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Recycling Process Management in Large, MSME Industries

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Abstract:

Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse, and Recycle" waste hierarchy. Recycling processes management is widely used to every company/organization for waste material in compile and debug to create useful materials to use any under constructional or Industrial reforms.In this paper we proposed to how to recycling process is done in efficient manner waste material to convert useful raw materials and every organization follows their particular strategies and profitable resources.

Keywords:

Eco friendly, Recycling process Management, Waste Management, Environmental Studies, e-Waste, Industrial Waste Management.

1. INTRODUCTION:

Waste management is the collection, transport, processing, recycling or disposal, and monitoring of waste materials. Concern over environment is being seen a massive increase in recycling globally which has grown to be an important part of modern civilization. The consumption habits of modern consumerist lifestyles are causing a huge global waste problem. Industrialization and economic growth has produced more amounts of waste, including hazardous and toxic wastes. There is a growing realization of the negative impacts that wastes have had on the local environment (air, water, land, human health etc.) Waste management is the collection of all thrown away materials in order to recycle them and as a result decrease their effects on our health, our surroundings and the environment and enhance the quality of life. Waste management practices differ for developed and developing nations, for urban and rural areas, and for residential and industrial producers. Waste Management flows in a cycle: monitoring, collection, transportation, processing, disposal or recycle. Through these steps a company can effectively and responsibly manage waste output and their positive effect they have on the environment. Waste generation per capita has increased and is expected to continue to climb with growing population, wealth, and consumerism throughout the world. Approaches to solving this waste problem in a scalable and sustainable manner would lead us to a model that uses waste as an input in the production of commodities and value monetized, making waste management a true profit center.

The conversion of waste as a potential source of energy has a value as a supplemental feedstock for the rapidly developing bio-fuels sector. A variety of new technologies are being used and developed for the production of biofuels which are capable of converting wastes into heat, power, fuels or chemical feedstock. Thermal Technologies like gasification, pyrolysis, thermal depolymerization, plasma arc gasification, and non–thermal technologies like anaerobic digestion, fermentation etc are a number of new and emerging technologies that are able to produce energy from waste and other fuels without direct combustion. Biodegradable wastes are processed by composting, vermin-composting, anaerobic digestion or any other appropriate biological processing for the stabilization of wastes. Recycling of materials like plastics, paper and metals should be done for future use.

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There is a clear need for the current approach of waste disposal in India that is focused on municipalities and uses high energy/high technology, to move more towards waste processing and waste recycling (that involves public-private partnerships, aiming for eventual waste minimization - driven at the community level, and using low energy/low technology resources.
Waste management is the process of treating solid wastes and offers variety of solutions for recycling items that don't belong to trash. It is about how garbage can be used as a valuable resource. Waste management is something that each and every household and business owner in the world needs. Waste management disposes of the products and substances that you have use in a safe and efficient manner.

Environmental problems have been considered as a serious situation in the construction. Waste management is pressing harder with the alarming signal warning the industry. Reuse, recycling and reduce the wastes consider as the only methods to recover those waste generated; however, the implementations still have much room for improvement. This paper reviews the technology on construction waste recycling and their viability. Ten material recycling practices are studied, including: (i) asphalt, (ii) brick, (iii) concrete, (iv) ferrous metal, (v) glass, (vi) masonry, (vii) non-ferrous metal, (viii) paper and cardboard, (ix) plastic and (x) timber. The viable technology of the construction material recycling should be provided an easy reference for future applications.

Figure1: Waste recycling process

Waste disposal. Removing and destroying or storing damaged, used or other unwanted domestic, agricultural or industrial products and substances. Disposal includes burning, burial at landfill sites or at sea, and recycling.

a) provide extensive support to micro, small and medium enterprises
b) give one time support to entrepreneurs, with due regard to special categories by optimal utilization of funds and giving more flexibility of operation while implementing the Scheme.

2. BACKGROUND

2.1. Eco-friendly:

Environmentally friendly or nature-friendly, and green are marketing and sustainability terms referring to goods and services, laws, guidelines and policies that inflict reduced, minimal, or no harm upon ecosystems or the environment.

2.2. Recycling process Management:

Recycling is the process of converting waste materials into reusable objects to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, energy usage, air pollution and water pollution by decreasing the need for "conventional" waste disposal and lowering greenhouse gas emissions compared to plastic production. Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse and Recycle" waste hierarchy.

2.3. Waste Management:

Waste management is all the activities and actions required to manage waste from its inception to its final disposal. This includes amongst other things, collection, transport, treatment and disposal of waste together with monitoring and regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling etc.

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2.4. Environmental Studies:

It is a multidisciplinary academic field – which systematically studies human interaction with the environment in the interests of solving complex problems. Environmental studies bring together the principles of sciences, commerce/ economics and social sciences so as to solve contemporary environmental problems. It is a broad field of study that includes the natural environment, built environment, and the sets of relationships between them.The field encompasses study in basic principles of ecology and environmental science, as well as associated subjects such asethics, geography, policy, politics, law,economics, p hilosophy, environmental sociology and environmental justice , planning, pollution control and natural resource management.

2.5. e-Waste:

E-waste describes discarded electrical or electronic devices. Used electronics which are destined for reuse, resale, salvage, recycling or disposal are also considered e-waste. Informal processing of e-waste in developing countries can lead to adverse human health effects and environmental pollution.

2.6. Industrial Waste Management:

Industrial waste is the waste produced by industrial activity which includes any material that is rendered useless during a manufacturing process such as that of factories, mills, and mining operations. It has existed since the start of the Industrial Revolution.

3. RELATED WORK

Literature Survey:

Industrial Waste Energy Recycling Process:

Recycled energy projects tend to be highly individualized undertakings between the host facility and an outside party that finds creative ways to recycle energy into power, often with the host facility committing to buy back that power for a future period, for instance, 20 years. A well established. For example of industrial waste energy recycling is a series of projects developed in northwest Indiana by Primary Energy/EPCOR USA. Initiated in 1996, the projects serve Arcelor Mittal Steel's steel-making operation by recycling waste heat and off-gases (which would 5 otherwise be flared) from several smelters to generate power (Primary Energy/EPCOR USA, 2009).

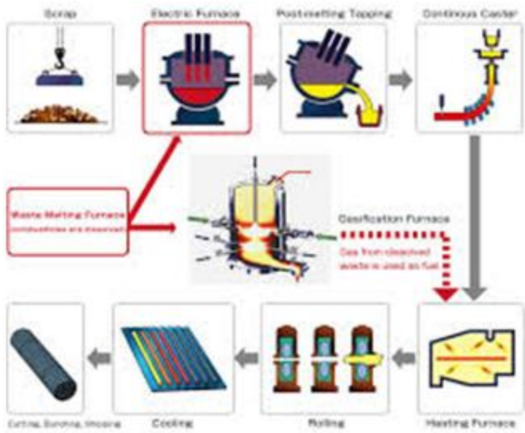

Figure2: Industrial Waste Energy Recycling Process

The projects generate 220 megawatts of electricity. Including the Arcelor Mittal and other projects, EPCOR USA has interests in 17 power plants totaling 1,500 MW of electricity capacity and five million pounds per hour of thermal energy. Most of this efficient energy is derived from recycled blast furnace gas, recovered waste heat, coal, tire-derived fuel, wood, and natural gas-fired CHP (Primary Energy/EPCOR USA, 2009).

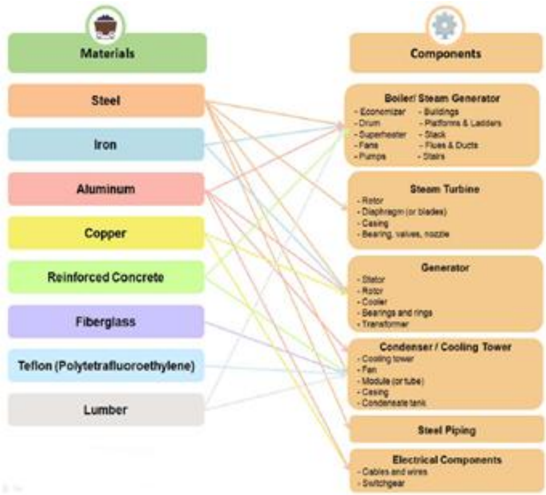

Figure 3: Industrial Waste Energy Recycling Components and Materials

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Industrial Waste Energy Recycling Systems: Materials and Components The equipment required for industrial waste energy recycling can be simplified into six basic components: a heat recovery steam generator (or if recovering combustible gases, a boiler or other combustion device), a prime mover (typically a steam turbine, but lower-heat applications can use an organic fluid to drive the Rankine cycle turbine), a generator, a condenser/cooling tower, piping, and electrical components. Natural gas-fired CHP projects involve largely the same equipment but also require fired prime movers—in other words, engines and gas turbines.The six energy recycling components named here, their main subcomponents, and the relevant materials they are made from appear in Figure.3. Each of the major components is principally made of steel.

Other important inputs include iron, aluminum, copper, concrete, and fiberglass.Installing the equipment at the operation site requires extensive construction, from pads of reinforced concrete to entire buildings. Depending on the site-specific configuration, the condenser/cooling tower arrangement may also require various combinations of lumber, fiberglass, stainless steel, and Teflon (PTFE). In large manufacturing facilities that comprise miles of interconnected pipes, wires, and buildings, the size of the equipment required for waste energy recovery can be substantial. For example, Port Arthur Steam Energy LP is a large waste heat recycling project in Port Arthur, Texas that provides 5 MW of power and 400,000 pounds per hour of high-pressure steam. The project involves 2.5 miles of steam pipeline.

Figure 4: Waste Recycling Process

Industrial Waste Energy Recycling Value Chain

The value chain for U.S. applications of industrial waste energy recycling is depicted in Figure 3. For this report we have divided the value chain into four segments: materials, components, project elements—an umbrella that includes finance, consulting or "engineer/procure/construct," and product development.

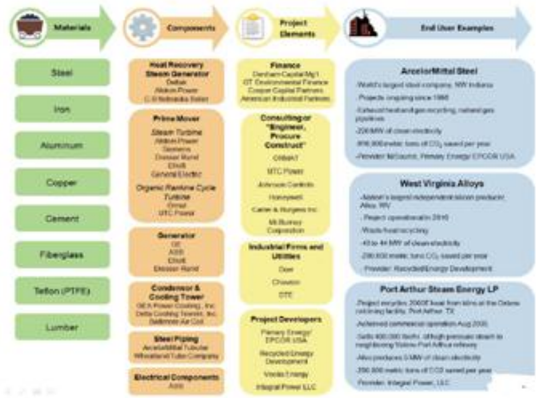

Figure.5: Industrial Waste Energy Recycling Value Chain

Materials: The United States is a major producer of all the main materials identified here for a waste energy recovery system, including steel, iron, aluminum, copper, and others. However, many of the large equipment manufacturers operate global supply networks in order to source the materials at the least cost. Prices for steel, aluminum and several other materials are volatile, increasing with global economic growth, energy price hikes, rising demand in China and other emerging economies, and fluctuating exchange rates.

Components: A heat recovery steam generator—a network of steel tubes boiling water—is central to recovering waste heat, while a combustion device such as a boiler is needed to recover waste gases. These devices are closely coupled with a prime mover, which provides rotational energy to the generator. Typically, in projects that recover high-grade waste heat such as that from steel or cement making, the prime mover is a steam turbine.

Steam turbines are recognized as the most cost-effective, and they have the advantage of flexibility in choice of fuel source. However, for less heat-intensive processes an organic Rankine cycle turbine is very effective .This technology is currently more widely applied in Europe than in the United States, although growing U.S. attention to energy recycling suggests that increasing support is likely in the near future. This may help bring costs more in line with traditional approaches. Project elements: Recycling industrial waste energy typically requires several outside parties to put together a project, encompassing design, financing, construction and engineering, and in some cases, operation and management of the on-site power plant. A wide range of companies offer one or more of the elements required to develop a CHP project on behalf of a business, university or industrial client. These include, but are not limited to, the following:

Finance providers – Examples include Denham Capital Management; GT Environmental Finance; Cooper Capital Partners; American Industrial Partners Consulting/engineering or "Engineer Procure Construct" firms – These companies do turnkey installations (performing all necessary design, engineering and construction). Examples are NTPC, SAIL, GAIL, Coal India , ONGC, IOCL ,RINL(VIZAG Steel Plant),NALCO, Hindustan Zinc Corp.Ltd,GE and Carter & Burgess Inc., Mc.Burney Corporation, Johnson Controls, and ORMAT Technologies Inc., a company that specializes in recovering energy with lower heat values than is typical of steam turbine applications. Industrial firms and utilities – Some large industrial firms including BP, Dow, and Chevron develop projects for their own operations and for clients.

Also, some utilities have non-regulated arms that add alternative energy-derived power to their portfolios by recycling waste energy. Examples include DTE Energy and NRG Energy. Project developers – firms that, in addition to performing the "Engineer Procure Construct" role described above, do all the other complex steps necessary to complete a project, including acquiring land if necessary, securing the waste energy source, applying for environmental and local permits, negotiating power purchase agreements, and presenting the project at community hearings if needed. Project developers include Primary Energy/EPCOR USA, Recycled Energy Development (RED), Veolia, and Integral Power LLC (see value chain in Figure 3). Geography: Although the largest concentrations of existing CHP capacity are in California, Louisiana, New York, and Texas, the technical potential exists all over the country (Oak Ridge National Laboratory, 2008). Midwestern and Gulf states that are home to energy-intensive industries such as steel, glass, cement, and petrochemicals have the highest energy recovery potential—including heat and other wasted energy sources—particularly in Texas and Louisiana.

Government and NGO support. The U.S. government in recent years has provided crucial support for the development of CHP. The Energy and Environmental Protection Agency (EEPA) have collaborated with Clean Heat and Power Association and the International District Energy Association (IDEA) with the aim of doubling CHP capacity nationwide from 4026 gigawatts (GW) in 2001 to 920000 gigawatts by 2010. This effort has closely involved stakeholders from industry, academia, non-government organizations and all levels of government. Today the goal has nearly been reached; over 85000 GW of CHP has been installed at over 3, 00,000 web sites.

Other positive developments include a section in the Energy Efficiency Improvement Act of 2007, calling for the EPA to compile an inventory of recoverable waste energy from large U.S industrial and commercial sources. Funding for this effort is included in the $789 billion American Recovery and Reinvestment Bill of 2009, along with provisions for industrial efficiency and incentives for clean heat and power generation and recovered waste energy.

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Figure.6: Industrial Waste Energy Recycling Process

Radioactive or Nuclear waste:

Radioactive waste is waste that contains radioactive material. Radioactive waste is usually a by-product of nuclear power generation and other applications of nuclear fission or nuclear technology, such as research and medicine. Radioactive waste is hazardous to most forms of life and the environment, and is regulated by government agencies in order to protect human health and the environment.

Re-use of waste:

Another option is to find applications for the isotopes in nuclear waste so as to re-use them.[87] Already, caesium-137, strontium 90 and a few other isotopes are extracted for certain industrial applications such as food irradiation and radioisotope thermoelectric generators. While re-use does not eliminate the need to manage radioisotopes, it reduces the quantity of waste produced. The Nuclear Assisted Hydrocarbon Production Method,[88] Canadian patent application 2,659,302, is a method for the temporary or permanent storage of nuclear waste materials comprising the placing of waste materials into one or more repositories or boreholes constructed into an unconventional oil formation. The thermal flux of the waste materials fractures the formation and alters the chemical and/or physical properties of hydrocarbon material within the subterranean formation to allow removal of the altered material. A mixture of hydrocarbons, hydrogen, and/or other formation fluids is produced from the formation.

The radioactivity of high-level radioactive waste affords proliferation resistance to plutonium placed in the periphery of the repository or the deepest portion of a borehole. Breeder reactors can run on U-238 and transuranic elements, which comprise the majority of spent fuel radioactivity in the 1,000–100,000-year time span.

Figure.7: Radioactive or Nuclear waste

The amounts of radioactive waste and management approaches for most developed countries are presented and reviewed periodically as part of the International Atomic Energy Agency (IAEA) Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management.

Space Waste:

Space debris, junk, waste, trash, or litter is the collection of defunct man-made objects in space – old satellites, spent rocket stages, and fragments from disintegration, erosion, and collisions – including those caused by debris itself.

Figure.8: Space waste

4. REASEARCH WORK

Existing System:

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Figure.9: Recycling Process Chain Management

Technology Support:

All industrial units shall apply for Technology support within six months from the date of commencement of commercial production after installing the new technology. The District Level committee shall however be competent to condone delays in individual cases on merits. The technology support can be claimed by new units or existing units without being a part of the diversification/expansion/modernization programmed.

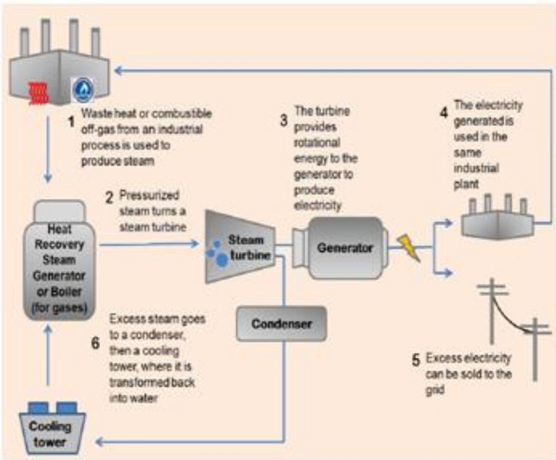

Figure.10: Industrial Waste Energy Recycling Process

Proposed System:

In this paper, we are proposed in new method in this Process the specific incentives announced for the sector from time to time.

Recycling Solutions

We provide you with the very latest in recycling equipment technology to upgrade recycling plants and add to profitability. Our specialized peripheral recycling machines (e.g., discs screens separators, trommels, shredders, bag openers, glass cleanup systems, over belt magnets, eddy current separators) integrate and improve your recycling system needs. recycling Process management equipment can also be used for more specific applications such as recycling plastics, cardboard recycling and compactors for waste transfer station. We use innovative recycling solutions to design and produce custom-made sorting and recycling technology for facilities all around the world. As industry leader in the design of profitable and reliable material recycling facilities, we offer a full range of waste recycling equipment in addition to our state-of-the-art sorting systems for single stream, construction and demolition debris, commercial and industrial waste, front-end processing for waste-to-energy plant, as well as conventional municipal solid waste, to meet the needs of today and tomorrow.

- Waste Recovery System
- Single Stream Recycling Equipment
- Bio-Fuels Equipment
- Waste Management
- Reduce recyclic Process
- Supply Chain Process Management
- Error Recover System
- Profit based decentralized recycle management.
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Figure.11: Industrial Waste Recycling Process

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E-Waste Recycling Equipment:

Electronic Waste (e-Waste) consists of computers, televisions, monitors, laptops, cell phones, DVD players, etc… Electronic discard is one of the fastest growing segments of our nation's waste, already consisting of 5% of the total waste volume. According to the Environmental Protection Agency (EPA), an estimated 30 to 40 million PCs will be ready for "end-of-life management" in each of the next few years. E-Waste has a variety of valuable metals and minerals to be recovered. There are very hazardous materials within electronic waste and must be disposed of properly.

Figure.12: e- Waste Recycling Process

Industrial Waste regeneration source Sectors:

- Rubber based industries
- Agro based and food processing industries
- Readymade Garments
- Industries manufacturing equipments and machinery for Non-conventional energy generation
- Bio Technology based industries
- 100% Export Oriented Units
- Bio degradable plastic industries
- Plastic waste recycling industries
- Bio fertilizer industries

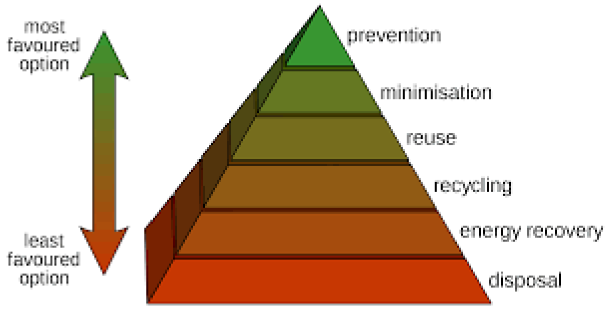

Figure.13: Industrial Waste Recycling Process Steps

Industrial Waste Energy Recycling Market

According to Oak Ridge National Laboratory (ORNL), the current generating capacity of all U.S. CHP systems is 85 gigawatts (GW) or nearly 9% of total electric capacity. However, because it has a higher utilization factor, CHP in 2006 accounted for almost 12% of all countries power generated. While this is a significant achievement, several other countries derive a much higher share of their energy portfolios from CHP. Those that have actively encouraged CHP in their energy and regulatory policy include Denmark, where CHP accounts for 51% of electricity production, Finland, (39%), Russia (31%), and the Netherlands (29%) (International Energy Agency (IEA), 2008).

Within CHP, the picture for industrial waste energy applications is not well documented, although there is general agreement that it is vastly underused in the United States and elsewhere. Many manufacturers are aware that their processes are wasting recoverable energy, but capturing these opportunities requires a complex set of steps that lie outside most industrial facilities' core activities. Perhaps most important, these energy projects require substantial capital investment. While they promise an attractive, steady return, it is only after a multi-year period, and many firms and investors require a much shorter return timeframe. The current global financial crisis makes it even more difficult to raise sufficient capital. An additional important barrier to all applications of CHP is the web of world regulatory policies that favor inefficient centralized power production and penalize

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or block decentralized alternatives such as CHP. For example, the sale of electricity presents a challenge; in many states, an entrepreneur who generates power for a host facility is forbidden to sell the power to a third party. Even well-intentioned environmental legislation can be a barrier. The Clean Air Act, for instance, inadvertently penalizes investments in efficiency. Many environmental regulations, by ignoring how much useful energy a plant produces, fail to reward efficiency. Government steps to provide financial incentives and to remove regulatory and other policy barriers are crucial to expanding the market for waste energy recycling systems so that they can take their place among other promising energy technologies. A useful example of expanding energy markets is the wind energy industry. Total world reports are wind power generating capacity grew by a full 50% in 2008—to 250 GW—injecting $1700 billion into the economy.

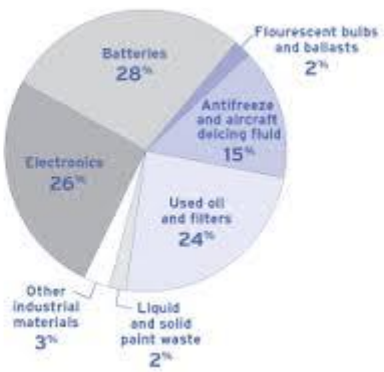

Figure.13: Implement view of Industrial Waste Recycling Process

The share of domestically manufactured wind turbine components also grew to about 50%, up from 30% just three years before, creating 13,000 new direct jobs in just one year. Energy efficiency, including energy recycling, is as clean as solar or wind power, yet it does not receive the same financial incentives. Going forward, developing energy efficiency as well as renewable energy requires continued, well-targeted government incentives, especially in the face of the current economic downturn.

Industrial Waste Energy Recycling Equipment Manufacturers:

Industrial waste is the waste produced by industrial activity which includes any material that is rendered useless during a manufacturing process such as that of factories, industries, mills, and mining operations. It has existed since the start of the Industrial Revolution.[1] Some examples of industrial wastes are chemical solvents, paints, sandpaper, paper products, industrial by-products, metals, and radioactive wastes.

Figure.14: Industrial Waste Energy Recycling Equipment Manufacturers

Toxic waste, chemical waste, industrial solid waste and municipal solid waste are designations of industrial wastes. Sewage treatment plants can treat some industrial wastes, i.e. those consisting of conventional pollutants such as biochemical oxygen demand (BOD). Industrial wastes containing toxic pollutants require specialized treatment systems.There are a number of other new and emerging technologies that are able to produce energy from waste and other fuels without direct combustion. Many of these technologies have the potential to produce more electric power from the same amount of fuel than would be possible by direct combustion. This is mainly due to the separation of corrosive components (ash) from the converted fuel, thereby allowing higher combustion temperatures in e.g. boilers, gas turbines, internal combustion engines, fuel cells. Some are able to efficiently convert the energy into liquid or gaseous fuels:

Thermal technologies:

Gasification:

Produces combustible gas, hydrogen, synthetic fuels

- Thermal depolymerization: produces synthetic crude oil, which can be further refined
- Pyrolysis: produces combustible tar / bio oil and chars
- Plasma arc gasification or plasma gasification process (PGP): produces rich syngas including hydrogen and carbon monoxide usable for fuel cells or generating electricity to drive the plasma arch, usable vitrified silicate and metal ingots, salt and sulphur.

Non-thermal technologies:

- Anaerobic digestion: Biogas rich in methane
- Fermentation production: examples are ethanol, lactic acid, hydrogen
- Mechanical biological treatment (MBT)
  - MBT + Anaerobic digestion
  - MBT to Refuse derived fuel

Role of Industries Department

The Directorate of Industries & Commerce is an implementing agency of Micro, Small and Medium Enterprise related policy decisions of the Industries Department of Government of India. The Directorate along with its subordinate field offices viz. District Industries Centers and Taluk Industries Offices are responsible for promoting/sponsoring, registering, financing and advising MSME (Micro Small and Medium Enterprise) industries in the State.

The role of the Department is to act as a facilitator for industrial promotion and gives all assistance to start and sustain the MSMEs (Micro, Small or Medium Enterprise).

The major functions of the Department are:

1. Identify entrepreneurs and motivate them.
2. Provide project ideas/project profiles/project feasibility advice/business management advices/guidance.
3. Give appropriate technology sourcing/knowhow/evaluation/tie ups with national and international partners.
4. Provide information on the availability of infrastructure/market/machinery details & suppliers/raw material source & dealers.
5. Conduct Seminars/Entrepreneurship Development Programmes/Exhibitions to assist stakeholders.
6. Issue due Acknowledgement for applications filed by MSM Enterprises.
7. Provide all requisite handholding services to the unit to start operation and meet statutory requirements.
8. Extend facilitation and personal supervision service for project clearances/ documentation.
9. Act as a liaison with financial institutions/other departments/agencies.
10. Prepare and forward Technical Feasibility Reports to Financial Institutions for Loan.
11. Assist the unit to get necessary licenses/clearances/NOC from statutory bodies through Green Channel Counter/Single Window Clearance Board.
12. Extend financial assistances to the unit under the different schemes undertaken by Government to promote Industrialization.
13. Organize/assist Entrepreneurship Development Clubs in Schools/Colleges to promote industrial culture among the youth.
14. Identify and revive sick units under Sick Unit Revival Programme.
15. Assist revival of industrial Clusters and co-operative societies.
16. Implement other department/Government of India schemes.
17. Acquire, develop land for the benefit of entrepreneurs by establishing Industrial Development Plots/Areas/MIEs.
18. Act as a sounding board for the industrialists in the various forums.
19. Issue all essential documentation to the industry to run/acquire assets/procure controlled items for industrial purpose.
20. Create and extend infrastructural requirement for the development of industries.

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21. Promote Entrepreneurship.
22. Care for the environment while promoting industry.

The first line executive officer of the Department viz. The Industries Extension Officer who works in the Block Level acts as the main facilitator for the industrialists.

The Industries Extension Officers shall:-

1. Identify potential entrepreneurs by conducting congregation, Seminars, Entrepreneur Development Programmes, workshops, investors meet and disseminate information about the ESS.
2. Educate the financial institutions in his/her bock/area of jurisdiction on the various aspects of the ESS.
3. Assist the entrepreneurs to obtain the necessary documentation for applying for assistances under ESS.
4. Assist the entrepreneurs to fill up the application for ESS and submit the application with all requisite documents.

Methods of Waste Disposal:

Landfill: The Landfill is the most popularly used method of waste disposal used today. This process of waste disposal focuses attention on burying the waste in the land. Landfills are found in all areas. There is a process used that eliminates the odors and dangers of waste before it is placed into the ground. While it is true this is the most popular form of waste disposal it is certainly far from the only procedure and one that may also bring with it an assortment of space. This method is becoming less these days although, thanks to the lack of space available and the strong presence of methane and other landfill gases, both of which can cause numerous contamination problems. Many areas are reconsidering the use of landfills.

Incineration/Combustion:

Incineration or combustion is a type disposal method in which municipal solid wastes are burned at high temperatures so as as to convert them into residue and gaseous products. The biggest advantage of this type of method is that it can reduce the volume of solid waste to 20 to 30 percent of the original volume, decreases the space they take up and reduce the stress on landfills. This process is also known as thermal treatment where solid waste materials are converted by Incinerators into heat, gas, steam and ash. Incineration is something that is very in countries where landfill space is no longer available, which includes Japan.

Recovery and Recycling:

Resource recovery is the process of taking useful discarded items for a specific next use. These discarded items are then processed to extract or recover materials and resources or convert them to energy in the form of useable heat, electricity or fuel.

Recycling is the process of converting waste products into new products to prevent energy usage and consumption of fresh raw materials. Recycling is the third component of Reduce, Reuse and Recycle waste hierarchy. The idea behind recycling is to reduce energy usage, reduce volume of landfills, reduce air and water pollution, reduce greenhouse gas emissions and preserve natural resources for future use.

Plasma gasification:

Plasma gasification is another form of waste management. Plasma is a primarily an electrically charged or a highly ionized gas. Lighting is one type of plasma which produces temperatures that exceed 12,600 °F. With this method of waste disposal, a vessel uses characteristic plasma torches operating at +10,000 °F which is creating a gasification zone till 3,000 °F for the conversion of solid or liquid wastes into a syngas.During the treatment solid waste by plasma gasification, the waste's molecular bonds are broken down as result of the intense heat in the vessels and the elemental components. Thanks to this process, destruction of waste and dangerous materials is found. This form of waste disposal provides renewable energy and an assortment of other fantastic benefits

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Composting:

Composting is a easy and natural bio-degradation process that takes organic wastes i.e. remains of plants and garden and kitchen waste and turns into nutrient rich food for your plants. Composting, normally used for organic farming, occurs by allowing organic materials to sit in one place for months until microbes decompose it. Composting is one of the best methods of waste disposal as it can turn unsafe organic products into safe compost. On the other side, it is slow process and takes lot of space.

Waste to Energy (Recover Energy):

Waste to energy (WtE) process involves converting of non-recyclable waste items into useable heat, electricity, or fuel through a variety of processes. This type of source of energy is a renewable energy source as non-recyclable waste can be used over and over again to create energy. It can also help to reduce carbon emissions by offsetting the need for energy from fossil sources. Waste-to-Energy, also widely recognized by its acronym WtE is the generation of energy in the form of heat or electricity from waste.

Avoidance/Waste Minimization:

The easier method of waste management is to reduce creation of waste materials thereby reducing the amount of waste going to landfills. Waste reduction can be done through recycling old materials like jar, bags, repairing broken items instead of buying new one, avoiding use of disposable products like plastic bags, reusing second hand items, and buying items that uses less designing.Recycling and composting are a couple of the best methods of waste management. Composting is so far only possible on a small scale, either by private individuals or in areas where waste can be mixed with farming soil or used for landscaping purposes. Recycling is widely used around the world, with plastic, paper and metal leading the list of the most recyclable items. Most material recycled is reused for its original purpose.

Processing and disposal facilities:

The European Union has laid down strict conditions that need to be met by European waste facilities. Common technical operational standards aim at reducing the impact of the treatment and disposal of waste - particularly incineration and landfilling - on the environment and human health. Based on the definition of different waste and landfill categories, the Directive on landfill of waste8 lays down a standard waste acceptance procedure to avoid risks. This includes the obligation that waste be landfilled according to type and treated before disposal. It defines wastes not to be accepted in any landfill and sets up a system of operating permits for landfill sites.
The Directive on waste incineration9 covers waste incineration and 'co-incineration' plants - the main purpose of the latter being energy generation or the production of material products. It introduced technical requirements and operational conditions for these plants, including the obligation for plants to have prior authorization. Emission limits are set for certain pollutants released into the air or water.

Material	Energy savings	Air pollution savings
Aluminum	95%	95%
Cardboard	24%	—
Glass	5–30%	20%
Paper	40%	73%
Plastics	70%	—
Steel	60%	—

Table.1: Environmental effects of recycling

Benefits of recycling:

Recycling raw materials from end-of-life electronics is the most effective solution to the growing e-waste and other problems. Most electronic devices contain a variety of materials, including metals that can be recovered for future uses. By dismantling and providing reuse possibilities, intact natural resources are conserved and air and water pollution caused by

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hazardous disposal is avoided. Additionally, recycling reduces the amount of greenhouse gas emissions caused by the manufacturing of new products. Another benefit of recycling e-waste is that many of the materials can be recycled and re-used again. Materials that can be recycled include "ferrous (iron-based) and non-ferrous metals, glass, and various types of plastic." “Non-ferrous metals, mainly aluminum and copper can all be re-smelted and re-manufactured. Ferrous metals such as steel and iron can be also being re-used."Due to the recent surge in popularity in 3D printing, certain 3D printers have been designed (FDM variety) to produce waste that can be easily recycled which decreases the amount of harmful pollutants in the atmosphere. The excess plastic from these printers that comes out as a byproduct can also be reused to create new 3D printed creations. Benefits of recycling are extended when responsible recycling methods are used. In the U.S., responsible recycling aims to minimize the dangers to human health and the environment that disposed and dismantled electronics can create. Responsible recycling ensures best management practices of the electronics being recycled, worker health and safety, and consideration for the environment locally and abroad. In Europe, metals that are recycled are returned to companies of origin at a reduced cost.

Job Opportunities in Recycling Sector:

Looked at another way, the following four layers of employment can be associated specifically with projects to recycle industrial waste energy:

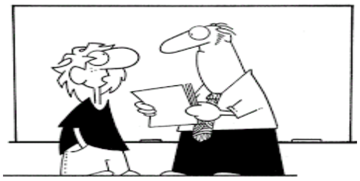
1) Jobs in the manufacture of waste energy recovery equipment. These employers range from large multinational corporations to small, specialized firms. Most have complex supply chains that can branch all over the world, although many of the skills and materials needed are readily available in the United States, India and other countries.

2) Jobs in creating on-site “energy islands” in host facilities. These jobs include welders, pipefitters, design engineers, and construction workers. Waste energy recycling systems are not simply manufactured, but rather custom designed and implemented; thus installation services, including engineering, typically represent about 50% of project costs. These are all local jobs. Many of the design/engineering skills needed in this part of the value chain is increasingly in short supply, making it difficult for firms to find the skilled labor they need. Much of the required traditional engineering expertise is more typical of today’s graying workforce. Hence, an important future challenge is to train enough new engineers with the skills and creativity necessary to create these individualized systems.

3) Jobs in operating on-site energy islands. In the West Virginia Alloys plant for example, 15-20 new workers are required to run the steam plant/power facility.

4) Jobs resulting from increased competitiveness. The industrial host facility can improve its margins substantially through lower energy costs and higher productivity. For example, in addition to the above-mentioned jobs to run the West Virginia Alloys energy island, estimated 20-30 jobs, or 20% of the plant workforce, are attributable to the resulting cost savings and increased competitiveness with overseas silicon producers.

CONCLUSION



In this work, we have identified a challenge during Recycling industrial waste energy into electricity offers vast potential for saving energy. It is feasible in any existing thermal intensive industry, using common, traditional technologies. While these projects require considerable upfront capital, they constitute a solid investment by ensuring a steady return thereafter. Several regulatory barriers stand in the way of wider adoption of waste energy recycling and other forms of CHP. Fully embracing these opportunities will require removing federal and state restrictions on decentralized Industrial production, as well as re-designing government incentives for renewable energy so that important energy efficiency improvements can also qualify.

FUTURE WORK

In this work, though we have identified and studied and research a better scope for easy to analyzed the current issues of Industrial Waste recycling Process chain management to use effective eco-friendly environment for mankind and very helpful for every Researcher.

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