

BUILDING CAPACITIES FOR A COMPETITIVE CIRCULAR ECONOMY – THE CASE OF WASTEWATER IN COLOMBIA

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1 Background of industrial wastewater in Colombia



Water supply

- Water scarcity more or less acute depending on region
- Competition between industries, municipalities, and agriculture

Industry

- Inefficiencies in water use
- Unnecessary high costs
- Potential for treatment technological upgrade
- **New legislation since 2015**
 - **Decree 1076: mandatory water discharge permit**
 - **Resolution 631: maximum levels for wastewater discharges into surface water and sewage systems**

Receiving water bodies

- Health risks
 - E.g., indirect reuse
- Threat to ecosystem services
 - Fishery
 - Agriculture
 - Tourism
 - Leisure
 - ...

Tangible goals

- Train local engineers (CNPML, the NCPC in Colombia) to state-of-the-art wastewater technologies and systems and build capacities in consulting for a new business model
- Focus on key Colombian sectors
- Allow for networking between CNPML, Colombian companies, and Swiss wastewater technology providers
- Develop replicable training program for other sectors and countries

Overarching aim

- Assist local companies in complying with new wastewater legislation while boosting their economic competitiveness (win-win)

WASTEWATER AS RESOURCE:

- Water
- Energy
- Biological nutrients
- Technical nutrients

Module 1

Wastewater Fundamentals 1

1.1 EAWAG-MOOC

Online Course

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- Climate Change
- Wastewater Treatment
- Energy Efficiency (Municipal)
- Maintenance / Networks
- Energy Efficiency (Industrial)
- Minimization (Industry)
- Reuse (Municipal)
- Reuse (Industry)

Module 2

Wastewater Fundamentals 2

- Activated Carbon Filtration
- UV Filtering
- Ozonation

Module 4

Business Module

Topics Covered:

- Introduction to Business
- Marketing (Offline & Online)
- Offering Writing
- Finance & Feasibility
- Public Speaking
- Project ROI Calculations
- Corporate Strategy
- Project Management
- Negotiation
- Accounting
- Evaluation

Module 5

Case Study

- Acquire practical business and managerial knowledge
- Address the wastewater remediation and reuse needs in a business context
- Receive necessary tools to competitively conduct feasibility and case studies
- Understand the mechanisms of a P&L Statement in a wastewater remediation / reuse context
- Put into practice the acquired skills in a feasibility study
- Develop consulting and problem-solving skills in the framework of wastewater treatment
 - Interact with companies (also C-level)

Two concrete business opportunities as a result of the capacity building project!

PIMSA case study (Module 5)

Who?	Industrial park of Malambo (PIMSA), Atlántico Department near Barranquilla
Problem	Obsolete wastewater treatment plant (constructed wetland), costly off-site wastewater treatment for some park companies
Opportunity	Upgrade to moving bed biofilm reactor (MBBR) allows increasing on-site treatment, thereby creating new revenue streams for park operator
Current status	Park operator requested an offer from Swiss wastewater technology provider

Answer to EPM's request for information on feasibility study (Refresher Course after Module 5)

Who?	Empresas Públicas de Medellín (EPM), large public utilities company
Problem	Cost of municipal wastewater treatment
Opportunity	Industrial reuse of treated wastewater (with tertiary treatment)
Current status	Based on CNPML answer, EPM will issue a request for proposals

Capacities built at CNPML and elsewhere...



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Systematic approach for identifying opportunities for circular business models...

Supplying material resources to manufacturing

- Waste becomes a valuable raw material
- Example: Alternative raw materials for the cement industry

Providing an environmental service

- Treating wastewater
 - Purifying air
- Example: PIMSA treats additional wastewater

Supplying energetic resources to manufacturing

- Waste becomes a source of energy
- Example: waste solvents become a source of energy for the chemical industry

Providing a material resource to environmental services

- For water treatment
- Example: membrane based on whey protein for wastewater treatment

Capacity building approach with double-aim works!

- Trained engineers plan to replicate the PIMSA case study for EPM
- Local companies highly appreciated the training and consultancy
- Swiss technology providers understand the potential of such an approach in creating new business opportunities



Lessons learned

- Promote mutual understanding of learning goals
- Train more engineers to increase impact
- Involve local companies even earlier to prepare case studies



Outlook on Peru

- Similar project in preparation in the field of industrial solid waste following new legislation
- Promising opportunities, e.g., the Peruvian cement industry relies exclusively on coal as kiln fuel



Renewable Energy, Energy and Resource Efficiency Promotion in Developing and Transition Countries

- Transfer of knowledge and technology to develop renewable energy, energy and resource efficiency in such countries
 - Strong involvement of the private sector
 - Market-oriented competence center
 - Multiple agencies of the Swiss government
 - High-impact projects with strong participation of Swiss and foreign stakeholders
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- REPIC's mantra is **replicability**
 - Projects should have a multiplier effect
 - Scaling-up to be planned in early stages of project

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