INDUSTRIAL SYMBIOSIS – a sustainable way towards Circular Economy

B. BEERACHEE
DIRECTOR, SOLID WASTE MANAGEMENT DIVISION
MINISTRY OF ENVIRONMENT, SOLID WASTE MANAGEMENT & CLIMATE CHANGE
Content of Presentation

- Overview of Solid Waste Management in Mauritius
- Cost of Waste Management
- Waste Management Options
- The Industrial Symbiosis Project
- The Way Forward
Waste Facilities
5 Transfer Stations
Landfill
Compost plant
Aerial View of the Mare Chicose Landfill
Sanitary Landfill: A contained structure
Waste disposal & compaction
Gas well drilling
Gas capture & flaring
Gas to Energy: 3 Engines x 1.15 MW from LFG
Construction of Capping, surface water drain & grassing
Waste Management Challenges

• More than 500,000 T/a. Rising waste quantities (about 2-3 % p.a) and by year 2030 will reach 650,000 T/a;

• Rising costs of waste management. Rs 2500 /T to Rs 3260/T including curbside collection, transfer station and landfilling;

• Unsustainable consumption of land for landfilling (~3Ha p.a);

• Currently, rate of recycling is on the low side 3-4% and low quantity of recyclable wastes for proper recycling business;

• UNSORTED clean wastes – inadequate legislative framework

• Small Islands Developing States have their own challenges to set up & run recycling businesses.
Sustainable Waste Management Hierarchy

- **Prevention**: Reduce waste generation and hazardous components in products
- **Reuse**: Reuse / re-manufacture end-of-life products and prepare waste for reuse
- **Recycling**: Reprocess waste for use as a secondary raw material or a new product
- **Energy recovery**: Use waste as fuel in energy and heat production
- **Disposal**: Landfill and incinerate waste without energy recovery
Waste Characterization by manufacturing sector required.

Figure 4-20a: Industrial wastes.

Figure 4-20b: Commercial wastes.

Figure 4-20c: Domestic wastes.
What is being recycled

• Metals (ferrous & non ferrous) collected & exported
• PET bottles Other plastics: Polyethylene (PE) and Polypropylene (PP)
• Chemicals- waste exchange mechanism
• Paper & Cartons baled and exported;
• Motor oil collected & recycled;
• Cooking oil collected & exported;
• Wood mixed with plastics to produce planks
• Glass ..... Struggling.

What about Labour? Logistics? Used Water for cooling?
Fundamentals of Recycling

• WASTE is considered as a RESOURCE
• Waste, if CONTAMINATED, is a waste, ...not a resource
• Larger quantities and clean waste/resources is likely to make recycling business feasible
• Ministry now has a New Strategy on waste management with focus on recycling
SO WHAT IS INDUSTRIAL SYMBIOSIS?

- Industrial Symbiosis is an innovative waste management tool based on the fact that waste is a useful resource and is tradable.

- Industrial Symbiosis - an association between two or more industrial facilities or companies in which the wastes or by-products of one become the raw materials for another

- Basically to connect the HAVES and the WANTS: type, quantity, frequency

- Industrial Symbiosis – collective approach to competitive advantage through the physical exchange of waste / materials, energy, water and/or by-products, or the shared use of assets, logistics and expertise
IS in KALUNDBORG, DENMARK
SWITCH AFRICA GREEN PROJECT 2018

• SWITCH Africa Green (SAG) project developed and funded by the European Union and implemented by United Nations Environmental Programme (UNEP) in collaboration with United Nations Office for Project Services (UNOPS) and UNDP.

• This project brings to support six African countries namely Mauritius, South Africa, Ghana, Uganda, Burkina Faso and Kenya.

• SWMD implemented the project in Mauritius.

• The project aimed at greening businesses in the Manufacturing Sector in Mauritius, with focus on sustainable waste management based on Industrial Symbiosis.
Expected Outcome

The training of the MSMEs

• reduced waste disposal costs, improved MSME revenues and resource productivity,

• less carbon emissions and industrial pollution,

• creation of green jobs and improved corporate image, and

• improved environment for local communities.
Outcome of SAG project on IS in 2018

• **Capacity Building of Enterprises: Around 106 MSMEs / some big enterprises were trained through 4 Capacity Building Sessions ( more than 250 SMEs invited )**

• **POOR RESPONSE , Many SMEs not interested . Time , low amount of waste , low cost of waste management,**

**Impact**

• From the total of 72 participating firms in Mauritius ( 34 from Rodrigues were more interested but very small scale),

• 49% were involved in the exchanges in Mauritius
Outcome of SAG project on IS in 2018

- 4,387 tons/yr of wastes from diverse industrial sectors, including symbioses for wood wastes, plastic wastes, textile wastes and coal ash to be diverted away from the landfill.
- Typical example: P’tit Sale – fish bone with flesh
- Total saving of around USD 350,000 on waste management costs by diverting the waste from landfill and a saving of around USD 290,000 by replacing the virgin raw materials by waste.
- CO₂ emission savings of around 2,488 (CO₂eq) ton/yr.
Industrial Waste Cost Structure Review Report, March 2022

- Cost of waste management
- For Individual companies: 0.012% to 0.70% of turnover
- Per Manufacturing sector and per Enterprise size: 0.06% to 0.32% of turnover

<table>
<thead>
<tr>
<th>TURNOVER for SMEs, Rs</th>
<th>Cost of waste Management, Rs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.032%</td>
</tr>
<tr>
<td>3,000,000</td>
<td>9,600</td>
</tr>
<tr>
<td>5,000,000</td>
<td>16,000</td>
</tr>
<tr>
<td>10,000,000</td>
<td>32,000</td>
</tr>
<tr>
<td>20,000,000</td>
<td>64,000</td>
</tr>
<tr>
<td>40,000,000</td>
<td>128,000</td>
</tr>
<tr>
<td>50,000,000</td>
<td>160,000</td>
</tr>
</tbody>
</table>
What will enable Industrial Symbiosis?

• Availability of reliable Information on Resources? Haves and Wants?
• Forum to share data – a common platform? Eg Decheteque
• From Mare Chicose Landfill- disposal by Generators can be uploaded on our website
• Central Statistics Office
• Industrial Waste Audit report – Industrial Wastes
• Observatoire de L’Environnement
• Sharing of information – MCCI/ BM to its members

Need for resources to be traded / exchanged / re-circulated in the system and diverted from landfill
Thank you for your attention.

Q & A