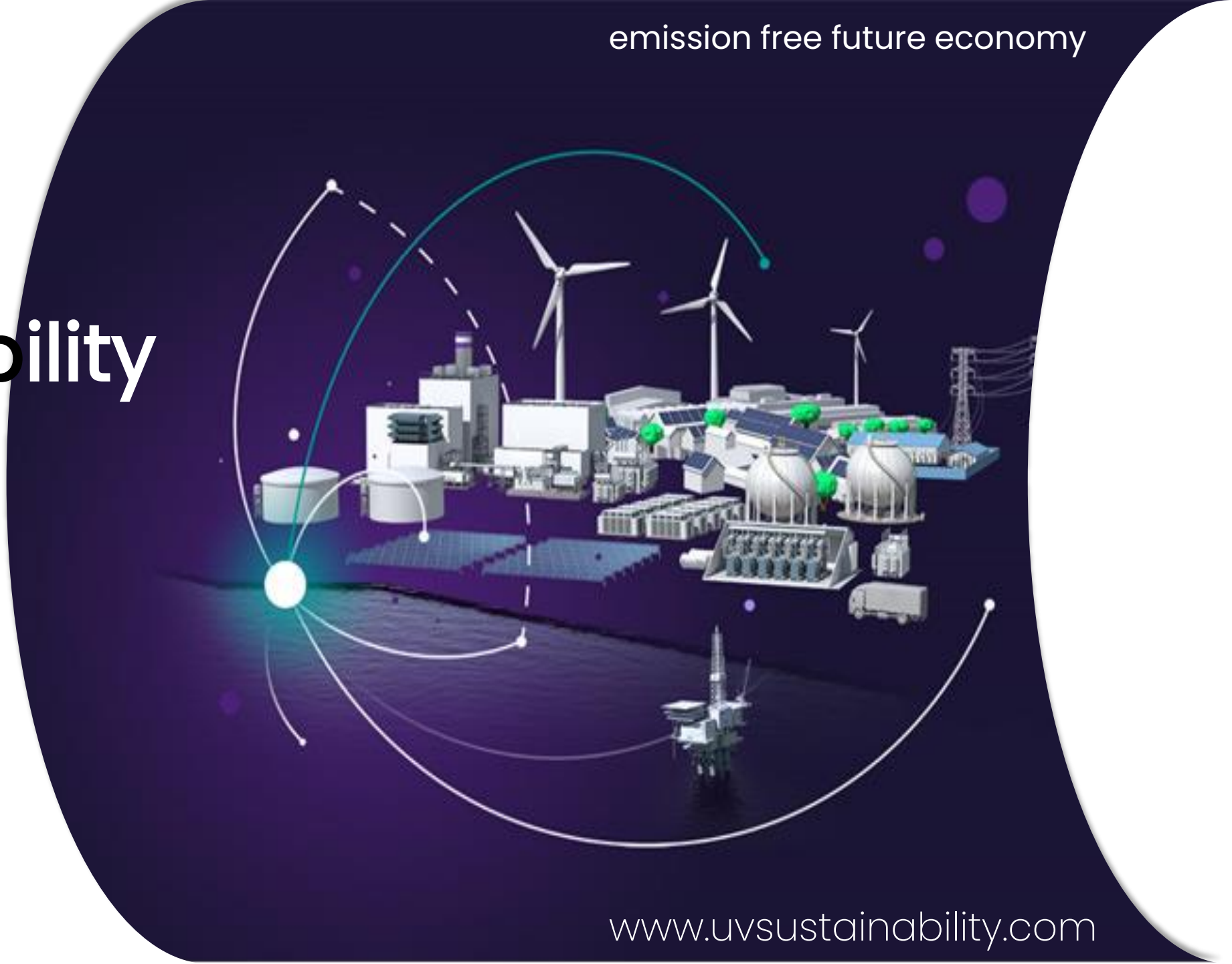
emission free future economy

uvsustainability



decarbonization opportunity & carbon management center for **India**

www.uvsustainability.com

UVSustainability - The Decarbonization Ecosystem

+ We're UVSustainability, a new and new age forward looking, carbon conscious Decarbonization Advisory & Technology Company based in India.

+ We stand strong with our vision to make global environmental impact and change utilizing our future ready and ingenious carbon emission control and reduction technologies and methodologies, one country at a time.

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Strength & Capability

+ UVSustainability's core strength is the exclusive firsthand access to globally proven and established innovative carbon control and reduction technologies, solutions operating across more than 50 countries in the world, spread across sectors like Steel, Shipping, Power, Energy & Utilities, Aviation, Hospitality, Oil & Gas, IT & Telecom, Railways, Roads & Highways.

+ UVSustainability's capability alongside is deep rooted and vertex scale influence across India Subcontinent and Middle East. This includes direct access to leaderships and decision makers to get the rock rolling, up the hill with utmost ease.

Partnerships

+ UVSustainability, eagerly invites global scale credible partnerships to execute global scale implementation capability across the board.

The Partnerships that UVSustainbility predominantly seeks are

1. Strategic Partnerships,
2. Technology Partnerships
3. Services Partnerships.

What is Decarbonization?

+ Is the reduction of carbon dioxide emissions through the use of low carbon power sources, achieving a lower output of greenhouse gasses into the atmosphere.

+ Refers to the process of reducing ‘carbon intensity’, lowering the amount of greenhouse gas emissions produced by the burning of fossil fuels. Generally, this involves decreasing CO2 output per unit of electricity generated

How Does Decarbonization Work?

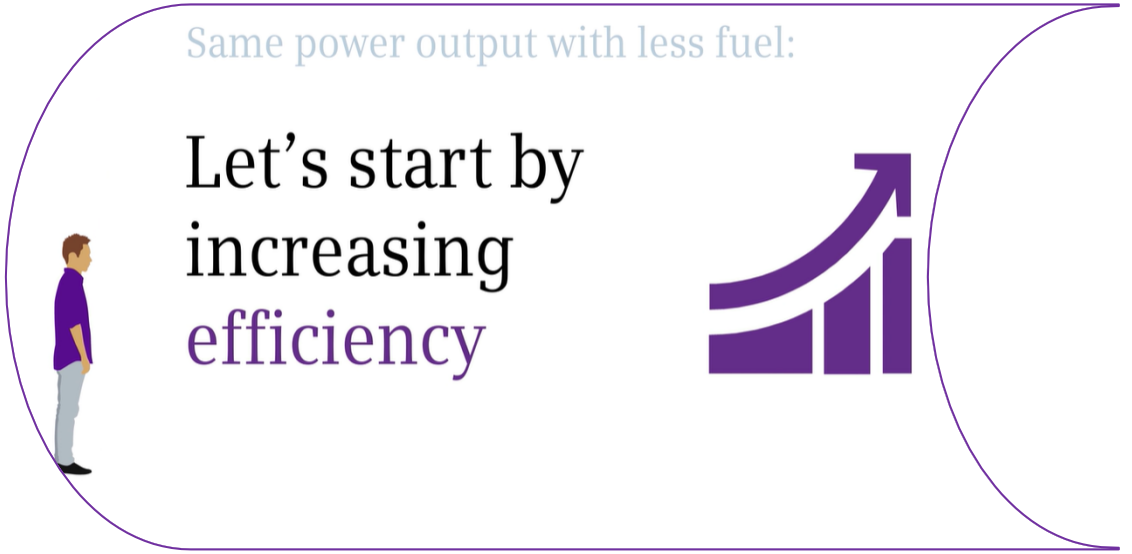
+ Decarbonisation involves increasing the prominence of low-carbon power generation, and corresponding reduction in the use of fossil fuels. This involves use of renewable energy resources like wind power, solar power, and biomass.

+ The use of carbon power can also be reduced through large-scale use of electric vehicles alongside 'cleaner' technologies. Decreasing carbon intensity in the power and transport sectors will allow for net zero emission targets to be met sooner and in line with government standards.

When Does Decarbonization Occur?

+ Efforts made to decarbonize have been put in place by various countries, with more than 150 governments having submitted plans to reduce carbon emissions by 2030. Changes made include Paris' pledge to ban diesel vehicles from 2040. Governments across the globe are introducing schemes to bring together electric and electric hybrid public transportation.

+ Renewable energy sources are also being implemented more widely, and now produce a third of all power capacity worldwide. Greenhouse gas emissions from fossil fuel power stations can be capped by installing carbon capture and storage (CCS) technology.



Why is Decarbonization Important?

+ Following the prioritization of decarbonization outlined in the Paris Agreement, the Governments across the globe are committed to achieving net zero greenhouse gas emissions by 2050.

+ The Committee on Climate Change recommended that net zero was not only feasible but also necessary and cost-effective. Rapid decarbonization is becoming more necessary as the transport sector becomes electrified, increasing the demand for electric power. Greater energy efficiency is therefore becoming a priority to meet emission targets to global temperatures

India Reaffirms Paris Agreement Pledge

+ Under the Reaffirmed Paris agreement, India has committed to cut greenhouse gas emissions intensity of its gross domestic product 33% to 35% by 2030.

+ India's Environment Minister Prakash Javadekar recently announced, India already has achieved 21% of its pledge to reduce the emissions intensity of GDP by 33-35% by 2030.

+ The Paris accord aims to keep the increase in average temperatures worldwide "well below" 2 degrees Celsius (3.6 degrees Fahrenheit) compared to pre-industrial levels.

India On Track To Succeed & Exceed

+ Power Minister of India has announced. India has already achieved emission reduction of 28 per cent over 2005 levels, against the target of 35 per cent by 2030 committed in its NDC (Nationally determined contributions).

+ This makes India among one of the few countries globally that has kept to its Paris Climate Change (COP21) commitments along with an exponential increase in renewable energy capacity and aggressively pushing towards decarbonization initiatives. India is determined to not only achieve, but to exceed its NDC commitments well within the committed time frame.

"India on course to exceed Paris Climate Change commitments"

India's Big Renewable Plan

+ It is anticipated that by 2050, 80-85 per cent of India's overall power capacity will come from renewables. India has already touched 200 GW of peak demand.

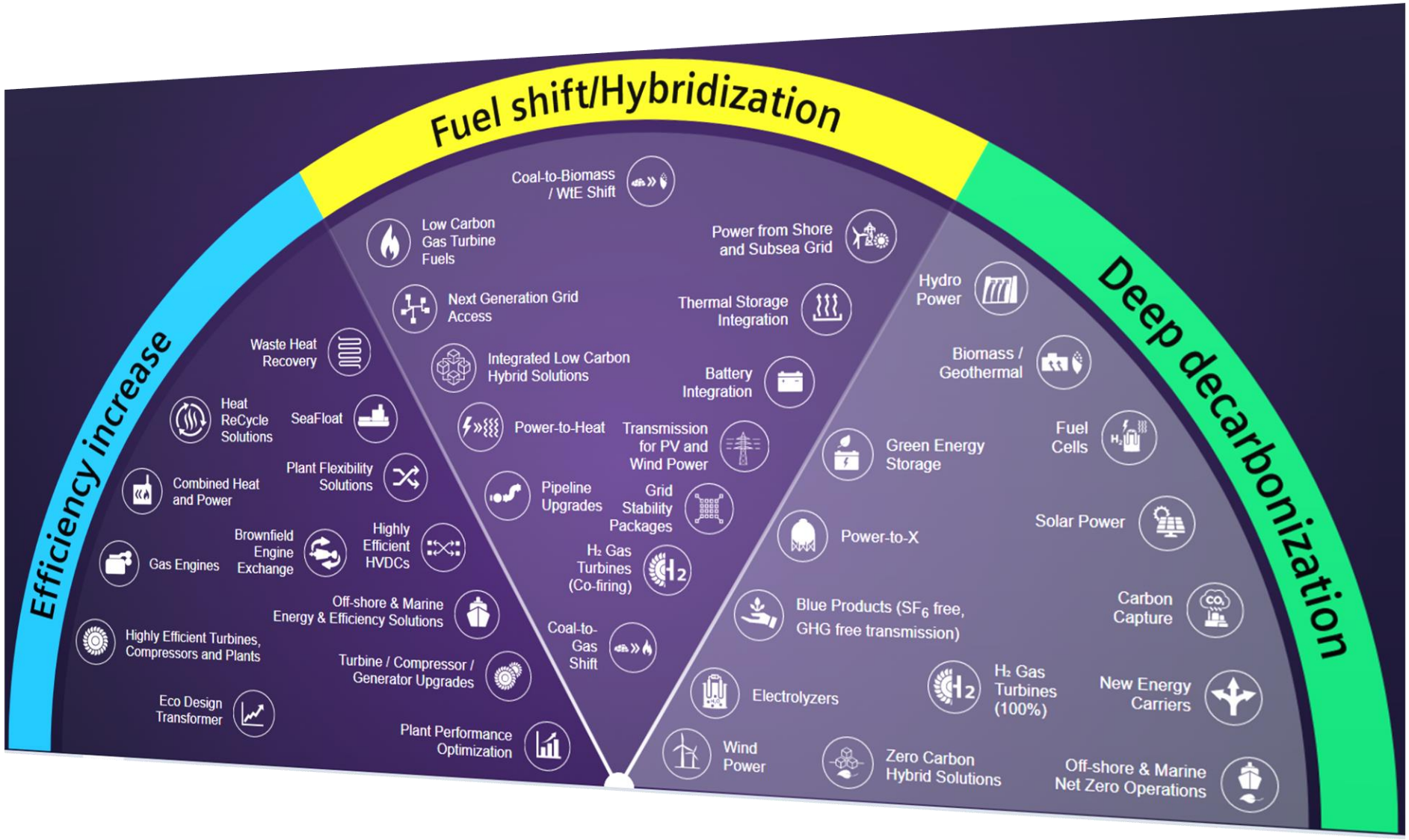
+ India plans to systematically scale up its targets to install 450 GW of renewable energy capacity by 2030 from its existing target of 175 GW by 2022

+ India understands that it is the third largest emitter of CO2 after China and the United States. CO2 emissions from India are estimated to increase to 2.7 times the 2015 levels to around 5,700MT by 2040—constituting 13% of the world total.

"India is at the center stage for action against global warming and towards decarbonization"

Decarbonization Solutions On India's Radar

+ This is how India Plans to lead the way to become a deeply decarbonized nation and be enabled with utilities, and industry to a transformed eco-system of energy.



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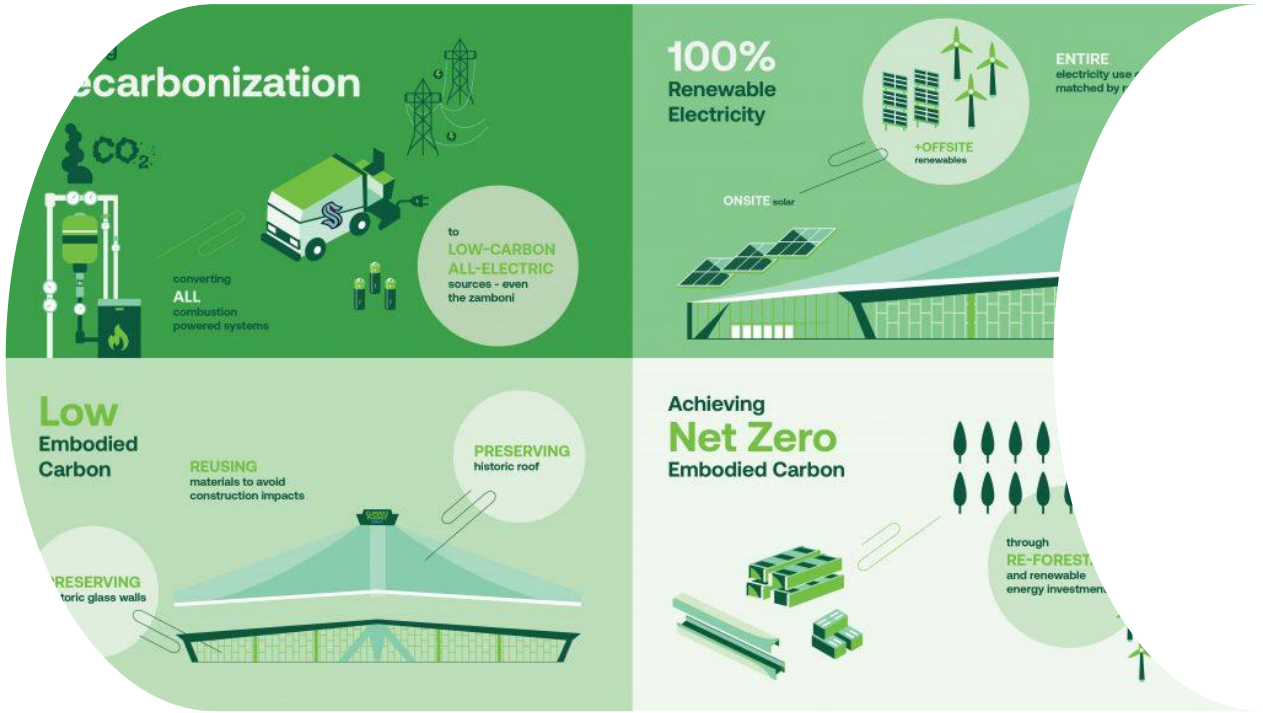
Net-Zero Carbon Future For India

+ A rapidly changing climate is an undeniable phenomenon which is severely affecting the global society. India is not untouched and being one of the most populous country with a rapidly expanding population, runs the risk of being part of the emission problem rather than solution. India is the third largest countries, after China and the US, both in terms of energy consumption and CO2 emission.

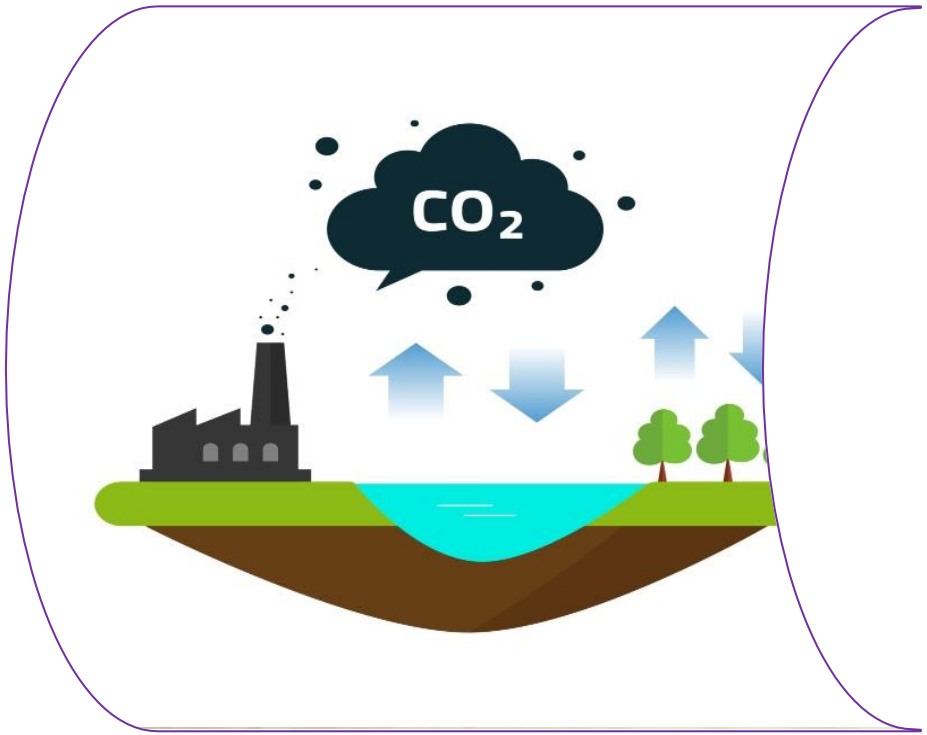


+ The country is already making strides in the use of renewable energy like solar and wind energy but the mitigation in carbon emission through these processes are slow. Removal of existing CO2 from the atmosphere, such as through “subsurface CO2 sequestration” is also needed. In a holistic sense, India needs a centralized body to manage carbon

Carbon Management Centre For India

+ This proposal deals with turning the table and converting India as a country that uses its subsurface to present a carbon storage solution to the world, thus joining the leadership ranks along with North America and Western Europe. Here, creation of a "Carbon Management Center" is proposed for effectively managing the emission, trading and sequestration of carbon in the country.

+ The purpose of the center will be to recommend ways to reduce carbon emission but also to find avenues for removing existing CO2 in the atmosphere. One of the key areas that the center will focus is on subsurface CO2 sequestration in conjunction with the major oil and gas and coal companies in the country.



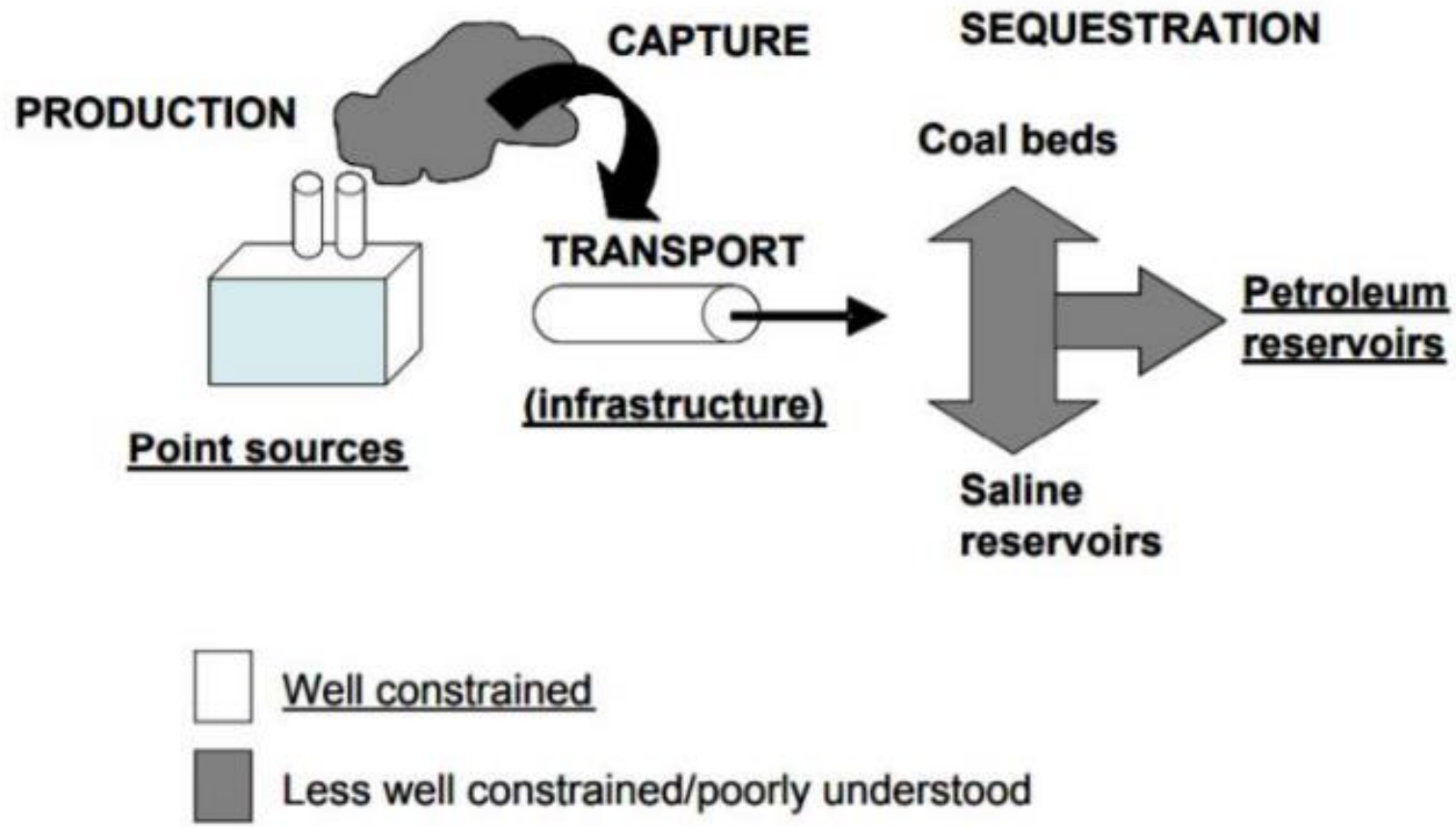
Carbon Management Centre Work Plan

+ **Step 1**: Creation of an expert committee HyperFybre subject matter experts have access to extensive network of world experts on carbon management. They will put together an international team of domain experts which will be complemented by experts (scientists and bureaucrats) from the Indian site.

+ **Step 2**: Identification of urgent and important carbon management issues. he committee will work with various units (PSUs, corporations and start-ups) to identify the needs of the country and prioritizing them.

+ **Step 3**: Reports and recommendations The committee will undertake the task of preparing comprehensive reports which will serve as point-of-reference for policy making.

Carbon Capture & Storage Concept



Subsurface CO2 Sequestration (Example Report)

+ For over four decades several initiatives in the US and Europe have shown that when captures from point industrial sources, separated and injected in geological formations below a critical depth, e.g., 800m, CO2 can be permanently removed from the atmosphere. This technology known as “subsurface CO2 sequestration” is being hailed as one of the most effective technologies to counter climate change. Under the current leadership of the country, India, like all progressive nations, aspires to achieve a “net-zero” carbon future. Currently, India is one of the leading CO2 emitters in the world and the country is endowed with large sedimentary basins with saline aquifers, coal beds, and depleted oil and gas fields which can store a significant amount of CO2 for a geological period. In addition, the crystalline basement which underlies the entire country and outcrops at various locations is also available for long-term CO2 storage through mineralization when present at appropriate depths and with an appropriate fracture network.

Subsurface CO2 Sequestration (Example Report)

+ Although the presence of such vast and extensive sequestration targets is known, a detailed compilation that can enable the administration to direct economic efforts is missing. That will be one of the first activities of the center. The end goal of this effort will be to create a comprehensive report outlining the a) point source of CO2 emission, b) existing pipelines infrastructure, and c) geological sequestration targets.

+ Within the geological targets, the report will discuss a) volumetric compartmentalization of sedimentary basins in terms of caprocks, petroliferous and saline formation, b) minable, un-minable, excavated and burnt coal seams and,
c) location of the crystalline basement that is appropriately fractured or buried for sustainable sequestration.

+ Point Emitters: Territorial emissions within the country from lifeline products such as power, cement, and steel are spread throughout the country. At present, the volume of emission from each of the point sources is not known although the locations of the emitters are known. This report will first generate a database of point emitters in the form of a bubble plot so that it is easy to visualize where the sequestration efforts need to be directed.

+ Pipeline Infrastructure: India has an extensive and growing pipeline infrastructure. IndianOil alone operates a network of more than 15,000 km long crude oil, petroleum product, and gas pipelines. Most of these pipelines run from the production fields to the refineries and then from the refineries to the distribution center. Knowledge of the pipeline infrastructure concerning the main emitter and sequestration targets is necessary for planning.

Subsurface CO2 Sequestration (Example Report)

+ Sedimentary Formations: Geologic storage of CO2 is a key component of mitigating anthropogenic climate change (Intergovernmental Panel on Climate Change, 2018). It is generally agreed that about 2700 Gt of CO2 would need to be stored at a rate of 40-60 Gt per year to keep the future increase in global mean surface temperature less than 2°C. A few common ways of trapping CO2¬ generally accepted in the literature are as follows:

1) **Structural-stratigraphic trapping**: CO2 is trapped as a continuous phase (meters to tens of meters thick) against an impermeable feature (caprock or fault plane).
2) **Capillary/residual trapping**: CO2 is trapped as a disconnected ganglion in a single pore or a blob in a set of interconnected pores.
3) **Dissolution trapping**: CO2 is dissolved in the formation brine.
4) **Mineral trapping**: CO¬2 is transformed into a different mineral altogether through a reactive transport process.
5) **Sorption trapping**: CO2 is adsorbed and absorbed into coal and organic matter.

+ All geological formations exhibit all modes of trapping described above to different degrees depending on the mineralogy, fluid content and petrophysics. India has an estimated sedimentary area of 3.36 million sq km. comprising of 26 sedimentary basins, out of which, 1.63 million sq km. area is in on-land, shallow offshore up-to 400m isobath has an areal extent of 0.41 million sq km. and deep-water beyond 400m isobath having a sedimentary area of 1.32 million sq km. area. The thickness of the sedimentary basins ranges from 1 km to 6 km or greater. Thus, there are at least 8.4 million km3 of sediments to be explored for geological sequestration. One ton of CO2 at atmospheric pressure and temperature roughly occupies 550m3 (5.5 *10-7 km3). Assuming a conservative 5% porosity, this implies 0.42 million km3 of potential storage space in the Indian sedimentary basins can store up to 7.6 X 105 Gt of CO2, which is enough to arrest the rapidly rising global temperature and generate enormous revenue through carbon credit.

+ The proposed report will look at the individual sedimentary basin in terms of the modes of trapping mechanism including the potential for enhanced oil recovery.

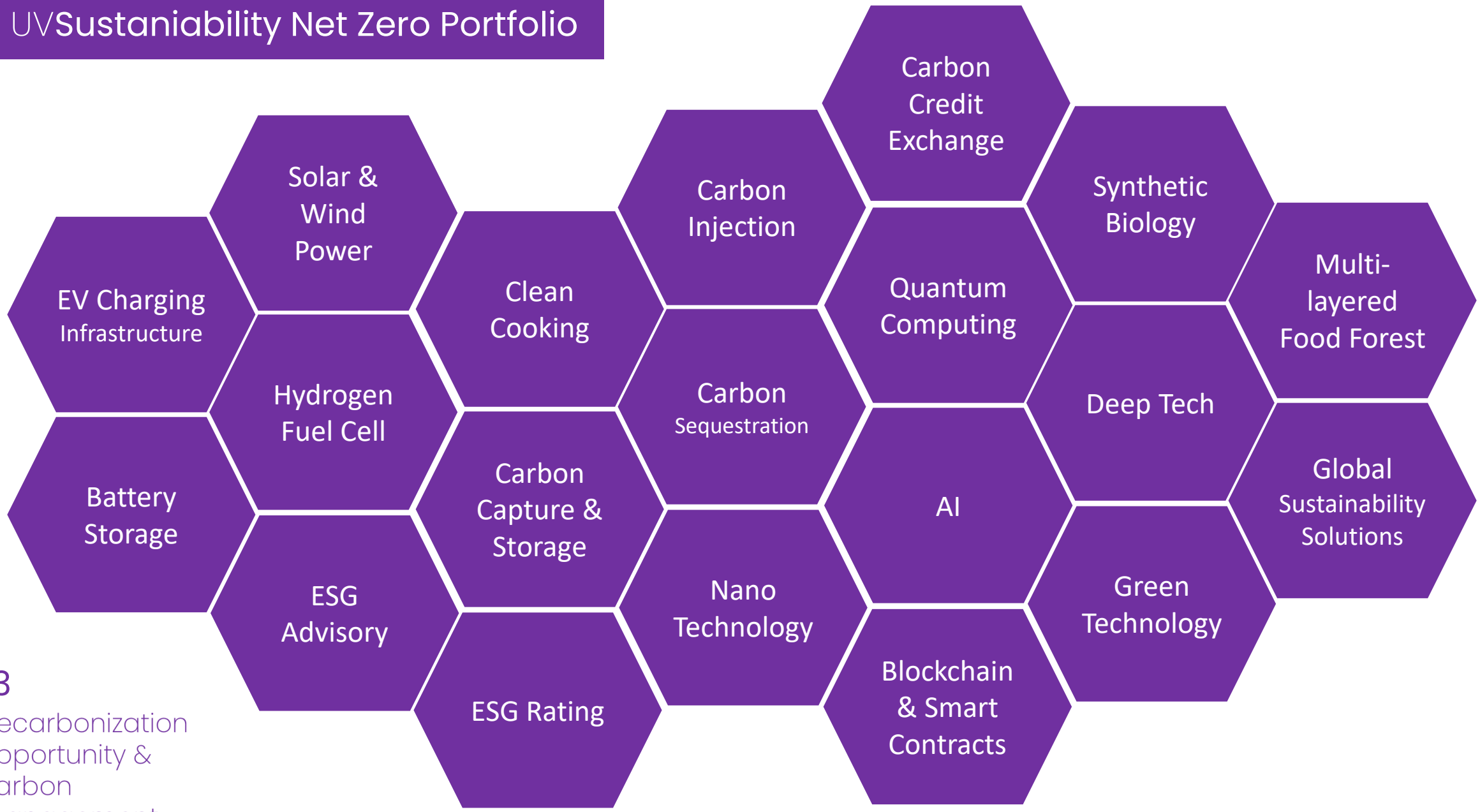
Coal: India has the fourth-largest coal reserves in the world. As of March 2020, India had 344 billion metric tons (379 billion short tons) of the resource. The known reserves of coal rose 5.37% over the previous year, with the discovery of an estimated 17.5 billion metric tons (19.3 billion short tons). The estimated total reserves of lignite coal as of March 2020 were 46 billion metric tons (51 billion short tons), an increase of 0.57% from the previous year. Coal itself absorbs CO2 which makes the three states an ideal ecosystem for CO2 capture and storage. The report will look at various aspects of the mines and provide an estimate of how much CO2 can be stored. The char and fly ash from in situ burning of coal can provide ideal sequestering material.

Subsurface CO2 Sequestration (Example Report)

+ The proposed report will look at the individual sedimentary basin in terms of the modes of trapping mechanism including the potential for enhanced oil recovery.

Crystalline Basement: To date, two pilot projects have successfully sequestered CO2 in basalts in the world: the Wallula basalt pilot study in Washington, and a project in Iceland, proving that CO2 can be sequestered in the crystalline basement rocks. Basin-scale screening criteria have not been defined as rigorously as they have for saline aquifers, but in general, there must be a significant volume of basalt at the proper pressure and temperature with sufficient porosity and long-range flow connectivity. India is blessed with extensive basement rocks, both onshore and offshore, at appropriate depths with appropriate fracture networks. This resource, which has been completely overlooked to date, will be discussed in the report.

UVSustaniability Net Zero Portfolio



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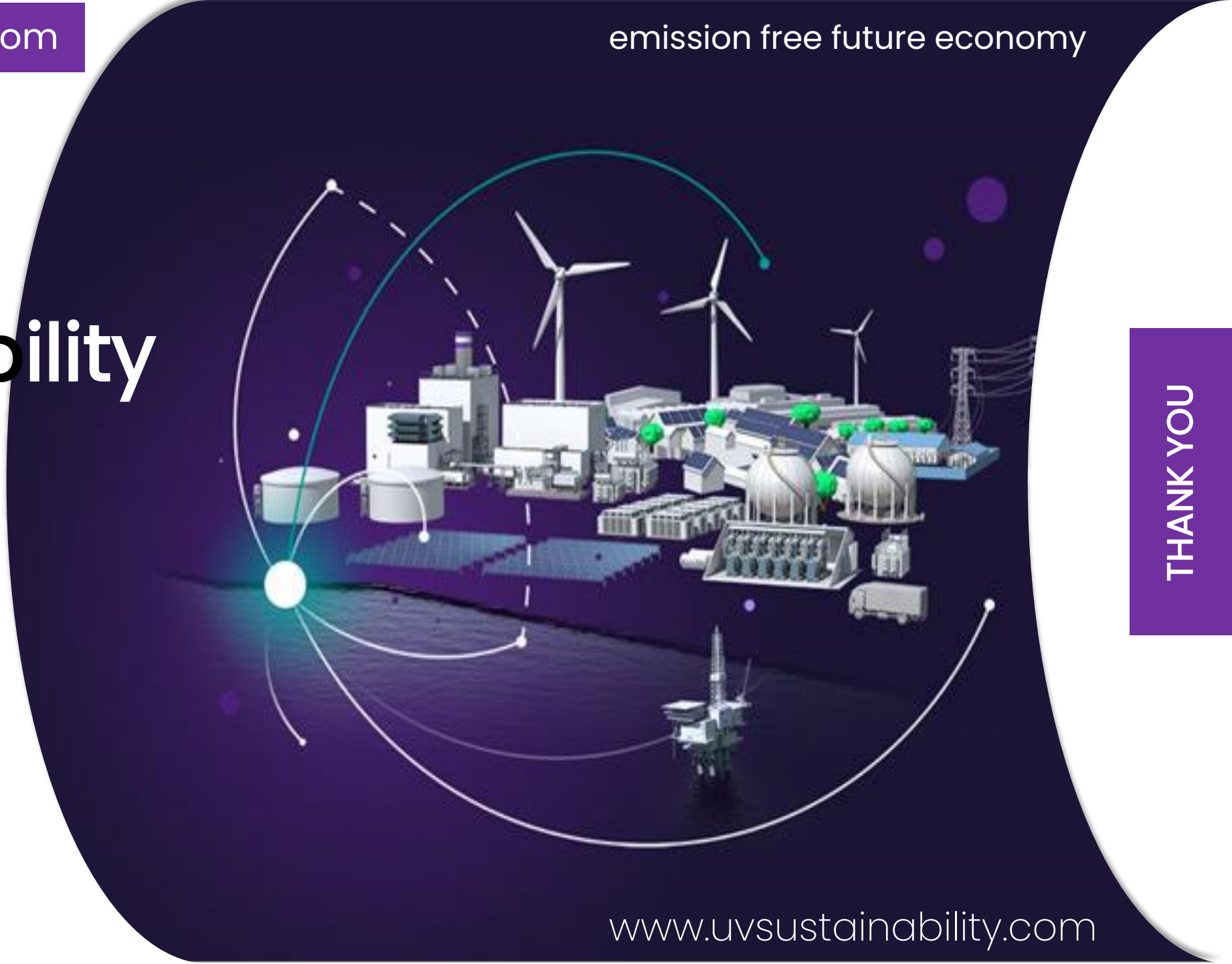

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