Gas Monetization

Expertise across the entire gas value chain
Amec Foster Wheeler

Gas Monetization

Founded 1848

165 Years History

40,000 exceptionally talented people worldwide

Project highlights

1. Philippines  16. Spain
2. Thailand  17. Canada
3. UK  18. India
4. Saudi Arabia  19. Italy
5. UAE  20. Russia
7. Uruguay  22. East Timor/Australia JPDA
8. Algeria  23. USA
9. Australia  24. Brazil
10. Oman
11. Egypt
12. Norway
13. Nigeria
14. Malaysia
15. Singapore
We have played a **key role** in many of the world’s **largest** gas field and gas processing developments.
Total gas monetization solutions

Our wide experience means that we can deliver a total gas monetization solution, integrating individual gas processing elements into a cost-effective whole.
Turning vision into reality

Whether you are trying to navigate the huge and complex range of possible solutions to monetize your gas asset, such as pipelines, LNG, gas-to-liquids or gas-to-chemicals, or whether you need assistance in turning your vision into reality, we can deliver whatever you need from concept selection right through to Front End Engineering Design (FEED), Engineer, Procure, Construct (EPC), completion, commissioning and start-up and ongoing asset support.

Reduction of risk

Gas monetization projects do not come without challenges: technical, financial, environmental, safety, political, public relations, procurement and construction. Our expertise, combined with our innovative and flexible approach to both design and execution, ensures the risks and challenges are identified, understood and mitigated.

Getting the right project

We have a reputation for delivering high quality conceptual designs, feasibility studies and front-end designs which lay the foundations for a successful project. But because we are also a renowned, experienced EPC and project management contractor our solutions are practical, constructable and based on real costs, real experience and local knowledge.

Safety & Environment

We’re very proud of our world-class safety record and our many safety awards. But our safety approach is not just about working safely in the office or on site, we also focus very strongly on building all aspects of safety and environmental performance into our concepts and designs, so that our facilities are safe to build and safe to operate.

Technology

We think that our objectivity adds value for our clients. We don’t offer our own gas technology. What we do offer is in-depth knowledge and experience of all of the key gas processing technologies, so that we can work with you to select the right technologies and configurations to meet your objectives.

ConocoPhillips Bayu Undan
Timor Sea

Over 12 years of operations and maintenance providing operational support to a production and processing platform, a compression, utilities and quarter’s platform, a wellhead platform and an FPSO, plus training and capability development services.

Getting the project right

And, because we are a global EPC contractor, whatever we design, we can build too, to a high standard of safety, quality and performance.

Integration

Another of our core skills is the integration of the different process, energy, offsites and utility systems that make up a gas facility. This delivers facilities that are more efficient and have a greener footprint. We offer innovative solutions for carbon capture and storage from gas processing, LNG and GTL facilities.
Reducing risk
Safety & Environment
Technology
Getting the right project
Getting the project right
Integration
Field development, gas processing & pipelines

We have played a key role in some of the world’s largest gas field and gas processing developments. Our field development experience includes projects in challenging locations, environments with little or no infrastructure, urban and industrial areas, military areas, environmentally sensitive wetlands, areas subject to periodic flooding, deserts, coastal marshes and offshore. Many of our gas field developments include a significant pipeline element.

We have also engineered one of the world’s longest high-pressure sour gas pipelines, and one of the longest sub-sea multiphase pipelines, both in the Middle East.
PTT Gas Separation Plant
Thailand
Feasibility study, FEED, EPC selection and project management for PTT. The plant processes 530 million scfd gas from the Gulf of Thailand, and includes sales gas, ethane, LPG products, and CO₂ removal.

Curtis Liquefied Natural Gas (QCLNG) Development
Queensland, Australia
Three-year contract for proprietary commissioning technology and consultancy expertise on key coal seam gas storage development, provided by our specialist qedi commissioning and completions company.

Shell Goldeneye Onshore Gas Plant
UK
EPC for a new onshore gas processing facility at Shell’s St Fergus gas plant. A modular construction approach was adopted as the new plant was being built in a live operating facility. First gas was achieved safely and on time. The team achieved a world-class HSE performance, recognised with an award for safety by the UK’s National Joint Council for the Engineering Construction Industry.

Qatih Gas Oil Separation Plant
Saudi Arabia
Overall FEED, detailed engineering for some facilities, essential procurement and construction management and overall project management responsibility for a new gas oil separation plant to process 800,000 bpd crude, and upgrading existing facilities at Berri to process 370 million scfd associated sour gas, with sulphur removal trains and 140 MW power generation.

Aramco Overseas Company Haradh Gas Program
Saudi Arabia
FEED and project management consultant (PMC) for a new gas plant, upstream gas gathering manifold and transmission line system, downstream gas and condensate line network, and new high voltage power supply. Overall project was completed six months early, 25% below budget with $140m client revenue gain due to early completion.

ADMA-OPCO Offshore Khuff Gas Development
Abu Dhabi
PMC for two major offshore complexes including the installation of a new gas gathering network, two new gas processing platforms and modifications to existing offshore facilities. Scope included new jackets, topsides, bridges, replacement of power generation facilities and pipelines for two new offshore complexes.

Sasol Temane Field Development
Mozambique
FEED and EPC for the first major upstream development in Mozambique, comprising 14 wellsites, 50 km of infield flowlines, 90 km of infield roads for rig and maintenance access and a gas processing facility. Later awarded the EPCM contract for the low pressure compression project to maintain design throughput and pressure as the gas field declines.

GASCO OGD-III & AGD-II
Abu Dhabi
PMC for the FEED phase of a development including a gas gathering and injection pipeline and manifold system, two new gas trains, expansion of the NGL fractionation plant, and additional condensate storage and handling at the refinery. In addition, PMC for the EPC phase of OGD-III, the Ruways NGL third train, and the Habshan Gas Complex expansion.

Arrow Energy’s Bowen Gas Project
Queensland, Australia
FEED to support the next phase of Arrow’s work to develop and commercialise its significant Bowen Basin gas reserves. Arrow’s Bowen Gas Project involves a major, staged expansion of Arrow’s existing domestic coal seam gas production to supply gas to the domestic market and for the production and export of LNG.

In Salah Gas Southern Fields Development
Algeria
In Salah Gas is the largest dry gas joint-venture development in Algeria, involving the development of seven proven gas fields in the southern Sahara. We updated the basis of design, developing the technical data, specifications and requisitions and providing a detailed cost estimate in order to define the EPC scope of work.

Shell Malampaya Deepwater Gas-to-Power
Philippines
Played a key role on this project, delivering EPC, commissioning, maintenance, training and initial operations for the two-train onshore gas processing plant, built in an earthquake zone. Awarded Shell Managing Director’s Outstanding Contractors’ Award for our performance in delivering the gas plant ahead of an extremely aggressive schedule with no lost-time incidents. Start-up was categorised as ‘world-class’.

Then awarded a long-term contract to operational support to the production platform, gas plant and 500km pipelines, plus living quarters, offices and warehouses at the Batangas supply base. Our role included management of maintenance, shutdown and turnarounds, project engineering, supervision, personnel and services for plant modifications, procurement, logistics, transport and facilities management. We have also been involved in the debottlenecking of the Malampaya facilities.
We deliver projects, from concept to commissioning and beyond.

For any development, we start adding value from day one, helping our customers to evaluate the opportunity, screen options, select the right option, and then realise the revenue as quickly as possible.

We deliver value at the front end, then can bring our global EPC skills and experience to bear, developing the right execution strategy, and then delivering on time, safely, cost effectively, and right first time. Right through the life of your asset we can provide the right support, from turnarounds and brownfield projects through to long-term asset support, performance improvements, through to late life planning and decommissioning.

Consultancy services

- Environmental
- Marine and coastal
- Geotechnical
- Permitting and regulatory
- Community and social affairs
- Water and wastewater
- Transportation
- Site selection
- Training and Development

Project delivery

- Feasibility studies, concept and pre-FEED
- Cost and schedule planning and control
- Technology selection and integration
- FEED
- Engineering and procurement
- Fabrication and construction
- Project management
- Start-up and commissioning
Amec Foster Wheeler is one of the world's leading providers of design, engineering and construction for the onshore and offshore oil & gas industry.

We have global capability and long-term experience covering all types of gas monetization projects across the whole value chain including: onshore and offshore gas gathering and production systems; LNG liquefaction plants and regasification terminals, gas-to-liquids (GTL), gas-to-chemicals and gasification projects.

Our capability starts from the earliest stages of feasibility studies and extends through design and engineering to construction, commissioning, completion and start-up, and asset support during operations. This full range of services and capability enables us to provide significant added value to clients as our expertise extends from cutting-edge technical knowledge to ‘real world’ experience from actual project construction sites.

We add value at every stage.
We have a proven track record in designing and building LNG liquefaction facilities, which are large, complex process plants, often in challenging locations. With our technical expertise, international EPC experience and our ability to manage these large, multi-billion-dollar projects, we are a key player in LNG liquefaction, especially in modular design and construction.
North West Shelf Train 5
Western Australia
We led the JV executing the EPCM contract for the addition of a fifth LNG liquefaction train of 4.4 mtpa capacity at the Woodside-operated LNG complex. Our in-depth modular design and construction experience was applied on this ground-breaking project, the first onshore liquefaction plant in the world to be designed and built in modules. In all, there were 75 separate modular structures, the largest weighing a colossal 1,800 tonnes and containing the majority of the liquefaction piping.

“Train 5 has been safely and successfully completed on time and at a highly competitive cost in an environment of extremely constrained resources. This remarkable achievement is testament to the focus and commitment of the project team in delivering this additional production infrastructure.”

Eve Howell
Executive VP North West Shelf
Woodside Energy Ltd

Qalhat LNG
Oman
Executed EPC with our JV partner for 3.3 mtpa third train, ready for start-up ahead of schedule, with a world-class HSE performance of nearly 20 million manhours without a lost-time injury at the construction and operational sites. Highest level of Omanisation (37.4%) in the Omani construction industry. The JV team previously demonstrated a world-class EPC performance in completing the two-train Oman LNG facility on a world-beating schedule and under budget.

Browse LNG
Australia
Woodside engaged us to undertake a concept study for an LNG development to process gas from the Browse gas field, off the coast of Western Australia. We worked on development options for the LNG facility.

Pluto LNG
Australia
We led the JV selected by Woodside to undertake the FEED and EPCM phases for this 4.3 mtpa LNG facility. This was built in modular form, with around 250 modules and pre-assemblies fabricated in Thailand.

INPEX Ichthys
Western Australia
Training and development services for QCLNG, the first in the world to turn coal seam gas into LNG. It is also one of Australia’s largest capital infrastructure projects.

Cameron LNG
US
Owner’s engineer for Cameron LNG’s new LNG liquefaction facility located in Hackberry, Louisiana, planned to export up to 12 mtpa of LNG.

INPEX Ichthys
Western Australia
Pre-FEED and FEED for topsides, semi-submersible hull and mooring system, Floating Production Storage and Offloading Facility (FPSO) topsides, hull and mooring system, infield flowlines, transfer lines between the central processing facility and the FPSO, associated flexible risers and umbilicals.

LNG Canada FEED
British Columbia, Canada
The CFSW joint venture, which includes Amec Foster Wheeler and our partners, Chiyoda, Saipem and Worley Parsons, is providing FEED and project execution services for a proposed LNG export project. When built, the LNG Canada facility will be one of the most significant contributors to the local and regional economies, as it will process more LNG than any other LNG facility being proposed for B.C.’s north.

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Weedon
UK
Owner’s engineer for Weedon’s new LNG liquefaction facility located in Hackberry, Louisiana, planned to export up to 12 mtpa of LNG.

INPEX Ichthys
Western Australia
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Image: Courtesy of Woodside Energy Ltd
LNG debottlenecking

One of the first options to consider for increasing LNG production capacity is to debottleneck an existing plant. Debottlenecking often presents an economically attractive solution as most of the infrastructure to support plant operation is already in place, compared with a greenfield site.

Increased production can be achieved by modifying or replacing existing equipment, adding new equipment and modifying operating conditions. The optimum solution is normally a balance between increased capital spending and returns from increased production.

PETRONAS MLNG Dua Debottlenecking Malaysia

FEED and EPC contractor on a debottlenecking project to increase LNG production by 1.2 mtpa. A new extended end flash unit was added to each of the three Dua trains, the existing gas turbines upgraded and two new Frame 5 gas turbine generators installed. We have a long track record with Malaysia’s LNG facilities, having project managed both the Dua and Tiga developments, two-and three-train expansions at the existing LNG facility.

Our LNG specialists can help you develop the optimum solution for your facility.
LNG receiving terminals

We have worked with a wide range of clients to provide expert services for new terminals, both onshore and offshore, and for expansions, including technical development and design, cost estimating, permitting and project execution.

SLNG Singapore

PMC for the S$1.7 billion Singapore LNG Terminal, a key infrastructure development in Singapore’s energy diversification strategy. The first phase of development, comprising two 180,000 m$^3$ LNG tanks, a jetty and regasification facilities was completed safely, on schedule and within budget. Later awarded a PMC contract for the expansion of the terminal to take throughput capacity from six to nine million tonnes per annum.

Enagás Spain

We have enjoyed a significant level of repeat business with Enagás, carrying out three LNG terminal expansions in Barcelona, performing basic design and EPCm, or EP, and civils work. In Cartagena, we have worked with Enagás for more than ten years, undertaking four expansions, and at Palos de la Frontera, we have completed two expansions.

Canaport™ LNG Canada

PMC for an LNG regasification terminal with a send-out capacity of one billion cubic feet of natural gas per day. Also technical advisory services during the detailed EPC commissioning and start-up phases for Canada’s first LNG receiving terminal.

Petronet LNG India

PMC for this new 5 mtpa receiving terminal at Dahej, comprising two 140,000m$^3$ above-ground cryogenic containment tanks with associated process facilities for the storage and handling of LNG.

ANCAP Uruguay

Owner’s engineer for a new LNG receiving terminal, the GNL DEL PLATA facility, to be built near Montevideo, in Uruguay. Our role included technical assistance through the initial phases of the development of the project, conceptual design of the terminal, and development of the invitation to bid for the role of owner and operator of the terminal.
GTL processes offer attractive alternatives for monetizing gas. There is a significant potential market for high quality, low impurity synthetic hydrocarbon transportation fuels which meet stringent product specifications, and chemical feedstocks.

We have led the way in developing complete GTL solutions, working with different technologies, for a number of clients. We’ve helped major international and national oil companies develop their GTL strategies. We have expertise in all the GTL technologies and can provide a complete project service to deliver fully integrated solutions. We also have experience of barge-mounted and floating production storage offloading facilities for the development of floating GTL facilities.

Gas-to-products
Gas-to-liquids

Sasol/Qatar Petroleum ORYX GTL
Qatar

The ORYX GTL plant is a ‘world first’: the first plant to convert natural gas to liquid fuel at commercial scale. It utilises the proprietary, low-temperature Sasol Slurry Phase Distillate™ process that is based on Fischer-Tropsch technology. Lean natural gas from Qatar’s North Gas Field in the Gulf provided the feedstock to produce 34,000 bpd of liquids (diesel, naphtha and LPG).

Shell Pearl (QSGTL)
Qatar

Five year contract for the provision of operations and maintenance services for QSGTL.
Gas-to-chemicals

Traditionally, gas has been monetized by targeting a broad range of methane-based chemicals, such as ammonia and methanol and their many derivatives. The development of new technologies is enabling the production of a widening range of chemicals and fuel substitutes such as DME and olefins via methanol.

Much of the recent ethylene investment has been based on low-cost ethane exploitation. We have wide-ranging experience covering both traditional and emerging technologies.

SABIC (YANSAB)
Saudi Arabia
FEED and PMC for new petrochemicals complex with a production capacity of 3.6 mpta, including 1.3 mpta of ethylene. Primary raw materials for the plant are ethane and propane which are cracked in the olefins plant to produce ethylene and propylene as feedstock for the downstream polymer and glycol process units.

Petrobras
Brazil
FEED for a world-scale grassroots gas-to-chemicals complex planned to produce more than 1 Mtpa of ammonia and urea fertilisers, methanol, acetic acid, formic acid and melamine.
Combined cycle gas turbine plants (CCGT) use both gas and steam turbine cycles in a single plant to produce electricity with high conversion efficiencies and low emissions. The gas turbine is used to generate electricity, and the waste heat from the gas turbine is used to raise steam to generate additional electricity via a steam turbine.

We have extensive expertise in many types of cogeneration projects, including combined cycle gas turbine plants. In addition we have strong experience in both integrated reforming (IRCC) and gasification combined cycle (IGCC) processes, where the gas turbine is fired on a gas fuel derived from the reforming or gasification of gaseous, liquid or solid feedstock.

**Teverola Power Plant**

Italy

EPC, commissioning, start-up, performance and reliability testing for a new 400MW gas-fired power station, delivering electricity to the Italian national grid. The plant is composed of a 250 MWe F-class gas turbine, a three-pressure-level Amec Foster Wheeler heat recovery steam generator with high-pressure steam generation at 141 bar(g) and 565°C, reheat and medium steam generation at 21 bar(g) and low-pressure steam generation to improve plant efficiency, and a reheat steam turbine. Other significant features include a steam-condensing unit cooled by air for environmental reasons, a three-winding step-up transformer, an air-insulated switchyard and a concrete machinery hall to help contain noise.
Our breadth of expertise in gas treatment and conversion processes is of particular benefit when considering integrated upstream and downstream projects. The integration and optimisation of the energy, offsites and utilities systems are key to providing economic solutions to GTL/GTC/GTP ventures.

Our extensive experience provides major cost-optimisation opportunities for our clients in:

► Air separation
► Heat integration and recovery
► Steam generation and utilisation
► Hydrogen production
► Waste water processing and treated water re-use
► Product quality optimisation

BP, DF-1 Project
UK

Study and FEED phases for a planned ground-breaking industrial-scale project for BP to generate electricity using hydrogen manufactured from natural gas to create 475 MW of carbon-free electricity, enough to power almost half a million homes in the UK. In addition, the project aimed to inject around 1.8 million tonnes per annum of CO$_2$ into the Miller oil field in the North Sea for enhanced oil recovery, thereby extending the projected life of the field by around 20 years.
Amec Foster Wheeler (www.amecfw.com) designs, delivers and maintains strategic and complex assets for its customers across the global energy and related sectors.

With pro-forma 2014 scope revenues of £5.5bn and over 40,000 people in more than 55 countries, the company operates across the whole of the oil and gas industry - from production through to refining, processing and distribution of derivative products - and in the mining, clean energy, power generation, pharma, environment and infrastructure markets.

Amec Foster Wheeler shares are publicly traded on the London Stock Exchange and its American Depositary Shares are traded on the New York Stock Exchange. Both trade under the ticker AMFW.

connected excellence in all we do