Small Scale LNG (SSLNG)

Why in news?

India's largest gas utility GAIL (India) Limited recently commissioned the country's first SSLNG unit at its Vijaipur complex in Madhya Pradesh.

What is small scale LNG?

- **Liquefied Natural Gas-** It is a natural gas cooled to about -161°C, reducing its volume by 600 times and making it half the weight of water, it is transported globally by ship and regasified at the destination for pipeline distribution.
- **Small scale**- It involves the liquefaction and transportation of natural gas on a smaller scale using specialized trucks and vessels, catering to areas *without pipeline connectivity*.
- **Utility**-It supplies LNG in liquid form to *industrial and commercial consumers*, with options for regasification or direct use as fuel.
- **Regasification**- LNG can be regasified using small vaporizers, allowing it to be supplied as compressed natural gas (CNG) for vehicles or piped gas for industrial and commercial consumers
- **Direct use**- If LNG is used in its liquid form, it's delivered directly to end users without the need for regasification.
- **Supply chain**-The SSLNG chain can originate from large-scale LNG terminals or small liquefaction plants near natural gas sources, like GAIL's Vijaipur unit.
- **GAIL's Vijaipur Complex**- A small liquefaction plant is established at a site with abundant natural gas, making it GAIL's largest gas processing location.

Vijaipur facility, SSLNG
• It is equipped with SSLNG skids that have a total capacity of 36 tonnes per day. • **Treatment skids**- The natural gas undergoes initial processing in the Zeolite Pre-treatment Skids (ZPTS) at about 15 bar pressure to *remove impurities* like nitrogen, water, sulphur, and CO2. • **Liquefaction skids-** The gas is then compressed to approximately 260 bar using a four-stage compressor and cooled down to -60 to -70 degrees Celsius via a *propane-based refrigeration system*. • It is then expanded, dropping the temperature below -140 degrees Celsius to liquefy it. • **Cryo boxes**-These are used for the actual conversion of natural gas to LNG. • **SCADA system**- An automated web-based Supervisory Control and Data Acquisition (SCADA) system controls the LNG unit. • **Distribution**- The produced LNG is distributed through cryogenic LNG tankers for use in city gas distribution networks and proposed LNG filling stations for vehicles.

Why there is a need of SSLNG?

- **Gas-Based Economy**-India aims to raise the natural gas share to 15% by 2030 from the current 6%.
- **Cleaner alternative**- The natural gas is considered less polluting to conventional hydrocarbons like oil and coal as they produce fewer emissions of GHG gases and air pollutants.
- **Energy security**- India can reduce its dependence on imported oil as it imports around 85% of oil by diversifying its energy sources and increasing the use of domestically available natural gas.
- **Economy benefits**- It could lead to significant foreign exchange savings by substituting diesel with domestically produced or imported LNG.
- **Transition fuel**- It can complement renewable energy sources such as solar, wind power by providing reliable and flexible energy supply.
- **Cost effective**- Using LNG as a fuel for heavy-duty trucks and buses can result in cost savings for transport operators and fleet owners, potentially lowering operational expenses.
- **Global competitiveness**- India can potentially lower energy costs for consumers and improve economic competitiveness by increasing the share of natural gas in its energy mix.
- **Distribution challenges**-Petronet, a public limited company has pushed for LNG, it supplied LNG to Kochi terminal which was struggling due to lack of pipeline connectivity to major consumers.

What are the issues with LNG?

- **Energy intensive**- LNG production and transportation require significant amounts of energy, contributing to its overall carbon footprint. From extraction to liquefaction, transportation, and regasification, each stage involves energy-intensive processes.
- **Methane leakage**- The complexity of LNG production and transportation increases the risk of methane (a potent GHG) leakages across the supply chain.
- **High emission intensity**- LNG emits approximately twice as much greenhouse gas as ordinary natural gas due to additional energy requirements and methane leakage risks.

Challenges	Solutions
There is limited availability of LNG-powered vehicles in India	Companies like Petronet and GAIL are working with commercial vehicle manufacturers to promote the development and adoption of LNG-powered trucks and buses.
The absence of a comprehensive LNG retail network is another challenge	The companies are establishing LNG dispensing stations along major highways to facilitate refuelling for LNG-powered vehicles.
LNG-powered vehicles may have higher initial costs compared to diesel vehicles.	The lower fuel costs and potential government incentives can help offset these initial expenses and make LNG vehicles more financially viable.

Absence of LNG vehicle financing ecosystem.	Collaborate between financial institutions, vehicle manufacturers, and government agencies to provide financing options and incentives for LNG vehicle purchases.

References

1. Indian Express- First SSLNG plant commissioned
2. Indian Express- What is Liquefied Natural Gas

