chemical Leasing: Motivations

Traditional business models:
Contradictory motivations

- Material (costs, volume)
  - "the more the better"
- Delivery of goods
- "less is more"

Chemical leasing models:
Bundled motivations

- Life cycle costs (material, work, waste management)
  - "less is more"
- Delivery of services
- "less is more"

Willingness and culture of corporation is required
Bundled motivations: Industrial surface cleaning

- **Legislative approach**
  - Increase efficiency of solvent use
  - Reduced environmental impact

- **Supplier approach**
  - Service business model - Chemical Leasing
Cleaning of metal parts - Case study

**Solvents**

*Classical business model:* payment per t of solvents

Chemical Leasing: payment per m³ cleaned surface or per number of cleaned parts
Cleaning of metal parts – Case study

does not pay to own a chemical, but spends money for the benefits provided by a chemical

sells the function of a chemical, including know-how on efficiency and risks, adding management services like production management and logistics

will decline as reduction potentials are realised, based on intensified collaboration; chemicals volume turns from a factor for earnings (“the more you sell the more you earn“) to a cost driver (“less is more“)

Payments are based on benefits; added value will be shared in a fair way among the involved partners
Experience has shown that it is best applied to processes that are not the core know-how of the chemical user, such as cleaning, de-greasing, painting, etc.

**Chemical leasing pilot projects successfully introduced:**

<table>
<thead>
<tr>
<th>Industry sectors/processes</th>
<th>Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacture of electronic equipment</td>
<td>Coating powder</td>
</tr>
<tr>
<td>Car manufacture</td>
<td>Hydrocarbon solvents for cleaning</td>
</tr>
<tr>
<td>Various industries/steel treatment</td>
<td>Galvanizing and phosphating agents</td>
</tr>
<tr>
<td>Beverage production</td>
<td>Lubricants for packaging conveyers</td>
</tr>
<tr>
<td>Waste water and drinking water treatment</td>
<td>Water treatment chemicals</td>
</tr>
<tr>
<td>Accommodation and service sector</td>
<td>Cleaning &amp; disinfectants chemicals</td>
</tr>
<tr>
<td>Beverage and food-processing</td>
<td>Glue</td>
</tr>
<tr>
<td>Petrochemical industry</td>
<td>Catalysts and water treatment chemicals</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Pesticides</td>
</tr>
<tr>
<td>Printing Industry</td>
<td>Ink, printing chemicals</td>
</tr>
</tbody>
</table>
Case 1: Water purification and oil dehydration

Country: Colombia
Supplier: Nalco SA
User: Ecopetrol SA
Industrial process: Water purification and oil dehydration
Chemicals: Water purification chemicals
Case 1: Water purification and oil dehydration

BEFORE

<table>
<thead>
<tr>
<th>Nalco SA</th>
<th>Ecopetrol SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallons or kilos of chemicals</td>
<td></td>
</tr>
<tr>
<td>Colombian peso (COP) / gallons or kilos of chemicals</td>
<td></td>
</tr>
</tbody>
</table>

AFTER

<table>
<thead>
<tr>
<th>Nalco SA</th>
<th>Ecopetrol SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service of water treatment and oil dehydration</td>
<td></td>
</tr>
<tr>
<td>COP per kilo barrels (Kbls) of oil with a specified quality</td>
<td></td>
</tr>
</tbody>
</table>

UNDER ChL:

- Operations with a high consumption of chemicals
- High operational costs
- Low efficiency and potential risks in the oil fields
- Low level of control over chemical yields
- Commercial relationship only based on price

- New strategy and partnership model were developed in order to better suit the company’s global vision
- Best practice in the field analyzed
- Operational optimization of oil and water treatments
Case 1: Benefits gained

**Economic Benefits:**
- Cost reduction in the water treatment process by almost 20%
- Reduction of the polymer residues in the stabilisation pools and the waste water
- Adjustment of the yield of the equipment
- Reduction of oil and grease in the cooling towers
- Reduction of drums used for transportation and storage

**Environmental Benefits:**
- Removal of 99% of the oil and suspended solids from the waste water
- Reduction in polymer consumption

**Social benefits:**
- Creation of new jobs (in the laboratories)
- Long-term commercial relationship
- Risks reduction and better working conditions

Case 1: Benefits gained

- Reduced chemicals consumption of 113 tonnes/year
Total energy consumption per year: ca 3,400 MWh
- Direct via electricity: ca 50 MWh
- Indirect via materials: ca 3,350 MWh

**Reduced chemicals consumption due to Chemical Leasing is 113 t/year**
Energy consumption for production of 113 t/year of chemicals = 500 MWh
→ 15\% indirect energy reduction

**Direct energy consumption:** ca 50 WMh remains about the same under ChL

→ Reduction of the total (and indirect) energy consumption via Chemical Leasing is 10 times higher than the direct energy consumption
## Case 2: Bonding of boxes

<table>
<thead>
<tr>
<th>Country</th>
<th>Serbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier:</td>
<td>Henkel</td>
</tr>
<tr>
<td>User:</td>
<td>Bambi</td>
</tr>
<tr>
<td>Industrial process:</td>
<td>Bonding of boxes</td>
</tr>
<tr>
<td>Chemicals:</td>
<td>Adhesive</td>
</tr>
</tbody>
</table>

**Unit of payment:**

**Number of bonded boxes**
Case 2: Bonding of boxes

UNDER ChL:
Chemical is substituted
Application conditions are changed

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>Application temperature (°C)</th>
<th>Application pressure (bar)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The old one</td>
<td>160</td>
<td>2,9</td>
</tr>
<tr>
<td>The new one</td>
<td>130</td>
<td>1,8</td>
</tr>
</tbody>
</table>

Old adhesive

New adhesive

CHEMICAL (ADHESIVE) CONSUMPTION IS 30 – 40 % LOWER
Case 2: Benefits gained

**IMMEDIATE COST SAVINGS**
(Measurable instantly)

- Costs for adhesive
- Energy costs (lower application temperature, lower pressure)
- Maintenance costs
- Cleaning cost

**MEDIUM TERM COST SAVINGS**
(Measurable after certain time)

- Spare part costs (nozzles, pipes)

For BAMBI (user)

![SAVINGS (Costs of adhesive)](image)

*Besides, environmental and working conditions improvements*
Case 2: Benefits gained

For Henkel (supplier)

**Competitiveness and relations**
- Better relationship with Bambi
- Threat from competitors is significantly reduced

**Economic and environmental benefits**
- Services are a part of the product price
- Transportation costs and storage costs are lower
- Lower consumption of chemicals;
- Lower energy consumption
Case 3: Cultivation of potatoes

<table>
<thead>
<tr>
<th>Country</th>
<th>Sri Lanka</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier:</td>
<td>Kandurata Agr</td>
</tr>
<tr>
<td>User/farmer:</td>
<td>Nanayakkara Farm</td>
</tr>
<tr>
<td>Industrial process:</td>
<td>Cultivation of potatoes</td>
</tr>
<tr>
<td>Chemicals:</td>
<td>Chemical fertilizers</td>
</tr>
</tbody>
</table>

Unit of payment in ChL: is the yield of potatoes harvested per season
## Case 3: Before and after ChL

<table>
<thead>
<tr>
<th>Before Chemical Leasing</th>
<th>After Chemical Leasing</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ No personal protective equipment</td>
<td>✓ Introduced personal protective equipment</td>
</tr>
<tr>
<td>✓ Excessive use of agrochemicals</td>
<td>✓ Introduction of Integrated Pest Management</td>
</tr>
<tr>
<td>✓ Uncovered chemical containers and improper waste-storage</td>
<td>✓ Development and implementation of indicators</td>
</tr>
</tbody>
</table>

“The ChL model has helped us increase our food security and provided evident benefits for us and our partners. It made us stronger. We are happy and proud of the first results” – Nanayakkara Farm
## Case 3: Benefits gained

<table>
<thead>
<tr>
<th>Savings and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water</strong></td>
</tr>
<tr>
<td>• 500m³ (50% savings compare to the conventional practice)</td>
</tr>
<tr>
<td><strong>Wastewater</strong></td>
</tr>
<tr>
<td>• 170m³ (40% savings compare to the conventional practice)</td>
</tr>
<tr>
<td><strong>Agrochemicals</strong></td>
</tr>
<tr>
<td>• 40% Reduction of agrochemical costs</td>
</tr>
<tr>
<td><strong>Yield</strong></td>
</tr>
<tr>
<td>• Increased yield -10%</td>
</tr>
<tr>
<td><strong>Added value</strong></td>
</tr>
<tr>
<td>• Added value of the project 150-200 USD/ha</td>
</tr>
</tbody>
</table>

- The partners already agreed to extend the contract for the next cultivation phase and apply the model to a larger area (10 Ha).
- The Sri Lankan NCPC is already investigating new potential ChL applications in the plantation sector (e.g. tea, coconut and rubber).
Tools and instruments developed

- ChL toolkit to facilitate ChL implementation at plant level
- ChL book and video
- Case study brochure
- Sustainability criteria for ChL business models
- ChL Award
- International and national working groups
- Information and PR material in several languages
- Homepage  www.chemicalleasing.com
- Provides a **systematic approach** to the implementation of Chemical Leasing business models at company level.

- Supports the planning, implementation and monitoring of Chemical Leasing projects by providing **templates, worksheets and other materials**
Sustainability criteria have been developed in Germany and are applied worldwide.

... to improve sustainability and motivation:

• Reduction of adverse impacts for environment, health, energy and resource consumption caused by chemicals and their application and production processes!

• Improved handling and storage of chemicals to prevent and minimize risks!

• No substitution of chemicals by substances with a higher risk!

• Economic and social benefits are generated; a contract should contain the objective of continuous improvements and should enable a fair and transparent sharing of the benefits between the partners!

• Monitoring of the improvements needs to be possible!
"This concept demonstrates Ecolab's commitment to provide innovative solutions which make the production process easier, more efficient and safer. It helps us maintain our leading position"

**Srdjan Jocic, Sales Manager, Ecolab**

"Overall we have achieved a win-win situation because, on the one hand, the performance of the line was improved, and on the other hand the consumption of chemicals was reduced, thus minimizing the impact on the environment without any negative effect on profit"

**Ashraf El Wassify, Deputy of the General Manager, Akzo Nobel Powder Coating SAE**

"Ecopetrol is convinced that Chemical Leasing is the best model to achieve the highest sustainable level of performance"

**Orlando Cortés Tulando Coordinator, Strategic Supply Unit, Ecopetrol**

"By partnering with UNIDO on the Chemical Leasing project, we proved that it is possible to purify water with less chemicals. This resulted in both environmental and economic benefits. Some 4.5 million people as well as industrial customers are now getting purer water, and the new technology helps guarantee that there will be no accidents."

**Karmazinov Feliks Vladimirovich General Director of Vodokanal St. Petersburg**
a S M A R T business for green industry!

Sustainable management, Monetary benefits, Additional safety & health, Resource efficiency, Technology innovation, Sustainable management.
THANK YOU!

Petra Schwager

Coordinator of the UNIDO Chemical Leasing Programme

e-mail: p.schwager@unido.org