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Thomas Reverdy

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# The unexpected effects of gas market liberalisation: inherited devices and new practices

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Thomas Reverdy

## **Introduction**

The liberalisation of the gas market in Europe was intended to establish competition between suppliers and create a European wholesale gas market with large numbers of transparent transactions taking place between producers and suppliers. It was also expected that the spot market would fix a price for gas and that this price would become a reference for all transactions, as is the case for other commodities like crude oil. Finally, the gas market was intended to support the development of hedging against price fluctuations.

The actual gas market is far different from these expectations. First, regulatory tariffs have been maintained and many industrial customers have not opted for the free market. Second, the maintaining of long-term contracts between major producers (from Russia, Norway or Algeria) and existing suppliers is preventing the development of a large and transparent gas marketplace. Competition is limited to incumbent suppliers. The gas spot market and the gas price index are not recognized as a reference for all transactions. Because of the long-term contracts, the price of gas is indexed to the oil price. Inherited practices and devices like regulated tariffs, long-term contracts, and the oil index coexist with new practices and devices

encouraged by liberalisation like calls for tender and indexed gas contracts, creating a confusing context for industrial customers.

The ongoing transition of the gas market offers a good opportunity for studying change dynamics in market practice. For instance: how do market actors make sense of this changing context, anticipate how it will evolve, evaluate its risks, define new offers, calculate and choose between such offers, etc.? Because of the liberalisation, industrial customers have to manage new issues like forecasting consumption and gas prices variations, while suppliers have to adjust marketing and sales practices, define new offers and contracts combining the physical supply with financial services. New types of actors have also entered the market: consultants promote new purchasing practices such as calls for tender; bank analysts offer financial services and provide information about anticipated prices and market structure. Through their various practices, all these actors contribute to shape the gas market.

This chapter investigates how market actors develop new practices on the basis of inherited and new “market devices” (Callon et al., 2007). My starting point is to regard market transitions, like the one following the deregulation of the gas market, as processes of socio-technical change. I argue that an important part of this process is the development of new practices employing “market devices”, which work as cognitive prostheses for market activities. Effectively, in this case, purchasers, marketers, sales people and consultants shape the market by combining inherited devices, such as long-term contracts and the oil index, and new practices such as benchmarking, price anticipation, hedging, etc. In this process, market devices, such as the “price index” (Caliskan, 2007), reduce uncertainty and support suppliers’ offers and purchasers’ “calculations” (Callon and Muniesa, 2005).

More specifically, I investigate the ambivalent status of market devices in calculation and transaction practices when their relevance is being questioned. In most markets, and most of the time, established market devices work as “black boxes” (Latour, 1991); they are taken for granted and employed by the actors without questioning. This “black boxing” occurs when actors accept that the devices simplify the complicated and confusing context in which they must act. However, in transition situation, “black boxes” may be “reopened”; their relevance and reliability may be questioned if they no longer seem to fulfil their initial promise. Major regulatory change, such as liberalisation, can weaken inherited market devices and promote the adoption of better-adapted devices. Thus, in the gas market, both new and inherited market devices are being questioned: Are new contracts more restrictive than regulated tariffs? Is the oil index a relevant reference for purchasing gas? And so on.

As a consequence, the envisaged effects of regulatory change do not occur immediately: there is a transition. During this transition, some inherited market devices remain in use although their “fundamentals” may become more and more precarious. As these market devices support established practices, it is difficult to abandon them. At the same time, new market devices are not immediately employed because they have yet to prove their relevance. During transition, then, the relevance of market devices, i.e. their capacity to reduce uncertainty and support calculation without disregarding market fundamentals, becomes a major issue for market actors.

On the basis of my empirical study, three important observations can be made concerning the role of market devices in selling and purchasing practices, and by extension, in market transitions. First, the relative stability of inherited market devices can prolong such transitions, or produce other results than those expected at the outset. Second, market

transitions imply learning processes for market actors, who evaluate the relevance of inherited and new market devices for the practices they engage in. Third, the weakening of certain market devices during market transitions may introduce asymmetries in calculative capacities which affect power relations in the market, e.g. customers may become more dependent on suppliers or consultants who have been better equipped to deal with uncertainties linked to the new market situation.

The next section presents my analytic frame for studying market transitions as socio-technical changes. The following two sections provide an introduction to gas market practice and detail how the empirical material was collected. I then present my results concerning five issues: how liberalisation introduced new forecasting and monitoring practices; how new devices affected price construction; how suppliers and consultants compete in organizing competition; how calculation practices developed around price uncertainty; and how use of the oil index became controversial. I end the chapter with a discussion of the stability of inherited market devices during market transitions.

### **The development of transaction practices in a context of liberalisation**

This section establishes an analytic frame for studying market transitions as socio-technical changes in which actors' attitudes towards and uses of market devices is central.

“Liberalisation” (or, more accurately, “reregulation”) is an ongoing process where new regulations are tested, implemented, evaluated, negotiated, etc (Crew and Kleindorfer, 2002).

In this context, transmission and distribution networks for gas can be conceived as “natural monopolies”, i.e. it is not justifiable for each competitor to have its own network, but all

competitors should share a single infrastructure. The aim of regulation is then to organise competition within this infrastructure. Further, incumbent suppliers possess equipment, networks, long-term contracts, etc., which disadvantage newcomers. The regulation should thus balance the market power of incumbent suppliers and new entrants so that competition is enabled. Indeed, a “liberalised” market can be far more complex and tightly regulated than a public monopoly.

Market transition is not the result of regulatory change alone; it also stems from endogenous market processes involving marketing and purchasing practices (Kjellberg and Helgesson, 2007). As argued by Araujo et al. (2008, p.8): “markets are in constant evolution both in terms of the practices that shape them as well as the forms they assume as a result”. Historic analyses of gas market reorganisation suggest that it relies not only on regulatory change, but also on strategic “appropriations” by producers and purchasers, maintaining inherited arrangements and abandoning them when important structural changes occur (Wilson, 1997; Stern, 1997; Kjærstad and Johnsson, 2007). The market transition triggered by liberalisation would thus seem to offer a suitable context for studying multiple and often conflicting efforts to shape markets, to which buyers, sellers, regulators, consultants, and others contribute by producing new devices and defining new practices. This process is further likely to include “efforts to shape markets as well as efforts to operate in markets qua structures and the intended and unintended interactions between these practices” (Araujo et al., 2008, p.8). As liberalisation is a multi-actor process, studying it requires overcoming the “distinction between market-making practices – defined as activities that shape the overall market structure – and marketing practices – defined as firm-based activities aimed at developing an actor’s position within a structure” (ibid.).

The perspective adopted here strives to be symmetrical, i.e. it looks at activities undertaken by both buyers and sellers. When analyzing a transition towards a “liberalised market”, characterised by complexity and continuous experimentation, the “purchasing” side must be considered in its own right (Kotler and Levy, 1973; Caldwell et al., 2005). Demand is far from being constructed, restricted and marked out by supply or prescription alone. In particular, the way in which purchasers are able to understand different supply and pricing solutions, how they evaluate these (Juliusson et al., 2007), and how they anticipate market developments, are of central import to the transition.

In this respect, one of the most interesting aspects of the socio-technical approach to markets (Callon, 1998) is the possibility it offers to study the distribution of calculative capacities in markets. According to this approach, market practices are intimately linked to market devices, i.e. to material and discursive assemblages (Callon and Muniesa, 2005). These devices become intertwined with human actors in economic *agencements* that have certain capacities to act, e.g. to produce prices. Depending on the constitution of these *agencements*, their calculative capacities will differ. Thus, market devices play an important role in producing calculative capacity. If a market device is detached from a specific economic *agencement*, its calculative capacity is likely to be affected. This suggests that actors’ adoption or rejection of specific market devices is a key issue in market shaping. This becomes particularly relevant in the context of liberalisation, which is often legitimised in the name of the customer who is supposed to benefit from more offers and lower prices produced by competition amongst suppliers. But the level of supplier competition also depends on the ability of these customers to influence competition through their purchasing practices (Caldwell et al., 2005). This ability, in turn, depends on their calculative capacities, which are intimately linked to the market devices they employ.

Economic theory suggests that a market can be more efficient than a public monopoly. In terms of economic sociology, this implies that distributed cognition (Hutchins, 1995) between market agencies, including purchasers, suppliers, regulators and the market devices they employ, is more efficient than a more bureaucratic and centralised organisation. Given the complexity of a reregulated market, purchasers have to be equipped with “calculative capacities” to match the level of market complexity. The question is whether purchasers have enough autonomy and are sufficiently independent of suppliers to be able to play their role and shape competition between suppliers. Their independence, their skills and their access to market devices and information will determine their ability to “calculate”, i.e. to interpret physical and financial gas markets and to act in these markets.

### **An introduction to gas market practices**

The supply of gas to an industrial customer is based on the following principles: the industrial customer purchases an anticipated volume of gas for the following year (sometimes for the following two years). The suppliers need a defined volume in order to check that the overall volume of gas they sell matches the volume contracted with gas producers. Suppliers also have to book transmission capacities. This means that contracts between suppliers and industrial customers are always defined on an annual basis. To avoid penalties, industrial customers have to abide by the consumption volumes defined in the contract. A second difficulty concerns the definition of price in the contract: the price of gas varies over time, which means that the industrial customer is confronted with a price risk. This price risk can be



managed through fixed or indexed prices or by using financial instruments such as oil price hedging (Levy, 1994).

Taking an in-depth look at purchasers' "calculation practices" (Callon and Muniesa, 2005) helps us to understand how they build their sourcing and price control strategies and how they assess what is on offer. A distinction can be made between two levels of action: first, there is the type of transaction adopted (e.g. regulated tariff or eligibility, fixed or indexed price, prices indexed to the gas or oil markets), and secondly, within the chosen type of transaction, there is the way in which the different offers put forward by the various suppliers are ranked.

The first action involves technical and financial uncertainties that are difficult to evaluate and quantify. It therefore requires understanding and interpreting the way the gas market works and evolves (e.g. marketplace, long-term contracts) and the implications of this for a business (e.g. supply risks, price fluctuations). Purchasing strategies can be divided into several types: regular consultation, call for tender or membership of a purchasing consortium. Several types of contracts are possible, e.g. fixed-price contracts (one or two years), contracts indexed to the gas market price, to the oil market or even based on regulated tariffs, and contracts where it is possible to "fix" part of the indexed price in order to seize upon a market opportunity.

The second level of action operates in a more structured way and has more to do with optimisation of purchasing parameters: comparing similar offers, choosing the date when fixing the price, etc. The two types of action do not necessarily occur sequentially: purchasers will drift from one level to the other to compare product offerings. Many actors "test" each form of transaction before opting for one or a mix of them.

## **A note on method: collecting market practices and market devices**

The research work behind this paper is based primarily on interviews with sales people, energy purchasers and energy managers (60 interviews in all). In-depth semi-directive interviews were carried out. In the first part of the enquiry, interviews with sales people helped to establish an overall picture of purchasers' practices. The salespeople detailed the purchasing practice background of their industrial customers. They proved to be very familiar with many purchasers' practices, such as calls for tender, information seeking, financial decisions, etc., because they are directly affected by these activities. However, owing to the nature of their business relationship, some purchasing activities remain hidden to them, e.g. the exchange of information with alternative suppliers, or purchasers' real motivations.

This is why we conducted in-depth semi-directive interviews with industrial purchasers and technical managers about their activities, what is at stake for them, and how they develop their role and perceive services and sales people's attitudes. The energy purchasers interviewed had 2-6 years' experience of the gas market. The interviews, which lasted between 1½ and 3 hours, were recorded and transcribed in their entirety to keep a complete record of the arguments put forward.

Interviewing is an excellent means of establishing how purchasers justify the practices they engage in. However, this method is not usually considered as the best way to investigate the practices themselves. To this end, the interviews with the sales people proved to be helpful. With the sales people, we were able to draw up a list of events, decisions and problems facing their customers, which revealed many practices that purchasers engaged in. Subsequently, the customers were asked to evaluate their business relationship, to express views about service

and product supplies, but also to justify these views. They described concrete situations where, for example, they found a sales person helpful or unhelpful. The interviews also revealed their doubts as to practices and the difficulties they have explaining their choices to their management. These interviews did not allow us to comprehend all the practices in detail: observation might for instance have allowed us to complement the picture. However, the in-depth discussions about specific events, including crisis situations, did reveal the conditions and resources of their day-to-day activity.

The purchasing practice background of each industrial customer was reconstructed with the sales person by considering events and outside influences but also their own learning. An attempt was made to trace the skills of those involved in these new activities and their training in energy purchasing; changes in their purchasing practices; the reasons behind these changes: events, influential messages, experience, etc. As well as carrying out interviews, the research also involved studying marketing and institutional documents, publications from the French Energy Regulation Commission and communication by industrial associations.

The following sections present different examples of competition between alternative transaction frameworks. The first relates to the transition from regulated tariffs to free market transactions. The focus here will be on new requirements in terms of forecasting and monitoring. The following sections look into price definition, competition and risk management, which have become essential issues for industrial purchasers.

## **New forecasting and monitoring practices**

In France, the gas market was opened in several phases between 2000 and 2004. Since July 2004, all non-residential consumers have become “eligible”, i.e. legally empowered, to purchase their gas and electricity on a competitive market. The liberalization process has created a transitory situation where clients are encouraged to abandon existing regulated contracts and adopt new free contracts.

### *Coexistence of regulated tariffs and new offers*

Rules governing market operation and network access have been defined allowing competition to develop despite the existence of a monopoly on transmission. At the request of industrial customers, however, the State has maintained regulated tariffs, delivered only by the incumbent suppliers. The State’s regulatory action has therefore led to the co-existence of two different forms of transaction: the regulated tariff and competitive offers (made by both incumbents and other suppliers). The question to be explored is how the transition from the former to the latter has been made.

The incumbents have developed their sales operations so as to facilitate their customers’ transition. They have tried to develop their supply in other countries, either by buying out existing suppliers or by investing in their sales activity. In the early years (2000 to 2004) the market supply was (with a few exceptions) cheaper than the regulated tariff. The State, professional bodies and alternative suppliers strongly encouraged the “exercise of eligibility” through extensive communication. A large number of customers switched from the regulated price to the market offer, in many cases staying with the incumbent supplier because its price was the most attractive. Still, a certain amount of competition appears to have been created since alternative suppliers have gained a non-negligible market share. In fact, most major

European energy suppliers have substantially increased their volumes sold abroad, whilst their domestic sales have dropped.

However, these general observations do not explain how the transition was made. What is the “calculative capacity” (Callon et Muniesa, 2005) of an industrial purchaser faced with a choice between regulated tariff and market offer? How do they identify alternatives and prioritise them? Before answering these questions, we must look in detail at the economic and technical context in which a purchaser operates.

*The learning of new practices: consumption forecasting and monitoring*

In the gas and electricity markets, the regulated price proposal (the tariff) and the “eligible” contract (market price) do not follow the same rules in terms of physical supply: with a regulated tariff, the industrial customer is not affected by peaks and troughs in consumption. Prices are primarily based on quantities actually consumed, without a requirement for forecasting or follow-up. This is not the case with “eligible” contracts. The contractual separation between transmission infrastructures (which have remained a monopoly) and trading in energy has led to additional constraints for industrial customers in terms of consumption forecasting and monitoring. These constraints are explained by a new distribution of roles in the market: the different suppliers are responsible for the balance between what they deliver on the network and what their customers consume. The pressures on the network to maintain the balance are transferred from the network manager to the supplier. For the supplier, the only way of guaranteeing this balance is to impose strict consumption forecasting and monitoring rules on their customers, or have them pay for the privilege of flexibility that their own users need.

### *Adjustments to forecasting and monitoring rules*

Looking more closely at how industrial customers compare the two supply contracts on offer (regulated tariff vs. market price), the assessment of consumption, including its fluctuation and future development, stands out as a major issue in their calculation. Our survey showed that many buyers experienced problems in assessing and managing these issues due to a lack of human resources, skills and measuring devices on each industrial site. Many customers thus preferred not to take the risk of turning to the free market. Furthermore, energy purchasers who did opt for eligible contracts for gas did not always fully understand the subscription rules, e.g. in terms of power requirements for their equipment. Not all these rules were fixed at the outset. As the rules firmed up, the owners of the distribution networks sought to help their customers access the market by maintaining a relatively lenient position towards them: many penalties for subscription overruns were thus not applied.

Another theme is the relationship between suppliers and their customers concerning the respect of consumption commitments (over a year, over a quarter, over a month, etc.). The salespeople of some suppliers seek to teach their customers to take these needs for flexibility into account in their calculations. They work to identify their industrial customers' flexibility needs. Sales people use their knowledge of industrial sites and their consumption and procedures to inform energy purchasers (who are often not aware of these problems) of the risks they are taking with overly rigid contracts.

Paradoxically, the new contracts are more restrictive owing to the regulated access to the gas supply network. Transition difficulties are due to the important investment in socio-technical

reorganisation of gas consumption at the level of industrial sites. In the transition period, not all industrial customers were organised to meet this requirement and thus risked ending up paying more than the regulated tariff if they accepted the market offer. Consequently, not all industrial customers exercised their option to use the deregulated market and instead continued to purchase gas according to the regulated tariff. Thus, from the “physical side” of supply, we witnessed the incomplete stabilisation of practices and devices: coexistence of regulated contracts and market contracts, and incomplete implementation of new rules by the gas supply network in order to facilitate the opening up of the deregulated market.

### **Inherited market devices and their effects on price construction**

The liberalisation of the gas market introduced some uncertainty concerning gas prices for industrial purchasers. When the market was opened up, the choice of a price reference was the major issue for industrial purchasers. The oil index competed with the gas index to act as the reference in price negotiations with suppliers. Industrial purchasers tried to understand market structure in order to evaluate the relevance of gas index or oil index. Most of the time, the selling price defined by the supplier (downstream market) depended on the supplier’s price negotiation with gas producers (upstream market).

There are two types of upstream gas markets in Europe, depending on whether the country in question is an importer or exporter of gas. The UK and Denmark are both importers and exporters and have an active upstream wholesale market. Many transactions between producers and suppliers are conducted transparently on a “marketplace”. Prices on these markets are common knowledge. On the downstream markets, suppliers offer their industrial

customers prices that reflect supply: the formula is indexed on the wholesale market (plus a distribution margin). The other European countries do not have their own production and depend on imports from producing countries like Russia, Algeria and Norway (upstream market). Before deregulation, these imports were organised through long-term “take-or-pay” contracts based on the oil price index (e.g. the Platts Brent Index). Both producers and suppliers considered these long-term contracts (10 to 30 years) as the best means of financing the heavy investments needed for operation and transmission. In these contracts, the supplier committed to buying a fixed annual volume of gas from the producers, at a price that was not fixed ahead of time. The prices negotiated were based on a "net-back" principle: the calculation takes into account the price of the fuel oil sold to the consumer and removes the estimated transmission and distribution costs and margins. The objective of this indexing was to ensure the competitiveness of gas in relation to fuel oil and to guarantee that certain volumes of gas were sold.

*Type of price formula*

$$P = P_o + A \times (G - G_o) + B \times (F - F_o)$$

*P (P<sub>o</sub>) = purchasing price from the producer / index o: initial date of contract*

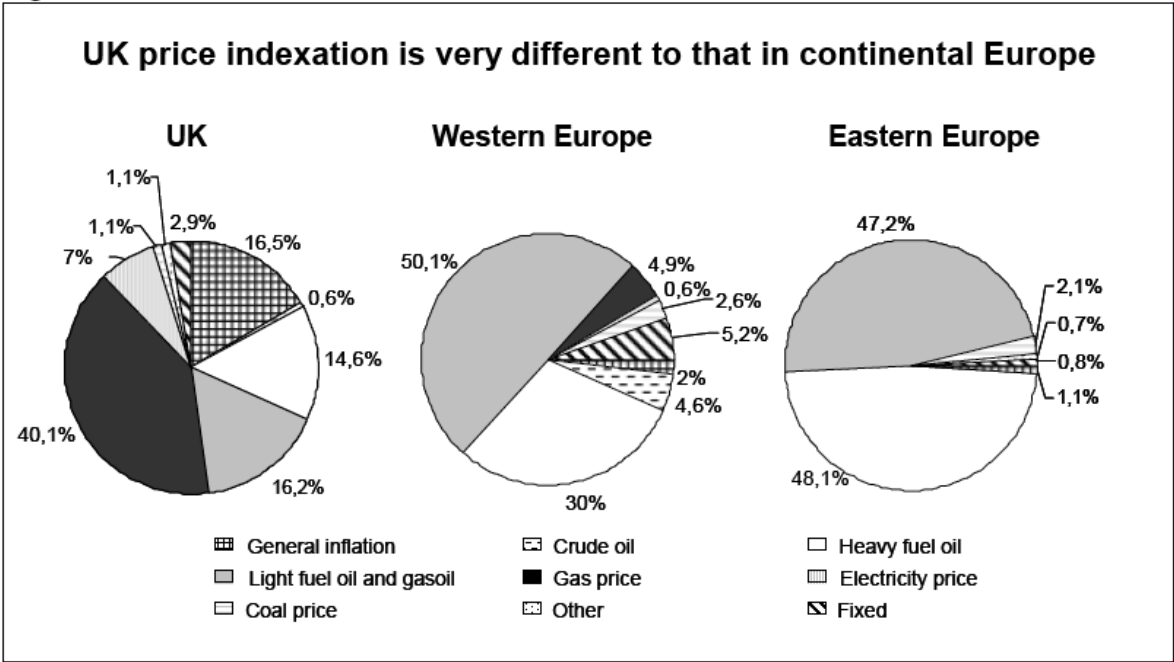
*G / F = average price over 3, 6 or 9 months for light fuel oil G, or heavy fuel oil F*

*A / B: coefficients*

The liberalisation of the gas market has not fundamentally changed this practice. In 2006, around 95% of the gas imported into France was purchased via take-or-pay long-term contracts from gas producers. More recent events show that this transaction form is still favoured by suppliers. The difference between the volumes purchased via long-term contracts and actual gas sales is covered by purchases on the wholesale markets. In continental Europe, gas wholesale markets only account for a small proportion of total sales: the Zeebrugge



market in Belgium and the TTF market in Holland are the most developed, but are not yet liquid enough to provide sufficiently representative indicators of market prices. Since they only account for a small part of total sales, they are very sensitive to gas availability. As can be seen in Figure 1, transactions in the wholesale market only account for around 5% of the indexation in Western Europe. In UK, the gas price is defined at the National Balancing Point (NBP), a virtual trading location for the sale and purchase of UK natural gas.

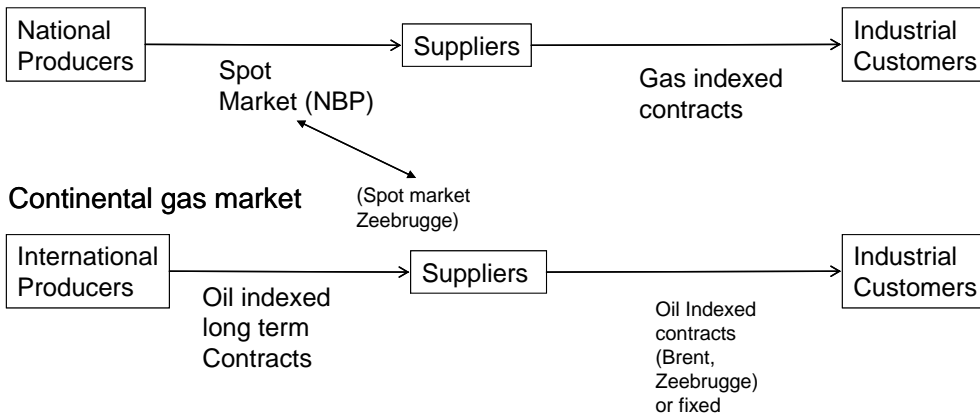


Source: Energy Sector Inquiry 2005/2006

**Figure 1. Indexation in supply contracts**

On the downstream continental market, suppliers offer their industrial customers varied price formula. The price formula defined by suppliers combines supply portfolio with financial instruments: suppliers join forces with investment banks to offer their customer a different price structure based on a combination of their sourcing arrangements and financial instruments.

### British gas market



**Figure 2. Market organisation**

### *Price references and risk management in the construction of suppliers' offers*

As noted above, the price defined by gas suppliers in the UK reflects their purchasing portfolio: their price is indexed to the wholesale gas market. Customers are advised to seek support from specialised banks to manage the risks attached to these fluctuating formulae. So, the risk management for prices developed in a disjointed manner: services are offered directly by banks and target the customers' finance departments rather than their energy purchasers. In continental Europe, suppliers had developed partnerships with investment banks, using "derivatives" to spread the financial risk arising from the difference between the price formula at which they purchased gas (mostly long-term contracts) and the formula offered to their customers. When offering customers a fixed price, suppliers buy a "swap" on the financial market to cover the risk of price increases on the upstream market.

The key role of long-term contracts in gas purchasing in continental Europe and the limited influence of wholesale markets make it impossible to establish a specific gas market reference for suppliers and industrial customers. And suppliers do not want to reveal their supply price

structure and therefore offer their customers diverse price structures, with fixed and indexed prices. The indexing formulae employ the oil price index (such as Platts Brent) or the spot gas market index (such as “Zeebrugge”). The choice of reference index was far from straightforward and the two indexes “competed” to act as the reference in price negotiations.

#### *Transfer of oil price anticipation skills to the gas market through oil indexation*

From a practical point of view, the oil index offers many advantages. Oil price anticipation skills are traditionally the domain of oil producers and investment banks. However, today gas suppliers have developed partnerships with investment banks in order to be able to share these skills and provide their customers with price anticipation services.

Investment banks have developed calculation capacities while identifying a spread between market price and so called “fundamentals” such as infrastructure, speculation, weather forecasting, disasters, geopolitical conflicts, political decisions, etc. Trade desk analysts always try to evaluate the effects of events and “macro shifts” on supply and demand trends. They build scenarios that integrate changes of fundamentals. For example, just after the Tsunami disaster in Thailand, the market anticipated a substantial drop in the oil price and banked on a decline in the South Asian economy. The market proposed a low price for a few days, until a correction kicked in. Market actors underestimated the real impact. But some trade desk analysts were able to evaluate the gap between market price and fundamentals.

Thus, in continental Europe, gas prices are set by processes akin to those found on other commodity markets. However, these prices have a sophisticated structure that attempts to offset the absence of a shared gas price reference by re-using a price reference that already

exists, i.e. the oil price index. This "prosthetic" construction (Caliskan, 2007), based on an inherited device, makes it possible to use financial hedging derivatives from the oil market, and compensate for the incipient financial hedging on the continental gas market. Market actors have developed price guarantees for gas contracts (e.g. fixed prices, indexed prices, contracts with different price references, hedging) as if gas were an oil by-product. This reveals the strength of inherited market devices, such as the price index, but also the flexibility of their use. Market offers overlap devices and practices inherited from the old gas market (i.e. before liberalisation) and from the crude oil market. This has resulted in innovative solutions to meet the needs of market actors.

## **Competition in organising competition**

Purchasing activities rely on organising competition. Indeed, it might be said that this is the "raison d'être" of purchasing. In the context of liberalisation, organising competition between suppliers may be seen as straightforward. However, it is interesting to look in greater detail at how competition is being organised on the gas market.

Industrial customers have been strongly encouraged by consultants (in fact, agencies depending on UK and Norwegian suppliers or producers) to adopt UK practices: putting out a call for tenders at a given date, which is planned in advance on the basis of an indexed formula. With the help of a consultant, the purchaser compares the formulae proposed by suppliers using a simulation based on the probable index changes. The objective of the call for tenders is to reduce supplier margins as far as possible, but also to identify the most favourable price formula and the one that suits the company's needs best. Having purchased

their gas according to an indexed formula, customers can also use financial services (provided by the supplier or a bank) to “switch to a fixed price” thanks to market “derivatives” when they feel they have obtained a good price or need to set their energy spend as part of their budgeting process.

Consultants advise their customers to initiate calls for tenders with indexed formulae primarily on the Zeebrugge wholesale gas market, hence relying on the development of a short-term gas market. They argue that these wholesale markets are becoming the price reference for the continental market. During the first years of deregulation a number of industrial customers accepted the idea that the reference price for gas was the Zeebrugge price or the NBP price. They saw it as a limited risk since it was a common price reference and only the wholesale market offered real reductions in relation to the regulated tariff.

In addition to the consultants, salespeople representing the main “continental” suppliers (who have no production activity and depend on long-term contracts) also play a decisive role in shaping purchasing practices. These actors criticise the use of fixed-date calls for tenders and wholesale gas market indexes (Zeebrugge index or the NBP index). Instead they try to convince their customers that wholesale markets are not representative of the supplier portfolio or of their purchasing practices. They argue that it is preferable to build a formula using the oil index on which long-term gas contracts between producers and major continental suppliers are based. These salespeople have been able to win over industrial customers who have experienced spectacular price variations on the British market, the NBP and the Zeebrugge market.

The suppliers' salespeople also explain the shortcomings of using calls for tenders to their customers: the formulae proposed in response to these calls depend on the date of the call (suppliers already use financial markets to construct these formulae). And a call for tender put out at the wrong moment runs the risk of being unfavourable to both the customer and the supplier (who will have no room for manoeuvre in constructing the formula).

Instead, salespeople encourage their customers to adopt a third purchasing strategy, the so-called "at the right moment" strategy. This involves defining one (or several) supplier(s), specifying your needs and the type of formula with which you wish to work. The customer then leaves it to the supplier(s) to inform them about prices, in particular when they are attractive. Purchasers set up a contract when they think they have reached a good deal. Thus, the customer benefits fully from their supplier's (and their bank partner's) abilities to anticipate and act on market opportunities.

There is thus competition between two practices linked to different representations of the market. Consultants focus their discourse and practices on promoting competition: they portray themselves as encouraging practices designed to foster the development of a competitive market. Incumbent suppliers, on the other hand, focus their discourse on the value generated by the synergy between the sale of gas and price engineering, in particular by making market opportunities more accessible. Thus, the purchasing practices of industrial customers are partly shaped by a variety of market actors. The way they think about how the market works and how they represent its organisation is crucial to the adoption of one type of offer or another.

## **Calculation practices developed around price uncertainty**

Purchasers try to make sense of the market context and formulate a purchasing strategy. How do they interpret oil indexation? How do they organise competition? How receptive are they to the arguments proposed by consultants and suppliers?

### *Use of the oil index*

Most purchasers suggest that a cautious price strategy would fit their organisational context better. In other words, it would be more suitable to use a fixed price, an oil-indexed price rather than be exposed to a speculative gas price.

Oil indexation in long-term gas contracts sets up equivalence between gas and oil products. The oil market is considered as “liquid” with a considerable amount of arbitration activity stabilising the price and much information available. Under these circumstances, customers should be able to access a variety of financial products and rich information from numerous investment banks specialising in the oil market. They should further be well equipped with a range of calculation tools.

However, what we observed was very different from this ideal situation. Only a few industrial customers appear to be equipped with information systems and calculation tools, namely those experienced in oil production and trade. These companies also have a team of analysts at their disposal. Other customers rely on their consultants, their gas suppliers and their associated investment banks. Although the oil index allows the physical contract to be

separated from the hedging operation, the supplier's strategy is to reintegrate both dimensions into one business relation in order to foster customer loyalty.

### *Organisation of competition versus anticipation of price*

Energy purchasers focus their attention on price variation. Most purchasers see an opportunity to develop a specialised and high profile purchasing function through forward planning and by playing the market. As one purchaser put it:

The added value of the energy purchaser is his understanding of the market and the timing of his purchase. What makes the price is the market. Timing is much more important than negotiating the supplier's margin.

Purchasers try to follow the market to detect the best opportunities to fix the price. Their understanding of the market is essential. They make a systematic effort to understand the context and attempt to forge an opinion about market prices. In the process, they raise many questions: what is the explanation behind this oil price increase? Why have the prices of futures contracts increased more than the spot prices? Does the price reflect market fundamentals? Are there a lot of speculators in the market? How can new events affect prices? What is the state of gas and oil stocks?

Sales people support these efforts by informing customers about market changes: they present scenarios and attach probabilities to scenarios; they help to build a representation of the market, analyse and aggregate data to create the most complete picture possible. It is clear that industrial customers construct their representation of the market thanks to a particular contact, e.g. a bank seller, especially when they do not have the requisite skills or the time to search



for more information. These relationships can take on several forms and vary in their intensity. Inexperienced purchasers employ the strategy of “buying at the right moment”, meaning that the customer accepts the supplier’s help when deciding on the contracting date. By including both the supply and the financial engineering, this makes the customer doubly dependent on their supplier. It also requires the customer to react quickly, i.e. within a few hours, making it difficult to compare rival proposals, since suppliers do not calculate their prices at the same time. This is an increasingly popular approach for purchasers, because it is aligned with what they regard as their main objective: price anticipation. For more experienced purchasers, cooperation with a supplier results in the joint definition of a purchasing strategy based, for example, on fixed intervention thresholds. When these thresholds (i.e. prices) are reached, the customer asks their supplier to switch to fixed prices or to return to variable prices.

### *Sophisticated practices undermined by ambiguity*

In order to manage these contradictions, suppliers propose more sophisticated practices to manage risks. Sales people defend a price fixing strategy designed to spread the risk. According to them, fixing the price progressively, i.e. quarter by quarter, and distributing the amount to be fixed, is the best way of avoiding risky positions. For example, before the end of the first quarter of the year, the purchaser fixes 100% of the price for the second quarter, 75 % of the price for the third quarter, 50 % of the price for the fourth quarter and 25 % of the price for the first quarter of the following year. During the second quarter, the purchaser must then fix 25 % of the price for the next four quarters, and so forth.

Sophisticated purchasers organise three or four calls for tender before deciding on one offer. They compare the formulae proposed by suppliers in simulations based on probable index changes. They also evaluate how these formulae evolve. However, this strategy takes time and reduces the possibility of exploiting opportunities and being flexible. The organisation of calls for tender can lead to decision-making situations that are far from ideal.

The practical consequences can be illustrated with an example. Some interviews took place at the end of the budgetary year when the tension between budgeting rules and the need to be reactive was exacerbated. Oil prices had been constantly rising, which meant that fixing the price at this point entailed the risk of purchasing gas at too high a price. Most analysts predicted that the market would adjust itself sooner or later, leading to a substantial drop in prices. However, no one knew whether this adjustment would take place before the end of the financial year. In this context, fixing the price meant that the purchasers would have to take a major risk. These complexities of gas purchasing and price risk management create a situation in which most industrial customers feel uncomfortable. In this context the devices inherited from the era of monopolistic supply are considered a source of stability by providing a satisfactory response to the main challenges, i.e. price stability and control. As a consequence, these devices still contribute to structure market practices.

### **The fragility of market devices: controversies over the oil index**

As explained above, oil-indexed long-term contracts set up equivalence between gas and oil products. For experienced purchasers, this allows a separation between the physical contract, based on the oil index, and the financial activities, developed with independent banks. For less

experienced purchasers, it reduces price risks. But the oil index reference is not as stable as incumbent suppliers suggest. The question of which index to use is regularly raised.

Underlying this choice is the question of the role of the long-term contract.

*Contracting practices called into question by the spread between gas and oil-indexed prices*

Industrial customers using the gas index in their formula have been surprised by its high level of volatility. The UK gas market in particular is characterised by increasing volatility, both in terms of spot prices and future prices. Having become an importer of gas, the UK is increasingly dependent on other European wholesale markets, which adds further volatility. The NBP has become extremely sensitive to weather conditions, climbing sharply at the end of 2005 and the beginning of 2006 (with prices approaching €40/MWh), owing to the very harsh winter, and then plummeting at the end of 2006 (under €10/MWh) during a more temperate winter. These variations applied to both monthly average spot prices and one-year contract prices. At the same time, long-term contract gas prices (based on oil index) stabilised at around €20/MWh. The low gas price on the NBP caused industrial customers to question their use of the oil-index. However, the contracts signed in advance by the industrial customers for one to two-year periods meant that it was nearly impossible for them to exploit this opportunity. On the other hand, sales people who promoted the oil-index were exposed to the risk of purchasers developing a different representation of the market.

Investment banks argued that it was uncertain what the main price reference should be – wholesale market or long-term contracts – and which would deliver the lowest price. But they also displayed an understanding of market fundamentals, focusing their communication on a new type of risk coverage, based on an option, a “best-of” formula designed to deliver the

best price between the two markets. So, complex financial products, such as options, were progressively introduced. For sales people, communicating market representation is strategic as it influences purchasers' acceptance of their proposals.

*Oil price equivalence is undermined by the limits of the long-term contract*

When interviewed, French industrial customers sharply criticised the short-term spot price market. To them, the development of a wholesale gas market in Europe is unlikely to have positive consequences for industrial customers. On the contrary, such a market is likely to be dominated by producers benefiting from their oligopolistic situation. One reason for this is that substituting gas with fuel oil is becoming less possible: fuel oil is mainly used in transportation and dual firing capacity in industry and electricity generation is on the decline. This is likely to foster rising gas prices. Today, long-term contracts indexed to oil products help to limit the market power of producers. Finally, according to the French industrial customers, a wholesale gas market would allow gas producers to redefine their price and stock up on profits. The long-term contract is considered as a reliable means of accessing gas resources.

The problem is that long-term contracts do not fully meet demand. Suppliers need to buy the difference on the wholesale market, at spot prices, in order to keep enough reserves for domestic consumption. The relative scarcity of long-term gas contracts introduces a new issue to be negotiated between suppliers and industrial customers. This became evident to several major industrial customers in France in 2007. To be able to negotiate better prices, these customers carried over their physical gas purchases for 2007 until the end of 2006, threatening to buy gas from alternative suppliers. The incumbent supplier announced that there was a risk

they might face a shortage of gas from long-term contracts. The industrial customers refused to believe this. However, this became the case: the incumbent supplier thus had to buy gas on the wholesale market through “futures” contracts. Their offers to the industrial customers thus became based on the “futures” price and not on the long-term price indexed to oil.

Throughout the autumn of 2006, the futures prices for 2007 remained higher than the oil indexed price. To the industrial customers these events revealed the consequences of the development of the wholesale market: the progressive abandonment of oil indexation by suppliers. As a consequence, industrial customers were forced to enter what they considered to be a highly speculative situation. They felt trapped, without any real alternative.

The oil indexation, a taken-for-granted market device, on which complex and sophisticated practices have been built, appears to be an increasingly uncertain device. This fragility is due to a more substantial change in market organisation linked to the decreasing role of the long-term contract. However, although this device is fragile, purchasers are not prepared to immediately abandon it. The continued use of long-term contracts and oil indexation also affects how purchasers view the market: it focuses their attention on the oil price and leads them to ignore other facets of how the gas market operates.

## **Discussion**

Liberalised markets are particularly complex because they combine remnants of a previous economic order (for instance a monopoly) and complex technical regulations. I have investigated the effects of this complexity by studying the role of market devices and market practices, primarily the link between such devices and calculation practices. Among other

things, the resulting account has highlighted the stabilizing role of inherited devices during market transitions. In this section, I discuss four specific observations from the gas market: first, the case suggests that the use of market devices relies on their perceived reliability. Secondly, it suggests that market devices allow new practices to develop. Thirdly, it suggests that the stability of inherited devices is due to their integration in on-going practices, which may persist even when the devices are perceived as increasingly less reliable. Finally, it suggests that liberalization may produce new asymmetries in calculating capacities by weakening inherited market devices that supported purchasing practices.

#### *How actors evaluate the relevance of market devices*

The literature on “market devices” (Callon et al., 2007) has primarily looked at their history (how social organisation and materiality are integrated into the device) and described how such devices support or constrain cognition and action. How actors evaluate the relevance of inherited and new market devices (such as long-term contracts, regulated tariffs and oil index) during market transitions has not been explicitly investigated. Still, this issue is implicit in many historical accounts of the spread of market devices. For example, MacKenzie and Millo (2003) demonstrates how the spread of one market device (the Black-Scholes-Merton formula) was supported by shared rationality and collective action. The case study presented in this chapter suggests that the question of the adoption of market devices in concrete exchange practices is not a trivial one. The relevance of a market device is not only related to its calculative ability or technical robustness; it is also a matter of how it is deployed in economic calculations. For this to happen, the credibility of the market device among market actors is important.

From the point of view of industrial customers on the gas market, the relevance of old and new market devices relies on how consistent they are with their assumptions about the market's structure. If established assumptions are maintained, inherited devices are still relevant. If new assumptions are made about the market's structure, new devices become more relevant. But market actors do not have direct access to market representations. In order to defend the relevance of devices and practices, consultants, banks, incumbents and alternative suppliers peddle alternative market representations. Each actor defends its own preferred practices and devices, as well as a preferred market representation, through what they communicate in their day-to-day business dealings. So, marketing is a matter of communicating market representations, structured around existing or novel market devices, so that the offers they put together make sense to the purchasers. Marketing is thus, at least partly, a matter of fostering confidence in particular market devices.

#### *Inherited market devices support innovation*

My account of the gas market transition suggests that inherited market devices may foster innovation. Even though the gas market is neither liquid nor transparent, gas suppliers and industrial customers have developed practices very similar to those existing on commodity markets. A market device like the oil index stabilises the equivalence between gas and oil prices and promotes the diffusion of financial practices used in the oil market. Sophisticated purchasing and financial practices for gas purchasing are built on this analogy. The oil index thus reduces uncertainty and allows for the import of sophisticated practices into the gas market. Calculations in the gas market result from the overlapping of market devices and practices. The calculative capabilities of gas market actors are thus hybrid and distributed. In

this context, marketing involves manipulating, integrating and/or associating a variety of market devices, both inherited and novel, with new offers.

*Inherited market devices remain despite transition*

The deregulation of the gas market has created a space in which new modes of transaction can compete with one another. However, the inherited upstream economic structure and the practices employed there (the long-term contracts) continue to constrain the downstream market. Incumbent suppliers benefit from inherited resources, i.e. the long-term contracts and the use of oil indexation. However, the transition renders the basis for these devices fragile and uncertain. The development of a gas wholesale market weakens the equivalence relation between oil and gas. Gas now has its own demand and supply.

Confidence in market devices can be maintained even though the market is changing. Market devices can act as “black boxes” that simplify a complicated and confusing context, and whose functioning is taken for granted. The fact that all transactions and financial activities pertaining to a gas contract are defined according to the oil price is not necessarily questioned. By employing the oil index in gas market transactions, gas is effectively transformed into an oil product. The oil index remains a reference for gas transactions even though it does not represent supply and demand of gas. This suggests that market devices can live a life of their own, independent of “market fundamentals”; they can survive even when they have been cut off from their roots. During transitions, “black boxed” devices may remain in use because they offer security. But they may also be “reopened” when they no longer seem to fulfil their initial promises. Actors then revisit their hypotheses about the market on which they were originally constructed. This is one reason why market liberalisation is not an immediate and



univocal process. Some market devices remain in use because they remain associated with particular practices and competencies, associated with an old order.

*The weakening of inherited market devices reinforces asymmetry in calculative capacities*

Industrial purchasers of gas combine different forms of reasoning and juggle with different transaction forms. Their skills, equipment and access to information determine their capacity to “calculate”, i.e. interpret physical and financial gas markets and operate within those markets (or ask others to do so for them). The ability to calculate is a crucial strategic resource that contributes to the position of market actors (Callon and Muniesa, 2005).

Surprisingly, French industrial customers prefer inherited devices, such as the oil index, to the gas index. More market actors are able to offer services on the oil market than on the gas market. Many financial actors are involved in the oil market, whereas relatively few actors are able to manage gas price risks. Hence, French industrial customers view oil indexation as a way of reducing dependence on suppliers and traders. Indeed, they seem convinced that long-term contracts and oil indexation make transactions more “calculable” (Callon and Muniesa, 2005) than the wholesale gas market, even if long-term contracts prevent competition.

By contributing to the calculative capacities of market actors, the use of market devices also has power consequences. New market devices are mastered only by a limited number of actors, whereas inherited devices reduce calculation asymmetries because market actors have learned how to make use of them. A purchaser, who accepts that certain inherited market devices have become less relevant, also accepts greater uncertainty and increased dependence on traders and suppliers. Owing to the complexity and price volatility of the gas market,

purchasers need help from sales people to make sense of the market context. Purchasers thus become dependent on traders (suppliers, financial institutions, etc.) with whom they exchange information and advice. The interactions between purchasers and sales people reflect an asymmetrical relationship where the customer's "calculative capacity" depends on informal relations with suppliers and bank traders. Market liberalisation should have conferred real market power to customers, but in some respects has increased their dependence on suppliers and banks.

The attachment of industrial customers to the long-term contract and oil index is paradoxical. Long-term contracts foreclose the market, and also constitute a source of power for incumbent suppliers. Furthermore, in a transition context, maintaining inherited devices increases the risk of deviating from market fundamentals, like gas supply and demand. Despite this, and despite the European Commission defending the creation of a substantial "transparent and liquid" wholesale market, French suppliers and customers are converging towards continued use of long-term contracts (with a common reference index). These devices are considered more effective in regulating the power struggle between producers and suppliers, and between suppliers and industrial customers, than the development of a transparent and liquid wholesale market.

## **Conclusion**

My analysis suggests that marketing and purchasing activities on the European gas market consist in developing, promoting, evaluating, combining and employing market devices that support and constrain particular forms of transactions. In particular, my account of the

transition of the continental gas market highlights the role of market devices in establishing common references for market exchanges. Although market transition may weaken inherited market devices, such devices may remain in use because they simplify calculations, reduce uncertainties, and limit the asymmetries in calculative capabilities of actors. But the weakening of inherited market devices, e.g. their dissociation from “market fundamentals”, provide market actors with a choice between abandoning inherited devices and becoming more dependent, and continuing to employ them at the risk of losing touch with the market.

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