PolaireTech

Going Green with LNG

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In a world where the pandemic has made industries volatile and where conventional methods of generating energy are comfortable, will green energy (especially in the form of LNG) be a successful option?

Global warming has been a familiar term in industries for the past few years. Being one of, if not the largest, producers of greenhouse gases, chemical, petrochemical and energy generation industries are yet to fully come to terms with the impact of emissions on the environment.

However, changes are being made with the way we view emissions. Many countries globally are implementing stricter measures and regulations with tangible goals to reducing the production of greenhouse gases, Coal has been the biggest culprit in the story, with the added disadvantage that is is a non-renewable energy source.

Carbon neutral or “green” LNG refers to either the reduction in the production of greenhouse gases or the offset of greenhouse gas emissions. This concept can be applied to all stages in the LNG value chain: from upstream natural gas production to downstream utilisation.

Some ways in which greenhouse gases can be mitigated or reduced are:

- Using biogas as feedstock
- Apply renewable energy to liquefaction plants
- Utilising carbon capture and storage or carbon capture and use techniques

Therefore, it is important to note that green LNG does not necessarily imply that emissions are zero, but it implies a concerted effort being made to reduce or offset emissions and minimise its impact on the environment.

Greenhouse gas emissions must be taken more seriously if we are to create and maintain a sustainable environment. LNG can assist with this, while still providing us with the power that we need.

https://www.edf.org/climate/how-cap-and-trade-works

PolaireTech has developed modular small-scale plants using ZR-LNG technology developed by Gasconsult. The technology uses no external refrigerant, but rather utilises the methane feed gas as the refrigerant medium in an optimised system of compressors and expanders. Zero refrigerant leads to a lower power demand during the liquefaction process in the modules (as compared to, for example, nitrogen cycles), which in turn results in reduced CO_2 emissions. This makes the technology an attractive option for industries looking to reduce their carbon footprint.

The modules developed by PolaireTech can use various different types of gases as feedstock, from natural gas and biogas to flare gas and vent gas. Although all of these gas sources are cited as typically burning cleaner than coal, biogas is specifically mentioned as the feedstock gas of choice to minimise emissions. PolaireTech also offers various pre-treatment methods of feedstock gases as necessary (depending on their composition).

Biogas is typically produced from sewage treatment plants, solid waste dumps, animal waste, food waste, agricultural waste, and factory effluent. More broadly, it is any material that contains organic compounds. Methane is naturally produced from these sources if dumped untreated. Methane from anaerobic digestors used to purify sewage is often directly vented or, at best, flared.

PolaireTech's micro and small-scale LNG plants can economically convert biogas from these sources into LNG for commercial use. Through capturing methane being released into the atmosphere, a single 5 ktpa plant would reduce greenhouse gas emissions annually by 115 ktpa of equivalent CO_2 emissions.

In additional to this, converting diesel vehicles to use LNG instead would result in an additional 4 ktpa reduction in CO_2 emissions.

If one now also considers the fact that during the decomposition or digestion process, CO_2 is also produced in conjunction with the methane at roughly a 1:1 molar ratio, another 14.5 ktpa of CO_2 is released.

During the LNG feed gas clean-up process utilised by PolaireTech, clean CO_2 at a certain pressure is produced. This CO_2 can be utilised in the food or agricultural sectors. In this way, a single 5 ktpa plant can reduce greenhouse gas emissions by 130 ktpa.

Carbon taxation is now being applied not only to CO_2 emissions, but also to other greenhouse gases such as methane. If one assumes the European carbon tax rate of $25/t applies, then the tax reduction by eliminating 130 ktpa of greenhouse gas emissions comes to $3.25 million per annum. The sales revenue of LNG could be in the region of $2 million per annum not including the potential revenue for the CO_2 sales at a total revenue of $5 million. Therefore, a 5 ktpa plant could be paid back before tax in 2-3 years making for a very lucrative investment in addition to the reduction in greenhouse gas emissions, leading to a greener plant.

Green LNG will have a positive impact on the environment and also proves to be a financially attractive option, making it a market to look out for in the future.

Visit us at https://www.polairetech.com/ to find out more about our green LNG modules.

References

ESI Africa. (2021). *Carbon-neutral or green LNG: A pathway towards energy transition*. Available: https://www.esi-africa.com/industry-sectors/generation/carbon-neutral-or-green-lng-a-pathway-towards-energy-transition/