

Whitepaper

**Hydrocarbon accounting:**  
Shaping the future of the  
energy business?



Logica is a leading IT and business services company, employing 39,000 people across 36 countries. It provides business consulting, systems integration, and IT and business process outsourcing services. Logica works closely with its customers to release their potential - enabling change that increases their efficiency, accelerates growth and manages risk. It applies its deep industry knowledge, technical excellence and global delivery expertise to help its customers build leadership positions in their markets. Logica is listed on both the London Stock Exchange and Euronext (Amsterdam) (LSE: LOG; Euronext: LOG). More information is available at [www.logica.com](http://www.logica.com).

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### Physical and commercial challenges

Against a backdrop of rapidly increasing demand from countries like China and India, there is a growing need to discover and exploit rapidly new oil and gas fields, as well as to extend the productive life of mature assets. All of the major players are investing heavily and have ambitious plans for expansion. This is recognised in current exploration activities and the industry is aware that it must try harder to find new supplies, often in remote locations and under harsh physical conditions.

There are also complex commercial challenges. New and old ventures often involve multiple partners for the production, transportation and sale of oil and gas. Detailed, specific, contracts govern accounting along the supply chain and there is much money to be made, or lost, according to how well this is managed.

This white paper looks at the importance of the right approach to address these commercial challenges, and how this approach needs to adapt to a fast changing oil and gas environment.

### More in the pipeline

The challenge of transporting gas towards its final destination can be at least as great as that of discovery, particularly as much gas production is now undertaken far from end markets. New projects, large and small, all require production, processing and transportation infrastructures. For example, increased EU dependence on imports is reflected in a large number of major pipeline projects. The North-European Gas Pipeline (NEGP), the Dutch-UK interconnector pipeline BBL (16mn m<sup>3</sup>/d), the Langed Pipeline connecting the huge Ormen Lange field to the UK market and the new Algerian-Spanish Medgaz Pipeline (over 1.6 bn m<sup>3</sup> /yr) are evidence of this. However upgrades to existing pipelines also play an important role. An example is the expansion of the TransAustriaGasleitung (TAG) where ENI and OMV are working to achieve a 10 per cent increase to a total of 30bn m<sup>3</sup> /yr at a cost of EUR130m.

So, bringing gas to the customer markets clearly calls for substantial investment and companies need to evaluate potential rewards carefully against the substantial risks and hazards involved. The sums invested in pipelines are enormous but the surge in demand is bringing new supplies onstream, as marginal fields become viable.

### A far more flexible supply chain

For markets where pipelines are not economically viable, or more flexibility is (politically or commercially) required, liquefied natural gas (LNG) is becoming the major option. In Europe, LNG is going to play a significant role in supplementing pipeline supplies from Russia, Algeria and Norway, both in quantity as well as in diversification of supply. There are also many LNG projects under consideration in the USA. LNG offers a number of advantages over pipeline supplies. Projects can be smaller in scale, which makes marketing incremental supplies easier. Problems that may occur in pipeline trade with transit countries are obviated and LNG offers a wider choice between a variety of suppliers. From a commercial standpoint, this is particularly significant. LNG is considered to have a competitive effect on the market for gas as it introduces more choice and flexibility into markets traditionally characterised by long-term supply rigidity.

With the role of LNG increasing in Europe, an LNG infrastructure is under construction. This is to some extent speculative and heralds a departure from the traditional market structure of the gas industry. This has been characterised by long-term contracts and fixed transportation routes that allocate price and volume risk of the gas trade among producers and consumers.

An emerging market of LNG carriers and receiving terminals with more flexible contracts shows confidence in a market with increasing appetite for gas. While some mooted projects may not come to fruition, there is broad agreement that LNG is set to account for a much higher proportion of energy supply in the future in many markets.

### Turning information into value – hydrocarbon accounting and the digital oilfield

The combination of more production and transportation projects, together with the rising importance of LNG and a trend towards flexible, global markets, means that the commercial management of the oil and gas supply chain - or hydrocarbon accounting - is of increasing importance.

Moreover, optimal performance of assets across the globe, given contractual constraints, is set to emerge as a greater priority than day-to-day physical management of individual rigs and facilities. In other words, physical operations will be governed by commercial requirements, rather than the other way around.

Over the next two decades technology will undoubtedly play a bigger role in bringing about this change and the widespread implementation of unmanned rigs may become a reality. The concept of the digital oil field is already widely accepted and by 2020

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hydrocarbon operations could be automated and integrated to an unprecedented level including unmanned rigs, with production and transportation steered by automated prediction of demand.

Hydrocarbon accounting, which tracks the ownership and management of oil and gas from production to sale, will be essential to ensure that the move towards a digital oilfield really does bring about commercial optimisation. It forms a key component of day-to-day commercial decision making.

Hydrocarbon accounting rules are fundamentally determined by the various commercial agreements that govern the ownership of assets, the operation of facilities and the ownership of produced hydrocarbons and associated losses along the supply chain. The verification and subsequent processing of this data allows operators to apportion ownership and subsequent revenue entitlement to producers and the sales quantities to buyers. It allows joint venture parties to assess (day-to-day) commercial success and it allows buyers of gas to check on their positions and seize market opportunities when they arise.

In addition to managing infrastructure capacity and throughput balance, hydrocarbon accounting satisfies the information requirements of all parties involved. For producers, accurate receipt of forecasted production demand and allocated quantities is vital to maximise delivery from hydrocarbon sources. Buyers can place forward requests for delivery, receive confirmation against contracts as well as reports of final attributed quantities facilitates optimisation of downstream supply portfolios. Of crucial importance is the provision of a comprehensive and auditable data repository which manages data across parties.

For example, one oil and gas major needed to manage an increasing number of shippers combined with new and complex commercial agreements. By implementing integrated hydrocarbon accounting processes and systems they were able to provide a range of benefits including: more accurate and frequent data; greater certainty attached to delivery (meaning that a price premium could be achieved); and accurate tracking of deliveries and nominations within day.

It is also essential that hydrocarbon accounting processes and systems are designed to generate auditable information to meet compliance and reporting requirements. These

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### Hydrocarbon accounting – critical timeline

include global regulations such as Sarbanes-Oxley as well as local taxation, financial and oil and gas industry regulations. When it comes to third party access to national transportation networks, this can be extremely complex. For example, Bord Gais needed a commercial gas management system to handle a wide range of processes from nominations, to balancing, allocations and invoicing.

Hydrocarbon accounting links critical related business processes that follow a discrete timeline across the supply chain. The exact details for these processes will differ from one facility to another, as production, ownership, regulations and other factors vary.

The production process is driven initially by before-the-day forecasts of production from fields. These are aggregated to operating facilities, together with nominations of actual volumes to be transported to the pipeline operator. Figures may be calculated on a quarterly, monthly, weekly, daily or even hourly basis.

Prediction of sales of oil, gas and LNG products ensure accurate estimates of longer-term capacity bookings in pipeline systems. Long-term capacity forecasts, over several years, are used to inform offshore and onshore processing and transportation facility operators. These capacity bookings are managed by various contracts between field operators and facility operators, which determine operating parameters such as firm maximum quantities and reserved capacity. The situation becomes more complex as each field may have different partners with differing ownership equity percentages.

Following the forecasting cycle, allocation is carried out, principally in two steps. First, allocation of the total quantities of actual produced oil, gas, water, fuel gas and flare between fields and allocation of produced oil, gas, water, and second gas lift by field to individual wells. Inputs into the allocation process include a variety of metering and process data, which is verified and, if necessary, adjusted.

Reporting of production covers daily output of oil, gas and water and includes gas lift and water injection. It also includes laboratory activities such as sample analyses and environmental assessments. Chemical stocks and usage are also monitored against permits and treatment plans are prepared for wells. Outputs of the production reporting process include regular reporting to the appropriate regulatory body for tax purposes and potentially environmental emissions information.

When, ultimately, hydrocarbons are delivered to buyers, operators of processing facilities send details of the allocated quantities back to field operators who attribute production to partners. Financial processes are initiated, including the issue of invoices for use of facilities and to buyers for gas sales.

#### Global vs Local

In the past, hydrocarbon accounting has mostly taken place at the level of individual fields or operating companies. But there are now reasons to consider a global approach. It can offer more flexibility in meeting contractual commitments and ensure that rigorous processes are followed with clear management oversight. Above all, a global approach can support commercial optimisation and bring cost efficiencies. However, it is essential that processes and IT systems remain flexible given the differences between fields and operating companies.

As more information processing is standardised to meet information requirements at corporate level, the potential to globalise hydrocarbon accounting is increasing. The need to meet contractual production obligations that encompass larger-than-local operations and multiple energy sources can be met by centralised processes and systems that might use more information than only the local operational agreements. Companies that are able to offer such services to the market will benefit from price spreads, arbitrage options and aggregation effects that will not be available to those who keep their eye only on a local operation. This can then evolve into an approach where commercial optimisation drives production and transportation decisions, rather than the other way around.

#### A best practice approach

Furthermore, providing complex energy sourcing services to wholesale energy buyers can command a premium but will require intelligent hydrocarbon production and transportation processes and thus intelligent hydrocarbon accounting systems.

Implementing a successful hydrocarbon accounting strategy is never easy. But based on over 15 years experience, Logica has been able to identify a number of core characteristics common to a successful hydrocarbon accounting strategy.

**It focuses on unique commercial agreements.** Each gas processing or transporting infrastructure is subject to unique commercial agreements. These dictate the information processing that creates the link between the day-to-day flow of hydrocarbons and the financial impact on the basis of the commercial agreements. All participants and

stakeholders must be sure that the commercial outcome correctly reflects the actual physical flow. This can only be achieved if the hydrocarbon accounting system provider really understands the true nature of both the physical and the commercial hydrocarbon world.

**It must fit the corporate and operational strategy.** Gas companies strive to differentiate in the way they market their energy and how they utilise their assets. Hydrocarbon accounting systems must fit in this strategy and therefore not one size will fit all. The systems must be able to provide critical information as well as analysis to support operational, commercial and corporate performance indicators. They must be flexible and secure in the way they work.

**It will be easily maintained.** Over the life of the system, its commercial and physical environment is likely to change. For example new fields come onstream and new equipment becomes available. Incorporating such changes into a system must be quick and easy.

**It will be accurate and auditable.** This seems an obvious point but comprehensive audit trails are essential for regulatory compliance and potential resolution of contractual disputes. Audit trails also improve customer service and provide all parties with comfort and confidence.

**It will be robust and quick.** Data input and output must be fast, easy and accurate. Customer expectations increase continually and reports will be expected to be readily available and in a familiar format.

**It will be open and scaleable.** Data must be easily converted into business information for decision support and 'what-if' scenario modelling. Data must be exportable into third-party packages, such as spreadsheets, for further analysis, display and reporting.

**It will be fully supported.** Behind every successful implementation is a willing partner. There is no substitute for choosing a partner with a global presence and unmatched breadth and depth of knowledge  
The implementation of a robust hydrocarbon accounting system has many benefits. It

### Summary and conclusion

gives companies the potential to make decisions based on real-time information, safe in the knowledge that there is integrity in systems and completeness of information flows. These issues are bound to become of greater importance as companies make more management decisions on a global basis. Moreover, integrated information systems make the operation of smaller multiple fields possible and practical.

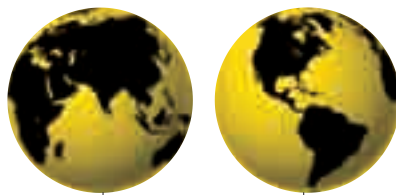
Overall, an integrated hydrocarbon accounting system also improves knowledge assimilation and use throughout an organisation. These issues are the key to survival and success in future and are also a mark of operational excellence.

Looking to the future, there is a real opportunity to use global hydrocarbon accounting as one of the levers to derive real value from the digital oilfield. This can be achieved both through commercial optimisation across facilities and contracts, as well as by improving internal processes and making them more cost effective.

### About Logica in energy and utilities

Our broad portfolio of energy and utility solutions and services cover: upstream and downstream oil and gas; competitive utility markets; enterprise asset management; and regulatory compliance. These are aligned with major challenges faced by our clients, including: achieving cost-efficiencies; managing increasing competition and regulations and reducing the cost of reaching global emissions targets.





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