

Process and Flow Technologies

Wellstream Processing



Wellstream Processing

We offer a comprehensive selection of wellstream processing technologies, systems, and services to the upstream oil and gas industry. We deliver innovative technologies for the separation and treatment of oil, gas, solids, seawater, and produced water. We also provide top quality hydrate-inhibition technologies for low temperature offshore applications. Drawing on a deep understanding of fluids behavior and more than 40 years of experience, our team of engineers and project managers work to always ensure that we achieve excellence in service delivery and project execution.

We combine advanced technologies with a team of dedicated experts on every project, delivering tailored solutions that are customized to meet specific customer challenges and reservoir characteristics. With more than 3,000 projects completed, we have fabrication yards strategically located around key port areas to ensure both high quality manufacturing and timely delivery.



1978

Kværner Process Systems is founded



1979

Merpro is founded



1990

Kværner acquires Paladon



1994

Petrex is founded



2002

Kværner and Aker Merger



2011

NOV acquires Merpro



2012

NOV acquires Petrex



2013

Opus Maxim and Separation Specialists were acquired



2014

Aker Process Systems renamed Fjords Processing



2015

NOV acquires ProFab fabrication yard



2016

NOV acquires Fjords Processing



Complete processing solutions...

Wellstream Processing supplies equipment and solutions for all the activities NOV performs for separating and treating oil and gas as part of an upstream production facility. This includes handling all components following the flow from the wells, such as sand and water, and processing them to enable enhanced oil recovery, such as seawater treatment for injection in the reservoir. Wellstream Processing is also the industry's most experienced provider of processing solutions for the treatment of hydrate prevention technologies, such as MEG regeneration and reclamation.

Whatever your needs as a field developer or operator, Wellstream Processing is right there with you. We deliver a full range of solutions, including equipment packages, complete modules, and integrated topside facilities. Our activities cover onshore and offshore field developments alike, and we adapt to the local needs of field development and operation in various oil and gas regions across the world. We have a strong presence in key oil and gas field areas and can set up delivery models that fit any need. Our in-house fabrication capabilities put us in stronger control of deliveries than any other suppliers in our field.

In addition to be a leading supplier of processing systems, we also have developed unique offerings for fields in operation. We not only serve the installed base, but also perform optimization and troubleshooting for fields where our processing systems are in operation. A strong combination of in-house expertise, dedicated laboratories, combined with full field testing capabilities, has put us in this unique position. We have more than 40 years' experience as a leading processing solutions group with more than 3,000 projects delivered globally.

...for an entire industry

Wellstream Processing operates as a group within NOV's Process and Flow Technologies (PFT) business unit. In addition to Wellstream Processing, PFT has a portfolio of pumps, chokes, valves, and mixers for both oil and gas and industrial applications. In NOV, PFT is a part of the Completion & Production Solutions segment. There, we serve well intervention service providers and oil and gas producers and pursue opportunities around hydraulic fracture stimulation, wellbore intervention equipment, composite tubulars, pumps, floating production systems, and subsea production technologies. Supported by the resources of the segment, PFT delivers complete solutions for oil and gas fields. Thus, we are the perfect partner to field developers and operators in onshore and offshore applications as both a product supplier and integrated systems solutions provider.

Process

With over 20 facility locations strategically spread across the globe, we're able to serve our customers in any location. From the Gulf of Mexico to the North Sea to Indonesia, we have fabrication facilities with large waterfront locations for easy loadout. Our teams of experienced engineers, project managers, fabricators and service specialists design, fabricate, deliver and service high quality engineered-to-order solutions from a single supplier the first time, on time, every time.





Oil Treatment Wellstream Processing

Our expertise with applied technologies makes us uniquely qualified to deliver turnkey oil treatment systems.

As both technology specialists and equipment providers, we can supply key components, process packages, or complete modules. Our expertise in oil treatment enables appropriate technology selection as well as cost-efficiency for our customers. We know exactly what our proprietary technologies can achieve and are consistently looking for new improvements.

We have an extensive product portfolio to supply both retrofit and new-build projects. Our service technicians are certified to assess and install internals on new and existing vessels. Lessons learned are incorporated in our design practices to ensure that new project deliveries benefit from past field experience.

Our experience spans from onshore to offshore, fixed platforms to FPSOs, heavy oil to condensate treatment, low to high pressure, horizontal separators to gas scrubbers, electrostatic to mechanical oil treaters, design of flare knockout drums to compact separators, and more. We deliver state-of-the-art technologies and systems for degassing, bulk water removal, dehydration, and desalting of oil that meet the required specifications for transportation and refining.

Technologies

- Separators with internals
- Separators and knockout vessels with advanced internals
- Scrubbers with internals
- Slug catchers
- Compact gas/liquid wellhead separators
- Vertical flow electrostatic dehydrator
- Horizontal flow electrostatic dehydrator
- Electrostatic desalter systems
- Compact Electrostatic Coalescer (CEC™)
- Heavy oil treatment products



Hydrate Inhibition Technologies Wellstream Processing

We have an extensive track record of hydrate inhibition installations across the globe.

Our team of technology and chemistry experts design robust solutions for removal and handling of salts and other impurities from the most challenging fields. We provide critically important feasibility studies, concept definitions, and front-end engineering design (FEED) that enable our customers to make sound decisions based on relevant cost and time considerations. Our testing facilities in Orkney, UK allow for additional technology performance prediction.

With extensive knowledge of the impact of production chemicals, we can advise on handling and clean-up with our MEG reclamation system. Our vast in-house technology portfolio allows us to bundle the MEG system with upstream hydrocarbon removal and downstream produced water treatment, offering a seamless route to meeting requirements while reducing weight, footprint, utilities, and cost.

Technologies

- **Conventional Monoethylene Glycol (MEG):** MEG Reconcentration
- **Full stream MEG:** Reconcentration & Reclamation: treating entire rich MEG feed producing salt free Lean MEG
- **Slip stream MEG:** Pre-Treatment, Reconcentration & Reclamation: producing a lean MEG with tolerable levels of salts
- **Advanced MEG:** combining full and slip stream with advanced impurity treatments
- In-house expertise in MEG & scale chemistry



Gas Treatment Wellstream Processing

Our technologies enable correctly specified gas for onward transport by pipeline reinjection or as LNG or FLNG.

We deliver consultancy, design, testing, qualification and start-up. Our Computational Fluid Dynamics (CFD) point up ways to achieve peak processing performance. We provide critically important feasibility studies, concept definition and front end engineering design (FEED) – this saves costs and time.

Our unsurpassed portfolio of high-end technologies, both standardized and custom-made, then allows specialized equipment selection, for Gas dehydration, hydrocarbon dew point (and combined water dewpoint), gas sweetening, process utilities equipment.

Technologies

- Highly-efficient compact scrubbers
- Fuel Gas Treatment
- Gas Sweetening (Amine)
- Gas Conditioning
- Gas Dehydration (MEG, DEG, TEG, Molecular Sieve)
- Compact TEG (Super Purifier)
- Hydrocarbon Dewpointing (JT, External Refrigeration, Turboexpander)

A large-scale offshore oil rig is being assembled in a harbor. A massive yellow crane is lifting a multi-story green metal structure into place. In the background, several other rigs and support vessels are visible in the water, with a city skyline on the distant shore under a clear sky.

Water Treatment Wellstream Processing

We provide complete seawater and produced water treatment solutions, and an extensive portfolio of technologies.

We design and supply full turnkey processing systems for onshore and offshore applications. Our services also include consultancy, testing and qualification for projects of all sizes and complexity. We are also one of the only providers of combined systems for treatment of water in MEG regeneration applications.

Our field-proven systems are custom-designed to maximize the performance value for our clients in diverse operational conditions and installation spaces. All technologies can be retrofitted into existing vessels and tanks, or supplied as new build packages. We support projects throughout the entire lifecycle from conceptual technology selection to commissioning and aftermarket service.

Produced Water Technologies

- Compact cyclonic systems (CySep™)
- Flotation technologies (traditional, compact, hydraulic, mechanical or vertical-induced)
- Filtration and polishing (Mare's Tail™ coalescer or nutshell filters)
- Complete sand handling systems (Tore OVD™, Tore Trap™, and Tore Scrub™)
- Gravity Separators, and skimmers

Seawater Technologies

- Coarse filtration
- Cartridge filtration, media filtration or ultrafiltration
- Sulphate removal using nanofiltration
- Deoxygenation using vacuum/gas stripping or membranes
- Desalination and demineralization
- Water injection pumping systems



Solids Handling Wellstream Processing

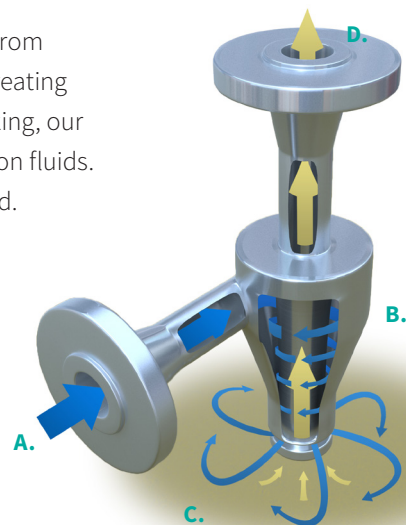
Don't let sand and waste solids get in the way of your production.

Our field-proven technologies will integrate seamlessly, taking unwanted solids from production to disposal. Whether it is upstream removal to protect equipment, creating tolerance in the production process or protecting your reservoir from pore blocking, our sand-handling technologies will efficiently remove the solids from your production fluids. We don't just supply the equipment, we ensure that you get the process you need.

Our Tore™ fluidization device and proprietary separation cyclones are just some of the technologies that guarantee reliable operation. All of our products are backed by an expert engineering team, lean manufacturing and fabrication facilities, as well as our comprehensive service and aftermarket technicians. We have delivered sand handling equipment to hundreds of projects over the years and have more than 5,000 Tore™ devices in operation, worldwide.

Technologies

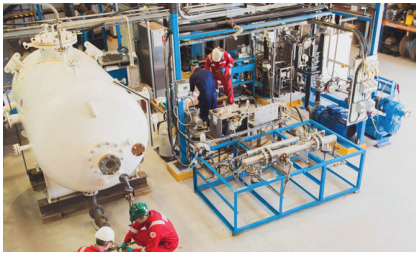
- Wellhead Desanding
- Online Vessel Desanding
- Produced Water Desanding
- Sand Cleaning
- Multiphase Desanding
- Solids/Slurry Transportation
- Erosive Service Choke Valves



Tore fluidizer cutaway

- A. Motive fluids inlet
- B. Swirl chamber induces spin
- C. Solids fluidized in vortex, transported via discharge pipe
- D. Slurry discharge

Solutions for Oil & Gas Fields Operations



NOV uses its experience as a leading process systems provider to serve operational fields. Available services include a variety of offerings, all aimed at enabling improved operational performance and utilization of oil and gas infrastructure. The Field Operations Solutions offerings are based on NOV's extensive processing technology expertise within the areas of oil, gas, water, and sand treatment, as well as specialized technologies such as hydrate inhibition and monoethylene glycol (MEG) reclamation and seawater membrane filtration technologies.

Typical NOV Field Operations Solutions offerings in this field include:

Aftermarket services – serve customer post-delivery with our equipment and systems, including installation supervision, commissioning and start-up support, spare parts supply, preventative maintenance, and operational support and supervision. Aftermarket services are normally provided for NOV-installed base, but we can also provide similar services for processes supplied by others.

Healthcare agreement - support through an agreement with NOV allows us to optimize performance, share knowledge, and maintain reliability of the systems. The agreement typically includes operational support, performance review, extended process warranty, training, spare parts management, and regular scheduled follow-up activities at site. A dedicated NOV support team is on call with in-depth knowledge of unit design and operation. This allows for seamless solutions to be provided for process optimization and revamps and extended guarantees of the units if required.

Field optimization services – NOV has specialist teams and equipment that are used to perform evaluations of processes in operations for debottlenecking operational issues as well as recommending adjustments to processes to enable operational optimization.

Brownfield upgrade and modification deliveries – we have extensive experience supplying equipment and systems upgrades to existing fields to enhance performance or enable changes in production profiles, e.g. by enabling tie-ins of new wells. Unique NOV competence across the processing product lines makes NOV the ideal partner to identify the right solution to get the most out of existing infrastructure. Such brownfield projects can vary in size, from changing components in the process to supplying new packages and modules to the field.

Early production facilities (EPF) – as a complete process systems technology provider, NOV has the expertise to supply and support the operation of complete early production facilities to enable fast production and financial returns while full field facility is planned and developed. Together with partners, we can take full responsibility of both development and operation of such facilities, both for onshore and offshore applications.



Redeployment – we see great opportunities in using existing infrastructure to enable new production and we work together with asset owners to upgrade such facilities to the requirements for new field developments. FPSO redeployment is one example of such activities.

Process packages rental – we can provide most of our wellstream processing technologies as rental options, both through a fleet of common rental-type equipment and packages as well as by alternative delivery model of specialized systems. Our rental units are supplied with full expert support to operate the units during the rental period, ensuring performance goals are met. Feedback from this operation also qualifies us to provide customers with a permanent solution to match their future operations.

Solutions for Oil & Gas Fields Operations



Fabrication – we have extensive in-house fabrication capabilities and are global specialists in providing processing equipment, packages, and modules. Our efficient execution setup allows us to streamline projects prior to fabrication. This differentiates us from our competition as fast track in-house managed delivery projects can be established, meeting the short delivery times required for brownfield and redeployment projects. With our fabrication expertise, we also provide mechanical services to support operators with modifications work at the field location.

Process training - NOV has established technical and operational training programs to ensure field operations meet the highest performance and safety standards. The programs can be provided in a class-room or remote environment by our expert trainers to enable direct exchange of know-how and field experience to engineers, operators, and maintenance personnel. A comprehensive library of standard, approved training programs has been developed over many years encompassing lessons learned and operational experience. Specialized training programs can also be designed for customers based on their specific needs and knowledge levels.

Process laboratory and field testing – technology evaluation and qualification are key for operators and process technology providers. We perform testing work in our unique process test facility in the UK, as well as performing testing in real conditions at the field. Such test and qualification work is performed both for NOV proprietary equipment, and is offered as a service to operators and also for third-party equipment.

Fluid characterization and chemistry support – our deep understanding of fluid chemistry and behavior through simulations and physical modeling, combined with chemistry expertise, allows us to identify and resolve production issues. In addition, we can help production chemists determine the correct dosing of chemicals to avoid scaling and secure plant availability.

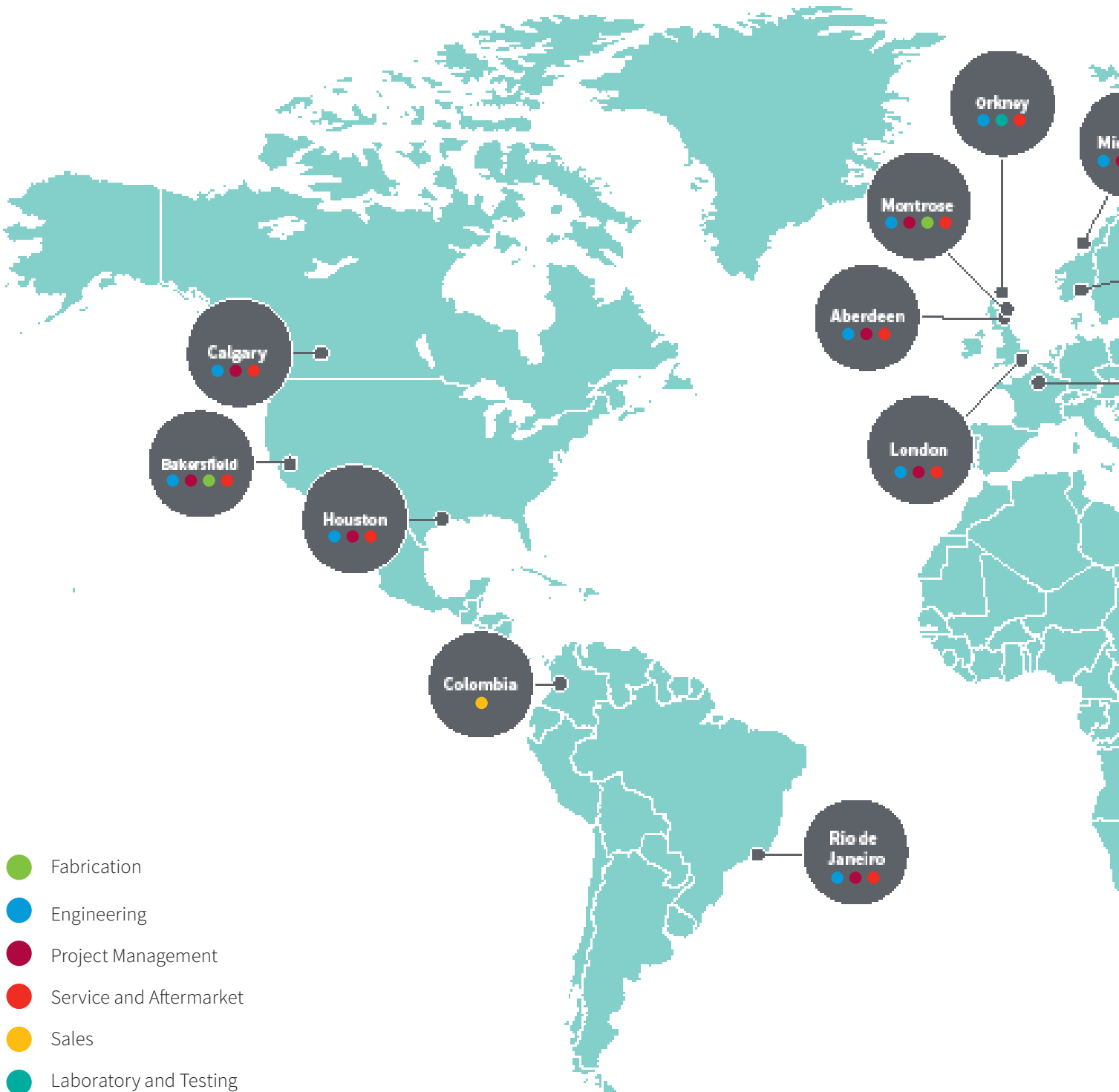
Environmental laboratory – determining environmental risk and understanding the regulatory implications of product registration and waste water discharge can be a costly challenge. Our environmental services help overcome these challenges through risk assessment of discharges, environmental modeling, ecotoxicology testing for chemical registration, and diverse consulting services related to environmental compliance. These services are offered out of our extensive environmental laboratories in the UK.

Digitalization – the rise of Big Data is dramatically changing oilfield development and production. In recognition of this shift we have developed a flexible range of GoConnect™ digital service packages. Our packages include a range of services from remote monitoring and identification of required instrumentation - to automation and autonomous operation of process units. NOV's data management platform, Max™, enables the large-scale collection, aggregation, and analytics of real-time equipment data to optimize process performance while decreasing maintenance costs across many products and systems through a proactive maintenance framework that minimize unplanned downtime. Our digital service offerings deliver more operational clarity and visibility than previously possible, which together with automated solutions can reduce the number of offshore personnel required for operations.



Our Locations

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