

# VIRTUAL ROUND TABLE

CORPORATE *LiveWire*

## ENERGY & NATURAL RESOURCES 2015



## MEET THE EXPERTS



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**B**irsell Law Offices is one of the oldest, most well-known and top tier law firms in Turkey founded in 1923, the establishment year of Turkish Republic. The Firm practices at the highest level of legal profession and holds to highest ethical standards, with many years of experience in advising foreign and domestic clients in complex cross-border transactions, financings, acquisitions, securities transactions, as well as corporate and commercial matters, and dispute resolution.

The Firm's partner Begum Durukan Ozaydin (admitted to the Istanbul and New York State Bars) is a leading individual with key role in major project finance and energy deals, loan transactions, advising on award winner finance and M&A projects in Turkey as well as capital markets transactions, acting for a collection of clients who are leaders in their fields, with numerous contributions to publications.



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**M**osby Perrow represents clients in the energy industry on transactional and regulatory matters. He focuses on regulatory counseling, drafting and negotiating documents such as precedent agreements, and administrative litigation. Mosby's clients range from natural gas pipelines to electric utilities to renewable energy developers to investors focused on the energy space. He practices regularly before the Federal Energy Regulatory Commission on rate proceedings, asset acquisitions and divestitures, and enforcement matters.

Prior to joining Jones Day, Mosby worked as an attorney-advisor for the Office of General Counsel at the FERC. There he worked on key orders and rules regarding FERC's open access reform, issues arising out of the organized electric markets, transmission incentive rates, and mergers and acquisitions.

Mosby is an active member of the Energy Bar Association, serves on the EBA Houston Chapter Board of Directors, and co-chairs the EBA Programs and Meetings Committee. He also serves on the Advisory Board for the Institute for Energy Law, a division of the Center for American and International Law. Mosby has chaired other EBA committees in the past, including the Finance and Transactions Committee, and also served on the editorial board for Energy Law360.



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A senior member of the corporate and infrastructure team of the Firm, Upendra has rich experience in all aspects of law and documentation relating to infrastructure including power (conventional and renewables), telecoms, mining, ports, airports, oil & gas, and project financing and has headed several large infrastructure related matters.

He has substantial experience in aspects relating to nuclear energy. Also experienced in Mergers & Acquisitions including due diligence, structuring, documentation, cross-border transactions, in Securities Laws – such as advice and documentation relating to issue of FCCBs, ADRs, GDRs by Indian companies, India-centric AIM listings, takeovers etc., in Privatisation including advice and documentation in relation to privatisation of Government companies in India on behalf of several bidders, etc., in Foreign Investments, Joint Ventures and Foreign Collaborations – such as structuring, advice and documentation, in PPP including on advising on structuring and submission of bids, regulatory aspects, documentation and all related aspects.



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Jochen Terpitz is a corporate finance lawyer based in Frankfurt. He specialises in the energy and infrastructure sectors.

Jochen has handled a wide variety of energy and infrastructure related transactions for German and international clients, including M&A transactions and privatisations. He advises developers, investors and banks on power projects in many European countries and has expert know-how in particular with regard to the development, financing and acquisition of renewable energy projects. Jochen's practice also covers relevant regulatory aspects.



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A partner since 1996, Ms. Wong focuses on the representation of sponsors and financing parties in connection with the development, acquisition, financing and/or restructuring of energy and other infrastructure facilities in Asia and North America. In her over twenty-five years of practice, she has led numerous development, financing and acquisition transactions involving generation assets (including large-scale coal, gas and LNG-fired cogeneration plants, as well as hydroelectric, wind, solar, geothermal, biomass, waste energy and other renewable energy facilities), transmission lines, and oil and gas pipelines. Ms. Wong has extensive experience in complex commercial and financial project financings, acquisitions and dispositions, as well as leveraged and synthetic leases. Her practice is balanced among representing sponsors and debt providers, and she has significant experience with the development of greenfield power and gasification projects in the United States and Asia.

In addition to her specialty in the energy sectors, she has also worked on development and financing transactions involving satellites, telecommunications, technology companies, and real estate (including office buildings, hotels, stadiums, golf courses, amusement parks and other entertainment complexes). She has extensive experience in complex commercial and financial transactions and has participated in numerous project financings, restructurings, private placements, acquisitions and dispositions, as well as leveraged and synthetic leases, municipal finance transactions, aircraft financings, and monetization transactions.

Her recent representations include:

- representing the tax equity investors and lenders in the financing of renewable energy transactions (wind, solar and biomass)
- representing the sponsors of concentrating solar power projects receiving a loan guarantee under Section 1705 of the U.S. Department of Energy Loan Guarantee Program.
- representing the sponsors in the development of several coal gasification projects throughout the United States
- representing the sponsors in a mine-mouth lignite fired project in Lao People's Democratic Republic

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Ms. Elizondo has participated in projects related to distribution, transportation and storage of hydrocarbons, petrochemicals and oil-refined products. She has also worked on Public Bids, governmental contracts and agreements as well as in the development of green energy and power production projects. Additionally, she has provided strategic advice and counsel to directors and staff of energy companies, working in coordination with technical teams on project planning and implementation of regulatory requirements. She holds a Master in Government and Public Policy from Universidad Panamericana and a law degree from Universidad Anahuac del Norte and Universite Catholique du Lyon.

Rodríguez Dávalos Abogados (RDA) is one of the fastest growing law firms in Mexico. RDA specializes in the Energy Sector, including Oil, Gas, Electricity, Green Energies, Maritime Projects and Finance, with almost 20 years of experience in this dynamic field.



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He provides legal counsel on environmental and energy matters and disputes. He obtained his law degree from the Universidad Anáhuac and a Masters in Law (LL.M.) specialising in environmental and energy law at the Johannes Gutenberg Universität Mainz, Germany. He is member of the Mexican Bar Association, the Environment and Energy Committee of the ICC, and the Environment and Energy Law Commissions of the IBA.



# Energy & Natural Resources 2015

Our Energy & Natural Resources Roundtable 2015 provides in depth analysis on the latest trends and recent developments. We spoke with nine experts from around the world with highlighted topics including: how the decline in oil and crude prices has altered the landscape in the United States, why India has the potential to become a favoured destination for investment, and the impact of regulatory changes in Mexico, Turkey and Ecuador.

## 1. Have there been any recent regulatory changes or interesting developments?

**Ozaydin:** A notable development is the establishment of the Turkish Energy Exchange, Energy Markets Operation Joint Stock Company (EPIAŞ). Electricity stock exchange operation activities will be carried out by the newly established EPIAŞ which will also supervise the financial settlement of operations conducted. EPIAS is to operate the existing “day ahead” power market and as well as intra-day spot and physical trading operations in power and possibly also natural gas. EPIAS will be formed by public and private sector players, its shareholding structure comprising Turkish Electricity Transmission Company (TEIAS) with 30% stake, Borsa Istanbul with 30% stake and private energy companies holding in total a 40% stake. EPIAŞ will start operations in January 2015 following the completion of the registration process with the trade registry. It is expected that with the commencement of operation by EPIAS, more competitive market conditions will be established.

**Perrow:** Yes. One of the more significant regulatory developments that we will be tracking in 2015 is the interplay between the Federal Energy Regulatory Commission (“FERC”) and other federal regulatory agencies such as the U.S. Environmental Protection Agency (“EPA”). For example, the FERC recently announced a series of technical conferences around the United States to address electric reliability, wholesale electric markets and operations, and energy infrastructure in response to EPA’s proposed “Clean Power Plan.” Under the proposed rule, EPA would try to control carbon emissions from existing electric generating units by establishing state-wide limits on carbon intensity to reduce national levels of greenhouse gas emissions by 30% in 2030 compared to 2005 levels. FERC is charged with protecting electric reliability and ensuring that wholesale electric rates are just and reasonable. The technical conferences will focus on the Clean Power Plan’s potential impact on the reliability of the power grid and the efficient operation of wholesale electric markets.

**Joshi:** The Indian Government is taking steps to address the issues relating to al-

location of coal blocks and to this end has issued an ordinance and allied rules. These seek to bring about transparency and accountability in coal mines allocation, and resultantly alleviate supply issues faced by the iron and steel industry and power generation facilities to name a few. The Government has also issued another ordinance for amending legislation relating to other minerals. The focus of this ordinance is to infuse predictability and a business-friendly approach in a mines regime which admittedly had cumbersome procedures and fostered delays. The Government has also recently deregulated diesel prices; this effectively does away with the cost subsidisation of this important fuel by the national oil companies. All these steps are expected to assist in getting India back on the growth trajectory.

**Jumbo:** In November 2014 the National Assembly passed the Organic Law of Public Service Electric Power. According to regulations, the Ministry of Electricity would be the highest authority, under which it will be the Agency for Regulation and Electricity Control (Arconel) that until now has the name of National Electricity Council (Conelec).

Among some provisions set that any power generation or distribution and marketing company could be managed and operated by international state companies which reach an agreement with the Ecuadorian state.

In the meantime, Law Production Incentives and Tax Fraud Prevention, published in Official Record 29 December 2014, contained an initiative to avoid reducing social spending. Among the tax measures that will generate more revenue for the Treasury are the non-deductibility of expenses on products advertising considered “hyper processed” for purposes of the Income Tax. Also stoves, water heaters and other appliances for cooking operating with gas, pay 100% of special consumption tax, these are so far exempt. Furthermore, VAT and Tax Overseas Remittance were removed for the purchase of kitchen, pots, induction heaters and electric showers. Thus seeks to encourage the change of energy matrix in the country.

While this 2015 will host new regulations, the National Assembly is discussing the proposed of a new Labour Code,

and the promotion of draft amendments to the Social Security Law, set between other things: regulations regarding the distribution of workers profits, the thirteenth salary, incorporating housewives to the Social Security, the elimination of the permanent contract for indefinite time, among others.

**Wong:** On 14 January 2015 the Obama Administration announced a new goal to decrease methane emissions from the oil and gas industry by 40-45% of the 2012 levels by the year 2025 along with a number of specific measures to achieve this goal. The EPA is expected to issue the proposed rule for the first-ever regulation on methane emissions for new and modified oil and gas production sources, and natural gas processing and transmission sources in summer 2015, with the final rule to follow in 2016. Summer 2015 is also the timeframe that the EPA will issue its final rule for regulating greenhouse gas emissions for new, modified and existing power plants pursuant to the Clean Power Plan released in June 2014. With a Republican-controlled Congress and lawsuits challenging the EPA's regulations, it will remain to be seen whether such carbon legislation will be effective in the coming year.

**Garrido:** The constitutional energy re-

form decree was issued in December 2013. Accordingly, key legislative and regulatory developments took place. Many aspects are being introduced by this legislative package that aims to modernise and transform the whole industry. Mexico is ready and open for investment.

This legislative effort is meant to model a new energy era. For instance, few countries around the world have implemented a highly developed electric industry. The Electric Industry Law introduces new legal figures such as net metering (*demanda controlable*), renewable energy certificates (RECs or CELs for its acronym in Spanish) and the smart grid (*red eléctrica inteligente*), which are important mechanisms already being used in countries such as the United States. It is important to address some difficulties that may arise given the ongoing transformation since the industry participants are reluctant to new functioning mechanisms. New rules need to be set, by the Energy Regulatory Commission, in a short period of time to be implemented in this complex new industry.

**Terpitz:** The energy transition has been at the centre of public attention for a couple of years now, and will likely remain there for a few more. Following a heavy

debate, Germany has implemented, in August 2014, an amended version of its renewable energy act. The new regime impacts the entire electricity market, and government is already confronted with criticism because by the year end solar investments were down, and coal fired power plants turned to record production. However, the amended act is widely being regarded as an interim step only: the feed-in tariffs which made the renewable energy grow over the last 15 years are phasing out now, substituted by a system of difference payments for the time being, but that is set to be further Europeanised.

Europe's new '[Guidelines on State aid for environmental protection and energy 2014-2020](#)', in force from 1 July 2014, provide a comprehensive statement of Europe's current ideas for integrating renewable sources into the power markets. However the methods in which Europe is supporting renewables will change substantially over the next few years: it seems unavoidable that power generation and electricity networks require a certain amount of state aid, but they will in principle only be available to sustainable technologies.

**Baratte:** The mining industry is hit by falling commodity prices and difficult equity markets. Interestingly, this is

leading a number of mineral-rich African countries to realise that the trend of "resource nationalism" in mining countries may be counter-productive if they want to keep mining investments and mining jobs. Resource nationalism is used to characterise the attempts of host governments in mineral-rich countries to get a bigger share of mining profits: through higher taxes, free equity interest for the state or the renegotiation of mining contracts. Some countries are still in this mindset like Zambia which has announced higher mining taxes but some have started to soften the tax burden for mining companies a little.

**Grieger:** In August 2014, Mexican Congress reached the approval of the reform minutes to the secondary legislation derived from the constitutional energy bill that came into force on 21 December 2013, the corresponding new Regulations entered into force on October 2014.

This reform seeks to regulate the hydrocarbon sector, the electricity industry, geothermal energy, as well as the new legal regime for *Petroleos Mexicanos* (Pemex) and the state owned Electricity Utility Company (CFE), and gives rise to a new chapter in the country's energy sector. In this manner, the modern history in the sector transits from a

nationalism with a fierce governmental control over the energy resources (same which was somewhat watered down over the time with the issuance of secondary legislation by several State administrations') to a scheme being very close to a free market that will be discretionally controlled by the regulatory bodies of the State entitled to do so.

## 2. Can you talk us through the current energy and natural resources landscape in your jurisdiction?

**Perrow:** All eyes are on the price of crude oil, which in early January, closed below \$50 a barrel in the U.S. for the first time in nearly six years. The precipitous drop means broad uncertainty, potential problems for some, and potential opportunities for others. It is no secret that there has been a revolution in gas and oil production in the United States in places like North Dakota, Texas, and Appalachia. Shale fields in these regions and new and proposed new pipelines constructed to service those fields have been driving so much growth over the past few years. This year has the potential to be turbulent.

**Joshi:** The energy and natural resources landscape currently in the country can best be described as gearing up for movement to the next level where investments in this sector seem poised

to increase as investors become more confident about the Government's intention and approach. The Government appears keen on taking a holistic well-considered approach to resolve the various bottlenecks associated with these sectors; it is therefore seeking to revamp the various aspects of doing business generally and in these sectors particularly, from business-driven bidding guidelines through to making investor exits easy.

**Jumbo:** The Constitution of Ecuador Republic considers energy in all its forms, telecommunications, non-renewable natural resources, hydrocarbons, biodiversity, genetic heritage, the radio spectrum and water, among others, are the strategic resources of the nation.

With regards to hydrocarbons; oil and its derivatives are one of the main exports in Ecuador. During 2013, 140.2 million barrels were exported, according to Petroecuador EP, which generated total revenue of US\$13,411.8 million; signifying around 31.3% of all non-financial public sector income. Over the last years, the main destination of Ecuadorean oil was to the United States, followed by Chile, Peru, Japan and China. On the other hand, demand for oil products in the country reached a total

of 90.4 million barrels per year.

The consumption of natural gas for electricity production and for using in industrial processes has increased significantly in recent years. Ecuador has a natural gas production from 30 million to 60 million cubic feet per day, according to the Non Renewable Natural Resource's accountability.

During 2013 more than \$10,400 million was invested in strategic sectors related with projects on hydrocarbons, energy, telecommunications connectivity, environmental protection, and mining, among others.

Ecuador is currently working at an accelerated pace in the construction of eight emblematic hydropower projects with an investment of \$5.5 billion. It is projected by 2016 to double the installed capacity to 6,779 megawatts (MW), while generating 11,446 jobs and in the near future is expected that the country can export electricity. This is Coca-Codo-Sinclair, Sopladora, San Francisco mines, Delsintanisagua, Manduriacu, Mazar-Dudas, Toachi-Pilatón and Quijos.

The Ministry of Electricity and Renewable Energy announced that by 2016 over 90% of the energy produced in the country will be generated from hydro-

electric sources, clean energy without pollution to satisfy domestic electricity demand. These projects are in addition to changing energy matrix that drives the system, within which the process is included to converting from gas stoves to electric. Furthermore, the production of new hydroelectricity, the state will save about \$800 million without spending on gas subsidy for human consumption.

**Terpitz:** Germany is in the middle of a process of defining the future of its energy supply. Traditional perceptions of security of supply, which are oriented towards national or even regional self-sufficiency, compete with the more recent European approach according to which every single member state can realise savings and maximise welfare by partially relying on its neighbours. As a country in the middle of the continent, Germany is supposed to take a leading role while at the same time the energy economy should become more decentralised and less governmentally led.

**Grieger:** With this year's structural energy reform, Mexico opens its doors to private national and foreign investment in order to boost its oil, conventional and non-conventional gas resources, and supports the generation, marketing, transmission and distribution of

electricity from various sources. The reforms will give rise to some disputes, mainly due to the ample discretion that was given to the new regulatory agents of the State regarding the implementation of economic, tax, contractual environmental risk clauses, as well as in connection with the potential occupation of lands of vulnerable social sectors for the execution of new energy projects. We will see if the economic success and social wellbeing suggested and publicised justify the change in policy and legislation which the Mexican State has provided.

### 3. What markets currently provide the best opportunities?

**Ozaydin:** Turkey's energy sector is quite active on many fronts, so I would like to focus here on electricity. The Turkish electricity market has been steadily performing at a growing pace due to the consistent high demand in electricity. Currently, hydro and natural gas power plants still dominate the power generation market. Turkey targets to use renewable resources in electricity generation at a minimum rate of 30%, therefore, numbers of renewable energy projects based on hydro, wind, solar, and geothermal energy has been increasing. In parallel, incentives and encouraging policies are expected to increase in this

area. Hydroelectric power plants take place on the top of the renewable energy resources which is followed by wind and geothermal power plants. Hence, the renewable energy market currently provides the best opportunities by increasing their capacity and installed power. In addition, while the privatisation of most of the electricity generation facilities have been either completed or are underway, there are still some further thermal and hydro power plants to be privatised in 2015.

**Perrow:** If there is a prolonged decrease in the price of oil, those with a strong balance sheet will have opportunities to acquire distressed assets and companies and there will be other investment and financing plays. On a different note, one of the big headlines in North America has been Mexico's sweeping energy reforms. The new legal framework stripped Pemex's control over all aspects of exploration, extraction, production, transportation, storage and refining of oil and natural gas in Mexico. Already, there have been openings for foreign companies to participate. For example, natural gas pipeline companies are competing for opportunities to build infrastructure from the United States to Mexico and within Mexico to fuel Mexico's economy.

**Joshi:** India's energy intensity - i.e. the energy input associated with a unit of GDP - has been declining, implying that the growth in energy used is less than the growth of GDP and which in turn underscores the opportunity. According to an E&Y report, the country's primary energy consumption grew at a CAGR of 6% to 563.5 Mtoe in 2012 from 420.1 Mtoe in 2007. According to a report by the International Energy Agency, India's energy demands will go up to 1,464 Mtoe representing a rise to 8.5% in 2035 from 5.5% in 2009. According to IEA estimates, it is expected that the largest demand growth would come from coal, almost tripling from 280 Mtoe in 2009 to 618 Mtoe in 2035. While demand for oil is expected to grow from 159 Mtoe to 356 Mtoe, for natural gas it is expected to increase from 49 Mtoe in 2009 to 154 Mtoe in 2035. Similarly, demand from nuclear energy would reach 48 Mtoe in 2035 from 5 Mtoe in 2009 while demand for renewable energy should grow from 2 Mtoe in 2009 to 36 Mtoe. On the back of these estimates, it could safely be assumed that India continues to be an important market with exciting opportunities. This, coupled with the Government's business-friendly approach will go a long way in making India a favoured business destination for energy and natural resources.

**Jumbo:** Ecuador has established objectives which indicate renewable energy is the strongest market and will continue to increase domestic production. To fulfil this objective, hydroelectric projects should be implemented without delay; and additional projects should be encouraged using other renewable energy sources such as geothermal, biomass, wind and solar. Between 2013 and 2016 3,223 MW of renewable energy will join the national grid through public investment. Until 2018, it is estimated to incorporate 394 MW of private investment. This investment will be achieved by building eight hydroelectric plants with an investment of USD 4.983 million - which is set to double the current installed capacity of 5.8 GW.

**Wong:** The sustained decline in oil and crude oil prices has resulted in many oil and gas companies slashing budgets and reducing spending in the U.S. shale production, as well as impacting potential new LNG projects in the U.S. and globally. Despite the fact that Congress did not extend the federal production tax credit available for wind power projects and the amount of the available investment tax credit for solar projects will decline from 30% to 10% for projects that are placed in service after the end of 2016, activity in the U.S. and



global renewable energy sector should continue to be robust in 2015 and 2016. The U.S. Energy Information Administration report released on 13 January 2015 projects that U.S. solar utility-scale power projects will increase by more than 60% between the end of 2014 through the end of 2016 and wind power projects will increase by about 23% between 2014 and 2016.

**Garrido:** The hydrocarbons sector (oil and gas) along with the power sector offer an unparalleled momentum. Private investments are allowed in all activities of the hydrocarbons' value chain, including without limitation the exploration and production of hydrocarbons, treatment, transportation, distribution, commercialisation, transformation, and public retail.

Similarly, the electricity sector is radically transformed as it opens power generation to private investors, therefore creating a wholesale electricity market. For strategic reasons, transmission and distribution will continue to be State-controlled.

All of our energy market offers great opportunities. For instance, the electric industry will become one of the most important markets in Mexico. Current generation is of approximately 61 MW

and it is projected to reach more than 100 MW to meet the demand. However, new investments could focus on renewables since fossil fuels carbon emissions will be most likely regulated and sanctioned while electric generation is conducted. Geothermic energy would be positively impacted by the reduction of generation costs. A very positive development is expected in this industry.

**Terpitz:** Over the last two years, many incumbent players perceived the renewable markets as being in a critical status across Europe: would there be sufficient and reliable further support for renewables, and would there be a place in the market for the 'traditional' set of players, such as developers, innovative manufacturers, project financing banks, cooperatives or retail funds.

**Grieger:** In my opinion the most intriguing markets are those of developing countries, i.e. Mexico and Brazil, which offer attractive economic conditions and have structured legal frameworks to enable the successful development of a project. Developing countries usually offer attractive labour conditions for investors as well. Other important factors that need to be addressed and provided are: stable social conditions, attractive tax schemes and incentives.

#### 4. What challenges is the sector currently facing?

**Ozaydin:** Initially it should be noted that Turkey's highly dependent in the energy sector, especially on imported natural gas, coupled with its high demand for electricity and the significance of natural gas in its power generation remains a delicate point. Around 30% of Turkey's energy consumption is from natural gas, which Turkey is not able to supply from its own reserves. While Turkey is involved in many cross border natural gas pipeline projects, which are expected to put the country in the spotlight in the Eurasian energy market, lack of sufficient reserves is still an issue. Further, the lack of sufficient infrastructure and gas storage capacity negatively impacts the cross border energy projects and domestic supply security. Strict disclosure requirements on licensing procedure sometimes discourage foreign investors in their investments in the sector. The recent license cancellations in the power sector for licenced companies which have not been able to timely commence construction have also been deterring for the investors. As another challenge, I may address the lack of relevant know-how and experience for the operation of energy exchange (EPIAŞ) which will require collaborations with international partners.

**Perrow:** Before the drop in oil prices, I would have answered this question by focusing on regulatory challenges. For example, the FERC conducts a review under the National Environmental Policy Act when it certifies interstate pipeline projects under the Natural Gas Act. Recently, stakeholders successfully challenged FERC's decision to analyse the environmental impact of several segments of a project separately rather than looking at the cumulative impact of all segments combined. Such challenges delay projects and increase costs. Notwithstanding such regulatory challenges, currently capital markets look to be the greater challenge facing the sector in the coming months.

**Joshi:** The need for clean energy is particularly being felt. However, the dependence on coal does not appear to decrease. According to the E&Y report, the share of natural gas in the energy mix was 8.7% in 2012, which is substantially lower than the global average. Further, the dependence on imports to meet domestic energy demands appears to be a major challenge. Apart from this the power sector has been facing a number of challenges from availability of coal to environmental concerns. One of the biggest challenges for the sector therefore is seeking energy independence without losing sight of climate and en-

vironmental considerations.

**Jumbo:** Currently the energy sector in Ecuador faces several challenges, the most outstanding are environmental problems such as environmental degradation, weather changes, and the inadequacies of technological development and infrastructure. Further, in Ecuador non-renewable sources are used to obtain energy, because our main source is hydropower use, oil, natural gas and coal.

**Wong:** The obvious challenges for the oil and gas sector include the sustained and declining oil and crude prices, short-term oversupply, and increased cost of new regulations on greenhouse gas and methane emissions. The wind industry in the U.S. is confronted by the potential loss of production tax credits without a phase-out period. Meanwhile many electric utilities are having to deal with the challenges posed by the increased in distributed generation and customer-owned distributed energy resources, as well as on-going proceedings that may ultimate redesign of the electric utility market as they know it. Energy companies with energy trading practices or who perform cross-market hedging may face greater scrutiny from the Federal Energy Regulatory Commission and the U.S. Commodity Fu-

tures Trading Commission.

**Terpitz:** A main challenge for investors in energy generation generally is the low wholesale prices. No new power plant project could ever amortise at prices below 4 €-cents. Although further nuclear plants, and some coal power plants, will be shut down, the wider area of Germany and its neighbours continue to face over-capacities across the different technologies. The German government seems determined to wait for the time when tighter offers bring the price back up in the future.

Another potential challenge is the cost of the grid infrastructure. Cost allocation systems in the different EU member states are quite different, and Germany's current system is mainly based on variable income (connected to the kWh consumed) while the overwhelming part of the costs are fixed. Strategies which are based on delivering clear of grid costs, while still using the grid as a fall-back supplier, could be at risk in future if the cost allocation moves towards a higher capacity premium.

**Baratte:** The natural resources sector, in particular the mining sector, faces the combination of falling commodity prices and more difficult access to equity markets, which badly impacts a num-

ber of projects, especially early stage exploration or development projects or high-cost producers, for example in the gold sector. The challenge for many mining companies is to survive during that period and comply with their various obligations: towards the host state, under mining and investment codes for example in terms of the timetable for the implementation of projects, towards lenders under financing agreements, towards joint-venture partners, etc.

**Grieger:** Against the tendency and preference that has been given to the development of renewable energy in more developed countries, the Mexican Congress has unfortunately temporarily set aside the discussion and approval of the appropriate reforms to specifically regulate and drive the energy from renewable sources. This leaves out, for the moment, the essence of the constitutional reform of last December 2013, which is to promote the sustainability and generation of energy through clean sources. However, progression was made in this regard in December 2014 when the Mexican Congress approved the initial Federal Energy Transition Act, only pending for the Senate approval. This outlines in general terms that the federal and local governments shall provide the necessary incentives

to continue with the development of clean energy. We are still awaiting the secondary legislation to provide more clarity and certainty on the specific incentives that will be granted for renewables and clean energy projects.

## 5. What should companies look for when deciding on a location to invest?

**Ozaydin:** Land allocation is the first and significant stage of an energy investment project since the right land will provide and increase a proper energy generation. The features of energy locations such as the insulation period, structure of land, slope and distance from the grid are advantageous for investors. In Turkey, especially in solar and wind projects, the location of the land plays an essential role. For instance, the regions where wind speed is sufficient (e.g. places recording wind speed of over 7 m/s) will be the best place to construct wind power plants. Western Marmara (e.g. Çanakkale, Balıkesir) and Southern Turkey (e.g. Mersin, Hatay) are suitable for both international and national wind power generation investors. As another example, locations where the solar radiation per day is high (e.g. Central Anatolia) will appeal to solar energy investors.

Legal considerations are of course also important. Ownership is a point to consider in determining the land on which you would establish your power plant. It would be best if the title to land could be acquired, however, if this is not possible, acquiring in rem rights such as a usufruct right can be considered. Whether the location allows any incentives is generally key to investors, and areas such as free zones are generally preferred, especially by investors operating in the renewable energy sector. Finally, the environmental impact of the project should be considered in great detail.

**Jumbo:** Ecuador offers a regulatory framework in which investment incentives in Strategic Sectors are enhanced with opportunities to build mutual benefits and achieve the development of our country. As government policy, the priority is to provide the public and private, domestic and foreign sector, with the tools which allow the conditions' consolidation required to attract investors. The procurement process is conducted by the National Institute of Public Procurement, through transparent, efficient and technologically updated procedures that facilitate control tasks in both contracting entities: suppliers and general public.

Foreign investment includes a number of securities such as the equal conditions and protection for investment, property protection of investors (prohibition of all forms of confiscation), production freedom, trading, import and exports of goods and services, with subjection to the provisions of the Constitution, laws and regulations established by current legislation, regarding tax payments, national and foreign investments are liable to the same Taxation. For investment contracts foreign investors may agree arbitration clauses to resolve disputes that arise between the government and investors, the dispute may be submitted to international arbitration in accordance with the treaties signed by Ecuador.

As to the Sectorial Incentive, the Organic Code of Production Trade and Investment, in force since December 2010, established its purpose to generate and strengthen the regulations that enhance, promote and encourage production to create conditions for increasing productivity and promote the transformation of the productive matrix, facilitating the application of tools for productive development. Additionally, it provides tax incentives, such as exemption from payment to income tax for five years for all new investments, at the beginning of the operation phase

in sectors that contribute to the change in the energy matrix; strategic import substitution; export promotion and rural development.

**Garrido:** Basic principles such as regulatory certainty, return on investment, market size and competitiveness, long-term government plans for the sector, government incentives for new investments, and tax treatment are some of the factors to be considered. The comprehensive energy reform sets forth many factors that will model the energy landscape. It is imperative to understand the many features recently introduced. For instance, environmental costs are important. Unlike other countries with a voluntary RECs system, Mexico's energy reform considers an obligatory RECs' system. This means that the authority will determine a minimum percentage of carbon emissions that need to be complied with by the permit holder in order to be certified. Otherwise, a fine would be imposed. The REC system will probably be entered into a market to incentivise investments. This system along with Yield Cost is a common trend between investors.

**Terpitz:** I would like to highlight two basic considerations: find out whether a project will be capable of amortising its investment cost, even if the regula-

tory environment in the given location evolves over the years; and try avoiding overly positive assumptions for the years towards the end. Promises of permanently high ongoing subsidies mislead some investors to invest in countries which are now unwilling to continue such subsidy payments, and too many investors are trying to put a gloss on their figures by assuming high returns post year 15 or 20. Realistically, most clean energy technologies are still relatively young, and we should all prepare for one or two other surprises over the lifetime of a project.

**Baratte:** More than ever, energy and natural resources companies are looking for "safe" jurisdictions to invest in. Safe jurisdictions are not necessarily developed countries but jurisdictions with stable legal framework, where disputes, in particular disputes with the government or state-owned companies, can be settled fairly either before local courts or more often through recourse to international arbitration, and where contracts, in particular again contracts with the government or state companies, are complied with by both parties.

**Grieger:** It is important to seek locations where the investors and companies engaging energy and natural resources projects will have the necessary

economic and social conditions to carry out their projects. A large amount of these projects are engaged in rural communities where the social factor plays a big role and must be assessed adequately and in parallel to the economic, legal and environmental aspects.

#### 6. What can new markets entering into shale gas production learn from established projects such as those in the United States?

**Ozaydin:** As far as I am aware, the government's role was a major factor contributing to shale gas boom in the United States. Government policies such as providing tax credits and incentive pricing for developing unconventional natural gas have stimulated the development of shale gas production. Government research and development programs are required since most producers are small and do not have the incentive or capacity to do much research and development. These programs are essential for developing some of the key technologies such as horizontal drilling and three dimensional seismic imaging. Other contributing factors which should be considered are the geology of target reservoir, water availability, natural gas pipeline infrastructure and the associated open-access policy.

When considering the need for natural gas in Turkey, shale gas is presented as a promising new resource to also reduce gas prices, however, its production in Turkey also entails many issues yet to be resolved. Currently, two regions in the country are especially appealing in terms of production of shale gas. However, whether the shale gas extraction will be cheaper remains to be a question mark and environmental aspects appear to pose a risk. Therefore, an established shale gas production still appears to be aloof to many. Similar to the US, incentives provided for shale gas production as well as developing technologies for such activity would definitely assist in its development. Again similar to the US, public-private sector partnerships in the sector could help in the progress. We have seen that the state owned TPAO has formed a partnership with Shell for the exploration of shale gas in the eastern part of Turkey. There is also increasing activity in this area by other international companies in the recent years.

**Perrow:** Conventional wisdom is that a key ingredient to successful shale production is a well-established system of private property and mineral rights. My understanding is that, unlike the United States, mineral rights in many places around the globe default

to the state rather than the land owner. Farmers and ranchers in the United States who are sitting on shale reserves have a financial incentive to invite drilling and production on their land because they get a cut. This not only benefits the landowners, but the local economies where they live and work.

**Jumbo:** New markets can learn from established projects in the United States regarding the advanced technological methods used, as well as economic, political, social and environmental trends, to help to form a stable outlook in such projects. Further, in the United States, most incentives come from energy policies, concerning financial incentives, such as tax exemptions, tax reductions, discounts, loans and specific funding, which can be a model for our market. The U.S. has produced many incentives created through energy policy, as the creation of Energy Policy Act in 2005, Energy Independence and Security in 2007, and Economic Emergency Stabilization Law in 2008; each promotes a variety of improvements on energy efficiency and encourages the development of specific energy sources. In addition, incentives for energy policy of the United States can serve as a strategic way to expand certain industries which are planning to reduce their dependence of the United States on foreign oil

products and create jobs and industries that boost the local economy.

**Garrido:** Mexico's natural gas sector is becoming very dynamic. The new legal framework calls for new players, more transparency and significant changes that will modernise the industry. We have seen how non-conventional gas projects have become a key issue in the United States since such country became an exporter of natural gas. When gas is considered as a commodity it is easy to place it in the market, while enhancing direct sale and purchase between producers and final buyers. This is a strategy that has been slowly implemented in the Mexican energy reform since prior activities allowed only bundled sells, which increased costs. The learning curve of established projects in the U.S. is reflected in our new legal framework that definitely allows a more flexible, competitive and business-oriented approach.

**Grieger:** Mexico has important reserve of shale gas that could be exploited, and will require a significant investment in geological studies, gas transport infrastructure, training of personnel, new technologies and the development of a regulatory regime that incentivises investment as well as adequately protecting the environment, workers and com-

munities. Mexico shall adapt foreign experiences to local fracking activities in the country whenever possible.

It is very important for Mexico to take into consideration that large scale fracking, as it has been going on in the US for a time now, has important environmental, social and labour consequences that must be previously assessed to avoid any substantial negative impact. Mexico must be at all times conscious and aware that fracking must be assessed with a regional approach, since it is not the same to frack in the US, the UK or in Mexico, as consequences differ substantially from one location to the other, due to local environmental and social conditions and other specific regional factors.

#### 7. Are there any renewable or alternative energy sources which can emulate the success of the shale gas boom?

**Perrow:** I think it would be foolish to answer no to this question. Technology always seems to unlock new and unexpected ways of producing energy more efficiently and at lower costs. This has been true in the oil and gas fields and will continue to be true in the renewable energy space.

**Joshi:** According to estimates published in November 2014 by a division of the Ministry of New and Renewable Energy, the total solar power potential of the country is a staggering 748 GW. Even applying a healthy discounting factor, the potential of this sector cannot be ignored. While efforts to harness this energy source have begun already in the form of the Jawaharlal Nehru National Solar Mission, this is still far from realising the potential. As of November 2014, the total installed solar capacity in the country was about 3 GW. The Government has revised the earlier targeted installed solar capacity of 22 GW by 2022 to 100 GW by 2019. Similarly the Government is proposing to double the installed wind power capacity to 40 GW by 2019. With India's renewable energy sector potential and the roadmap laid by the Government, India could well emulate the success of the shale gas boom.

**Jumbo:** The government proposal of an energy matrix change recommends the development of large power plants in the power sector, especially in the Amazon basin. According to data from the Ecuadorean Centre for Environmental Law, there are viable energy sources in Ecuador, within which geothermal energy offers great potential for electricity generation. There are also other viable

sources such as bioenergy, electricity generation from agricultural waste such as rice husks, solar energy (both plants as SP PV modules) and wind energy areas.

The biofuel in Ecuador has achieved positive results; its use began in January 2010 in Guayaquil city, through the Ecopaís program as a pilot before extending into the national territory. Ecopaís is a biofuel compound with 5% of ethanol from sugarcane 95% gasoline base. In view of the results, by resolution of the Production Sectorial Council, it was decided to expand sugarcane planting to 80,000 hectares, where alcohol production is exclusively for the manufacture of biofuels. With these new hectares of sown for the production of alcohol, is intended to fill the annual domestic demand of about 900 million litres of ethanol to the distribution of Ecopaís with 15% ethanol, in 2020.

Other energy sources such as eolian, generated by wind and geothermal located in the deep earth, are sources of generation available all the time, and will displace other more expensive fuels such as gasoline and diesel. The development of new additional hydroelectric projects in the coming years will consolidate the position of Ecuador as an important generator pole in the region.

**Wong:** As photovoltaic solar projects approach grid parity and with the increasing improvements and innovations in the wind turbine designs and technology, these two renewable energy sources have arguably surpassed the success of the shale gas boom.

**Terpitz:** It seems difficult to think of any new form of truly renewable energy source which would suddenly be located as a hidden treasury – once you start exploiting the treasury, implicitly it does not normally renew, except perhaps in the case of geothermia (which is not new). However, any type of cheap, robust photovoltaic cells (perhaps those based on chalkopyrites instead of silicon?) certainly has the potential for a similar impact on the market if millions of household worldwide started generating substantial parts of their home electricity consumption – or for their electric vehicles.

#### 8. How can 3D printing transform the energy supply chain?

**Ozaydin:** 3D printing would allow companies to print off oil rig and increase profitability of upstream assets. Furthermore advanced onsite 3D printing capability could reduce transportation costs for remote locations. 3D printing can also help to compress and optimise

supply chain operations and hence it may be possible to change the point of manufacture and minimise delivery lead times and downtime by enabling on-demand, on-site production of machine components.

**Jumbo:** Researchers at MIT (Massachusetts Institute of Technology) believe that the application of 3D printing to solar panels could be made about 20% more efficient than flat solar panels, as 3D printing can extend the amount of solar energy taken up by cells.

Another advantage of these printers is the cost; researchers estimate the 3D printing precision could lower production costs about 50% by eliminating many of the inefficiencies associated with the loss of expensive materials such as glass or poly silicon.

3D printers and their applications in different fields will be a topic of high importance, and could give a significant improvement to sectors from an economic, strategic and even political view for energy production.

## 9. How important is international collaboration in accelerating the development and global deployment of sustainable energy technologies?

**Joshi:** The dependence on crude oil imports has been a major concern as a result of which the Government has been offering oil and gas blocks under the New Exploration and Licensing Policy regime. Although enthusiasm from international investors has been modest in this sector, the Government is now focusing on the renewable energy sector in order to attract foreign investments to the tune of USD 100 billion over the next five years. Apart from the financial investments as mentioned above it is important that Indian developers partner with capable foreign partners with expertise in the area and gain access to the technological advancements particularly in solar energy.

**Jumbo:** International collaboration is important because we need to have access to cleaner energy technologies with the ability to adapt to any ecosystem, also to improve our resources and energy services for sustainable development, have a more reasonable cost, and viable economically and ecologically.

The IEA (International Energy Agency) is by far the most comprehensive network, in which thousands of experts around the world coordinate their energy technology programs. These networks need strong international leadership from policy makers at senior lev-

el. With the leadership of the General Secretary of the ONU, Ban Ki-moon, ONU-Energy, a coordinating group 20 ONU's agencies, prepare a new global initiative, "Sustainable Energy for the entire world".

This initiative will involve the governments, the private sector and partners from civil society around the world to achieve three important objectives for 2030: ensure universal access to modern energy services, reduce the intensity of global energy by 40% and increase the renewable energy use worldwide to 30%.

**Wong:** International collaboration is vital. Countries collaborate with each other in research and development to improve or commercialise sustainable energy technologies. In adopting energy policies and incentives to drive such development, it stands to reason that the development would be accelerated by virtue of such collaboration.

**Garrido:** We think it is fundamental. International collaboration translates into different types of incentives to develop and invest in sustainable energy projects. The reduction on carbon emissions is a worldwide trending topic. This type of international collaboration may be seen in some non-binding

agreements executed between California and Mexico for enhancing clean energies and energy efficiency. The 2014 agreement is mainly concerned and focused on reducing GHG emissions and may be applied -in a future- for international credits offset pursuant to the AB32 program in California. These agreements might have a worldwide environmental impact if applied among different countries.

**Terpitz:** We already have a fairly global market for these technologies, and while specific international collaboration can certainly accelerate deployment a bit, the real drivers will be two groups of countries: those without sufficient home resources, such as Europe, and those without sufficient current electricity supply. Photovoltaic modules especially can become a very simple yet sustainable way to making energy accessible; to that extent, international cooperation in the production of modules could accelerate the development.

**Baratte:** In Africa, the largest opportunities in renewable projects lie in cross-border projects: whether because such large projects require international financings or because they are able, and need to, supply markets broader than their domestic market, with the need for the corresponding distribution net-

works (transmission lines for electricity projects; pipelines for major oil and gas projects etc). This is the case for example the Inga 3/Grand Inga hydropower projects in the Democratic Republic of Congo.

#### 10. Are there any exciting technological developments on the horizon?

**Jumbo:** Some of the exciting new technologies in a near future we have the following:

**Clean Energy.** It is the biggest challenge in the energy sector: solar, wind, biofuels, bioenergy, carbon capture and storage, energy from nuclear fusion, and storage batteries (including batteries plutonium and strontium).

**Nanotechnology.** Based on manipulation of microscopic materials and allows working and manipulating molecular structures and their atoms. PCs and mobile convergence, the contact Lens Smartphones (glasses that will make phones). Soon we can surf the internet and communicate with friends through glasses.

**Synthetic Biology.** Applications have emerged such as smart fuels, synthetic algae, synthetic food that could feed billions of people, and altered stem cells

that can prolong life. Study of the relationship between brain connectivity and human behaviour is beginning to understand how neurons in the brain connect and work together to enable learning and memory.

As for robotics, attempts are being made to create automated machines that can replace humans in harmful environments or manufacturing processes.

**Wong:** Improvements to and commercialisation of battery storage technology and smart grid technologies.

**Terpitz:** In my view, the main development worth mentioning is the convergence of information technology into grid management and balancing. It is amazing to see how one of the most discussed concerns vis-a-vis decentralised and volatile power generation is evaporating. It is all about switching or dimming either generation or consumption very quickly in order to always match. This would not have been possible in a scenario with people sitting in dispatch centres making phone calls to people sitting next to a power plant.

Obviously there is still a long way to go until private households install systems able to control their air conditioning

in a way it is only being run as long as there is sufficient sunshine electricity on offer, but for industry scale installations it already seems feasible.

At the same time, the quality of production forecasts also increases due to computing capacity and based on improved weather data.

**Baratte:** Geothermal power projects, although not entirely new, are spreading across East Africa. This is also the case, more widely, of wind and solar projects, which were initially confined to North Africa, in particular Morocco, and South Africa, and which are now developing quickly in many Sub-Saharan countries.

**Grieger:** The push to extend fracking to arid regions is drawing attention to water-free methods- such will be the case in Mexico. The foregoing, since the most important shale basin in Mexico is the Burgos Basin, extension of the Eagle Ford basin of the US, and it comprises several northern states which are known to be arid and scarce of the vital water resource.

Hydraulic fracturing uses large amounts of water injected into wells under high pressure to help free natural gas and oil from shale deposits. However, it's possi-

ble to fracture gas-rich rock formations without using any water at all. Indeed, gas and oil companies have been using and exploring the use of carbon dioxide and other similar substances, albeit on a limited basis. If this approach is going to be used on a large scale, it will require a major investment in infrastructure for getting carbon dioxide and/or other similar substance to fracking sites, and to assess the environmental impact of such techniques.

#### 11. What eco-friendly products or innovative technology can you see taking 2015 by storm?

**Jumbo:** Ecuador closed 2014 with three new ecological works aimed at increasing the use of renewable energy and to reduce dependence on oil and its derivatives. Furthermore, President Rafael Correa recently inaugurated three important works in Galapagos Islands, considered as a World Heritage Site by UNESCO, Educational, Scientific and Cultural United Nations Organization.

The government is working to make energy the new wealth of the country once it has passed the oil phase. Thus it is expected that within two years 93% of Ecuadorean energy will be generated in a clean, sustainable and renewable way. One of the products included in

this sense, is the process of converting gas stoves to electric. These devices are already sold with a discount between 12 and 20% due to withdrawal from VAT and Tax Overseas Remittance when parts are imported for local assembly. By efficient cooking program, the Government seeks to replace 3.5 million gas stoves to induction stoves to reduce fuel subsidy.

**Garrido:** Eco-homes, friendly to the environment, are an innovative technology that might boom in 2015 due to the recent electric industry reforms. Solar energy has been deployed through net metering in developed countries such as the United States. Despite the new regulation to be issued on this matter, Mexican users could be highly benefited with real value for the amount of energy produced, while saving and reducing energy in peak periods without the need of backup generators or batteries. The national electric system would also be provided with security in terms of reliability and resiliency.

**Terpitz:** I do not see any specific new technology coming up, but rather lots of smaller improvements on existing technologies. In a way, these are the signs of a maturing market where product quality rises while prices reduce and

at the same time many smaller players consolidate into fewer but bigger companies.

**12. In an ideal world what would you like to see implemented or changed?**

**Jumbo:** Government policies in Ecuador applying the same trend of a shift towards sustainable development. If the oil resource could be replaced by other types of energy resources such as bio-fuels and eolian energy for technological and industrial development. Also, to achieve a paradigm shift in terms of consumerism that currently affects the pattern of citizens' life with incentives for recycling and saving support.

**Wong:** For the U.S. wind industry, it would be ideal to have a long-term extension of the production tax credits with a reasonable phase-out period in lieu of the historical short-term and retroactive extensions which have created bust and boom cycles in the sector and negatively impacted the overall sustained growth of the sector.

**Terpitz:** The EU ETS really requires reform, namely I am hoping for a reduction of the available certificates and a revised concept regarding the use of certificates from CO2 savings in other

parts of the world. In principle, it has proven to be capable of setting the right incentives, but at the moment the price level is just too low to have any impact.

