

## Plenary 3: Introduction to Green Industry and the Circular Economy

**Mr. Stephan Sicars, Director, Department of Environment, UNIDO**

- Industry is related to sustainable effects. Green industry is linked to a circular economy.
- There is a huge growth and wealth of population. This means countries are interested in reducing inefficiencies in economy. The circular economy is a good way to resolve this.
- The object of circular economy is cleaner production. For example, to reduce toxic materials would thereby mean creating more green production. In examining the circular economy, we should collect what is there at the end of a given lifecycle, separate waste, reuse resources. The aim is cleaner production with less resource use.
- The European Union is moving forward to a very large market with 40 million consumers and adjusting to economic model for circular economy.
- We should reduce resource dependency – this is an economic concept whereas to reduce environmental footprint is an environmental concept. Combination of these two concepts will have lasting impact.
- It will be crucial for developing/middle-income countries to produce the exact products that align with the circular economy concept. There needs to be a dialogue between those who use circular economy and those who don't to create mutual benefit. Building off economic models related to circular economy will bring up businesses small and big, so same will happen in developing countries.
- In conclusion: circular economy is a long-term trend that not only impacts the production but extension of life of the products. We aim to promote a circular economy. Intergovernmental dialogue on circular economy is needed to promote how we benefit from this powerful concept. Eco-industrial Parks and sound chemicals management are the two areas that UNIDO attempts to assist countries within the Metropolitan context.

### **Green Industry and the Circular Economy: Eco-Industrial Parks Towards a Common Framework**

**Chair : Mr. Smail Alhilali, Industrial Development Officer, Department of Environment, UNIDO**

- Working with UNIDO is one way of upscaling the application of resource efficiency. It is linked to circular economy which is linked to the concept of sustainability.

**Mr. Suren Erkman, Head of Industrial Ecology Group, University of Lausanne**

Greening of Industrial Parks in the context of Global Urbanization

- The concept of eco-industrial parks (EIP) is not new, but it started to regain the interest of developing countries and UNIDO to upscale resource efficiency - it is related to the circular economy.

- In many countries, EIPs are still in the process of implementation. Now it is necessary to observe the whole value chain, instead of focusing on one enterprise alone, and improve the resource efficiency in an integrated way.
- Systematic resource-efficient and cleaner production (RECP): interaction between all parties in the region – referred to as co-industrialization (symbiotic development of industries). It has different outcomes from the traditional way of industrial production.
- Localization of economic activity is not happening by chance but has a specific pattern.
- Concept of EIPs regained attention due to the need to reduce pollution and need for resource efficiency.
- But it faces two challenges – collective RECP implementation & disruptive dynamics of globalized economy.
- Recommendations: There is a need for awareness and institutional definition of EIPs, not many requirements for labels, a need for capacity building and relevant policies, and a need for dedicated mechanism/structure at the level of park.
- We should establish overall framework for mainstreaming and upscaling eco-industrial parks and in particular: EIPs as key element of regional development and urban infrastructure, plan and invest accordingly and create business opportunities and attract investment.
- Cities should launch global thematic initiatives – agro-industrial complexes in urban environment & systematic valorization of CO<sub>2</sub> for valuable products (we should incorporate the concepts of agriculture and industry). CO<sub>2</sub> can become the source of income and major incentive, not a cost.
- Emphasized that resource efficiency and cleaner production should be achieved at the systematic level, with industries across the whole region integrated, because it is not appropriate to consider the concept with one entity alone. Cities should promote EIPs that function for resource efficiency and cleaner production.

**Mr. Park Hung-Suck, Professor, University of Ulsan**

- Introduced type of EIP.
- Future direction: We have to see EIP projects get to EIP development. We need standards, handbook manuals and international collaboration.
- We need commitment by the policymakers and public-private partnership is crucial for new business.
- Explained lessons learned and future direction.
- The system should be self-sustained, as it is a continuous process and should combine the strong points of developing countries and the good technology of the developed countries to achieve the global goal: to end poverty and create shared prosperity.

**Mr. Kim Byoung-jo, Deputy Director of Resource Recycling Division, Ulsan Metropolitan City Government**

Success Cases for Turning Waste into Energy

- Explained Ulsan city's EIP practice focusing on waste generation and disposal and waste treatment policy.
- Public facilities include 1 landfill, 3 incineration plants, and 2 food waste disposal facilities.
- Private facilities include 5 landfills, 6 incineration plants, and 181 food waste disposal facilities.

- Ulsan experienced rapid inflow of population due to increased industry, and we need more infrastructure to manage waste which the city is working on. Since 2005, we have been not allowing waste to come into landfill. We have separated combustion sites according to the waste.
- Due to the increased amount of waste, there is a need to reuse waste to produce energy and a need for a paradigm shift in treatment of daily waste.
- Breaking the conventional way of thinking, the concept of EIP was brought to utilize the increasing amount of waste for cleaner production and income generation – private sector was brought in as well. As a result, industry is now able to contribute to regional economy for low carbon green growth, with the new concept of EIPs

**Mr. Etienne Kechichian, Senior Private Sector Development Specialist, World Bank Group**

Mainstreaming Eco-Industrial Parks

- There has been a drastic increase in the past 10 years of EIPs (green zones).
- There is a big mix of activities in EIPs - energy efficiency, industrial symbiosis, waste management, water management, renewable energy, etc.
- There is a need to promote all types of green activities in industrial parks and should be part of our continuous conscious efforts.
- We need clearer guidance for EIP promotion, should be more result focused, self-assessing and voluntary. The concept of EIPs should focus on RECP, circularity and cleaner energy. The World Bank prioritizes lending for the projects, climate resilience in industries and building firm standards.
- Emphasized the need for the continuous promotion of EIPs, following the existing trend and mainly talked about the focus of UNIDO and the World Bank Group.

**Mr. Zhang Hua, Deputy Director General, Weifang Binhai Economic Development Zone**

Eco-Industrial Park: Heading for a Common Framework

- Introduced Weifang Binhai Economic Technological Development Area – a national ecological industrial demonstration zone in pursuit of a circular economy.
- Development model of ecological industrial park of Weifang Binhai Development Area -- the circular production of enterprises, the combination of industrial cycle, and the recycling renovation of the parks.
- In addition, it is crucial to extensively utilize green energy, like wind energy, solar energy, geothermal energy, etc. to gradually replace the traditional industrial energy.
- In terms of transportation, we creatively set up the Luliao Great Channel for drop and pull transport and zero emission E-bus.
- The main approach is to develop circular economy: circular link to build ecological industrial system, optimizing and structuring the industries, extending the industrial chain of ecological industry, further promoting the recycling use, and enhancing the competitiveness of ecological industry through scientific and technological innovation.

**Mr. Dong Tran Duy, General Director, Ministry of Planning and Investment**

Eco-Industrial Park in Viet Nam

- Currently there are 300 industrial parks (IP) now at 2015 in Viet Nam. IPs in Vietnam contribute to 40 percent of industrial output a year, 49 percent of export revenue, 2.5 million jobs created. It shows significance of EIPs.
- Challenges include that a significant number of IP can't be well-equipped - 20 percent are not competitive.
- The aim is to transform existing industrial zones into EIPs in which companies cooperate with each other.
- UNIDO initiated the eco-industrial park for sustainable industrial zones in Viet Nam.
- Methodologies included emission control and innovative financial instruments.
- Steps for moving industrial zones towards eco-industrial parks include identification of EIP pilot projects, capacity building, awareness, policy and guidelines to transform, and monitoring and evaluation.
- Initial results in first year include that more than 100 companies visited to investigate RECP potential. We are continuously seeking to attract more companies, working on capacity building, guidance and policy making related to EIPs

**Mr. Bharat Jain, Member Secretary, Gujarat Cleaner Production Centre**

Green Industry & Circular Economy: Eco-Industrial Parks towards a Common Framework

- Explained strategy and case studies in Gujarat.
- We are working on Micro (industrial), Macro(estate level), and Industrial symbiosis (network of waste synergies).
- Initiatives at Micro level- 16 pilot mills targeted, 6640 tons/year material saved, 750 MWH/Year electricity saved.
- Initiatives at macro level include multi effect evaporators and a disposal line for marine diffuser arrangement.
- In process of multi effect evaporators, have sewage treatment plants, bio-medical waste treatment facility, and disposal line to marine diffuser arrangement.
- Initiatives for Industrial symbiosis involve the ceramic sector and food industry.
- Reviewed the projects being held and promoted at the Gujarat Cleaner Production Centre with the assistance of UNIDO and emphasized there should not only be promotion of cleaner production at micro and macro level but also as a network of waste synergies.

**Ms. Michelle Zhao, Chairwoman and General Manager, Sino-Swiss Zhenjiang Eco-Industrial Park**

Sino-Swiss Zhenjiang Eco-Industrial Park

- Example of EIP in China: Sino-Swiss Zhenjiang Eco-Industrial Park (SSZEIP).
- Out of the 4,000 EIPs in the world, half of them come from China, but unfortunately, not all of them can be called truly eco-friendly.
- Introduction of SSZEIP includes its strategic location thirty minutes from Beijing.
- We divided the park into 4 functional sections: R&D section, industry section, accommodation section, and leisure/tourism section.
- It is the education/demonstration base as well as international solution center for eco problems.
- UNIDO RECP pilot project also kicked off there.

**Green Industry and the Circular Economy Opportunities for Sound/Innovative Chemicals Management in Cities**

**Chair : Mr. Stephan Sicars, Director, Department of Environment, UNIDO**

- Chemicals management involves substituting hazardous chemicals and increasing resource efficiency, minimizing process emission and changing. business practices in urban areas, and it lies in the heart of urban activities.
- This session will invite speakers to introduce tools and expertise of chemicals management, and we would like to ask how chemicals management can contribute to smart cities.

**Ms. Petra Schwager, Industrial Development Officer, Department of Environment, UNIDO**

Opportunities for sound and innovative chemicals management in cities

- Chemicals are increasingly becoming part of our everyday life; presented annual consumption of chemicals in cities and households.
- SDGs regarding chemical management: SDG 3,6,12,14 – related to pollution, chemicals and waste.
- UNIDO's approach : 3 main pillars are innovative technology solutions, innovative business models, and green sustainable chemistry.
- As the production and growth in demand and sales of chemicals are growing, but at the same time, chemicals harm human health, there are increasing policies and regulations related to chemicals management. Consequently, there is a need to further develop and search for means of sound chemicals management in the same line with UNIDO's initiatives and support.
- Stressed innovative approaches, new business models and system thinking are required.

**Mr. Branko Dunjic, Director, National Cleaner Production Centre, Serbia**

Circular business model

- Advanced Circular Business Models include chemical leasing where we set a unit price for the clean performance of chemicals that create new relationships between the suppliers and buyers (interest to share knowledge and optimize consumption of chemicals).
- Chemical leasing materials: UNIDO published online chemical leasing book, brochure, toolkits, etc.
- Introduced the case of Serbia where there is invoicing based on efficiency of cleaning process (instead of the amount of production) to change unit of payment.
- The results promoted resource efficiency: due to stabilization, solvent is used three times longer. Used solvent is distilled, waste is decreased 12 times, and composition of the waste is changed.
- Chemical leasing in hotels: the benefits are chemical safety, eco-efficiency, monetary savings, and social benefits which are workers are living in safe condition with less work accidents.
- Explained the opportunities and potential of chemical leasing for cleaning of industrial parts.
- Importance of sharing knowledge and creating partnership through which we can alter chemicals from being a curse to being a source of opportunities.

**Ms. Anke Joas, Director, BiPRO GmbH, Germany**

The potential of green chemistry and green engineering technology to address the challenges of plastics waste.

- Plastic production and use has gone through dramatic increase over the last 50 years and continues to increase (forecasted to double by 2034 and increase by 4 times by 2050).
- The Asian region now accounts for almost half of plastic production.
- Plastic waste is a challenge, especially in cities, not only as an economic loss but also health and environmental threats.
- Plastic waste is a major constituent of municipal and industrial waste in cities.
- Plastics management: low recycling and high leakage rate can lead to deterioration of eco-systems which can lead to, in 400-600 years, marine degradation.
- Need systematic approaches to tackle plastic in products and waste risks.
- What is important is the design and management of chemical products and processes that reduce or eliminate the use or generation of hazardous substances across the life cycle of products by using green engineering tools (USEPA, 2016).
- Solutions: reusable packaging, light-weighting, recyclable mono-materials, etc. In order to create markets and new business models, there is an urgent need to recognize harmonized marketing, economic incentives, regulations and monitoring system.
- Plastics are a key challenge in cities due to slow degradation and chemical threats and need green chemistry and green engineering technology to reduce environmental and health risks to enable circular economy. This requires integration among different parties across the region and government support.

**Mr. Marcos Alegre, Executive Director, National Cleaner Production Centre, Peru**

- In Peru, national interest in chemicals management started in 2010, the year of SAICM project and the National Chemicals Strategy developed with local stakeholders and UNIDO. 2011 National Chemical Strategy developed 2013 Innovative chemical solutions project 2015 recommendations.
- Peru has a toolkit for sound chemicals management, with the support of UNIDO, and at the business level which is important to generate innovative options.
- Peru is one of the six countries with innovative technology solutions implementing toolkit. There is a cosmetic company reducing 90% of chemical consumption by improving the cleaning method and a paints company reducing zinc chromate consumption by 100% and solvents consumption by 75%.
- Inter-organization programme IOMC toolkit is an online tool for countries striving for sound chemicals management.
- Next steps involve IAMC and IOMC toolboxes promotion such as a national promotional event for decision makers and web-based promotional event at regional levels.
- Challenges involve weak enforcement from government perspective, low service specialist companies for chemical management and EIPs.

**Mr. Byeong Kyu Lee, Professor, Ulsan University**

## Air Pollution/Chemical Release in the Largest Industrial City in Korea

- Explained air pollution/chemical release in the largest industrial city in Korea.
- Air pollution trends in Korea: NO<sub>2</sub> and ozone are not improving (Ulsan has the highest SO<sub>2</sub> level in Korea).
- Many world scale industries in Ulsan are releasing chemical substances.
- Energy consumption patterns in Korea: on average 58% is coming from industry, but in Ulsan alone, 85% coming from industry.
- CO<sub>2</sub> emission of industrial sector in Ulsan is around 90% compared to 11.3% in non-industrial sector. Thus, we need a specific means of sound chemicals management in Ulsan to better control the industrial sector.
- Regulations do exist for chemicals management - Act on Registration and Evaluation of Chemical Substances, Act on Management of Chemical Substances and others. With these regulations, we are in the right direction for chemicals management.