



— جَمْعِيَّةُ الصَّنَاعِيِّينَ اللَّبْنَانِيِّينَ —
ASSOCIATION OF LEBANESE INDUSTRIALISTS

“Waste to Product to Energy” – The Lebanese Paper Industry

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OUTLINE

I. ALI

II. Solid Waste Management (SWM)

III. The Paper Industry and Its Role in SWM

i. Recycling: Waste To Product

ii. Gasification: Waste To Energy

IV. Conclusions



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I- ALI

- Overall **Representative of the Manufacturing Industry in Lebanon**
- Involved in **Environment and Renewable Energy Related Issues** since 1995
- **Key Partner with the Ministry of Environment**
- **“Environment & Energy Department”** created in March 2009 to support and raise awareness of members on issues related to green industry
- **“The Green Production Help Desk”** established in October 2012 which provides information and technical advice to Lebanese Industries that want to engage in the emerging green economy



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II- Solid Waste Management (SWM)



The world is trying to find solutions to the problems of solid waste disposal.

Proper waste management is a key element in ensuring the efficient use of resources and sustainable growth of the economy.

The International trend today is to benefit from the waste generated as much as possible.



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II- Solid Waste Management (SWM)

In this regard, ALI has a firm position related to SWM in Lebanon:

1. **Proper SORTING**
2. **RECYCLING: Processing Recyclable Products into Raw Material**
3. **Generating Energy from Unrecyclable Waste**



ZERO WASTE





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III- The Paper Industry & Its Role in SWM

Step 1: **RECYCLING:** Waste To Product

Step 2: **GASIFICATION:** Waste To Energy



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III- The Paper Industry & Its Role in SWM

- ❖ Lebanon has been a pioneer in the paper recycling industry since 1929.
- ❖ The manufacturing of paper in Lebanon employs 4000 employees and is largely based on the recycling of waste paper to help reduce the cost of production and maintain a clean environment.



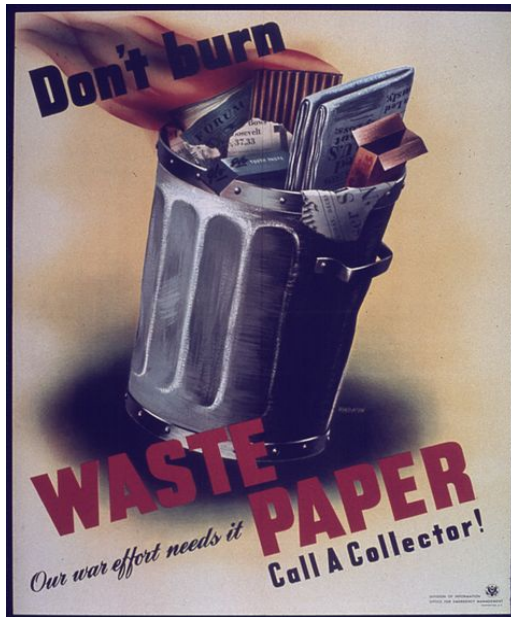


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III- The Paper Industry & Its Role in SWM

- ❖ There are **4 factories working in paper recycling**, making it an essential for many other industries such as **manufacturing paper for packaging, manufacturing corrugated carton boxes and book binding.**
- ❖ In doing so, **it is providing the raw materials for the packaging sector, which in turn contributes to the packing of productive goods.**



- ❖ Paper waste constitutes a high proportion of the total solid waste, accounted for **17%** of the waste in Lebanon.
- ❖ **local factories needs of raw materials from paper waste are obtained from** companies involved in the handling of solid waste, institutions, supermarkets, schools and associations.
- ❖ **More than 120,000 tons/year of waste paper is needed.**



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III- The Paper Industry & Its Role in SWM

Waste Paper & Cardboard





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III- i. Recycling: Waste To Product



From
WASTE



To
PRODUCT





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III- i. Recycling: Waste To Product



Excellent Products
Being Exported

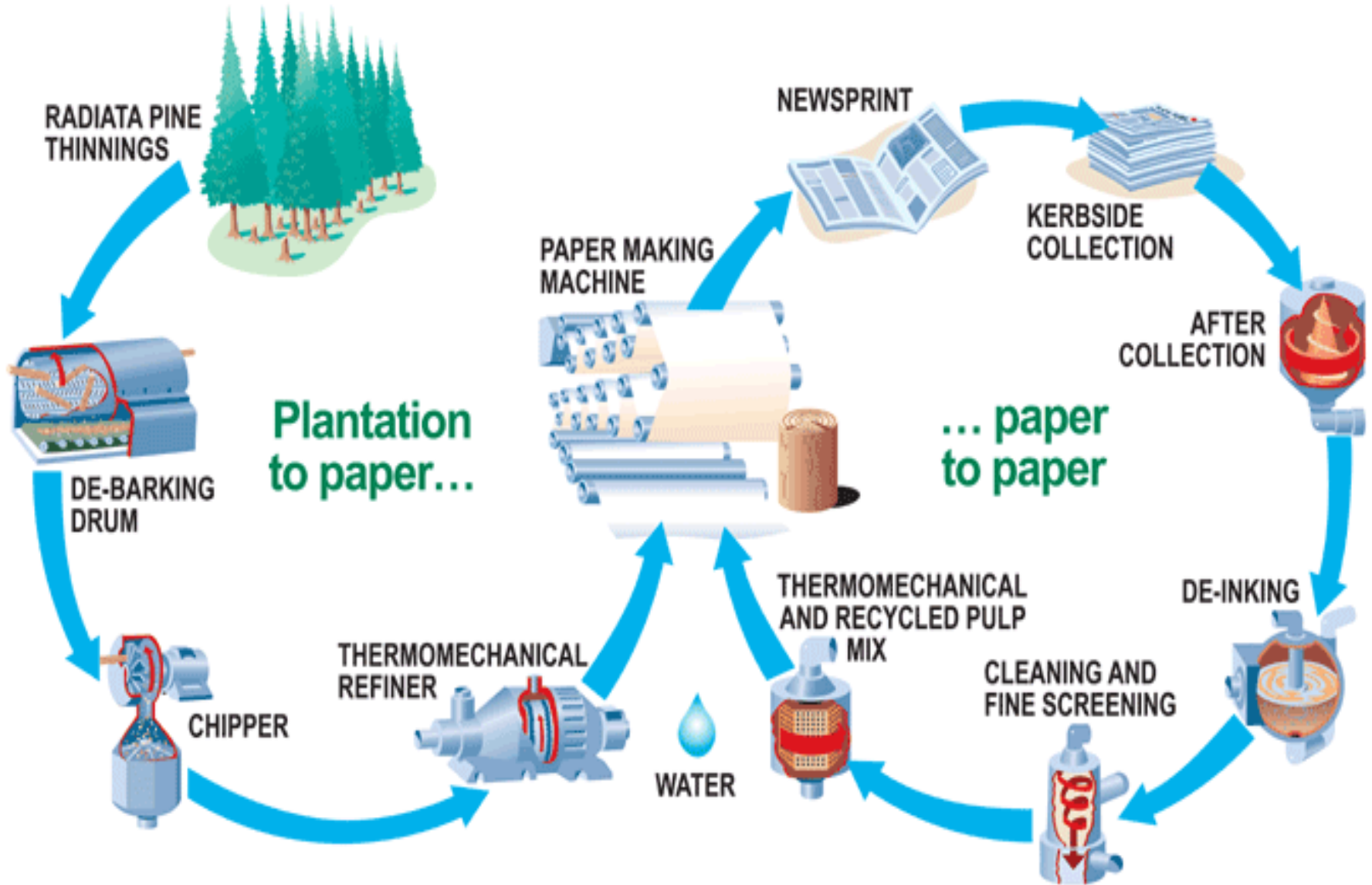




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III- i. Recycling: Waste To Product





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III- i. Recycling: Waste To Product

Waste Paper Recycling: Process



1. The recycling process is to **add water to the waste paper & cardboard** separated into grades in order to create a pulp.
2. **The pulp is screened and washed** to remove any contaminants, such as paper clips, staples, glue and ink.

3. **The clean pulp is spread into large thin sheets** using large rollers to be turned into a new product.





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III- i. Recycling: Waste To Product

Waste Paper Recycling: Process



5. The **paper is left to dry**, and then it is rolled up ready to be cut and sent back to the shops.



*Newspaper/magazines are turned back into recycled newsprint.

*Lower grade mixed paper and cardboard are recycled into a number of cardboard based packaging products.



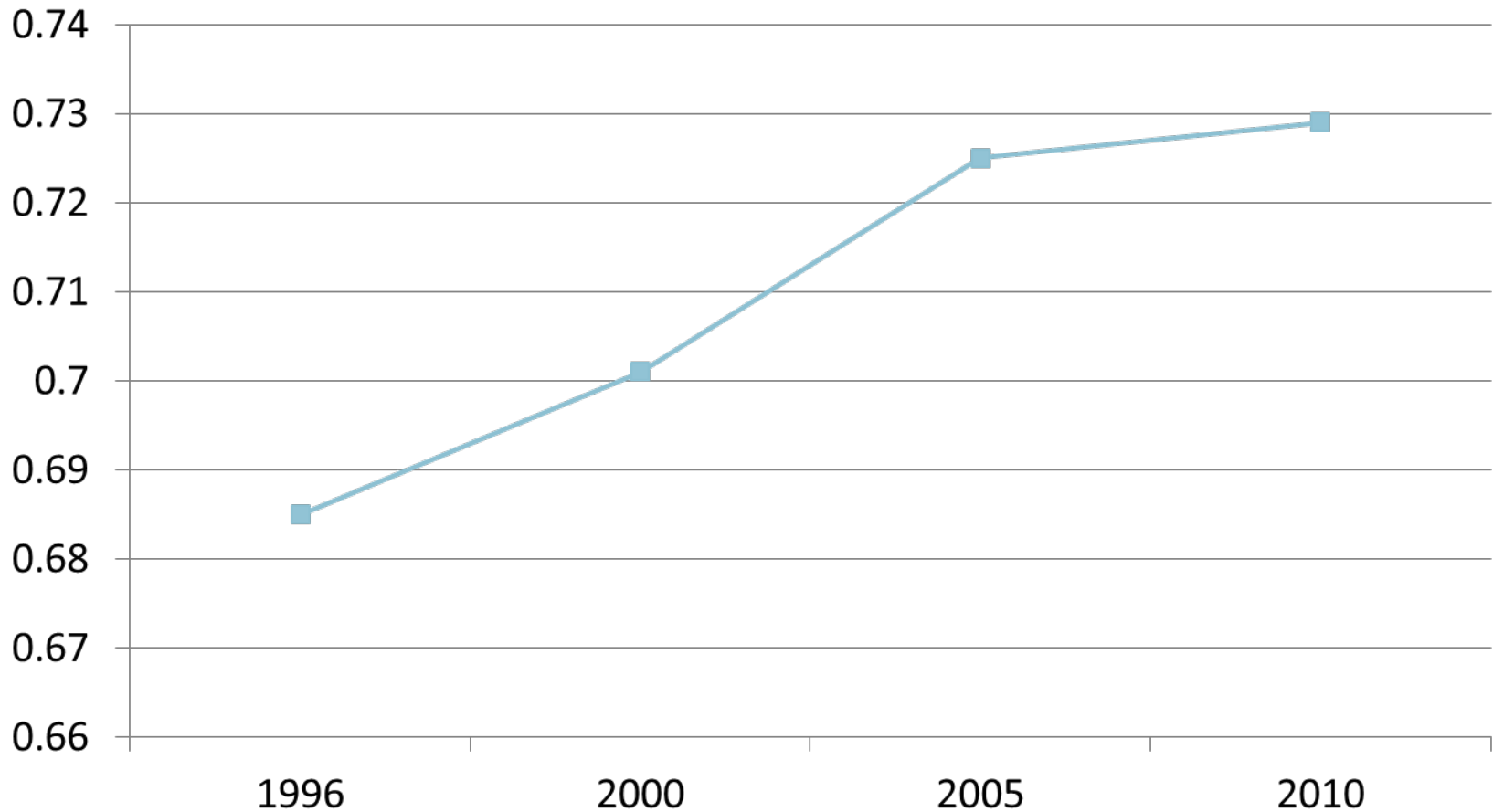
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III- i. Recycling: Waste To Product

More than 70% of waste paper is recycled and is a new product again.

SHARE OF RECYCLED MATERIAL IN PAPER PACKAGING





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III- i. Recycling: Waste To Product

By redirecting waste to serve as raw materials for industry, recycling provides a number of important benefits:

- **Reducing pollution and conserving natural resources.**
- **Saving energy and reducing greenhouse gases.**
- **Stimulating the development of greener technologies.**
- **Avoiding the cost of waste disposal in landfills and incinerators.**



It takes 70% less energy to make paper products from recycled material than it does to make them from crude materials



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III- ii. Gasification: Waste To Energy

- ✓ The paper recycling industry generates at the end process non-hazardous waste called **rejects**, composed of:
 - 75% non-recyclable plastics
 - 10% cellulosic fibers (paper)
 - 10% water
 - 5% sand, steel, glass
- ✓ These rejects are converted to energy using the **GASIFICATION** process
- ✓ **6,000 tons of wastes per year create 80,000 Megawatts of energy** used in the industrial facility as electricity and in boilers





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III- ii. Gasification: Waste To Energy

Why Convert Waste to Energy via Gasification?

- Rejects started accumulating and local dumps refrained from receiving the plant's rejects
- Proven technologies showed potential advantages into reducing waste while producing energy
- Extremely clean technology
- **1 ton of waste creates 3.5 MW of energy** – equivalent to 300 kg of fuel oil
- **Officially permitted by the Lebanese Ministry of Environment** as responding to all environmental recommendations





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III- ii. Gasification: Waste To Energy

Gasification Technology:

Implemented in 2010 / Total Investment Cost: 5,000,000 USD





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III- ii. Gasification: Waste To Energy

Gasification converts materials normally considered waste into energy:

- Gasification is the conversion of feedstock into their simplest molecules – carbon monoxide, hydrogen and methane.
- This is achieved by reacting the material at high temperatures without combustion, with a controlled amount of oxygen and/or steam.
- The resulting gas mixture is called syngas and is itself a fuel.
- The power derived from gasification and combustion of the resultant gas is considered to be a source of renewable energy.

Gasification is NOT Incineration!

Incineration is the burning of fuels in an oxygen-rich environment, where the waste material combusts and produces heat and carbon dioxide and other pollutants.



III- ii. Gasification: Waste To Energy

The Gasification Process:

1. Collection of Non-Recyclable Solid Waste
2. Trucks take the waste to the gasification plant
3. Waste is dropped off into a waste storage to be used as fuel
4. Waste gets transferred to the area where it will undergo thermal treatment
5. The process creates two sources of energy: steam and syngas.
 - a. **Steam** is directed to a turbine in order to produce electricity.
 - b. **Syngas** is treated to be cleaned up from sulfur. The clean syngas is then transferred into a gas turbine to produce electricity.

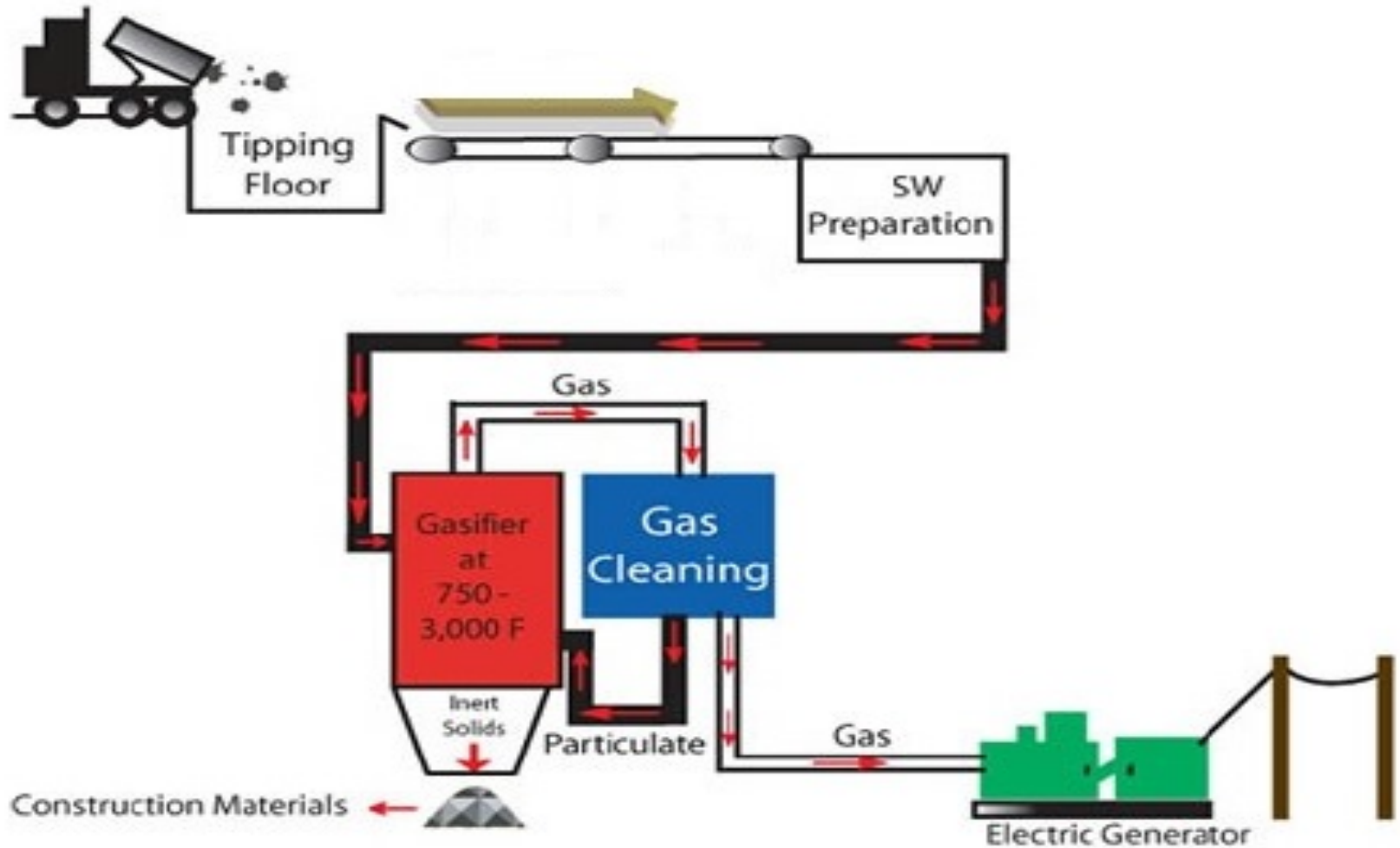


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III- ii. Gasification: Waste To Energy

The Gasification Layout





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III- ii. Gasification: Waste To Energy

Gasification Benefits:

- ✓ Pay-back Period: Around 4 years
- ✓ Decrease Landfill Waste and Their Negative Impacts
- ✓ Gradual Phasing out of Fossil Fuels
- ✓ Creation of 25 New Green Jobs
- ✓ Gasification Byproducts – Ash – are Non-hazardous and Within Acceptable Limits
- ✓ Inert Ash is Used for Mix in Cement Industries, Concrete and for Road Construction





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III- ii. Gasification: Waste To Energy

✓ **Waste Reduction: 88% in Weight & 95% in Volume**





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III- ii. Gasification: Waste To Energy



waste2energy

**“Waste-to-Energy via Gasification is:
clean, reliable and a renewable source of energy.”**

Gasification creates fewer air emissions, uses less water, and generates less waste than most traditional energy technologies.

This innovative technology has been proven, providing a low cost, low emission solution for waste disposal.





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IV- Conclusions

“Maximum Valorization of All the Components of the Waste”

1- Maximize Raw Materials by:

- **SORTING**
- **RECYCLING:** Ensure that the percentage needed for the local industries is recovered.

2- Then, Generate Fuel from Non-Recyclables:

- **When recycling is NOT possible, remaining waste should be turned into energy as alternative fuels.**



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IV- Conclusions

- **Have National Strategy & Legislations** to Ensure Proper Waste & Resource Management



Ensure Recyclable Waste as Raw Material for Valued And Important Industries, or else many sectors are threatened to close, resulting in job and financial losses.



CLOSED



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**I Will Be Glad to
Answer Your
Questions!**



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اشترني
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صناعتك هويتك



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THANK YOU FOR YOUR ATTENTION !