



**ANNUAL MEETING OF
THE NEW CHAMPIONS
2010**

**ENERGY INDUSTRY
PARTNERSHIP
PROGRAMME SESSION
SUMMARIES**

Tianjin, People's Republic of China
12-15 September 2010

World Economic Forum
91-93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland
Tel.: 41 (0)22 869 1212
Fax: 41 (0)22 786 2744
E-mail: contact@weforum.org
www.weforum.org

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Energy Board Room Sessions

Renewable Energy and Energy Efficiency

Two central facts drove the conversation in this session. First, it is impossible for a world with rising economies and expanding middle classes to sustain an energy-intensive lifestyle run on coal and oil. Second, as the world's largest energy producer and second largest consumer, China's energy policy will be central to global efforts to increase both energy efficiency and usage of renewable energy.

While the predominance of coal is unlikely to change in the near future, the boom in China's energy demands and the interest of central and regional governments and major corporations are pushing innovation, investment and policy-making on reducing energy usage per unit of GDP, creating green-tech innovation and driving down per-unit prices of renewable energy technology. Major initiatives include supercritical power generation, energy efficiency in public lighting, hybrid and natural cars, hydropower, nuclear plants, solar, biogas and a variety of pilot projects on the technology and policy fronts, covering more than 20 Chinese cities.

Many of the R&D enterprises and other capacity-building efforts for green-tech innovation were financed through China's 2009 stimulus effort. The 2008 Beijing Olympics and 2010 Shanghai World Expo provided major opportunities for the government to promote fleets of cleaner vehicles. In the past year alone, China's investment in wind and solar energy increased 120%.



Li Junfeng, Deputy Director-General, Energy Research Institute (ERI), People's Republic of China



Wan Gang, Minister of Science and Technology of the People's Republic of China

Foreign business leaders expressed concern that, despite China's centrality to development, scaling and implementation of global energy solutions, foreign corporations sometimes find the Chinese market environment difficult and discriminatory against foreign entities. China representatives pointed out that, while localized problems exist, the goal remains fair competition and open markets.

Chinese development depends on global participation, while the world must coordinate with China's development. Besides emphasizing public and private sector cooperation with nations as diverse as the United Kingdom, Germany, Italy, Japan and South Korea, one participant welcomed international producers of electrical cars to the Chinese market.

The true cost-effectiveness of renewable energy and amount of easily implemented policy and technology "low-hanging fruit" proved a major point of contention. Participants were unable to reach consensus on whether and how much of this low-hanging fruit exists, as well as the feasibility of building market structures that make renewable energy more competitive.

The failure of the Copenhagen Summit to send clear, actionable market signals to private and public stakeholders is a major obstacle; without a clear price for carbon or other organizing framework to create market incentives for green technology, companies lack incentives to innovate with the urgency required. Whether or not a global market to incentivize energy efficiency and green technology materializes, individual countries can and must set national targets. The best models of such policy targets are those found in Europe.

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Lykke Friis, Minister of Climate and Energy of Denmark

Besides the continuing unattractiveness to investors of the “green spread” between renewable and fossil energy sources, another major challenge is the tension between investment in infrastructure and innovation. Smart grids are considered a key component of any energy-efficiency initiative, but the question of implementation – either with current technology or after waiting for innovation to produce better technology – produced no agreement.

Micro grids – distribution systems for rural areas that depend on localized renewable energy sources instead of hub-and-spoke power grids – were also examined. Currently, there are 90 smart grid pilot programmes operating around the world. But to increase efficiency, power generation must focus not on kilowatt capacity, but on kilowatt-hours of electricity generation to deliver electricity precisely where it is needed. “Smart grids are the energy Internet,” one participant noted.



Khalid Bin Khalifa Al Thani, Chief Executive Officer, Qatargas, Qatar

The most provocative statement of the session sought to highlight perceived foot-dragging of the two most-discussed developing nations: “In energy policy, China’s and India’s rich are hiding behind China’s and India’s poor.” In other words, elites are enjoying an energy-intensive lifestyle run on fossil fuels while using their poor populations as an excuse to shift the burden of innovation onto the rich world. Participants were reminded to consider the long-term social costs of not providing affordable, renewable energy to rising populations that will increasingly expect the benefits of grid access.

Ultimately, the conversation appeared to coalesce around the idea that, although some short-term financial incentives can spur innovation, there will be no substantial immediate payoffs for those financing the broader social goods of renewable energy and energy efficiency.

Powering Growth – The Natural Resource Imperative

A Common Agenda for Energy and Mining & Metals

Asia and, in particular, China will be at the forefront of continued economic growth, driven by population expansion and urbanization. This trend is generating a shift in demand for commodities from old to new economies, particularly to fuel infrastructure development and industrial production. In meeting this demand, the oil & gas and mining & metals industries are playing a key role in global economic recovery and future growth, and must work together to ensure economic growth prospects fully materialize.

The next wave of economic growth will be underpinned by growing interdependencies between the energy, mining and metals industries – including a doubling of energy needs by the mining industry and China’s growth dependence on steel production for infrastructure. This is driving closer relationships across the value chain, e.g. between the mining industry, power producers in China and India, and thermal coal suppliers.

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John S. Watson, Chairman of the Board and Chief Executive Officer, Chevron Corporation, USA

A number of common challenges and opportunities are linked to demand growth by resource-hungry emerging economies:

1. Availability of resources

The scale of demand requires working with host governments to secure availability and accessibility of resources. Currently, companies are experiencing restrictions manifested in different ways. At the same time, there is clear recognition of the need to meet the acceptability challenge through a strong environmental and socio-economic license to operate – delivering benefits to all impacted stakeholders.

2. Capital availability

The scale of capital required to meet demand is the main challenge, e.g. the trillion dollar investments required for energy infrastructure. Both industries have seen a tightness of supply of capital and market uncertainty, which is predicted to continue.

3. Technology investment

Major technology investments are required to meet voracious demand and efficiency needs over the long term. While there is a perception that technology can provide an easy fix, investment and a balanced set of policies are required to build a path for the long term. Oil, gas and coal will continue to provide a great proportion of energy needs 20 years from now.

4. Government revenue and tax policy

The overall regulatory environment of these industries is changing as governments increasingly look to the resources sector to support fiscal balance and future economic growth.

5. Energy and carbon policies

In the face of the challenge to shift to less energy-intensive value chains, the two industries need to work together to understand what their future energy requirements will be and then share this analysis with governments and work together on carbon abatement, energy and investment policies around the world.

Two Sides of the Same Coin: Demand and Efficiency

The twin challenge of meeting demand for resources while achieving the necessary efficiency gains in energy and resource use was highlighted. This means meeting demand in the short term while investing to slow demand growth as part of ensuring security of supply. One participant noted: "Efficiency of energy should really be thought of as another form of energy – how to grow efficiency."

Greater partnerships are required to build capacity and lead integration of the resources value chain to deliver efficiency and security of supply. Collaboration between the mining & metals and energy industries can help to identify more efficient ways to use energy and source renewable energy; there is also an opportunity to collaborate on carbon capture and storage technologies.

The efficiency challenge extends through the value chain to help downstream industries, such as the auto industry, reduce energy consumption and promote metal recycling. For example, Chinese companies are pursuing vertical and horizontal integration strategies to produce minerals for new energy technologies such as fuel cells and solar energy to develop lightweight materials and promote recycling. They aim to relieve pressure on energy demand at each step of the value chain.



Ma Guoqiang, President and Director, Baoshan Iron & Steel Co., People's Republic of China

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Cynthia Carroll, Chief Executive, Anglo American, United Kingdom

Even the most optimistic scenarios predict that global energy demand will increase 30-40% in the next decade, and fossil fuels will continue to dominate the energy mix. Diversification is necessary to meet the voracious rate of growth of energy demand at an affordable price and meet the challenge of acceptability; all forms of energy will be required.

The Collaboration Imperative

Given the interdependent nature of resources supply and demand, collaboration of governments and business around the world is fundamental to fully realize opportunities for future economic growth. From a business risk perspective, further cooperation between producing countries and consuming countries could reduce policy uncertainty. It is also an opportunity to enact good practice and foster and learn from good examples around the world.



Simon Henry, Chief Financial Officer, Royal Dutch Shell, Netherlands

The energy and mining & metals sectors should join their markets to enable supply to meet demand – security of supply will help create and drive demand. Pricing structures can support the supply and demand balance, unless government interventions have a distortion impact.

Different and increasingly effective models for partnership, cooperation and collaboration need to be examined. Given the innately political and geopolitical nature of the resources sector, industry should regard governments as customers and require added-value propositions such as employment or infrastructure in return for an operating license.



Jack Wen, Vice-President, GE Energy, and President, GE Energy China, GE, People's Republic of China

Public-private and industry partnerships are critical to success; China's increasing interest in developing partnerships internationally was welcomed by participants. Partnership models can bring benefits in terms of the huge capital commitment required to develop resources and infrastructure, and build technology and innovation. The future lies in greater cooperation between resource owners, markets and companies sharing technologies.

These discussions were co-chaired by Cynthia Carroll, Chief Executive, Anglo American, United Kingdom, and Zhang Xiaogang, President of Anshan Iron & Steel, and moderated by Robin Niblett, Director of Chatham House.

Cross-Industry Sessions

New Vision for Energy Infrastructure in Emerging Economies

The International Energy Agency has estimated investment needs in energy infrastructure in China at US\$ 200 billion per year up to 2030, equivalent to 17% of the global total. Emerging economies will largely drive the expected global growth in energy sector investments. Across the value chain of energy generation as well as transmission and distribution, the investment needs to fuel China's and other emerging economies' economic expansion will be daunting. The scale of investments and the goal of moving towards lower-carbon solutions pose not only considerable challenges, but also opportunities for international and Chinese stakeholders.



Li Junfeng, Deputy Director-General, Energy Research Institute (ERI), People's Republic of China, and **Steve Lennon**, Managing Director, Corporate Service Division, Eskom Holding, South Africa

Industry leaders discussed issues surrounding infrastructure needs in developing countries and the investment needed to fund its construction. What investment conditions are required to attract sufficient capital and cutting-edge technology to meet China's energy needs? How can public-private financing mechanisms and international carbon markets be leveraged to scale up low-carbon energy infrastructure investments in China and other emerging economies? What are the global supply chain implications of projected investments in different energy infrastructure areas in China and other emerging economies?



Wu Changhua, Director, Greater China, Climate Group, People's Republic of China

China, and the speed at which it is building energy infrastructure to provide electricity to its massive and geographically spread out population, was a key focus. China has the ability to leapfrog its technologies and infrastructure, constructing power grids and sources of power supply that are cleaner and more sophisticated than those in developed countries. How can China attract foreign and domestic capital to fuel its deployment of infrastructure, particularly smart grid technologies?

Executives from Western utility companies said they are aggressively working to partner with Chinese companies, as the scale and market potential could result in lower-cost technologies that could be deployed elsewhere in the world. They highlighted the difficulty they face in upgrading existing infrastructure in countries like the United States, where political and financial barriers make it difficult to install and upgrade technologies. China, with its massive infrastructure projects that are underway or soon will be, provides a learning platform for other countries facing similar challenges.

The opportunity to deploy smart grid on a massive scale in China means that the country will be a crucial testing ground for these systems. New technologies will emerge in the country and there will be no shortage of capital to fund them in the future. How private and public capital can be integrated to fund smart grid and other energy infrastructure remains to be seen.

The developed and developing world face huge challenges in upgrading existing infrastructure over the next decades to become more efficient and use more renewable resources. In the US, for example,

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Khalid Bin Khalifa Al Thani, Chief Executive Officer, Qatargas, Qatar, and **Alaa Abu Jbara**, Marketing Director, Qatargas, Qatar

nearly all existing infrastructure will have to be upgraded or replaced to meet policy requirements. Meanwhile, China is aggressively enacting plans to roll out new infrastructure ranging from smart grid systems to nuclear and hydropower plants. Against this backdrop, there are questions about how to secure large-scale capital to fund the projects, develop new technologies and commercialize them to meet future demand.

Many see China and its strategies as an opportunity to partner with Chinese companies to produce cost-effective systems while learning from the Chinese how to deploy new systems effectively and affordably. Western utility companies are looking to forge cooperation in China to develop technologies and explore ways to upgrade infrastructure at home.



James E. Rogers, Chairman, President and Chief Executive Officer, Duke Energy Corporation, USA

Yet there are problems, mainly surrounding the acquisition of capital to move the industry forward. Capital allocation in this area has not fully come to fruition in China; however, many project it soon will, especially if the policy environment remains stable.

Integrating alternative resources into infrastructure was discussed. The focus, particularly in China's case, was on how to make infrastructure more efficient given the country will still largely rely on coal to fuel its economic growth in the coming decade.

More attention needs to be given to grassroots solutions that have emerged in China, such as the widespread use of solar water heaters and electric bikes. How can such solutions be upgraded and used more effectively in China and elsewhere in the world? It is crucial to make sure that proper policy is in place to advance new infrastructure that endures for the next 60 years.

The dilemma is that technology is still too expensive, not mature and lacking finance. It can sometimes be slow to obtain and, once obtained, quickly becomes out of date. Creating the right mix of innovation coupled with technologies, forward-thinking policies and capital will advance energy infrastructure. China may provide the clearest picture on how to obtain such a mix and deploy it elsewhere.

Repowering Transport: Effective Energy for Mobility in the 21st Century

Oil-derived fuels power 97% of the global transportation system. Projections indicate oil will continue to be the primary source of energy for transport over the next decades. Against the backdrop of climate change and its increasing effects on the planet and human life, there is a pressing need to find alternative, clean sources of fuel for transportation.

Finding solutions is not always easy. Clean energy must be combined with new technologies that are integrated across varying sectors, creating a holistic, environmentally friendly transportation ecosystem. New partnerships must be forged, policies created, financing secured and innovation propelled to advance the development of transport systems that no longer solely depend on oil.

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The objective of this session was to bring together stakeholders involved in the transportation system beyond energy and transportation companies. Executives from the Forum's mobility (automotive, aviation and logistics), energy (oil and gas, utilities, alternatives) and chemicals' Industry Partners, Global Growth Companies and Technology Pioneers discussed how to best accelerate the adoption of clean and secure energy sources for the transportation sector and assess feasibility of future scenarios. They identified key challenges and opportunities in the realms of partnerships, policy and financing to drive greater energy efficiency, further penetration of alternative fuels and electrification of the transport ecosystem.

Four leaders gave their perspectives on clean transport derived from their backgrounds, which included government policy and research, utilities and energy, finance and investment and aircraft manufacturing. They addressed establishing partnerships within and between different sectors



Ravi Pandit, Chairman and Group Chief Executive Officer, KPIT Cummins Infosystems, India

to drive innovation, the crucial role policy plays in advancing clean transport solutions and the financing mechanisms required to advance new technologies and infrastructures as well as innovative business models emerging in the space.

A sound, transparent policy framework is essential for stakeholders, including companies and investors, to move forward with business models that would accelerate new technologies for transport.

Companies often face difficulties in forging new partnerships across different sectors that are unaccustomed to cross-sector collaboration.



Thomas J Casey, Chief Executive Officer, Current Group, USA, and **David Mohler**, Senior Vice-President and Chief Technology Officer, Duke Energy Corporation, USA

With such collaboration, new challenges and opportunities arise; yet for collaboration to take place, policy must be clearly defined that will secure financing for new technologies and business solutions. On the financing side, it is clear that not enough resources are going into transportation, partly due to the high levels of risk and uncertainty that these young emerging technologies represent to investors in clean technology.

Participants took part in discussions focusing on partnerships, policy, and finance. Key conclusions include:

Partnerships

With the correct policies in place, partnerships will fall into place. Yet there are also many challenges with developing partnerships. In particular, the complexity of partnerships in this sector is high, and the key reason many of these partnerships exist is to manage the complexity of the issue. Developing a clean transport ecosystem requires collaboration between sectors that have not worked together before, hence the need to work hard to arrive at common understanding and incentive structures, and to learn how to work with one another.

Two new stakeholders are retailers and government. The reason for developing such partnerships is survival for the industry and the complexity of the challenge that lies ahead. Sound business plans must be put in place; trust is essential, and there must be long-term credible incentives to stay involved and assurance that all interests are represented. Companies working together across

sectors also face obstacles in aligning interests and understanding the different opportunities and constraints different stakeholders face.

Policy

Policies accelerate the shift to clean transport. They must be clear up front so technologies can be effectively built around them. There must be a balance between setting policy early enough to encourage investment and setting it late enough not to act as a disincentive for alternative solutions to be developed. Further, policies can help foster social change, as the public perception of transportation has deep historical roots that will not necessarily be easy to shift.

Finance

It is very difficult to make investments in the transportation revolution due to low confidence in policy and negative past experiences, among other factors. Regulatory risks as well as the challenge of competing against the price of the incumbent system (e.g. fuel) make allocating capital difficult.



David Mohler, Senior Vice-President and Chief Technology Officer, Duke Energy Corporation, USA

However, there are signs of growing consumer demand for green transport, indicating business cases will become more feasible as end users demand greener products. Consumer demand cannot be underestimated.

China provides a unique case study for other countries. The Chinese government is moving forward rapidly with clean initiatives across many sectors, including transportation. In this sector, the government has set performance standards for

industry; in addition, they have the required capital and a growing market place with businesses that can bring the sector to scale, and an opportunity to break new ground. This is especially the case with land transport. How China implements more environmentally friendly transport will provide valuable insight for other governments/business seeking to do so: they may also hold the answer to the financing question.

The Future of Fossil Fuels in a Low-carbon Economy: Carbon Capture and Storage

An Urgent Imperative

Pursuing carbon capture and storage (CCS) technology to reduce fossil fuel emissions has become an imperative in the face of urgency to reduce fossil fuel emissions to meet global low-carbon targets by 2050. Analysis shows that CCS is not optional if emission targets are to be achieved.

CCS needs to be discussed through the lens of the future of energy and not in isolation. Coal and other fossil fuels will continue to play a key role in the energy mix for next two to three decades, especially in the US, China and India. According to a report by the Energy Fund and WWF on China's emissions to 2050, even under the most optimistic scenarios, coal and other fossil fuels will still represent up to 40% of the total energy supply.

The Promise of CCS

Key drivers for CCS in different geographies and sectors include:

- In the United States, CCS is important in the context of utility companies facing regulations that will force them to retire and replace their existing power plants in the next 30 years
- Under the EU Emissions Trading Scheme, CCS technologies are key to the steel industry in Europe – it is estimated that one tonne of steel produces roughly two tonnes of CO₂
- In China, CCS is an essential consideration in development plans in the context of a low-emissions economy and clean growth coupled with the prevalence of coal-based energy

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A substantial number of pilot projects are necessary to test feasibility, drive technology forward and lower costs. Promising pilot projects are underway in the European Union, Australia, United States and China, supported by investments by governments to accelerate research and development.



Roland Verstappen, Vice-President, International Affairs and Corporate Responsibility, ArcelorMittal, United Kingdom

Examples with multiple-country, public-private partners include:

- Companies like Duke Energy exploring CCUS (utilization and storage) for various products including fertilizers and biofuels, and using CO₂ to contribute to value-added products rather than consider it as waste
- Arcelor Mittal is running pilot demonstration projects in Germany and France with “top-gas recycling” technology: in terms of cost, 500 million euros will remove about 1 Mt of CO₂; it is estimated that, across 79 blast furnaces in Europe, the total cost of installing CCS is around 24 billion euros
- In China, there is strong investment in CCS R&D, e.g. a project in Inner Mongolia to remove 100,000 tonnes of CO₂ in five phases, including carbon capture, purification of CO₂, liquefaction, transport and underground storage; the project is to be completed by end 2010 at a construction cost of approximately 120 million RMB (US\$ 20 million)

In Whose Backyard?

Appropriate sites are a crucial challenge for CCS development, as the NIMBY (not in my backyard) protests raised over nuclear power plant developments in the past have evolved into the NUMBY (not under my backyard) protests now

accompanying debates over storage facilities. Governments and industry must work together to address the NUMBY arguments of critics and move CCS development forward. Governments may need to consider “eminent sub-domain” policies to overcome the hurdle of where to locate facilities that might store emissions indefinitely.

In general, the high cost of projects, stretched government budgets, weak carbon markets, insufficient public acceptance and tough planning legislation are combining to make it difficult to envisage significant project activity in the US and Europe.

Stakeholders are looking to China as a technology laboratory where pilots could potentially be developed rapidly at scale. Large Chinese companies are already cooperating on R&D CCS projects, including CNPC, CNOOC and Sinopec. The benefits of international cooperation include speed, scale and intensity of technology advancement as well as broader benefits of partnership experience and learning.

Who Will Pay?

Participants debated feasible financial models for CCS demonstration projects in the light of the current economic climate and need for justification of expenditure by governments and business.



Lykke Friis, Minister of Climate and Energy of Denmark

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Carbon markets will likely not deliver the necessary finance for CCS – particularly in the context of alternative low-carbon technologies, which begin to look more attractive and at lower risk with a carbon price of 80-90 euros. Alternative finance options do exist but, in Europe, require greater flexibility and redesign, e.g. to use revenues from auctioning to finance CCS.

In Europe and the US particularly, there is a need for public-private partnership. To justify massive expenditure on demonstration projects, industry requires assurance that CCS technology is backed by governments in the form of policies, laws and public sector funding.

In the China context, huge potential is seen in international cooperation among companies, with a favourable policy environment and possibility to access domestic finance. For international and Chinese companies exploring collaboration and partnership opportunities, CCS presents a good opportunity with favourable technology development conditions. It should not be expected that the Chinese would provide the public purse for CCS: however, it is worth considering further models for using public money in a way that de-risks investments to further leverage private sector investment.

Building a Ladder of Cooperation

Building a “ladder of cooperation” among countries and industry partners will accelerate CCS development and help persuade governments to invest the necessary sums to realize this low-carbon technology.



James Cameron, Vice-Chairman, Climate Change Capital, United Kingdom

Regardless of whose backyard or the ultimate price tag, only public and private sector cooperation among multiple countries along with commitments for massive and long-term financing can accelerate CCS development to meet low-carbon targets in the time frame necessary to safeguard against future climate change.

There is evidence of strong support from governments around the world, including Australia, Europe and the United Kingdom. Other governments like Japan, where CCS has low feasibility in part due to public acceptance, are interested in developing international partnerships. Following the success of early stage CCS demonstration projects in China, participants were keen to further explore the opportunity to finance and accelerate pilot projects in China.



Cheng Siwei, Chairman, International Finance Forum (IFF), People's Republic of China

However, to realize the potential for international cooperation in China or elsewhere, a clear mechanism for bringing together industry and governments to examine barriers to technology, finance and demonstration is required. To move forward, regardless of the region or country that would house the projects, a ladder of cooperation to develop CCS technologies must involve stakeholders from research sectors, public funding and private sector expertise contributing to CCS development.

Official Sessions

Powering Efficient Growth

Investments in energy efficiency could provide an estimated 35% of the reductions required to achieve emission goals by 2020.

What are the most promising technologies and business models for making production, distribution and consumption of energy more efficient?

Key Points

- China could become the clean technology laboratory for the world, a market where low-cost clean energy solutions are scaled up.
- To achieve ambitious energy efficiency targets, people's "energy wisdom" will have to change. There will be an increasing fusion of energy and information. To promote efficiency, people will need to have full information about energy use, costs, pricing and environmental impact. The world needs to develop a new capacity and facility for energy efficiency.
- Small entrepreneurial companies are developing many of the new technologies to promote energy efficiency. The large process-oriented companies focus more on evolutionary innovation. Where before the larger players might have mistrusted the smaller ones and seen them as threats that needed to be challenged or taken over, today there may be advantages to collaboration, perhaps by helping the small enterprises scale up their technology.



Heinz Haller, Executive Vice-President and Chief Commercial Officer, The Dow Chemical Company, USA



Christina Lampe-Önnerud, Founder and Chief Executive Officer, Boston-Power, USA; Technology Pioneer

Synopsis

There are two main ways to respond to the threat of global climate change: reduce the carbon intensity of energy supply infrastructure and improve the efficiency of energy use. Either way, action has to be taken with urgency and great ambition.

To drive greater energy efficiency will require innovation. Around the world, many enterprises are already engaged in developing cutting-edge products and systems in the fields of energy storage and clean energy technology. Just as the mobility revolution has changed computing and telecommunications, there is a transformation going on in the energy sector. Batteries that can power motorbikes, cars and trucks have been developed and can be deployed now. Entrepreneurial initiatives are moving forward and new opportunities exist all over the world.

Such innovations are essential if a country like China is to embrace energy efficiency and avoid following the American consumption growth path. With industry accounting for 70% of China's energy use, it is imperative that businesses get on the bandwagon. The Chinese simply cannot imitate American lifestyle patterns. Indeed, China is looking for solutions and best practices to adopt. It could become the clean technology laboratory for the world, a market where low-cost clean energy solutions are scaled up.

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To achieve ambitious energy efficiency targets, people's "energy wisdom" will have to change. There will be an increasing fusion of energy and information. To promote efficiency, people will need to have full information about energy use, costs, pricing and environmental impact. The world needs to develop a new capacity and facility for energy efficiency.

Business relationships will have to change. Small entrepreneurial companies are developing many of the new technologies to promote energy efficiency. The large process-oriented companies focus more on evolutionary innovation. The interaction between these companies will have to change. Where before the larger players might have mistrusted the smaller ones and seen them as threats that needed to be challenged or taken over, today there may be advantages to collaboration, perhaps by helping the small enterprises scale up their technology. Indeed, to achieve a revolution in energy efficiency, the main driving factor may be business models rather than new technology.



Peggy Liu, Chairperson, JUCCE, People's Republic of China; Young Global Leader

New approaches may also be needed in regulation. China's leaders see energy efficiency as an urgent priority and are enacting and enforcing energy efficiency standards and regulations. There are now over 400 energy conservation supervision centres across the country. They play an enforcement and educational role in an effort to change people's mindsets and behaviour. NGOs have organized training programmes for officials, including city mayors.



Solving the Energy Puzzle

Energy governance is highly fragmented globally and the scope of issues (efficiency, renewables, security and safety) is highly interlinked.

How can policy-makers and industry leaders from developed and emerging economies collaborate further on this critical global issue?

Key Points

- Governments the world over face the challenges of meeting present and future energy demands for their citizens, improving sustainability, and connecting the 1.5 billion people who lack access to modern energy to the system.
- The goal of energy governance is to deliver energy security.
- Aligning interests and encouraging communication will help, but solutions will arise first on a national level.



Noé Van Hulst, Secretary-General, International Energy Forum (IEF), Saudi Arabia



Tulsi R. Tanti, Chairman and Managing Director, Suzlon Energy, India

Synopsis

With the diffusion of political and energy power, international governance is more complex. Energy ministers from producing and consuming countries encouraged collaboration between IEA and OPEC officials; this has been a silent revolution in energy governance. Yet, it is difficult to coordinate energy policy on an international level. Even on a national level goals shift rapidly, especially with shifts in administrations. Planning for change to come from national, bottom-up initiatives is much more realistic than expecting an enforceable international framework.



Gao Jifan, Chairman and Chief Executive Officer, Trina Solar (TSL), People's Republic of China

One participant decried an overemphasis on renewable energy sources. Oil, the main source of the world's energy now and for the foreseeable future, was missing from the debate on energy security. The extreme volatility of oil markets kills investments not only in oil but also in related energy sectors. Increasing links among stakeholders in the oil, energy and financial markets would stabilize the oil price and improve global energy governance.

Other Key Takeaways

Just as some developing companies skipped the fixed-line telephone system and leapfrogged to mobile technology, solar energy could provide the same revolution.



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