



Green Industry

Resource Efficient and Cleaner Production for Sustainable Rice Milling in Cambodia

SLIDES PRESENTATION



Green Industry
Resource Efficient and Cleaner Production
For Sustainable Rice Production in
Cambodia





UNIDO's Green Industry Initiative

Unlocking Development Opportunities

- **Launch in September 2009** by UNIDO Director-General Kandeh K. Yumkella at the **International Conference on Green Industry in Asia in Manila, Philippines**.
- **Sectoral strategy for achieving Green Growth and Green Economy** in the manufacturing and related productive sectors.

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Context

- World population growth
- Corresponding large-scale increase in production
- Resource consumption increasing in parallel
- Climate change affected
- Strain on water resources

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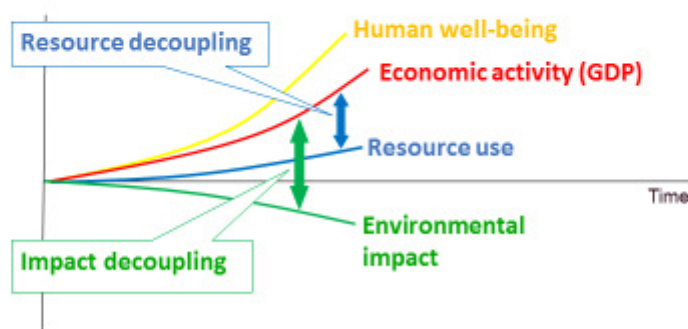
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The Challenge

- Business as usual is no longer an option
 - Provide more value with fewer negative consequences
 - Improve economic and ecological efficiency; do more with less

Decouple Growth from Natural Resource Consumption and Negative Environmental Impacts



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UNIDO's Response

- Launching the **Green Industry Initiative**
 - Scales up and mainstreams proven practices to reduce negative environmental impacts
 - Transforms manufacturing and associated sectors into more effective contributors to sustainable industrial development
 - Provides sector strategy for Green Growth and a Green Economy
- **Greening of industry:**
 - Helping enterprises improve resource productivity and environmental performance, and
- **Creating green industries**
 - Establishing new operations delivering environmental goods and services



Processes

Greening of Industries

- Efficient use of materials, energy and water
- Reduction of wastes and emissions
- Safe and responsible management of chemicals
- Phasing out toxic substances
- Substituting fossil fuels with renewable energy sources
- Product and process redesign

Creating New Green Industries

- Reduce, reuse and recycle (3R) industries
- Pollution control technology and equipment
- Renewable and energy-efficient technologies
- Waste management and resource recovery
- Environmental advisory and analytical services

Benefits

Economic <i>More Innovation and Growth; Increased Resilience...</i>	Social <i>More Employment, Rising Incomes and Empowerment...</i>	Environmental <i>More Efficient Resource Use; Less Waste and Pollution...</i>
<ul style="list-style-type: none"> ▪ Increase resource productivity ▪ Bring down production costs ▪ Foster technology development and innovation ▪ Improve competitiveness ▪ Open up new markets ▪ Develop new businesses 	<ul style="list-style-type: none"> ▪ Create new jobs and make existing jobs more secure ▪ Reduce poverty ▪ Develop new skills and capacity ▪ Improve occupational health and safety conditions ▪ Safeguard health and safety of communities ▪ Lower risks to consumers 	<ul style="list-style-type: none"> ▪ Reduce environmental pollution ▪ Counteract resource depletion ▪ Prevent degradation of ecosystems ▪ Mitigate climate change ▪ Combat water scarcity

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Challenges in Sustainable Rice Cultivation and Production



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Rice Cultivation and Production Around the World

- The staple food of more than half the world population
- Grown in more than 113 countries around the world
 - 90 per cent of rice in developing countries in Asia where access to knowledge and support is limited.
- Post-harvest losses (PHL) vary from 35 to 50% of the total production, which is equivalent to over 100 million tons of food lost per year.
 - In Asia: PHL estimated at around 30% or USD 5 billion a year (ASEAN Secretariat, UNIDO 2011);

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Rice Production in Cambodia

- Rice production 8.78 million tons, 2011
- Average national rice crop yields are among the lowest in Southeast Asia
- Paddy cultivation estimated to increase to 10.5 million tons without increase in arable land
 - Rice exports of 1 million tons are predicted by 2015

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Rice Husks

From a waste product to a valuable resource

- Rice husk, which accounts for 20% by weight of rice, comes from rice milling process as by-product.
 - 100+ million tons produced around the world
 - 1.1 million tons in Cambodia alone
- Low density of rice husk can cause it to be air-borne easily resulting in breathing problems, if inhaled
- Rice husk is increasing now due to its usage for other applications such as; cement additive

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Project Background

- UNIDO-GEF Project: Reducing GHG Emissions Through Improved Energy Efficiency in the Industrial Sectors in Cambodia
- 2011-2015
- Counterparts: NCPO-C, MIME
- 12 pilot companies

Pilot Company: Sokh Sroow Paddy Milling Company

- Established 1968
- 20 employees
- Installed capacity: 8,000 tons/year of paddy equivalent to 5,000 tons/year of rice
- Output: 2,800 tons/year of paddy, equivalent to 1,700 tons/year rice products
 - Operating at 34% of total capacity.

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Resource Efficient Cleaner Production

...for more informed policymaking

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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



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RECP for the *Greening* of Industry

- Evaluation report (2012) conducted by SECO:
- 340 consultancy projects conducted by Viet Nam Cleaner Production Centre on behalf of ten major donors and agencies such as CIDA, DANIDA, ILO, UNEP, WWF and the EU
- Cleaner Production options implemented in pilot companies led to savings of:
 - 7% in electricity,
 - 9% in coal,
 - 18% in water and
 - 25% in chemical consumption
 - Average savings of US\$ 75,000/year



Source: SECO, 2012

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Resource Efficient Cleaner Production & Policymaking?

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RECP & Policymaking?

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RECP for more informed policymaking

- For an **enterprise level perspective**:
 - Production processes
 - Sources of waste and pollution
 - Resource (including energy) efficiency
 - Occupational health and safety
- For **practical "triple-bottom line" solutions** to dispel conventional myths about environmental protection costing more, not being feasible etc.

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Working Session 1: Baseline Situation for Rice Cultivation and Cleaner Production Options for Rice Milling

Task 1: Characterize the baseline situation of the rice sector from the different sustainability perspectives

- Identify opportunities and constraints for enhancing the sector's contribution to sustainable development and poverty alleviation in Table 1.

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Working Session 1: Baseline Situation for Rice Cultivation and Cleaner Production Options for Rice Milling

Task 2: Rice milling – Process Flow Diagram:

- From the description given in the case study, draw a process flow diagram showing the
 - Inputs,
 - Production processes and
 - Non-product outputs at each stage of the rice-milling process.

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Task 3: Cleaner production options for rice mills:

Identify cleaner production opportunities, considering five key techniques, namely:

- Good housekeeping – better work procedures
- Input substitution – use of alternative input materials
- Equipment modification – modifications of productive equipment
- Reuse and recycling – opportunities for making use of waste and turning these into by-products
- Product modification – changes in product specifications

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Working Session 2: Rice Husk Utilization and a Green Industry Sectoral Strategy for Rice Cultivation and Production

Task 4: Rice husk utilization:

- Consider the alternative use scenarios for rice husks, taking into consideration the dispersed generation of the total volume of rice husks from numerous small mills spread around the country.
- For each of these value-adding applications, identify the key market/economic potential and challenges for realization.

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Working Session 2: Rice Husk Utilization and a Green Industry Sectoral Strategy for Rice Cultivation and Production

Task 5: A Green Industry sectoral strategy for the rice cultivation and production:

- Identify the key development priorities in each of the areas below and make your suggestions for policy recommendations in this regard.

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Project Results

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Policy Recommendations

- Cleaner production and industrial energy efficiency for rice mills
- Infrastructure
 - Market infrastructure, storage facilities, transport
- Capacity development
 - Extensions services
- Finance for farmer and for rice mills

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Green Industry

Project Results

7 Cleaner Production Options implemented, including:

- Duel-fuel generator
 - 70% producer gas
 - 30% diesel
- Paddy dryer which captures and makes use of waste heat
- More efficient milling machine increasing production capacity
- Automated silo storage system
- Wastewater treatment and recycling system for gasifier
- **In phase II of project:** 2MW co-generation plant using rice husks will be installed to produce electricity and steam for parboiled rice for export market



Project Results

- Increased revenues from rice production: US\$ 436,800
- Diesel savings: US \$ 216,000
- Direct savings reported by the company: US\$ 612,800
- GHG emissions: 520 tons/year
39% reduction
- Total cost: US\$ 1.48 million
- Payback: 30 months

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Thank You



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