

# Technology Brief

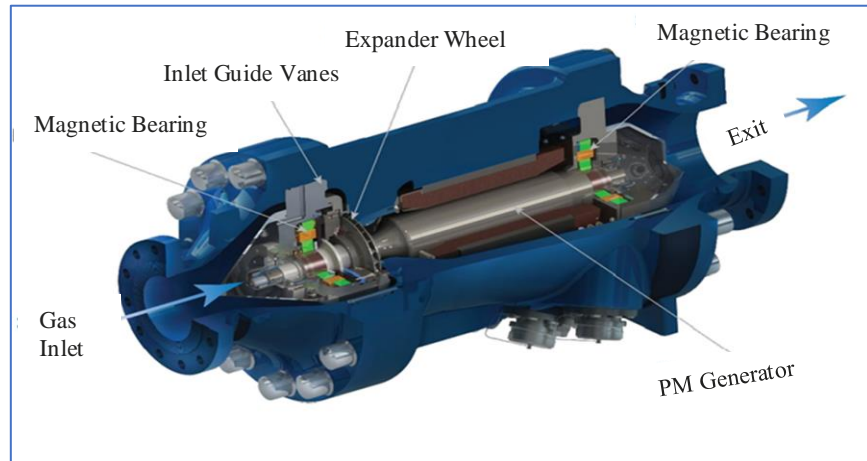
## FreeSpin™ In-line Turboexpander (FIT)

*Efficiently Captures Energy from Gas Pressure Letdown*

### DEVELOPPER

Sapphire Technologies is a US company with a headquarterd in Cerritos/California.

- Subsidiary of Calentix Technologies with Chevron & Equinor as shareholders
- Core business includes developing and manufacturing of energy recovery systems for natural gas and hydrogen applications.
- Successfully deployed the first FIT technology (300 Kw) in collaboration with Baker Hughes in 2019.
- Supplied two sets of FIT skids to Toho Gas / Japan in 2020



## Technology Overview



The heart of this disruptive technology is the uniquely designed Turboexpander which is directly coupled with a Permanent Magnet (PM) generator in the same housing. This unique arrangement allows efficiently capturing and monetizing the kinetic energy which otherwise wasted through pressure control valves on gas streams. This energy is exported to the grid as an electrical power via Variable Speed Drive (VSD). This simple and reliable arrangement is essential for harnessing energy optimization reducing the carbon footprint part of the ambitious journey to achieve the ultimate goal of Net Zero Emission (NZE).

## Benefits and Applications

- Mature, reliable and simple system.
- Optimizes energy consumption and result on lower CO2 footprint.
- Cost effective application with more 90% efficiency.
- Compact arrangement with relatively small footprint
- No impact on the main process
- It can be scaled up to fit the required rating.

## Potential Areas of Application

- Gas pressure letdown stations in sales gas distribution networks
- Pressure letdown applications in gas plants and refiners (to be evaluated case by case)
- Gas Wells check valves (*Under development*).

## Deployment Track Records

- A 300 Kw unit operating at a NG network in Italy since 2019.
- 300 & 125-Kw units installed for an LNG terminal in Japan since 2020



## System Schematic Diagram

