

## EXECUTIVE SUMMARY

Over the past decade, several IEA member countries embarked on a policy path of market liberalisation of the electricity supply industry. Pioneers in electricity market reform have now been operating with considerable success for a number of years, delivering substantial benefits to economies. Finding the most effective way to develop competitive electricity markets that fulfil the goals of real economic benefits has not been clear, however. Scepticism and concerns are voiced in many countries, and debate continues on several key issues. The sceptics point to the California crisis and market breakdown in 2001, only a few years after the new market was launched under much publicity and the subsequent and spectacular bankruptcy of the large energy company Enron. The widespread blackouts in North America, Italy and Scandinavia in 2003 are also sometimes used to argue that electricity market liberalisation is a failed concept.

Today, extensive expert opinion and research material identifies the root causes of some of the past failures. The California crisis can be attributed to a wide range of factors, including important regulatory failures in the set-up of the California market. Official investigations into the 2003 blackouts do not blame liberalised markets for being the root causes of those events. Learning from these blackouts, a recent IEA study on transmission system security points out that liberalisation has fundamentally changed the use of transmission systems. The management of transmission systems still needs to adapt to these changes. With that adjustment in place, liberalised markets can provide a framework that improves system security, largely through increased co-operation amongst jurisdictions.

While the public has focused on the remarkable failures of the past decade, several electricity markets have been operating successfully and have developed into robust markets during the same period. In all IEA member countries, the liberalisation process has progressed at varying speeds. Despite the fact that no straightforward path to success has emerged, there is a general lesson to be learned: Electricity market liberalisation is not an event. It is a long process that requires strong and sustained political commitment, extensive and detailed preparation, and continuous development to allow for necessary improvements while sustaining on-going investment. It is, in fact, a process that has not yet been completed anywhere in the world – nor will it be in the foreseeable future.

This book focuses on the experiences and lessons learned in several pioneering markets that have now operated with considerable success for a decade or more. While discussing prescriptions for successful electricity market

liberalisation and drawing on real-world experiences, three questions are pursued: *Has electricity market liberalisation been practicable? Has it delivered real economic benefits? If so, what are the key issues for success?* The key messages, conclusions and recommendations following from the findings are presented in this Executive Summary.

## Electricity Market Liberalisation Delivers Long-term Benefits .....

Traditionally, electricity sectors developed and operated within strictly regulated frameworks in which vertically integrated utilities have handled most or all activities – from generation to transport to distribution. Moreover, it has been a centrally planned activity, wherein needs are assessed and fulfilled by electricity system planners and all associated costs are passed on to consumers.

But traditional, vertically integrated utilities tend to create substantial overcapacity, a fact that became more obvious when electricity demand growth slowed during the 1980s and 1990s in many IEA member countries. In addition to reducing this overcapacity, liberalisation has also been shown to provide large potential gains from improved efficiency in the operation of generation plants, networks and distribution services.

Monitoring of electricity rates paid by different customer classes is one basic way to assess the performance of liberalised electricity markets. Indeed, many countries promised falling prices prior to launching liberalisation processes. In markets that have liberalised successfully, there is a clear trend of falling electricity prices for industrial consumers, in both nominal and real terms. The trend is less clear, and certainly slower, for household consumers. However, prices paid by consumers do not necessarily reflect the costs of producing and transporting electricity. Some consumer groups often subsidise other consumer groups. Different parts of the value chain – from the recovery of fuels to generation and transport of electricity – are also often subsidised in one way or another, or are not fully cost reflective for other reasons. Electricity rates and taxes are often related in non-transparent ways. Changes in fuel costs and environmental regulation, affect final costs of supplying electricity and seems to be important drivers for recent increases in electricity tariffs in many particularly European IEA member countries, but are not directly related to the effects of electricity market liberalisation. In addition, investment decisions made within a vertically integrated industry influence electricity costs for a long time, hence the effects of past investment decisions

will be reflected in retail prices for several years to come. All in all, these factors make electricity retail prices paid by end-users complex to interpret. In reality, retail prices are poor indicators of whether performance development is positive in the electricity industry.

Examining performance in various specific segments of the value change paints a clearer picture. For example, many countries mothballed unused generation assets and data show that they now use existing plants more efficiently. At the same time, fundamental changes in the use of transmission assets has created more dynamic and enhanced usage, often resulting from increased trade across jurisdictions. Other indicators show marked increases in labour productivity.

A recent study by the Organisation for Economic Co-operation and Development (OECD) explores the benefits of liberalising product markets and reducing barriers to international trade and investment across several regulated sectors. It singles out electricity as one of the sectors with the greatest potential for improvement. The results of the analysis assess the total annual benefits across all sectors to be 1% to 3% of GDP in the United States and 2% to 3.5% of GDP in the European Union. The study assesses only the static benefits from increased trade and better allocation of resources, but recognises that dynamic gains from increased innovation may be even greater.

According to traditional performance indicators, electricity market liberalisation is already delivering significant benefits. But it is perhaps even more important to consider how a liberalised electricity sector is better equipped to meet challenges and exploit opportunities of a future more diverse and flexible portfolio of technologies. Combined Cycle Gas Turbines is a preferred generation technology option in many circumstances which is re-enforced in the new market framework where focus on operational and financial flexibility has increased. Uncertainty, which creates financial risk, is seen in a new light; today's market players show a preference for less capital-intensive and smaller units. Technological developments are also creating opportunities for greater consumer involvement in decisions that determine the system. Another driver for change in the technology mix comes from government support of a wide range of technologies – many for their environmental merits and some of which are already being deployed at high rates. Nuclear power is re-surfacing as a technology that warrants serious consideration in some countries.

All in all, a more diverse electricity system is beginning to emerge. Correspondingly, management of this system must accommodate many players, ranging from very small generation units and demand resources to very large nuclear power

plants. Thanks primarily to transparent price signals, liberalised markets are creating a more level playing field and allowing for the necessary co-ordination of many diverse market players. As liberalised markets begin to mature, it becomes more obvious that a centrally planned and vertically integrated approach is less appropriate for such a diverse system and is, in fact, likely to be a barrier to the innovation required to meet the future need.

For the moment, it is critical to avoid being overly short sighted. Liberalisation is expected to bring large economic benefits for consumers and societies in the long term and evidence so far indicates that markets can deliver these benefits. But in the short term certain groups may not realise immediate benefits or may even experience losses. Vertically integrated utilities are likely to feel threatened by the requirement to unbundle. Consumer groups that previously benefited from subsidised electricity tariffs (at the expense of other consumers) may perceive liberalisation as a loss as cross-subsidies are unwound. Certain segments of the utilities' workforce will feel threatened when open competition demands higher efficiency and increased labour productivity. Without question, one of the most critical policy challenges facing decision makers is the management of social and equity issues in distributing the benefits of electricity market liberalisation.

## Key Message

*Electricity market liberalisation has delivered considerable economic benefits.*

*Under pressure from competition, assets in the electricity sector are used more efficiently, thereby bringing real, long-term benefits to consumers. Liberalisation to introduce competition is, however, a long process rather than an event: it requires on-going government commitment to resolve challenges when vested interests and cross-subsidies are unwound.*

## Government has a Critical but Fundamentally Changed Role.....

Regardless of the approach to liberalisation, the process requires strong government involvement. In fact, the level of on-going political commitment invested significantly influences the outcome. In the absence of clear signs of

commitment, regulatory uncertainty may well become self-fulfilling and undermine a positive outcome. From time to time, all electricity systems will experience a crisis. Such crises have become important tests of the robustness of liberalised electricity markets and, perhaps even more importantly, of the robustness of the political framework backing the liberalisation process. At difficult junctures in market development, signals of strong political commitment – often expressed by *not* intervening – can lead to the necessary market responses.

Effective markets are fuelled by competition. Thus, one of government's most decisive roles is to establish a framework that allows for the development of effective competition. Liberalisation creates benefits by introducing incentives for higher efficiency and more innovation – with competition as the driver.

The first step required to introduce competition is to break down the monopolies that exist in traditional vertically integrated utilities. It is necessary to separate network activities from all other activities, either through legal unbundling of the network entities or, more effectively, through true ownership unbundling. The key is to introduce competition in as many parts of the value chain as possible – from generation to consumption. Remaining natural monopolies (*e.g.* networks and system operation) should be subject to continued and improved economic regulation.

Unbundling effectively breaks up the centralised decision-making process found in vertically integrated utilities, replacing it with a decentralised process where market players make decisions within markets. This can only work smoothly when markets are 'effective', but effective markets do not develop automatically. Creating a level playing field and developing effective, competitive marketplaces requires establishing detailed market rules, design and regulation. Within the on-going liberalisation processes, the level of government involvement through detailed legislation and rule-making has varied. But it is evident that governments are critical to establishing a framework with the necessary incentives. At the same time, independent regulators are one of the critical bodies within this framework; their role in overseeing compliance with legislation and ensuring fair and efficient economic regulation of networks is fundamental to successful market development.

Real-time system operation is an aspect of the electricity sector that is maintained as a natural monopoly and, thus, should be unbundled from other competitive segments of the value chain. Market rules, design and regulation aim to direct all actions transparently, but many subtleties remain in secure, day-to-day system operation. It is inevitable that system operators will preserve certain discretionary powers, regardless of careful efforts to

regulate grid access. Their independence is particularly critical to the creation and further development of well-functioning and robust markets.

In the new decentralised industry structure, transparency is a prerequisite for developing competitive liberalised electricity markets. Competitive market players do not automatically (or voluntarily) collect and publish fundamental market data and statistics. Therefore, it is important to redefine responsibility for this necessary task in liberalised markets. Increased transparency is a proven, strong instrument to ensure continuous development towards more effective markets. In fact, transparency adds to the benefits of liberalisation in its own right, by improving the decision-making framework for all actors – policy makers, industry and consumers alike.

But a formal framework that allows for competition and creates a level playing field is not enough. Competition will flourish only if multiple players compete in the market. Governments and regulators have managed to enhance competition through various means, but a high level of market concentration remains a serious concern in several markets. Effective markets and transparency have been vital to easing access for new-comers. In addition, extending markets across countries and regions helps enable the “import of competition”; this is particularly important in smaller jurisdictions in which the need for consolidation limits the number of market players that can operate efficiently. To date, achievements are more limited in *ex post* regulation of competition. It is illegal to exercise market power, but it often remains difficult to prove such behaviour. In some cases, dealing with market power abuse has been further complicated when the largest companies are regarded as national champions or provide substantial revenue streams to their public owners.

Some claim that market failures are inherent across the value chain in electricity markets requiring government intervention. But, upon closer scrutiny, many alleged failures turn out rather to be the result of regulatory failures. In the event of real market failures – as might arise from concerns about reliability of supply and the environmental impacts of electricity production – governments may be called upon to intervene in more active ways.

Analysing reliability of supply in unbundled electricity sector has also called for an “unbundling” of the concept of reliability of supply into its relevant parts of the value chain. Concern has been voiced about secure supply of fuel for power generation, adequacy of investment in generation and network assets, and the security of real-time system operation.

Considerations concerning market failures involving the secure supply of energy or fuel for electricity generation are an issue with geo-political

dimensions. Increased use of natural gas as a fuel for power generation raises the issue of IEA member countries' dependence on natural gas supplies from non-member countries – and stresses the importance of developing, in parallel, a competitive market for natural gas. Thus far, the levels of security of fuel supply ensured by commercial market players have not undermined the performance liberalised electricity markets.

Also, so far, the efficiency of liberalised markets has sufficiently incentivised adequate generation capacity. Despite efforts to integrate some network investment decisions in the competitive market framework, networks remain, more or less, regulated monopolies. Adequate network assets must be incentivised through a framework of economic regulation.

Finally, when it comes to secure real-time system operation, markets so far have failed to provide a complete framework of incentives without jeopardising system security. Government intervention is necessary and this has been carried out (rather effectively) through the establishment of truly independent system operators. A recent IEA publication explores the main requirements and challenges for effective regulation that creates the necessary levels of transmission system security.<sup>1</sup>

The environmental effects of electricity generation are not addressed by normal incentives in competitive markets. Environmental benefits are classical public goods and liberalised electricity markets will not adequately account for their value – or for the cost of their potential loss. Policy intervention is needed to ensure they are properly taken into account. Policies motivated by environmental and climate change concerns are already having serious impacts on liberalised electricity markets, as was intended.

Many environmental policies are, however, potentially distortive beyond the initial intent, particularly when looking across internal markets within the context of international competition. Direct financial support for particular technologies, or non-transparent barriers that block development of others, can lead to inefficiencies and distort competition. This adds uncertainty to the investment decision process and ultimately poses a threat to the system. In several liberalised electricity markets, the preferred option to address this issue is implementation of cap-and-trade policies. This approach transforms the political goal into an obligation imposed upon market players. Market players are then left to fulfil the obligations in ways that they find optimal, including trading the obligations amongst themselves and finding alternative technology solutions.

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1. IEA (2005), Learning from the Blackouts: Transmission System Security in Competitive Electricity Markets.

For example, carbon dioxide (CO<sub>2</sub>) emission trading was introduced in Europe to address climate change. Creating a market for CO<sub>2</sub> emission permits creates a price for CO<sub>2</sub> emissions, thereby making it possible to internalise the environmental cost within the total cost of producing electricity. Following similar principles, support for renewable energy has changed from direct financial support for specific technologies to market-based certificate systems backed by obligations. Fulfilling climate change policies through cap-and-trade instruments seems to be the least distortive option. In addition, this approach adds transparency that enhances the quality of decisions made by policy makers and industry.

## Key Message

***Establishing truly independent and committed regulators and system operators precedes a competitive framework.***

*Liberalisation still requires strong and committed government involvement, but in fundamentally changed roles. Vertically integrated utilities must be unbundled. Governments, independent regulators and independent system operators must collaborate to establish rules, market design and regulation that create a competitive market place and support its further development. Continued government commitment and signs of support is crucial, particularly at the difficult junctures every market will, inevitably, face.*

## Price Signals are the Glue .....

In the process of unbundling utilities to introduce competition, vertical integration has been replaced with markets comprising multiple players. In this new framework, price signals direct decisions in the marketplace. Efficient decisions depend on correct signals, *i.e.* price signals that reflect the real costs, benefits and values of producing, transporting and consuming electricity.

Electricity has a value to the consumer only if it is supplied at the right place, at the right time, in the right volume and at an acceptable quality. The locational aspect of electricity pricing is the most controversial and complex issue in efficient pricing. Principles that establish a price for each node in a system are the ideal reference because they value electricity based on where it is generated and delivered, and some markets come close to achieving this.

However, there are important trade-offs to consider when choosing pricing principles that could justify a less fine-tuned, zone-based system, where a price is established for several nodes that are rarely congested. Even though there are important trade-offs, the main controversy often relates more to social equity and distribution rather than specific pros and cons of market functioning and system operation. Nodal pricing evolved as a necessity in highly meshed networks where transmission lines are criss-crossing the electricity system (*e.g.* North America); zonal pricing is accepted as a good approximation in more radial networks, where the structure of congestion is less complex (*e.g.* Australia). Higher transaction costs and the greater complexity of nodal pricing are often used to argue for pricing principles that are less reflective of location. In reality, evidence shows that obvious congestion points have often not been priced appropriately. The highly meshed network in continental Europe is currently developing into a zonal market, often with countries constituting entire zones, thereby potentially blurring price signals and inhibiting efficiency.

Open trade across jurisdictions is one of the classical merits of liberalised and competitive markets. It enables exploitation of comparative advantages – at mutual economic benefit for all regions involved. Electricity generation and transport include many factors related to resource endowments, geographical characteristics and regional skills. They are both very capital-intensive businesses that can realise significant gains by optimising asset use across as large an area as possible. This is particularly true for smaller jurisdictions. But trade across jurisdictions relies on co-operation amongst system operators. Therefore, independence and appropriate incentives of system operators are critical in the development of cross-border trade.

Designing an appropriate market model is a matter of creating trading arrangements that fit to the specific circumstances of each electricity system while also addressing broader key issues of unbundling, third-party access, cost-reflective pricing and transaction costs. There is not one single winning market model - no one-size-fits-all – in each situation important trade-offs must be made. However, there is one common feature of all successful markets: some sort of formal price quotation, conceived through formal market design. Cost-reflective pricing principles are an aspect that must be fostered through regulation and active market design and will not develop without well-designed market rules.

Electricity consumption and supply are inherently volatile. But the volatility is an inseparable characteristic of the service and is not related to the organisation of the sector. Liberalised electricity markets create a more

transparent framework, allowing for cost-reflective pricing reflecting this volatility. In some instances, government interventions to suppress volatility and cap prices below what can be justified by economic reasons have blurred price signals and slowed market responses.

Price volatility creates risks for market players, including generators and consumers. Risks are the result of uncertainty, and there is considerable uncertainty connected with many of the fundamental factors that determine electricity generation, transport and consumption. In the previous model of a vertically integrated and regulated sector, all costs – and, therefore, all risks – could be passed on to consumers. Liberalised markets make risks more transparent and, more importantly, re-allocate these risks to the decision makers themselves.

In liberalised electricity markets, business risks can be effectively managed through contracts. Generators, retail suppliers and consumers can agree on prices, volumes, times and other conditions that create the desired certainty within the framework of the contract. In fact, liquid and effective markets for financial contracts improve competition by enabling sophisticated risk management. This, in turn, eases market access for new and smaller market players and contributes to ensuring that market power is not exercised. Most markets provide a framework for a liquid market in the day-ahead and real-time segments through market rules and design. In some markets, relatively liquid and effective financial markets for longer-duration contracts are developing, but the evolution of these markets remains a major concern for the creation of robust electricity markets.

## Key Message

***A framework for efficient and cost-reflective prices is established through regulation and market design.***

*Prices that reflect the inherent volatility of electricity are critical in creating a framework for efficient decisions regarding operation and investment in liberalised markets. Electricity market design, as conceived and implemented by governments, independent regulators and independent system operators, can create prices that reflect real costs through mechanisms that incorporate time, volume and location. Blurring price signals with price caps or insufficient locational signals slows market responses in short-term operation and longer-term investment. It is therefore potentially risky for reliability, particularly in the longer term.*

## Empowering the Consumer .....

Vertically integrated utilities naturally focus on the supply side of the electricity sector, concentrating on the two pillars of electricity generation and transport. Until now, consumers paid the bill, and no infrastructure was in place to involve them in decision-making processes. Liberalised electricity markets introduce a third pillar that allows consumers to become active participants. Effective markets allow consumers to exercise their right to shift supplier, thereby enhancing competition for better services and increased innovation. Perhaps more importantly, consumer response to prices adds real resources to the system, potentially saving expensive generation or transmission investment and improving reliability. Finally, improved transparency from cost-reflective prices provides clearer incentives for more efficient energy use. This new third pillar is a product of the recent liberalisation process and, unsurprisingly, it has developed more slowly than the other two pillars. While the framework for consumer participation now exists, many of the detailed structures needed to facilitate ease of participation must still be further developed.

A first building block to empower the consumer to participate is to create the necessary competitive pressure. Such pressure creates the incentives needed for retail companies to bring the opportunities of a competitive wholesale market to the doorsteps of consumers.

Retail competition is based on the same principles as wholesale competition, with regulated access to the grid being the key factor. Unbundling of competitive retail activities from network activities is an important aspect of the process, but in most cases this phase of liberalisation has been less comprehensive than in transmission and system operation. Regulated access is provided by constructing systems and formal rules for consumer switching, but many markets still have small, but possibly decisive, barriers to switching – or still offer advantages to incumbent semi-integrated retail and network businesses. In all competitive markets, larger industrial consumers have switched in great numbers. The experience for smaller commercial and residential consumers is more varied, ranging from high switching rates in some markets to disappointingly low rates in others. In jurisdictions with liquid financial markets, more sophisticated retail products have been developed to better serve the needs of consumers who want to take an active role in managing risks. However, overall product innovation and development has been slow and sporadic.

Anticipating that many small commercial and residential consumers will not switch retailers, some states and countries opted to introduce a regulated

default tariff or contract to protect consumers. While the justification for such regulated contracts is clear in a political context, they also often create distortions that may serve consumers poorly in the end. Establishing competitive retail markets that provide easy access to switching between competing retailers remains a challenge.

Another effect of the somewhat slow development of competitive and innovative retail markets and the still often supply focused market design is the failure to bring wholesale market prices to the doorsteps of consumers. So far, there has been only limited opportunity for consumers to create benefits by shifting load as a price response. Considering that electricity is consumed by millions of different consumers for millions of different purposes, consumers are undoubtedly, in principle, willing to shift demand by varying degrees as a response to different prices. Demand is price-elastic: the challenge is to lower transaction costs sufficiently to justify participation for consumers who stand to realise the largest potential benefits. At present, a large barrier is in the hands of retail companies that must bring wholesale prices to the consumers' doorstep. That being said, there must also be something to respond to: consumers cannot be expected to respond before prices rise sufficiently to off-set transaction costs. The largest consumers, who already have remotely read interval meters, are likely to be the first to see the benefits of shifting demand in response to price. Finding a way to take the wholesale price to the doorsteps of smaller commercial and residential consumers is, however, fraught with a technical and economic barrier given the absence of necessary metering equipment.

Lack of demand participation remains one of the most serious challenges in liberalising electricity markets. The barriers are numerous. Creating easy and effective systems to manage retail switching is challenging. For small residential consumers, the infrastructure to enable switching is relatively costly compared to the potential benefits. In addition, it has been difficult to remove all distortions from semi-integrated networks and retail companies. Where governments show a willingness to intervene through price caps and other means, this also serves as a barrier to demand participation. Finally, lack of liquid financial markets makes it difficult to create the necessary innovative products. However, early evidence shows that consumers do switch suppliers and do respond to price when the conditions are sufficiently good. In fact, remarkably little demand response to price is necessary to significantly improve the performance of electricity markets, enhance system security and substantially reduce volatility and electricity prices for all consumers.

## Key Message

***Removing barriers to retail-switching and to active demand participation empowers consumers.***

*Liberalised electricity markets provide a framework that can empower the consumer to exercise freedom of choice, to realise benefits from active response to prices and to consume energy more efficiently. Effective retail competition is a prerequisite to realising these benefits. A formal system must be in place to enable quick and easy retailer switching. Demand resources must also have easy access to wholesale, balancing and reserve markets. Opportunities to install metering equipment and infrastructure that serve the needs of different consumer groups should be considered, with due attention paid to cost-effectiveness.*

## Efficient Incentives for Investment are Critical.....

A substantial share of the electricity consumer's bill goes toward financing generation and network assets. The opportunity to improve investment decisions is a significant potential benefit of market liberalisation. The ability of electricity markets to provide sufficient incentives for timely and efficient investment in generation plants continues to be one of the most debated aspects of market design. Many investment projects require long lead times and have an economic lifetime of several decades. The transitional phase of market development is characterised by uncertainty that may undermine the investment climate – and ultimately the successful transition to a competitive market. Investments in power generation are one of the big tests for the development of robust markets.

Liberalised markets create a new investment paradigm in which decisions are taken under competitive pressure. When risks are shifted from consumers to decision makers, capital-intensive technologies with long construction times are viewed with greater scepticism – even if marginal costs are low. In the new competitive environment where risks are transparent, market players prefer technologies with short leadtimes that can be built in small incremental steps. Competition also pushes investment decisions to the last minute, which saves resources but can also put policy makers under pressure to intervene in a transitional phase (*i.e.* before the process has proven to be robust).

In situations where the supply and demand balance is tight, demand response to price can constitute the necessary buffer of last resources and add much-needed flexibility. To date, a certain level of active demand participation has been critical in re-affirming the robustness of markets; conversely, lack of demand participation has laid the groundwork for very high price spikes needed to trigger investment. When governments have refrained from intervention and let prices reflect real costs, markets have come through – they have not failed to provide incentives for a response through investment in new generation capacity. In this context, so-called “energy only” (or, more correctly, “one price only”) markets, in which the wholesale electricity price provides remuneration for both variable and fixed costs, have performed well.

Some markets have not shown enough confidence to rely on the delicate balance inherent in this new investment paradigm. These markets assume that consumers are not willing to participate and thus find that protective price caps are necessary as a consequence. However, with the barrier of a price cap, extra incentives must be added to prompt timely and adequate investment. These extra capacity measures have been implemented in various forms and have incentivised new investment. But they have also been prone to market manipulation. Another drawback is that capacity measures force decisions regarding the overall need for new generation capacity back into a centralised decision-making process.

Investments in networks are, by and large, still being made within regulated frameworks. Distribution networks are still regulated, even though liberalisation reinforced the focus on cost-cutting in the whole value chain, including networks. The introduction of new economic regulation models prompted cost cuts but, in many countries, the focus is now shifting to quality aspects. Low investment levels and quality problems have directed the focus towards the necessary regulated rates of return to award investment and other incentives tied to quality.

The development of regulated transmission networks is similar to that of distribution networks. Locational pricing in wholesale markets has, however, added crucial analytical input to enable more qualified investment decisions in transmission networks. In effect, transmission networks are an alternative to generation plants. Thus, in principle, transmission investments could rely entirely on locational pricing and commercial, competitive enterprise. In reality, the business model for merchant lines has proven to be fragile. Very few merchant lines are currently financed by purely commercial means, but locational pricing has still added substantial transparency to the process of making investment decisions in transmission. For example, several markets are developing information systems that enable a more co-ordinated interaction between decisions on regulated transmission investments and decisions on investments in generation plants.

It is important to design markets and create regulatory frameworks that provide sufficient remuneration and incentives for efficient investment. But none of this makes any difference if investors cannot get permission to build. The absence of transparent and smooth approval procedures – whether to use a particular technology or to site a new generation plant or network at a particular location – continues to be a serious barrier to investment in most markets. This is not related to the liberalisation of electricity markets; rather, cost-reflective locational prices make the consequences of related environmental policies and the so-called “not in my back yard” (NIMBY) syndrome more transparent.

## Key Message

***Minimising regulatory uncertainty is key to creating a framework for timely and adequate investment.***

*Some amount of regulatory uncertainty is a fact in a changing world, but governments can take a number of measures to credibly minimise this uncertainty for investors. Investors in new generation capacity, particularly small market players, need access to market information, a well-established marketplace and regulated access to this marketplace. An investor will also require a transparent and clear procedure for applying for new investments, in terms of both siting and choice of technology. Any signal of government willingness to intervene in the market, including possible future support and possible price capping, will add uncertainty and deter investment. Finally, regulated network investment requires adequate regulated rates of return to maintain an acceptable quality of service in the long run.*