



Subsidies limit Indian LNG demand 3

India's low regulated domestic gas price does not provide sufficient incentive for new upstream investment. This has created an import gap, but Indian demand for LNG is highly price sensitive and distorted by subsidies in other sectors. The recent drop in international LNG prices represents a large opportunity to fulfill India's latent gas demand, but it's not clear that they have yet fallen far enough. **Sunil Saraf**



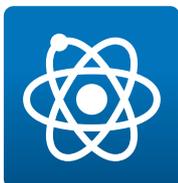
Solar power undermines Australian coal 7

Developments in the Australian power sector highlight the challenging trends affecting the electricity industry worldwide. Despite economic growth, electricity demand is falling and there has been a big divergence in wholesale and retail power tariffs. Solar power is undermining coal's future in the domestic market, meaning that coal must look to exports at a time when coal prices are breaching new lows. **Neil Ford**



Russia's evolving gas export strategy 11

Gazprom is seeking an enhanced role in price formation at European gas hubs, an expanded role in storage and direct sales to end-users in compliance with the EU's Third Energy Package. It is working closely with the EU on a new way of building onward transmission capacity within the EU, while at the same time seeking to mitigate transit risk to the benefit of all parties concerned. **Andrey Konoplyanik**



Diesel future: the VW scandal 16

The scandal over diesel engine emissions at Volkswagen has sharpened the debate about the future of diesel itself. Yet this debate was already well underway. The danger with the scandal is that in the eyes of public opinion, the case against diesel is now virtually 'open and shut', without any serious examination of the consequences... **Chris Cragg**



East Mediterranean gas supply post-Zohr 19

The discovery of Zohr, a major gas field offshore Egypt, could transform the country's security of gas supply, but whether exports can be resumed using domestic gas depends critically on the level of internal demand, which has been obscured by shortages. Nonetheless, the discovery of Zohr threatens the prospects for the supply of Israeli and Cypriot gas to Egypt's two idle LNG plants.



Brazil banks on uncertain 13th round 22

Latin America's largest economy is hoping the global oil industry can help lift it out of recession by snapping up the fresh exploration acreage on offer in the country's delayed 13th bid round. But low oil prices and spending cutbacks mean Brazil, once the darling of oil majors with its massive subsalt discoveries, faces stiff competition for a shrinking pool of oil-investment dollars. **Jeff Fick**



NEWSFLASH: Oil prices fall as demand rises! 26

The IEA in September highlighted a forecast sharp drop in non-OPEC oil production in 2016 and five-year high oil demand in 2015. In contrast, Goldman Sachs predicted potential for oil to fall to \$20/b. Both like to grab the headlines. A price-driven demand response is evident in the US, but the global macroeconomic backdrop is that economic growth in future will be less energy intensive than in the past. **Ross McCracken**

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Value in regasification

LNG buyers may be missing a valuable opportunity. LNG is typically regasified by burning gas to heat the cooled LNG, although in some cases passive warming, for example the use of seawater, is employed. While the latter system is cheaper, both methods ignore the fact that a cargo of LNG is also a cargo of 'cold', and cold, like heat, is a form of energy storage.

The tolling costs of liquefying gas in the US of around \$2.5/MMBtu give an idea of the value contained within each cargo of cold.

The question is how to retrieve this energy? The answer may already exist in the form of the Peter Dearman liquid air engine. This concept rests on the force exerted by the expansion of liquefied air when it is exposed to ambient air temperatures. Critically, there is no combustion as the energy is released through expansion, which in the Dearman engine is used to move a piston. Liquid air expands by a factor of 710 when changing from liquid to gas, LNG expands by a factor of 600.

A key challenge is that air is inert and non-explosive, while natural gas is highly flammable, but that's one for the engineers. A second challenge is that regasification may be scheduled in relation to demand and an expansion-based regasification process may prove less flexible than simply heating the LNG, but this is essentially a storage issue.

The fact is that a cargo of cold has value in and of itself, regardless of the medium in which it is carried, although some mediums are better suited to releasing that energy in a usable way. But if the principle of the liquid air engine can be harnessed within a regasification plant then regasification could produce saleable electricity and become a revenue generator, rather than literally burn money through the consumption of natural gas.

— Ross.McCracken@platts.com



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the current coal fleet means a big renewal of the country's generating stock will be required, creating an opportunity for a huge change in the generation mix.

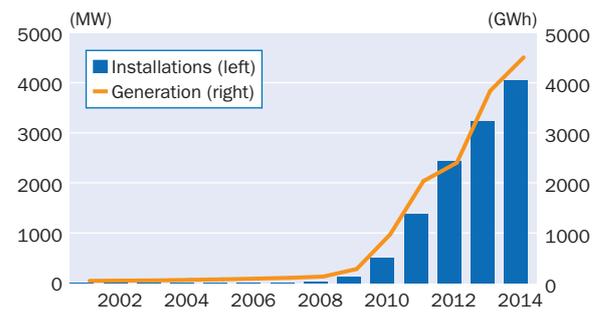
Frischknecht said: "The challenge is that we have existing fossil fuel power plants that are fully depreciated – that means they've been fully paid for, and you can't compete against that and it will be...a while before we can. However, if you wanted to build a brand new, coal-fired power station, it already is competitive, both wind and solar, similar in price or cheaper."

The coal industry is still keen to promote cleaner coal technology in power generation, but this is unlikely to fit into a longer term, low carbon future unless any revolutionary innovations emerge, at least sufficient to take coal emissions to the level of existing low emission gas-fired plants, but without a prohibitive jump in costs.

It is not just pro-renewables organizations, such as IEEFA, that are predicting a bright future for solar power in the country. The AEMO for South Australia forecasts that solar PV could account for all daytime energy consumption in the state within 25 years. This will deter the construction of thermal power plants that require more time to recover their construction costs and generate a profit.

The growing PV market is leading to some interesting innovation. Councils are beginning to invest in PV installations in car parks, thereby

Australian solar PV installations and generation



Source: Australian PV Institute, BP

avoiding the costs entailed in buying land. There have also been trials in Queensland, where many residential PV units come together to pool production in the form of a virtual power plant. The renewable energy movement is keen for the NEM to promote smart grid solutions and demand management rather than the traditional kind of national grid based on large thermal plants.

Forecasts on growth in Australian PV have become more and more optimistic over the past few years. Some analysts suggest that the country will have 50 GW of solar generating capacity by 2040, with half of that residential and on the roofs of businesses. That equates to about half of all anticipated generating capacity by that date. Such an eventuality will certainly reduce the scope for coal-fired capacity.

Russia's evolving gas export strategy

Gazprom is seeking an enhanced role in price formation at European gas hubs, an expanded role in storage and direct sales to end-users in compliance with the EU's Third Energy Package. It is working closely with the EU on a new way of building onward transmission capacity within the EU, while at the same time seeking to mitigate transit risk to the benefit of all parties concerned. **Andrey Konoplyanik**

Russia has been adapting its gas export strategy in line with developing trends in gas export markets where it is already present or aims to be present. The former markets are the mature European market for pipeline gas, and limited supplies of LNG to Asian markets, mostly Japan. The latter is represented by China in particular, Asia and the more globalized and interconnected global market for both pipeline gas and LNG, which is in the making.

A number of major factors have prompted Russia's post-2009 strategy. On the demand side, recession, improving energy efficiency and inter-fuel competition, particularly in power generation, have slowed demand growth for gas, even to the point of stagnation, although declining EU gas production will still mean increased imports into the region.

On the supply side, gas supply to Europe has increased, most recently the re-routing since 2007 of Qatari LNG flows initially destined for the US market. As a result, the EU gas market is now over-supplied, putting downward pressure on gas prices.

In addition, institutional changes, such as the EU's Third Energy Package have established a new and much more competitive architecture for the EU gas market. And, finally, unfortunate political developments resulted in major Russia-Ukraine gas transit crises in January 2006 and January 2009. As a result, Russia has made a major reassessment of the transit component of its gas export strategy to Europe.

Russia's response to these changes has been to aim for more diversification and flexibility from the exporter's

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perspective, while continuing to maximize resource rents for the Russian state through its sole legal corporate pipeline gas export agent, the majority state-owned gas company Gazprom.

The emergence of transit risk

Under the EU’s Third Energy Package, the unbundled capacity market means that a gas supplier can act within the EU only as a shipper. Capacity allocation for available transportation capacity with mandatory third-party access is provided by auctions as the default procedure. However, in the case of new cross-border pipelines, capacity can be allocated by “alternative capacity allocation mechanisms”, according to the Agency for the Cooperation of European Regulators’ (ACER) draft Capacity Allocation Mechanism Network Code for Incremental Capacity, which has yet to be adopted by the European Commission and member states. In effect, this means an “open season” procedure.

Gas transit has also changed from the historical Soviet single pipeline concept to the current multiple pipeline concept – at least two pipes/corridors or means of supply to each export market. The single pipe concept was based on direct control for each export route from Russia through to the EU border, reflecting the realities of the Cold War division of Europe. This was the cheapest option because it entailed only technical risk and no transit risk.

The competitive multiple routes concept is more costly as it takes into account both technical and transit risks, with the consequent financial costs of risk mitigation. This concept reflects the dissolution of the USSR and COMECON and the emergence of new sovereign states within the gas supply chain. The economic justification for new Russian pipelines to Europe is thus based not so much on the prospective sale of new gas, but on the mitigation of transit risk.

Long Term Contracts – a means to an end

Pre-2009, Gazprom’s export strategy was based on the dominance of Long Term Contracts with indexation to oil prices. In Europe, this meant mainly oil product prices. The standard approach was based on the “Groningen-type” LTC.

This made Gazprom a price taker in the global oil market, which it still is. In an era of high and rising oil prices and increasing demand for natural gas, this approach enabled Gazprom to earn the highest possible resource rent from its natural gas. To do so is the sovereign right of states, a right protected, *inter alia* by UN resolution 1803 as of December 1962. Oil indexation, often portrayed as an end in itself, was in fact just the most appropriate means of achieving this during a period of high oil prices.

Moreover, between 2003-2009, the “Groningen scissors” effect brought a substantial bonus to buyers. The lagged effect of oil prices on gas prices meant that buyers consistently paid a lower price for gas than the then ‘current’ oil price.

From 2009-2014, as the market became oversupplied and oil prices remained high but flat, end-users put wholesale buyers of Russian gas under pressure to abandon LTCs and switch their resales of Russian gas in the retail market to hub-indexation.

This pressure moved up the supply chain, initiating requests from EU wholesale buyers to switch to hub-indexation in their supply contracts with Gazprom. In areas with relatively liquid hubs that had alternative competing supplies of gas – for example, North-West Europe – this made sense as buyers and resellers of Russian gas were buying gas at high oil-indexed prices with take-and/or-pay obligations and having to re-sell that gas at lower hub-based prices.

To stay competitive, Gazprom and other suppliers began to add hub-indexation components into their oil-indexed pricing formulas.

However, requests for change also came from markets where there were neither liquid hubs nor significant competition, such as in South-Eastern Europe and Ukraine. In these markets, for Gazprom, maximizing market rents from gas remained reliant on oil-indexation, sometimes with unilateral price-discounts.

Nonetheless, this approach also encouraged buyers to create the supply competition that their markets lacked, aided by EU regulations, such as the enforcement of EU legal provisions for obligatory physical reverse flows capacity at each EU interconnection point since December 2013.

Hub-indexation and LTCs

What is definitely not appropriate for Gazprom is to adopt hub-indexation within its LTCs and to maintain the current LTC structure, with high take-or-pay (TOP) obligations and flexible nomination rights for buyers. This structure places all price risk on the producer. Wholesale buyers/ resellers of Russian gas faces zero price risk as they effectively buy and sell at the same price.

High TOP obligations and flexible nomination rights also mean they can buy excessive volumes of Russian gas and then sell them at the hubs. This would force down prices to the detriment of the producer, who faces rising upstream costs, as the ‘easy’ gas becomes exhausted.

In this scenario, Gazprom will remain a price taker, not from the oil market, but from the gas hubs, where it is inadequately represented. Gazprom risks being cut out of the price formation process, which would be left to mid-stream companies engaged in wholesale buying and reselling of gas, and which would consequently deepen the downward spiral in gas prices.

As a result, producers, including Gazprom, are searching for alternatives. Whereas before it was the buyers of Russian gas requesting adaptation, today it is Gazprom that is also making the same request in search of a more flexible export strategy.

In the case of LTCs, further deviation from the standard oil/oil product indexation formulas is likely. In the new low oil price environment, indexation to other energy commodities may return higher rents to producers. Producers/exporters might seek lower TOP obligations and a higher proportion of spot sales. Producers now want to transfer contractual volumes to spot markets within LTCs so that they have a choice similar to wholesale buyers under flexible nomination procedures.

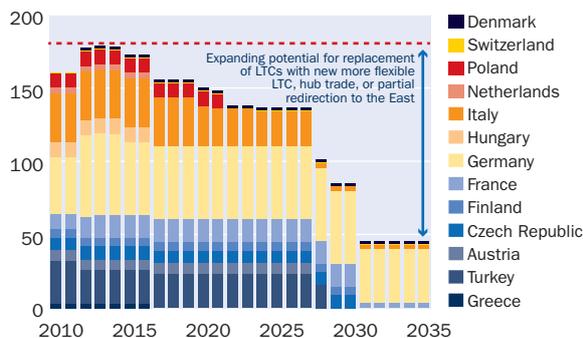
As a result, Gazprom will try to become a direct seller at EU hubs because, in its current position as an indirect seller, it risks seeing excessive TOP gas sold into the market pushing down prices to its own disadvantage. Gazprom, in short, wants to play a direct price-making role on European gas hubs as the exporting agent of a major gas resource-owning state.

In addition, a critical dimension in the development of liquid hubs is adequate underground gas storage. If Gazprom is to be both an exporter of gas under LTCs, under either their old format or in new adaptations, and a seller at hubs, then it needs to continue building a position in underground storage, constructing or renting available capacity.

Boosting sales

A feature of the Third Energy Package is that it allows Gazprom direct access to end-users. Gazprom's initial

Contracted volumes of Russian gas supplies to Europe (Bcm)



Source: Adapted from original: ERI RAS (T.Mitrova), reproduced in & taken from "The Russian Gas Matrix: How Markets Are Driving Change", Ed. by J.Henderson & S.Pirani, Oxford University Press, 2014, Fig.3.1/p.53.

strategy was to buy or construct gas-fired power stations in the EU and supply them directly with Russian gas. However, this is no longer economically attractive as the spreads on gas-fired generation remain stubbornly negative.

Contracted volumes of Russian gas supplied to Europe have peaked. Russia thus faces a dilemma as to how to boost overall sales volumes. It has a number of ways of achieving this, but which it chooses will be determined in large part by the results of commercial negotiations with EU companies, and on the attitude of the EU authorities' and their readiness to take into consideration the concerns of Gazprom as a major non-EU gas producer/supplier within the current political environment.

Russia is already evaluating alternative options, both within and between current EU and prospective Asian (primarily Chinese) gas markets in an attempt to find a new balance of risks and rewards for its gas export strategy. It is from this point of view that the results of Gazprom's auction of Nord Stream gas in September should be assessed.

Ukrainian transits

The level of political and commercial mistrust between Russian and Ukraine creates a prohibitively high level of transit risk for Russia. This also represents a risk for the EU. It is Russia's sovereign right to evaluate transit risk and undertake adequate measures for its mitigation, including the development of by-passes. In an unbundled gas world, there is no obligation for an exporter to stay with the same transportation route for a given supply contract after the expiration of the transit component of that contract.

This is why Russia has announced its intention not to prolong its transit contract with Ukraine after 2019 and to develop alternative routes by-passing Ukraine for timely deliveries of existing contractual volumes of gas to the EU, thus mitigating transit risk for both parties.

However, the European Commission has stated its support for the continuation of Russian gas transit via Ukraine post-2019. The reasons for this appear to be two-fold:

- to provide Ukraine with steady transit revenues post-2019 from Russian gas supply contracts to the EU, which will reduce pressure for the EU to provide Ukraine with financial aid itself; and
- to secure prospective financing and guaranteed pay-back for investment in the modernization of the Ukrainian Gas Transportation System.

It has been proposed that this modernization should be undertaken by an international consortia of Ukrainian, European and American investors. The participation of Russian companies in the proposed consortium is forbidden by Ukrainian law.

Financing such a project would depend on guaranteed transit of Russian gas through the Ukrainian GTS. However, Russia will not bear the risk of guaranteeing transit to the Ukraine-EU border.

The European Commission has unofficially proposed delivery of Russian gas to the Russia-Ukraine border. In this case, either EU companies would have to take the transit risk via Ukraine upon themselves, which they are unwilling to do, or there might be a role for a de facto EU Single Purchasing Agency, a concept that was indirectly mentioned in the EU's Energy Union Package. However, changing the delivery points from their current points would require a large-scale reorganization and renegotiation of contractual arrangements between EU companies and Gazprom, which represents significant disruption and risk in itself.

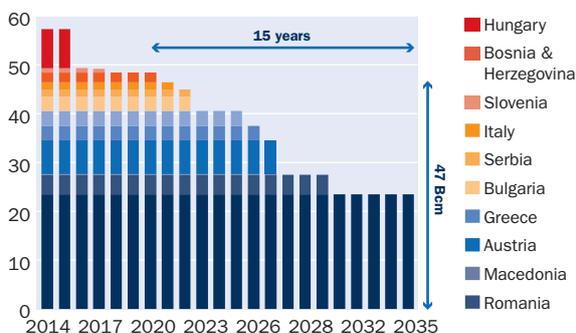
A further consideration for Russia is that Ukraine's participation in the Energy Community Treaty means that it will have to apply the rules of the EU's *energy acquis* post-2019. As such, Ukraine will be considered a 'market zone' with entry-exit tariffs. These tariffs would include the cost of modernization of the Ukrainian GTS and would therefore be much higher than current transit tariffs, making them unattractive to shippers whether Russian or otherwise post-2019.

Southern pipelines

In December last year, Russian President Vladimir Putin announced that Russia was cancelling the South Stream gas pipeline project and would instead develop an alternative – Turkish Stream. This would land on Turkey's Black Sea coast with the same 63 Bcm capacity as South Stream and deliver 16 Bcm to Turkey and 47 Bcm of gas to the Turkish-Greek border.

This gas would be gas currently routed through Ukraine, and therefore needs to reach South East European states and most particularly the major Austrian gas hub at Baumgarten, which provides interconnectivity with northern Italy.

Russian gas supply contracts to CEE via Ukraine (Bcm)



Supply contracts = 100% security for TSO project financing of new capacity

Source: Calculated by E.Orlova (FIEF) based on: "Turkish stream": Scenarios of by-passing Ukraine and barriers of European Commission". Vygon Consulting, June 2015 (fig.4, p.30).

Unlike South Stream, the onshore extension of Turkish Stream, which would take gas from the Turkish-Greek border to EU markets, is to be developed in full compliance with Third Energy Package rules. This means that Gazprom will act only as a shipper inside the EU and it expects that the costs of the new transportation capacity will be covered by the corresponding Transmission System Operators of the relevant south and east European states. The raising and repayment of project finance will be guaranteed by contracts with Gazprom for use of the new pipeline capacity under existing EU rules, thereby minimizing any financial risk to the TSOs.

Onwards transmission

There are currently two ways to develop new transportation capacities within the EU, neither of which are particularly beneficial for non-EU gas suppliers. One is based on gaining an exemption from TPA requirements under Article 36 of the Third EU Gas Directive, and the second is through the combined Ten-Year Network Development Plan and "Projects of Common Interest" procedure.

The first route requires individual concessions by regulatory bodies from existing regulatory rules, which are by no means guaranteed to cover in full existing supply obligations. This creates a high level of risk, as demonstrated by the OPAL pipeline in Germany, a cross border pipeline that, in combination with the Gazelle pipeline in the Czech Republic, takes gas from the Russia-Germany Baltic subsea Nord Stream pipeline to the existing delivery point of Waidhaus at the German-Czech border.

The second route is designed to provide limited EU funding for new gas transportation projects rather than fund or make financeable, for example, the full amount of transit capacity required for the redirection of gas flows to south and east European states represented by Turkish Stream.

However, a possible third avenue is emerging under Article 13.2 of the Third EU Gas Directive, which places responsibility for investment on the TSOs of the respective EU countries. In short, Article 13.2 means that if there is market demand for new transportation capacity, the TSO should develop it.

Based on this, European TSO body ENTSOG, on the request of the European Commission, and with the active participation of market players including Gazprom, has developed an additional section to the Capacity Allocation Mechanism Network Code devoted to the development of new and incremental transmission capacity. A version of this amendment has passed through public consultations with stakeholders, organized by ACER, which ended August 31.

This amended regulation appears to provide a reasonable procedure for developing new transportation capacity. For new cross-border capacity, a new "coordinated open season" procedure would apply – Article 20(d) – that seems to be a workable avenue for

Russian gas ring



Source: ENTSOG, author

such projects, which should include the extension of Turkish Stream and/or the expansion of Nord Stream onshore in the EU.

However, it is still unlikely that 47 Bcm of Turkish Stream extension capacity to existing delivery points, mostly Baumgarten, will be developed by 2019. As a result, some transit of Russian gas through Ukraine is likely post-2019.

This explains why Putin has ordered Gazprom to negotiate the rules and conditions of post-2019 transit through Ukraine, while Gazprom has, at the same time, stated its intention not to extend the existing contract for Ukrainian transits beyond that timeframe.

Although EU-Russian energy relations are often characterized as dire, Gazprom and Russian government experts have in fact been very active in their collaboration with ENTSOG, ACER and the European Commission's Directorate-General of Energy – within the framework of informal consultations and at the Work Streams' level of the Russia-EU Gas Advisory Council – on the development of the amendment to the Capacity Allocation Mechanism Network Code, as this would mean that the development of onward transportation capacity in the EU would be possible to the mutual benefit of the parties involved.

The Russia/Gazprom group of experts, who were actively involved in the development of the new amendment, have proposed a joint pilot test of the Article 20(d) procedure for onshore pipelines linking to either Turkish Stream or to the planned expansion of Nord Stream before the amended regulation passes through the EU's comitology procedure, and comes into force, possibly, sometime in late 2017. The Russia/Gazprom group of experts hope to explore jointly with European colleagues the potential for early implementation of the amended procedure.

The planned expansion of Nord Stream – Nord Stream II – was announced in June in reaction to another obstacle faced by the Turkish Stream project. Turkey has chosen to bundle negotiations on the pipeline's construction with the gas price that Turkey pays Russia. This represents an attempt by Ankara to leverage Russia's desire to bypass Ukraine and secure a larger gas price discount for its imports of Russian gas.

However, the Article 20(d) procedure leaves open the possibility – at least until an agreement is reached between Russia and Turkey – that some of the four strings of which the Turkish Stream project consists may still land in Bulgaria, as was originally planned for the whole South Stream project. This time, though, the onward transmission pipes would be built in full compliance with EU rules.

Russian gas ring

Contrary to public perception in the EU, the development of Russia's new gas export pipelines does not mean the eradication of Ukraine's role in the European gas system. Ukraine could, in fact, stand to benefit.

The EU's Gas Target Model based on the provisions of the Third Energy Package stipulates trade at hubs. These need to be liquid, and most EU hubs currently lack liquidity. To gain liquidity, they need to have close links with the neighboring Ukrainian underground storage system.

LTCs provide both a supply and service contract simultaneously, since in addition to volume and price they also provide flexibility through flexible nomination rights on the part of the buyer. For spot trade, with a fixed volume and price for each transaction, supply flexibility can only be gained from the market.

An expansion of trade at Baumgarten will require increased regular use of underground storage to balance market fluctuations. This implies a very different role for underground storage in western Ukraine, which is currently used mostly for the seasonal adjustment of Russian gas transit flows to the EU.

With growing volumes of Russian spot gas expected in Baumgarten, both west Ukrainian underground storage and other storage facilities in the EU could be used to adjust market fluctuations at EU gas hubs. If hub prices at Baumgarten are low, gas can be injected into the Ukrainian system, and, if they are high, gas can be withdrawn, thus providing Ukrainian storage a new permanent role in market balancing.

It should also provide full bi-directional utilization of the Slovak gas transmission system, which will compensate for the loss of gas flows from Russia via Ukraine to the EU. Ukraine will be able to earn revenue without Russian gas transits and the country's energy system will be further integrated into that of the EU. It will also lessen the need for EU financial support for Ukraine.

The concept of a Russian gas ring thus eliminates Ukrainian transit risk and presents a new way for western Ukraine to earn money from its storage and pipeline assets. Moreover, it represents a safeguard for both the EU and Russia regarding potential transit monopolies.

Long and winding road

The multiple pipeline concept also has relevance for Russia's expansion into Asian markets. The broader aim is to establish a triangle of interconnected markets – Asia, Europe and the domestic Russian market – with flexibility of supply to each within contractual obligations.

It is from this perspective that Russia is also considering LNG and testing the comparative advantages of both pipeline gas and LNG supplies to Asia. In both cases Russia is testing the "multiple supplies" concept, which means that different pipeline and LNG options are being examined to assess their competitive coexistence.

Not all planned projects will necessarily be implemented. Russia's gas export policy is in the midst of a multi-dimensional adaptation to the new realities of its major markets. The search for a new balance of risks and rewards remains one in which Russia will seek to exercise its sovereign right to maximize marketable mineral resource rent collection for the state. It is a long and ongoing process of adaptation.

Diesel future: the VW scandal

The scandal over diesel engine emissions at Volkswagen has sharpened the debate about the future of diesel itself. Yet this debate was already well underway. The danger with the scandal is that in the eyes of public opinion, the case against diesel is now virtually 'open and shut', without any serious examination of the consequences... **Chris Cragg**

It is an old joke in the oil industry that a low emission passenger vehicle in a traffic jam is putting out an infinite weight of pollutant per vehicle mile.

The joke neatly shows the triangle of interests that control transport emission standards and their enforcement: the oil industry, the motor industry and governments. To reach maximum fuel efficiency most cars should travel at around 55-65 mph without slowing or accelerating. So governments have an obligation to keep traffic flowing.

As for oil companies, they have an obligation to deliver pure fuels suitable for specific engines, safely and not

sell old cooking fat. In relation to the vehicle-makers, there are a seemingly endless series of trade-offs in engine design, between power, acceleration, fuel efficiency and emissions. Public expectations tend to demand all of these things simultaneously, when they are often contradictory requirements.

Real life driving

This is illustrated by Volkswagen's disastrous mistake. Whoever was responsible when the original 'defeat device' was attached to the Passat and Jetta diesels, there was probably a round of applause at the sheer ingenuity of the new device. By switching to what VW