CIRCULAR ECONOMY FOR A LOW CARBON FUTURE

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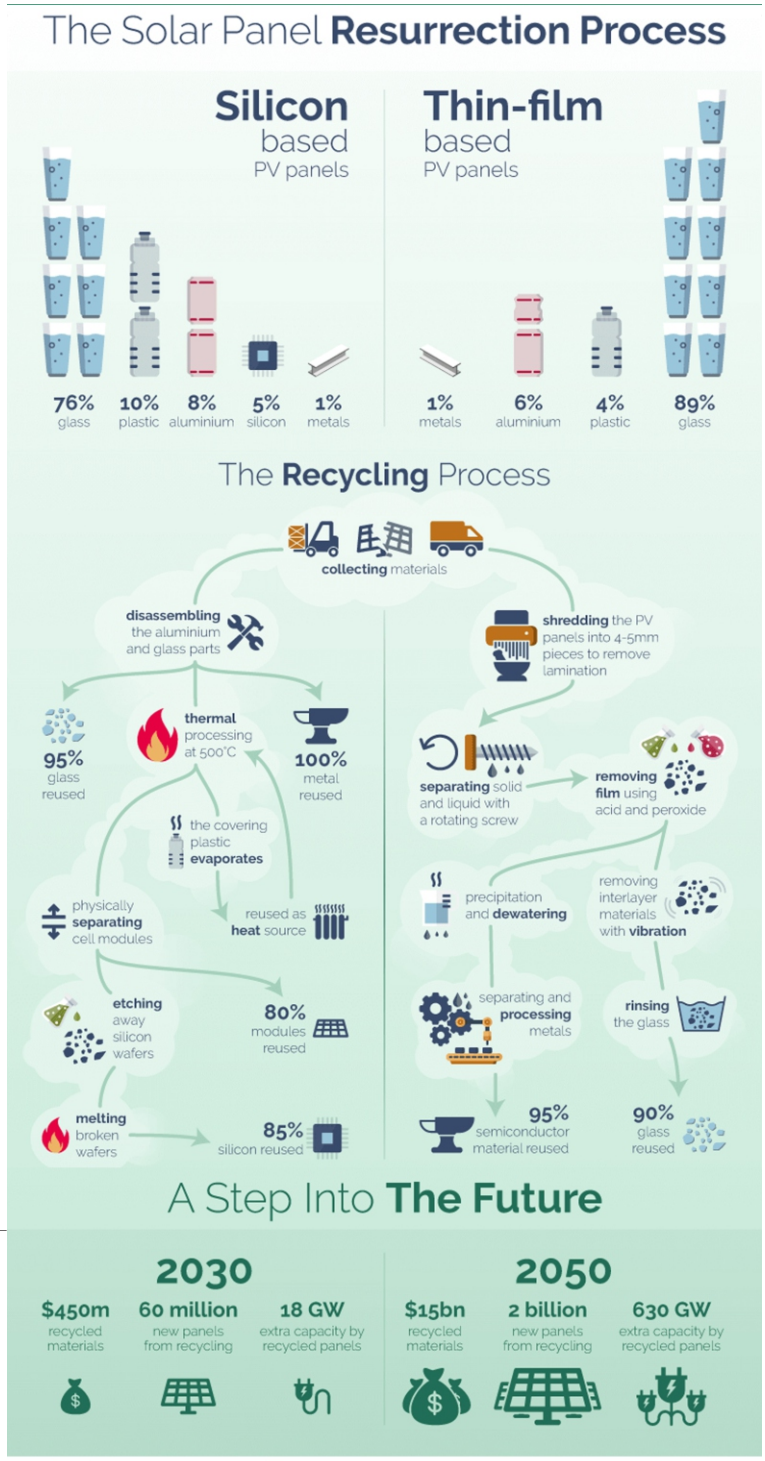
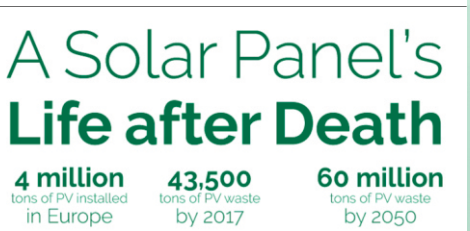
Global demand for energy is increasing rapidly, because of population and economic growth, especially in emerging market economies. The energy market itself has witnessed a shift more towards renewable energy sources, with the growing concern surrounding global warming and climate change leading to a drive towards a lower carbon future, changes in consumer behavior and technological innovation. Globally usage of renewable energy in 2017 was 12 percent, which is a percent more than its average in 2016, according to a report by Frankfurt School of Finance and Management and United Nations Environment Programme (UNEP). This amounts to 1.8 gigatonnes less carbon dioxide released into the atmosphere!

Over the last 40 years, as the population grew and more consumers entered the middle class, **total demand for resources is expected to reach 130 billion tons by 2050, up from 50 billion in 2014.** That's an overuse of the **Earth's total capacity by more than 400%**. The global energy demand for air conditioners is expected to triple by 2050. The global stock of air conditioners in buildings will **grow to 5.6 billion by 2050, up from 1.6 billion today** - which amounts to 10 new ACs sold every second for the next 30 years, according to IEA report. The biggest increase is happening in hot countries like India - where the share of AC in peak electricity load could reach 45 per cent in 2050, up from 10 per cent today without action.

As the demand for power is on the upward trend, annual extraction of materials has more than tripled. **In mining industry, energy cost accounts for 10-11% of production cost**, **thus it is central for low carbon future**. The contribution of diesel and electricity in cumulative energy cost is quite significant. Annual electricity consumption in open mines in India would be 54 lakh units, and the annual diesel consumption is 8364 kL/year. Renewable energy offers an attractive alternative for remote mines not connected to the electricity grid.

A fair share of developing countries which have the privilege of abundant natural resources like solar energy or wind energy or hydro energy, find renewables to be a cheaper investment option, shielded by price fluctuations. Countries like India, China and Brazil aim to use only renewable resources in their operations in the coming years. While countries are tapping the unconventional and natural resources, not all that looks sustainable stays that way at the end of its life cycle. While





solar technologies enable us to generate enormous amounts of green energy, the components used for generating electricity are themselves not biodegradable. Hence, proper handling of components, after their useful life is over, becomes imperative. The environmental imperative to reduce CO2 emissions in the energy sector, should make it obligatory for government to earmark a new investment cycle.

- **While policy makers are focusing on ramping up solar power generation, how and when would we address the prospect of used panels inundating landfills and leaking toxic waste into the environment?**
- **In the process of reducing carbon emissions through output efficiency e.g renewables, other optimal measures and usage new technology, what is the real energy offset?**
- **Are we trying to make this earth hollow through mining, with an objective to reduce carbon footprints?**

Resources are not infinite, now is the time to address the elephant in the room. There is only one planet to live, we need an ecosystem that offers long-term flexibility, generates business and economic opportunities, and provides environmental and societal benefits. We should aim at transitioning to a circular economy where economic activities build and rebuild overall system health across scales – for large and small businesses, for organisations and individuals, globally and locally.

The circular economy concept has deep-rooted origins, however its practical applications across economic scenario and industrial processes have gained momentum in recent past, led by thought-leaders and businesses. Circular economy policies are complex; covering issues such as waste, design, procurement, secondary use, plastics, ocean debris, recycling, waste management among others. **The need of the hour is a unifying, multi-sector, international business voice to provide constructive guidance to the public sector on policy-setting to accelerate the circular economy**.

As large-scale solar PV deployment has taken place only recently in India, major end-of-life PV waste volumes may not be expected until after 2030, after which significant amount of waste is expected to be generated. A 2016 report published by the International Renewable Energy Agency (IRENA) projects India as the producer of over 78 million tonnes of solar e-waste by 2050. **India is talking of 100 GW of solar by 2022, which equates to 303030303.030303 panels**!!

India's existing rules document—E-Waste Management Rules, 2016—clarifies on the roles and responsibilities of the key stakeholders involved in the e-waste value chain. This is the set of rules referred to in most of the solar power tenders for solar projects in India. However, **it does not specifically mention about the issue of management of used components of solar power systems—it only addresses household electronics and not PV panels**. The challenges faced by advanced nations like Japan or the US is similar to that of India, with no specific regulation for the solar waste generated in these countries, as PV panels are still not identified by the law for specific recycling and regulation. However, in the UK and Germany, its collection, treatment and recycling have been defined in Waste Electrical and Electronic Equipment (WEEE) Directive. Germany has also established a collective producer responsibility system for end-of-life management of business-to-consumer PV panels.

As the global installations of wind turbines increase, issues related to the decommissioning of wind turbines becomes increasingly important both for policy makers and industry. Industrial-scale wind turbines are largely recyclable and contain primarily steel and copper. These materials are widely recyclable but decommissioning wind farms might be more costly than the construction phase.

The recyclable components of the wind turbine, includes its foundation, tower, and components of the gearbox and generator. But the turbine blades which have been designed to be lighter, longer and more aerodynamic for better performance are not well designed for durability and recyclability. Some of the blades of the largest new wind turbines are 288 feet long, creating a large-scale waste reduction issue. Unfortunately, blades made from reinforced composite glass or carbon material are difficult to recycle. Unlike other wind turbine components, they do not have good scrap value. Cables also play an important part in recycling plans for offshore wind farms. **Site-appropriate solutions is likely to provide cost-competitive energy.**

If renewable energy is to be a genuine environmental benefit to us, then we cannot let the waste to pile up. Recycling industry can create employment opportunities and apart from generating green energy, panels can be recycled for a different purpose. At the global level potential material influx can produce 2 billion new panels by 2050**. In addition to creating direct economic benefits for businesses and households, following a circular economy development path would reduce negative externalities.** For example, greenhouse gas (GHG) emissions could be 23% lower in 2030 and 44% lower in 2050 compared with the current development scenario, helping India deliver on its targets announced at the Paris agreement. Other externalities like congestion and pollution would fall significantly, providing health and economic benefits to Indian citizens.

For Indians reusing, re-purposing and recycling has been our second nature traditionally. In a world that is increasingly running out of natural resources, this thinking is an asset that must be leveraged by businesses, policymakers and citizens in an organized manner. Increasing circularity in the Indian economy, by optimizing utilization of materials, energy and innovative ideas ranging from India's traditional knowledge to latest technologies will be very important to realize India's sustainability goals over the next decades.

Having access to conventional, more expensive means of energy gives the developed countries an edge over the third world nations. With renewable energy coming into the picture, developing countries are becoming less dependent on the big economies. Choices made today will determine India's mid- to long-term development, and India could help meet the needs of its growing population while avoiding getting locked into resource-ineffective infrastructure. As Indians, we believe in life after death, as stated by the law of Karma– what goes around comes back to us. Here we are talking of lifecycle of products**.** If we do not act now, karmas of this generation will haunt our future generation. ▪

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