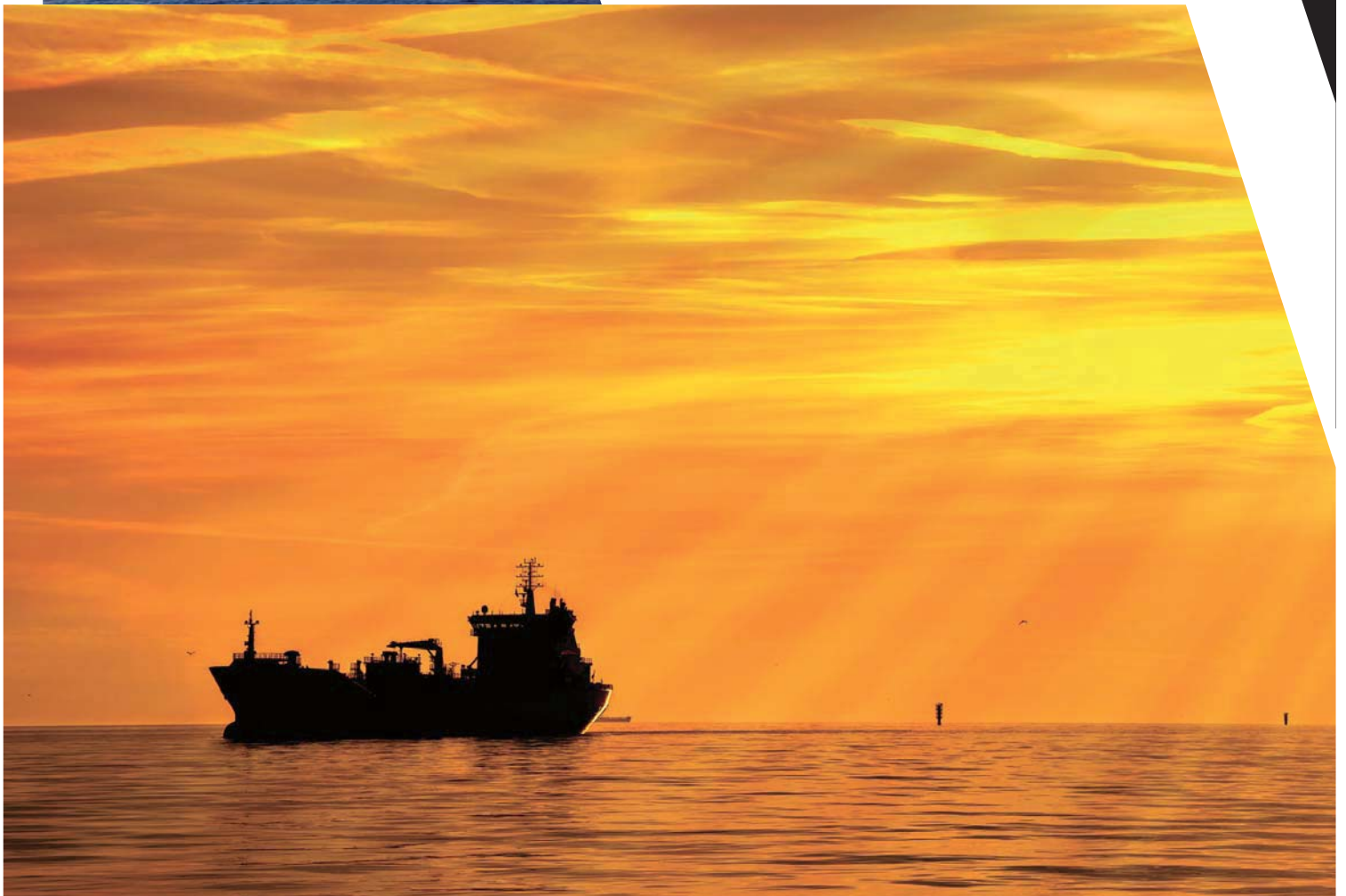




WHO ARE WE?

GENERON® is the world's leading supplier of non-cryogenic membrane systems to the maritime industry.

An industry leader in onboard nitrogen solutions, we have supplied ships with over 1,500 nitrogen generators, from cabinet solutions to large containerized systems, since 1987.





WHAT DO WE DO?

GENERON® specializes in designing, manufacturing, and servicing PSA and membrane systems for the marine, oil and gas, and industrial markets.

Our systems are designed to meet any third-party registration, with proven field reliability, covering a range of flow capacities, nitrogen purities, and footprint variances.

- ◆ System Capacity: 10 – 6,000 Nm³/hr
- ◆ System Purity: min 95% Inert Gas, max 99.9%
- ◆ Nitrogen Dew Point: -65°C up to -85°C
- ◆ Certification: All class societies
- ◆ Compression: First class marine approved screw compressors from 8 – 450 kW

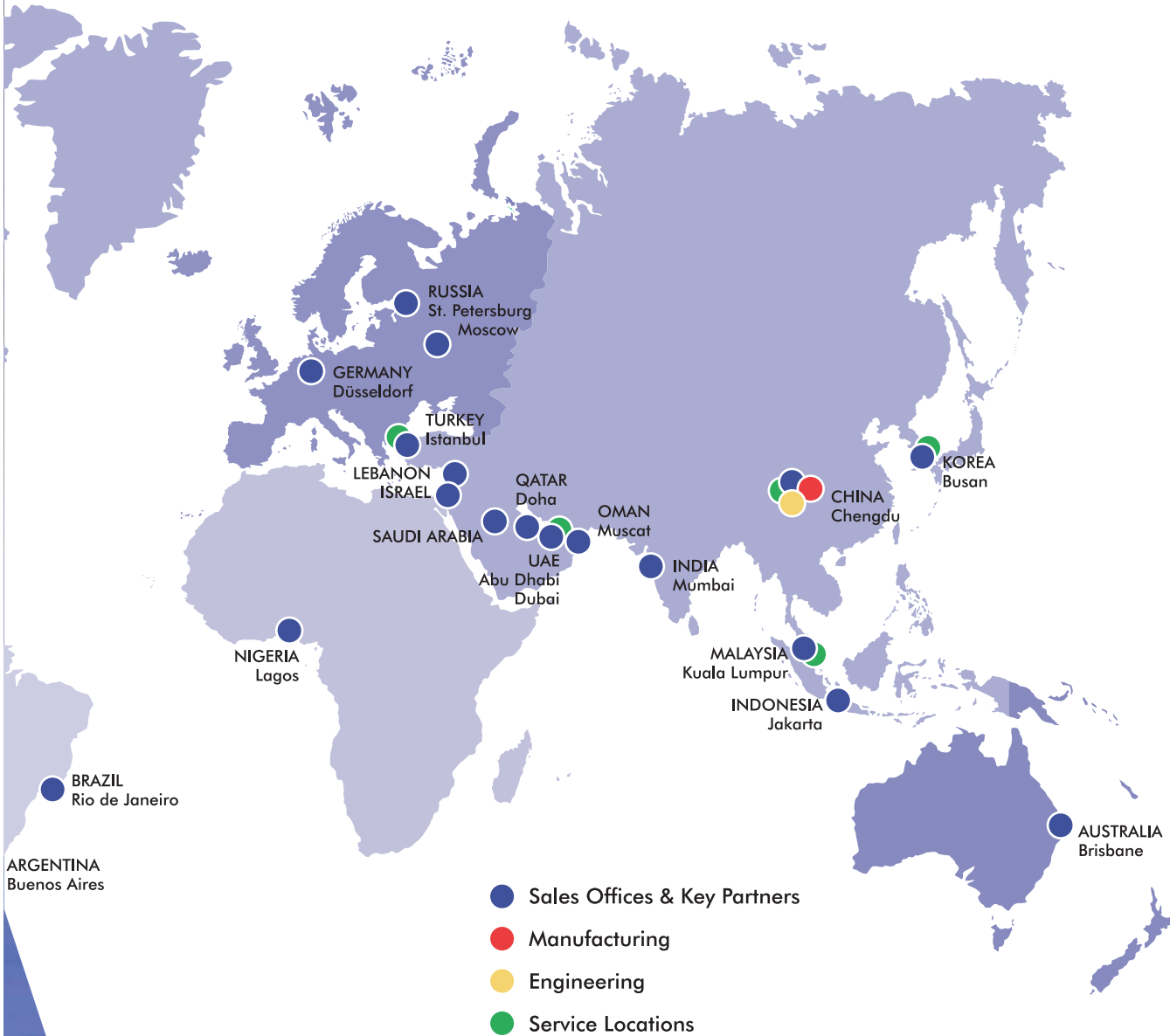
WHO DO WE SERVE?

Our nitrogen generators are utilized throughout the maritime industry, on chemical and gas tankers, offshore supply ships, and reefers. Typical maritime applications include:

- ◆ Cargo hold interting/oxidation control
- ◆ Transporting perishable goods
- ◆ LNG/LPG
 - ◆ Cargo hold and hull fumigation
- ◆ FPSO
 - ◆ Chemical tankers / barges
 - ◆ Gas buffer seals
- ◆ FLNG



WHERE DO WE SERVE?



WHY CHOOSE GENERON®?

THE CHALLENGE

The membrane module contains millions of fibers.

Compressed feed air is passed down the bores of the fibers at one end of the module with enriched nitrogen product gas exiting from the opposing end. Oxygen and water vapor are selectively removed and vented from the feed air as it flows to the other end of the module.

THE GENERON® SOLUTION

By combining the best available membrane materials with state-of-the-art fiber bundling and the optimum module fabrication methods, GENERON® provides the most cost-effective solution for onsite nitrogen production.

GENERON® system benefits include:

- ◆ All systems manufactured and tested at the Generon® facility in Houston, TX
- ◆ Systems designed to supply higher flows in a reduced footprint design
- ◆ Low operating pressures
- ◆ No hazardous storage
- ◆ Minimal installation
- ◆ Low operating costs
- ◆ Easy to maintain and operate
- ◆ Systems built to last with extended warranty options
- ◆ Systems fully tested and certified to all marine standards

Marine products built to IMO regulations and certified by nominated Class society

- ◆ ABS
- ◆ DNV-GL
- ◆ BV
- ◆ LR
- ◆ GOST
- ◆ RINA
- ◆ ATEX
- ◆ CE-PED

GENERON[®] PRODUCT UPDATES



GENERON[®] is committed to constantly evaluating our product offerings to ensure the best in class technology and design is available to our clients.

Based on feedback from major ship owners and the 2015 IMO regulations now in place, the GENERON[®] research and engineering group has implemented the following improvements to our nitrogen applications:

- ◆ Filtration line changed over to a 3-stage cartridge type design which reduces the service and system down time dramatically.
- ◆ New membrane case design allows the modules to be replaced on board without returning cases.
- ◆ Higher operating temperature allowance (70°C) for GENERON[®] modules as a result of steady increase of sea and fresh water cooling temperatures.
- ◆ 23% lower power consumption due to lower operating pressure and refined electrical heaters.
- ◆ GENERON[®] module performance evaluation and repair program.

CERTIFICATIONS:



GENERON® MARINE PRODUCT OFFERINGS

GENERON® has been a world leader in the design and fabrication of nitrogen generator systems for over 30 years. Our marine systems are designed with low operating pressures and low operating costs making them easy to maintain, easy to operate, and built to last.



All GENERON® marine systems are supplied as standard packages or individually designed to meet our client's requirements. Standard systems are designed for non-hazardous applications and for normal operating conditions. Products are built and tested to latest IMO regulations and certified by nominated Marine Class society.

NITROGEN MEMBRANE SYSTEMS

MARINE NITROGEN CABINETS

Our Marine Cabinet Series is designed and fabricated using the patented GENERON® Hollow Fiber Membranes. These highly engineered systems enable high flow rates in a small cabinet design.

Small Capacity Cabinets



- ◆ Capacity between 10 – 250 Nm³/hr
- ◆ Used on board small chemical tankers, methanol carriers, and offshore supply ships
- ◆ Capable of general interting using pressurized nitrogen cylinder racks
- ◆ Fully enclosed IP 54 cabinet
- ◆ Certified dew point of -70°C available for LNG applications

Large Capacity Cabinets



- ◆ Capacity up to 500 Nm³/hr
- ◆ Used on medium sized chemical tankers for direct cargo interting
- ◆ Fully enclosed IP 54 cabinet
- ◆ Certified dew point of -70°C available for LNG applications
- ◆ All cabinets are DNV type approved

Open Frame Skids



- ◆ Capacity between 500 - 6000 m³/h
- ◆ Low purities from 95% to 99.5%
- ◆ Integrated designs for minimal footprint
- ◆ Modular designs to optimize footprint and minimize maintenance

CONTAINERIZED PACKAGES FOR RETROFIT

In order to meet the new requirement set forth by the IMO, which mandates that nitrogen generators must be installed on all marine vessels carrying hazardous chemicals, GENERON® has developed the integrated marine retrofit system, a containerized system designed to be installed on the deck of a vessel with minimal retrofit to the vessel. The system is designed for use in hazardous area with the main power panel installed in a safe area of the vessel. Fully certified to third party inspection agencies and weatherproof for use on vessel deck.



- ◆ Retro-fit designs for existing ships
- ◆ Nitrogen purities up to 99.5%
- ◆ Certified dew point of -70°C available
- ◆ Space savings of over 55%
- ◆ Installation on deck in electrical classified areas
- ◆ Installation on lower decks in new-builds

NITROGEN PSA SYSTEMS

For higher purity applications typically seen on LPG carriers or product tankers with oxygen sensitive or highly flammable goods, GENERON® has developed a marine PSA line offered either in a classic twin tower or in a sequential arrangement.

- ◆ Designed for higher purity applications between 99-99.99%
- ◆ Available in twin tower or sequential arrangement
- ◆ High limitation of 2,400 mm



SEQUENTIAL PSA

- ◆ Input pressures up to 10.3 bar g
- ◆ Output pressures up to 8.3 bar g
- ◆ Flows up to 4,500 Nm³/hr
- ◆ Purities from 95% up to 99.99%



TWIN TOWER PSA

- ◆ Input pressures up to 10.3 bar g
- ◆ Output pressures up to 8.3 bar g
- ◆ Flows up to 6,000 Nm³/hr
- ◆ Purities from 95% up to 99.99%

GENERON



Contact GENERON® today for more details about Turnkey Systems and Custom-Engineered Solutions.

MANUFACTURING AND SALES

GENERON® manufacturing facilities are ISO 9001 certified. We manufacture to the following codes and standards:
ASME • PED • Baseefa • API • IEC • NEC • NFPA • RINA • ATEX • CENELEC • Class I Div II • Class I Div I • Zone 2 • DNV-GL • Lloyds Register • GOST • CSA • NK • Bureau Veritas • ABS • NEMA • IP

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