INNOVATION TRENDS

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MAIN SUBJECT **ENERGY**

Innovation as the Driver for a Sustainable Energy Future

Jatin S. Nathwani – Ontario Research Chair in Public Policy and Sustainable Energy at University of Waterloo, in the Faculty of Engineering and the Faculty of Environment, Executive Director, Waterloo Institute for Sustainable Energy (WISE)

What role national governments play in energy innovation process?

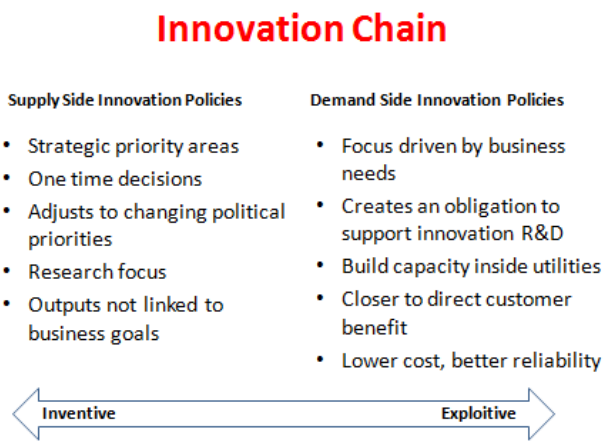
National governments in general, and in the case of Canada provincial governments since they have primary jurisdiction over energy resources, play a key role in providing the necessary policy certainty, incentives and R&D support through specific programs to promote and foster development of new energy resources. This is partly because the private sector enterprises have a lower appetite for the investment risks associated with next generation technologies where the payoffs are uncertain. Recent examples include carbon capture and sequestration projects, bioenergy for electricity generation or transport fuels or the next generation battery technologies and the associated infrastructure for a "smart grid" to enable electrification of the transport sector.

I note that policy instruments such as renewable portfolio standards, feed in tariffs, establishment of cap and trade or carbon tax regimes or specific tax policies for accelerated depreciation or direct incentives for consumers and producers have all played a role in different OECD countries to promote renewable energy resources such as solar, wind, biomass, geothermal. The reasons for success or failure of some of these instruments vary from one jurisdiction to another and very much depend on the context. For example feed-in-tariffs (FITs) as implemented in Germany, Spain, Ontario – Canada are effective in promoting rapid implementation of some green technologies such as wind and solar but the high costs have been a concern for governments because of a potential consumer backlash. Unfortunately, the FITs are not a particularly effective mechanism for promoting innovation and depending on the level at which the tariffs are set they simply permit unbridled economic rent seeking by producers at the expense of consumers and their contribution to overall net social welfare remains an open question.

What is the ratio of public/private investments?

The ratio's of public/private investments in R&D are a simple metric that provides one high level view of what may the enablers for innovation to take hold but comparing across countries we must recognize this as partial view. The role of governments in providing the funding for fundamental research in universities and other research focused institutions is one important element of building the necessary capacity to support innovation. There is an equally important role for private sector companies to create the market for testing new ideas and making the necessary investments through effective collaborations to create profitable products and services.

Figure 1: Innovation Chain



On the left hand side tends to be the focus of government policies that establish, what I would call, the supply side of innovation capacity. In Canada this includes agencies and funding councils such as the NSERC, the MRC and SSHRC that provide ongoing support for research at universities, and then on an ad hoc basis governments also intervene to

provide special funds for strategic priority areas, either at the Federal or Provincial level (SDTC, OCE, MRI). In addition, there is government funded research in government labs in support of departmental objectives. This is a model similar to U.S. and most of the OECD countries. In the chain this is essentially the "inventive" part of the supply side of innovation capacity. In Canada, we believe the research base and the capacity to generate new ideas is reasonably well funded and great potential exists to participate in the evolution of the green energy system.

Equally important is the exploitive part of the chain that is driven primarily by business needs and the development of methods, tools and implementation that is in close coordination with the in-house experts in the business. The key point that has become somewhat compelling is that stimulating innovation requires sustained collaboration and a systemic response by different individuals and institutions in the innovation system working together. Also providing a mechanism of funding that creates an in-house capacity in businesses, industry and energy utilities to absorb ideas is crucial.

A mainstream of energy innovation is "green" energy. Why alternative energy is crucial today?

The need for a transformation of the global energy system with a lower environmental footprint is now widely recognized among decision makers in government and the political leadership, the corporate business sectors and the major national academies as well as non-governmental organizations around the world. A drastic re-alignment of the global energy system on a large scale is an urgent priority to ensure that the performance and growth of the economy remain in harmony with the goals of a cleaner "green" environment.

Our reliance on existing fossil fuels based sources of energy and their associated detrimental impact on the environment, whether related to poor air or water quality or impact on forests, land use and sensitive ecosystems or climate change, have been well documented and articulated over the last three decades. What remains at the heart of the challenge is the growing demand for energy services arising from a combination of global population demographics and shifting income levels in developing countries. A comprehensive set of innovative but credible energy solutions are required for rapid implementation that strike a balance between economic growth and a sustainable environment.

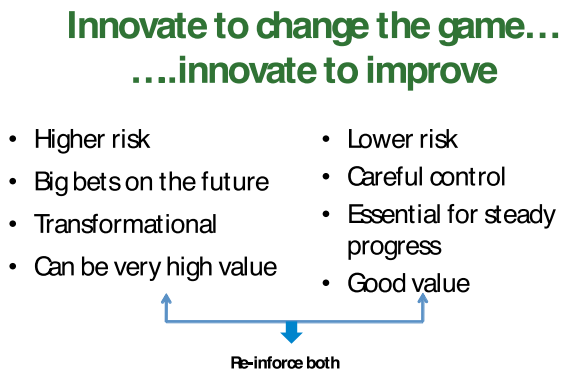
It is clear that cleaner, but affordable, and at the same time reliable energy services are indispensable for enhanced human development and quality of life. It is unconscionable that a third of humanity (approximately 2 billion people) have no access to electricity. This suggests a yawning gap in the capability of the current energy systems to deliver effective energy services to meet the needs of the world's poor. Whether these solutions are labeled as "green" or otherwise, there is a compelling need to expand access to modern energy services through innovation and at the same time maintaining a close scrutiny on the biophysical impacts on the environment.

Scientific and technological innovation combined with effective policy instruments will be required to help meet some basic goals similar to those identified by the UN as part of the Millennium Project to reduce poverty and to improve the health of citizens. For instance, in the absence of a reliable supply of energy, neither health clinics nor schools can function properly nor can clean water and sanitation be provided without effective pumping capacity. Thus, making the transition to a sustainable energy future is one of the central challenges we face. This can be achieved only through effective investments in critical energy infrastructure allowing innovation to spur cost reductions to ensure affordability for the largest number of people.

What are the latest technological trends in energy innovation? Can you elaborate on some recent breakthroughs?

In simple terms, as the picture below shows, there are two interrelated propositions: Innovate to change the game?... Or Innovate to improve?

Figure 2: Innovate to change the game… innovate to improve



Whether an entity wishes to participate in innovation that is game changing or to participate in activities through allocation of limited funds for innovation that provide incremental improvements, we need to re-enforce both since they have value and a specific company will of course determine on the basis of unique circumstances and its level of risk appetite.

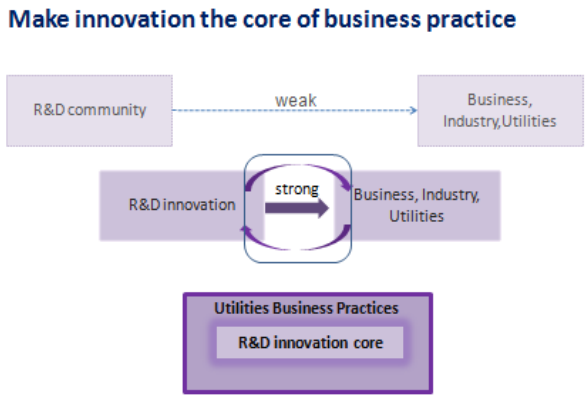
In the clean energy sector, several game changing innovation from the supply side of the chain are what we may call transformative technologies:

- plug in electric vehicle technologies and advancement of battery technologies,
- large-scale storage on the electricity system, very high efficiency solar photovoltaic devices to provide affordable energy for the masses,
- a range of developments under the umbrella of "smart grid technologies" that involve real time feedback of energy use and a significant convergence of the information systems science with the power sector,
- self sustaining "renewable based" micro grids for remote and rural communities,
- second generation biofuels,
- super conducting magnetic energy storage systems and conductors and others.

But we should not underestimate the right hand side that can also create equally compelling value propositions for operating energy utilities that would include, for example, advanced measures to control voltage, improve fault detection on the system, power flow management, on line condition monitoring and asset management for end of life recognition and seamless integration of distributed generation resources into the distribution system.

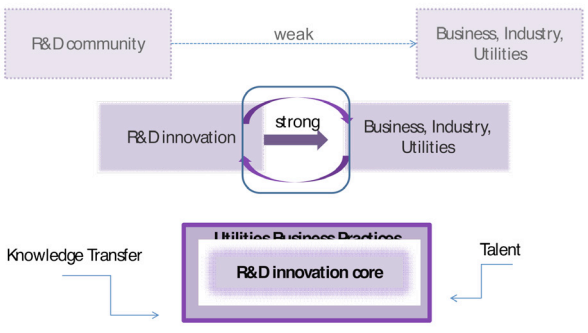
For implementation on a wide scale, there is a broader compelling need to make innovation the core of business practice (see Figure 3).

Figure 3: Make Innovation the core of business practice



Innovation comes from how people create, share, refine and combine their ideas. It is a little naive to believe that most new ideas come as a flash of inspiration. The lone ranger; the brilliant scientist with frizzy hair and so on is an endearing image but the ultimate goal of producing goods and services through innovation is a more complex subject. Innovation is very much a development through collaboration, dialogue and through the application of a range of different skills from different organizations. An individual's skills, talents, ideas and knowledge are crucial for innovation but it is the team that is key. Thus the need for a strong linkage and a culture that is receptive to establishing very strong links between the R&D community and the business sector and energy utilities is one path. If we accept that innovation and skills are linked and a skilled workforce is better able to generate and adopt new technologies and organizational change, then we need to find the right stimulus and incentives for fostering a business culture that promotes strong links.....almost to the point where it has become core practice. It would be a positive development if every CEO, without blushing, will openly state that innovation is at the core of our business because that is our path in delivering value to our customers.

Figure 4: Open innovation ... an idea whose time has come



Beyond the concept of making innovation a core business practice, there is the idea of open innovation that has a good potential in the clean energy sector. This is where firms increasingly collaborate with their customers, suppliers and research institutions. Compared to more linear and internal models of innovation, open innovation offers considerable benefits to the organization and to the wider economy and the society.

In summary, I would like to quote from a famous paper that Friedrich Hayek wrote in 1945 called "The Use of Knowledge in Society." He distinguishes between scientific knowledge as organized knowledge and disorganized knowledge on which the functioning of a constantly changing modern economy depends, namely "the knowledge of the particular circumstances of time and place", which every one of us has. This is "unique information of which beneficial use might be made, but of which use can be made only if the decisions depending on it are left to him or are made with his active co-operation."

It is this unique information that is available to an individual at the workplace armed with the knowledge of particular circumstances that are best qualified to spur innovation.

Is there a progress or a standstill in the sphere of thermonuclear energy? Can it become a viable alternative to other energy sources? How "green" it may develop?

On the subject of fission based nuclear energy, for the next generation of "safe" reactors, there has been significant progress on the technical front but the wide scale adoption has been slower. This is largely due to a number of related economic and social factors. The nuclear option has significant potential to make a positive contribution to the global energy supply mix in a manner that has a lower negative footprint on the environment. Nuclear energy being a highly dense form of energy translates to a lower environmental impact on land use, in terms of energy output per land area (i.e. MWh/m2). It is a centralized source of energy. However, I note that the emerging innovations often categorized as Generation IV reactors and in particular the small modular nuclear reactors in the range of 25-50 MW capacity of each module appear to be a promising innovation. They are designed to address the issue of high upfront capital costs associated with the big 1000MW generation plants. The reactors are modular, scalable, emission free power can be provided at lower financial risk. The small modular reactors could power small towns and remote communities off the grid. This development needs to be monitored and promoted and it is an innovation that may just be right in time to help displace fossil fuels based generation.

How is clean energy R&D incorporated into national innovation systems in general? What role do governments play or should play in developing clean energy?

As discussed above, the incorporation of clean energy R&D into the national innovation chain is a "hit and miss" type of proposition. The speed with which innovative solutions could be incorporated into blood flow of a business entity needs to be improved. In Canada, this, however, is a generic problem not necessarily confined to just the energy sector.

Recently, we have made some significant strides to help improve the collaboration and integration of new knowledge and ideas into business practices. Government agencies such the Natural Science and Engineering Council (NSERC), the Ontario Centers of Excellence (OCE) and the Ministry of Research and Innovation (MRI) are playing an influential role in fostering, promoting and funding initiatives to bring ideas to the market place.

The Role of Government is to Address Market Failures

Ruud Kempener – postdoctoral research fellow in the Energy Research, Development, Demonstration & Deployment (ERD3) Policy project

Major innovation trends in energy deal with its generation and saving reminding a centuries-old argument of who comes first a hen or an egg. Which sector scored more impressive results so far and why?

In the energy sector, the problem might be even more complicated than the chicken and egg one, because "generation and saving issues" transcend over time and interact not only with each other but also with geopolitical concerns. For example, after the first oil shock the immediate response by governments was to install energy savings measures in the short term, but simultaneously invest in new energy generation technologies that could increase global energy sources in the long term. Nowadays, the increasing growth of energy consumption with imminent finite fossil resources also creates this dual response: governments worldwide are investing in energy efficiency labeling to reduce vulnerabilities, while investments in alternative sources of energy are seen as a longer-term solution for a transition towards a low carbon society.

I think that both the generation and saving innovation in the energy sector do not perform very well in comparison to innovation in other sectors, mainly because incentives for innovation in both sectors are often temporary. Only in those countries and sectors where you see continuous, predictable and progressive incentives with a long-term focus (e.g. CAFE standards for energy efficiency of automobiles in the U.S., or energy efficiency housing standards in the Netherlands), you truly see progress. Unfortunately, limits to such incentives are in place in the generation industry (an exception is the biofuel production incentives by the Brazilian government), which has hampered technological progress.

What institutions set targets for innovations in energy?

In our latest report on energy technology innovation policies in the BRIMCS countries (Brazil, Russia, India, Mexico, China, and South Africa), we identify four institutions that currently play a role in setting national targets for energy technology innovation: 1) intergovernmental organizations, 2) energy ministries, 3) science & technology institutions (or ministries), 4) and, state-owned enterprises. The extent to which these four institutions are involved in setting targets differs per country.

The impact of national targets on energy technology innovation is also difficult to determine. First, the severity of national targets is difficult to compare. For example, Brazil uses electricity-specific targets for renewables (70%), South Africa has an absolute target (10000 Gwh), while other countries use growth targets (eg. Russia's target to double nuclear capacity). Second, targets differ in the extent to which they are translated into responsibilities for individual actors. Except for South Africa (where the main electricity generator was responsible for meeting the targets), governments have paid little attention to translating national targets into tangible goals for individual actors.

In the last two decades international and national standards have been tightened dramatically. How did it affect national innovation strategies? Could you show some most eloquent examples?

Standards can play an important role in promoting energy technology innovation, as long as the standard setting is long-term and transparent. Furthermore, standards work best in environments where solutions for energy efficiency improvements are clear. For example, energy efficiency standards for refrigerators in the United States have created continuous improvement in energy efficiency.

Although government support for the development of standards and labeling for appliances, buildings, and consumer products has increased in the last decade (in Russia, the government has created biofuel standards and building codes), I think that there are still too few international agreements on harmonizing energy efficiency standards. The United States and Brazil are working on the creation of international standards for biofuels, but for most energy technologies there is no consistency between standards in different countries. For example, the fuel economy standards for automobiles differ in Europe, the U.S.A., and China.

To what extent energy innovations can be regarded as integral part of national innovation systems? Or perhaps they are efforts of individual companies either supported by governments or going alone at their own risk?

The concept of "national innovation systems" arose when scholars (Nelson, Freeman, and Lundvall) attempted to compare different countries (nations) to each other. However, this does not mean that the institutions constituting a "national innovation systems" need to be "national", nor that it only includes those institutions that are supported by a national government. Instead, this literature emphasizes that the institutions themselves can be global, national, regional or sectoral (Edquist, 1997), and that the innovative performance of a country depends on how this set of institutions interacts

and affects national firms. In other words, although it is difficult to determine what institutions are part of a "national innovation system", it is important to focus on how these institutions interact with each other and how their interactions affect the innovative behavior of national firms.

The extent to which the structure and interaction in a national innovation system affects the innovative performance of a country is still weak, despite a large number of comparative studies (e.g. Nelson, 1993). Some scholars (e.g. Smits, 2004; Sarewitz & Pielke, 2007) argue that an innovation system requires different actors (supply actors, demand actors, an intermediary infrastructure and a support infrastructure). Other scholars (e.g. Johnson & Jacobsson, 2001; Hekker, 2007) argue that the functions of innovation need to be supported, while others (e.g. Holdren, 1997) argue that a national innovation system requires support of the whole innovation process from R&D to demonstration to deployment.

Our study on Russia's energy technology innovation system attempted to evaluate to what extent Russia's government supports different actors, stages of R&D, and functions of innovation. This analysis took place in 2009 (before Skolkovo) and shows that the Russian government gives little support for demonstration projects for most energy technology areas. Furthermore, there are only a small number of policies in place that support the diffusion of knowledge throughout its innovation system, or support entrepreneurial activities. Finally, the Russian government has no tangible policies in place that promote innovation in fossil energy technologies and transmission, distribution, and storage technologies.

What role should national government play in innovation process?

Many reports argue that the energy sector is especially prone to "market failures", because the price of environmental degradation is not internalized, knowledge created is not fully appropriable, there are long time gaps between R&D and deployment, and energy availability and reliability is a public good. From this perspective, the government role is often defined as "addressing market failures".

Governments can address some of these market failures by e.g. creating a price for carbon (either through tax or emissions trading), R&D support, and incentives for energy companies to improve the energy efficiency of their generation activities. I do believe that taking away these "market failure" is a necessary condition in which governments play an important role, but I also believe that businesses have an important role in supporting government incentives that try to address these "market failures".

However, I believe that addressing "market failures" is not sufficient for stimulating innovation in the energy sector. In particular, the fact that the energy sector is dependent on a very rigid infrastructure to deliver energy services to their customers warrants a more pro-active approach by governments. First, governments have to provide more incentives for customers and suppliers of energy to find innovative solutions. Second, the government has to support high-risk technology development that does not have any market potential now, but might have transformative power in the future or which could provide the infrastructure of the future. Third, the government has to attract the "young and the bright" to study STEM, and instill a sense of urgency and pride in working on energy related issues. I believe that the nuclear energy sector in Russia still attracts young and bright employers, but that the Russian government can do more to stimulate human capital for other energy technologies.

In the age of globalization is it appropriate to say that a universal innovation system is in the offing? To your opinion how Russia may effectively participate in it?

In a preliminary analysis of scientific collaborations in "international highly ranked applied science journals" in the areas of nuclear energy, fossil energy, and renewable energy (to be published shortly), our data shows that between 2000 and 2009 the number of international collaborations by Russian institutions has increased between 2.5 and 5 times. Globalization of science collaborations is thus an ongoing process. However, the extent to which Russian institutes participate in international collaborations differ substantially between nuclear energy research, fossil energy research, and renewable energy research. For example, in our dataset Russian institutions collaborate in 2009 372 times on nuclear energy with 32 different countries, while Russian institutions only collaborate 5 times with 5 different countries. In the same database, Russia is ranked the 9th highest international collaborator in nuclear energy, while it is ranked 58th highest international collaborator in renewable energy.

However, it is important to recognize that scientific collaborations is only one of many avenues for international cooperation. Russia's cooperation with the Chinese government on developing new nuclear reactors is an example of another, high-impact international cooperation activity.

No single country can participate in the fullest extent on all technology areas. It is therefore important to develop international cooperation strategies that 1) complement existing international cooperation activities, and 2) support national priorities. In a nutshell, an effective Russian policy on international cooperation requires a pro-active approach. It needs to 1) support Russian scientific institutions and companies to instigate international R&D activities, contribute to international demonstration projects, or provide support for international deployment opportunities and, 2) identify national problems that could benefit from R&D activities, demonstration projects, or deployment support that attract clever solutions from other countries to Russia.

Many reports argue that the energy sector is especially prone to "market failures", because the price of environmental degradation is not internalized, knowledge created is not fully appropriable, there are long time gaps between R&D and deployment, and energy availability and reliability is a public good. From this perspective, the government role is often defined as "addressing market failures"

How tough is international competition in the energy innovation market? What did it bring about and what may it introduce in practice?

The economic downturn, and the increase in unemployment rates in many developed countries, did increase awareness about "green jobs" moving from one country to another. Furthermore, the combination of an economic downturn and concerns about climate change in 2009 made many countries invest a large proportion of their stimulus packages in green energy technologies. For example, a HSBC report estimated that more than USD 430 bn in fiscal stimulus were invested in climate change investment themes worldwide. Furthermore, our report on energy technology innovation policies in BRIMCS countries shows that almost all of these countries have policies in place that support the manufacturing, and deployment of renewable energy and energy efficiency technologies through tax credits, feed-in tariffs, loans, or grants.

So, the number of activities, and the number of companies, involved in the development of renewable energy and energy efficient technologies has increased in the last couple of years. Furthermore, we've seen a spectacular growth of manufacturing capacities in some countries, for example the production of PV panels in China.

However, I believe that the issue of international competition on energy innovation markets is more complicated than simply an increase in manufacturing capacity in individual countries. Most energy technologies, renewable energy technologies included, are complex technologies, which are often assembled based on multiple components. For example, the turbines of wind mills might be manufactured in China, while its gearboxes and propellers are manufactured in the U.S.A. Similarly, many of the manufacturing equipment for the production of PV panels in China are sold by U.S. manufacturers. Furthermore, there is often a very important "local" component to energy technologies, which reduces the ability of one company to dominate the market. Finally, there is still an important role for companies in installing, maintaining and improving new energy technologies.

Finally, the growth in renewable energy technologies (PV and wind) is continuing and with increased energy demand in emerging economies, the Middle East, and Africa there is a growing market for energy technologies. Finally, much of the energy infrastructure in the U.S.A. and Europe need to be replaced in the forthcoming years. All in all, this means that markets for new energy technologies will continue to grow. A growing market attracts international competition, but it simultaneously provides sufficient opportunities for a range of countries to participate.

How effectively energy innovation may influence national policies and international relations?

Energy is critical for economic and social development, and will remain to play an important role in both national policies and international relations. Furthermore, energy security is a key element in international relations.

It is important to recognize that there is a two-way relationship between science and technology and policy. New developments in science and technology will shape national and international policies. For example, the discovery of shale gas in America and Europe has shifted national policies and international relations very rapidly. Similarly, the development of nuclear capabilities in the U.S.A., Russia and a number of other countries has shaped national policies and international relations for centuries. Simultaneously, policy shapes the direction of science and technology. The cases in both Denmark and Brazil show how government policies can support the development of competitive technologies for wind energy and biofuels, respectively.

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The 6th Kazan Venture Fair, April 22, 2011

April 22, 2011, the Sixth Kazan Venture Fair will be held in Kazan at: "Korston", Ershova str., 1A. The Venture Fair is intended to draw the interests of both technological innovators and Private Equity and Venture Capital investors. It is a platform, where managements of small and medium size innovative companies present their businesses to prospective investors. The Fair gathers all interested parties: enterprises of innovative technological sphere, the Russian and foreign private investors, venture funds and private equity funds, banks and other investment institutions, as well as technological agents. As compared to traditional industrial exhibitions, presenting companies have an opportunity to attract and negotiate with investors.

The following types of companies should seek to participate in the Fair:

- *companies interested in private equity for their business development;*
- *companies that develop products and services with high added value;*
- *companies with high growth rates;*
- *companies that are capable of demonstrating project IRR no less than 30% per annum.*

www.ivf.tatar.ru

7th International CIS PRIVATE EQUITY AND VENTURE CAPITAL FORUM, March 15-16, 2011

C5's Annual CIS Private Equity and Venture Capital Forum is, no doubt, one of the most anticipated events in the private equity calendar. This prestigious and highly acclaimed event has been running for the past 7 years and established itself as the key meeting place for leading LPs, GPs, venture capitalists, investment banks and lawyers active in this region. The Agenda for this investor-led event designed to keep you up-to-date with the latest development in the world of private equity and venture capital and features contributions from the key global and Russian players constantly succeding in generating alpha in the toughest market environment.

www.c5-online.com

Energy as a Basic Human Need, Can We Do Without It?

Gregory Nemet – assistant professor at the University of Wisconsin, member of the university's Energy Sources and Policy Cluster and a senior fellow at the Center for World Affairs and the Global Economy, visiting scholar at Harvard University

Major innovation trends in energy deal with its generation and saving reminding a centuries-old argument of who comes first a hen or an egg. Which sector scored more impressive results so far and why?

Which comes first is indeed a difficult question to answer. But the more important aspect of the relationship is that innovations in each beget innovations in the other. Better end-use technology allows energy to be used by more people for wider a variety of activities – this creates demand for more generation, and thus stronger incentives to invest in supply side technologies. Similarly, better, cheaper and more reliable energy supply spurs development of new uses as more people gain access to energy services.

From a global perspective, most people think there is a large amount of low cost untapped potential in end use savings, even negative cost opportunities. So we need increased emphasis on improving the efficiency of end use devices. In the long term, saving energy will not allow us to power the aspirations of 9 billion people. We will need new and improved generation technologies too.

Who or what institutions set targets for innovation in energy?

Most targets affecting the use and production of energy are set at the national level. Some international coordination occurs, for example via institutions like the International Energy Agency, the United Nations, and OPEC. But for the most part, binding targets are set by those institutions that can enforce them best, national governments.

In the last two decades international and national standards have been tightened dramatically. How did it affect national innovation strategies? Could you show some most eloquent examples?

There is plenty of evidence that targets and policies affect the rate and direction of innovation in energy. For example, regulations on air pollution encouraged the development of scrubbers to remove sulfur dioxide from coal power plants. This was international with important advances happening in Japan, Germany and the U.S. Similarly, automobile efficency standards around the world have led to advances in transmissions, fuel injection and aerodynamics, as well as the use of new fuels like diesel and biofuels. Japan, the EU, and China lead on this today.

To what extent energy innovations can be regarded as integral part of national innovations systems?

Innovations in energy have been absolutely central to global economic growth over the past 200 years.

Perhaps the biggest accomplishment is that we mostly don't notice it; energy became nearly invisible for large periods of time. We often take it for granted as a basic infrastructure, such that it has become a basic human need for escaping poverty and subsistence.

Although it has often remained in the background, the 2 energy crisis in 1970s and increasing concern since around 2000, especially since mid-2000s make it clear that energy is a central issue, on which much else depends. The importance of innovation in energy is less broadly appreciated as a part of national strategy. But Nixon's Project Independence in 1974 had a very strong innovation component. You can see the emphasis on innovation in energy most clearly today in places like Denmark and China and also Brazil.

Although it has often remained in the background, the 2 energy crisis in 1970s and increasing concern since around 2000, especially since mid-2000s make it clear that energy is a central issue, on which much else depends. The importance of innovation in energy is less broadly appreciated as a part of national strategy

Taking energy as an example what are the proper roles for national governments and businesses to play in innovation?

The private sector has to dominate the effort at the development and commercialization of new energy technologies. That is where investment will come from. Firms are the ones that can best identify and anticipate the needs of consumers and match those needs to technological possibilities. This include big companies and start-ups and many different sectors, not just those we typically think of as energy companies. But even if the private sector ultimately plays the dominant role, government needs to actively promote innovation as well. There are too many incentives

to free ride on the investments of others especially in the early stages of a technologies development. Government needs to fund a wide swath of early stage projects and perhaps support initial niche markets for new technologies when they are still risky and unproven.

In the age of globalization is it appropriate to say that a universal innovation system is in the offing?

The energy system is truly global. We move electrons, oil, and gas across borders; the supply chain for many energy technologies is highly dispersed and international; we even move coal across oceans. Many big companies who will dominate investment in innovation are global. In theory they have access to a global pool of new technologies and ideas. Most important, the scientists and engineers who generate and develop new ideas move internationally and collaborate easily across borders.

Still, it's not one innovation system. The unique characteristics of domestic markets still matter. National capabilities matter and are different. Governments play a central role and have national interests in mind.

To your opinion how Russia may effectively participate in it?

Because it produces its own innovations and contributes to the global stock of knowledge, Russia has access to the innovations of the rest of the world. Like any other country, it keeps in mind its own capabilities, resources and potential sources of advantage in deciding which areas to pursue.

How tough is international competition in the energy innovation market? What did it bring about and what may it introduce in practice?

This is important, there appears to be much competition. That is mostly good since each country or firm raises the bar in terms of the performance of the best technology or practice exists. If competition raises investment in innovation that is generally a positive development; we can expect diversity to lead to good outcomes. Competition can also potentially lead to international conflicts over trade barriers and currencies. Fortunately the gains from investment in competing innovations are pretty obvious and so conflicts should be overcome with that in mind.

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How effectively energy innovation may influence national policies and international relations?

There is much untapped opportunity for collaboration. Leaders of China and the U.S. recently met. Energy innovation and collaboration on new energy technology were central to these discussions. Russia developed a gas pipeline with Germany. Brazil is engaging in biofuels technology collaboration with many European countries. I expect more of the same.

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Russia Power 2011: For the industry by the industry

Russia Power, now in its ninth successive year, is established as the power industry's premier platform to gather and exchange information about both strategy and technology.

Russia Power comprises a high level multi-track conference program created for the industry, by experts from the industry. It will continue to cover the key business issues and latest technologies that are essential to safeguard the future of the Russian power industry.

Russia Power's world class exhibition floor will offer unrivalled networking and business opportunities for attendees and exhibitors alike, with the major players in the Russian and international power industry displaying state-of-the art services and technologies.

The 2010 event attracted over 5000 attendees and 140 exhibitors from 56 countries representing some of the major players in the Russian and international power industry.

www.russia-power.org

Russian Railways to hold international forum "Transportation Science: Innovative Solutions for Business"

Russian Railways is to hold the first international forum "Transportation Science: Innovative Solutions for Business" on 22 – 23 March 2011 in Moscow, which is being organized by Business Dialogue with Russian Railways support.

The main task of this scientific forum is to create the conditions for effective communication between the leaders in the rail business and representatives of the scientific and expert communities from different countries. As a result, they will be able to work together to identify priority areas for the development of scientific work.

Among the issues on the forum's agenda are global trends in innovative solutions for rail transport, the priorities for innovation, green transport, the environmental factors in competition on the transport market and improving energy efficiency. The forum will also bring together representatives from the CIS and Baltic countries, Germany, Finland, Britain and others.

www.eng.rzd.ru

A Lot More Needs to Be Done to Make a National Innovation System a Reality

Vithal N. Kamat — Director, Centre for Apparent Energy Research, Baroda Electric Meters Ltd., India

In the age of globalization is it appropriate to say that a universal innovation system is in the offing? To your opinion how Russia may effectively participate in it?

In spite of the globalization, we do not expect that the national innovation systems of every country will converge to a common, integrated, unified or universal innovation system. To justify this statement we need to take a look at the goals and objectives of each country. They differ widely even in the globalized scenario. Take for instance, the evolution of Smart Grids. Every country aspires to tap on the benefits of smart grid implementation to meet their own objectives. In the European Union, the main objective of smart grid implementation is to achieve demand response and outage management, while in India the primary focus is to achieve technical and non-technical loss reduction.

Russia can effectively study the challenges it is facing in its own infrastructure sectors such as the energy sector, and work towards finding a solution to meet them. The Russian Government could thereafter, draft the policies for its own national innovation system.

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To what extent energy innovations can be regarded as integral part of national innovation systems? Or perhaps they are efforts of individual companies either supported by governments or going alone at their own risk?

As per our estimate, about 60% of the energy innovations in India or other developing countries are attributed to the national innovation systems, primarily in the energy generation and transmission sectors. Till 2001, the distribution sector which was essentially a subject of State Governments and not the Central Government, was not covered by the national innovation systems. Hence, due to high distribution losses, the various state electricity boards entered the red. Realizing its folly, the Ministry of Power, Govt. of India decided to fund different programs to strengthen the distribution sector under its prestigious "Accelerated Power Development Program". Even then, the innovations related to the distribution sector are essentially due to the efforts by the private sector – namely individual companies and their R&D labs which are competing fiercely to retain their share of market and funds.

Who or what institutions set targets for innovations in energy? In the last two decades international and national standards have been tightened dramatically. How did it affect national innovation strategies? Could you show some most eloquent examples?

For the generation and transmission sectors, it is essentially the Central Electricity Regulatory Commission and the Central Electricity Authority, the latter monitored by the Ministry of Power, Govt. of India which set the targets for innovation in energy. Recently, with the formation of the National Innovation Council headed by Dr. Sam Pitroda, Advisor to the Prime Minister on Public Information, Infrastructure and Innovation, and Head of Smart Grid Task Force, India is poised for even more drastic power sector reforms.

It is true that over the past two decades, both the International Electrotechnical Commission (IEC) and the Bureau of Indian Standards (BIS) have tightened, respectively, the international and national standards. However, we are of the opinion that such a move is in the national interest as it would compel the electrical industry to innovate. For instance, the introduction of the Availability based Tariff (ABT) by the Centre has resulted in numerous innovation strategies that has brought in Grid discipline. Thereafter, the nation has been observing a much more stable regional grid.

On the distribution front, programs such the 100% metering program or our own initiative of Apparent Energy Metering to reduce aggregate technical and commercial loss has affected the innovation strategies in India.

Major innovation trends in energy deal with its generation and saving reminding a centuries-old argument of who comes first a hen or an egg. Which sector scored more impressive results so far and why?

So far, the major innovation trends in energy has been in the generation sector, and that too from renewable sources such as wind, solar and biogas. This is because, it was felt that the efforts required to be put in to achieve energy saving are considerably higher than those required for generating it.

It is therefore, obvious that the generation sector has scored more impressive results. However, in view of the fact that the cost of electricity distribution can only reduce

through energy savings, the attention is shifting, lately, towards innovation in energy savings. For instance, we will soon witness to numerous innovations in every electrical appliance for saving energy, thanks to the introduction of Apparent Energy Tariffs by the Centre for Apparent Energy Research. The change in the unit of energy measurement from kWh (unit of Active energy) to kVAh (unit of Apparent energy), is a harbinger of innovation in the appliance market. Tariff acts as a powerful enabler to not only trigger an electrical revolution that will ensure that old inefficient appliances that operate at low Power Factor and inject Harmonics are systematically replaced by the more efficient ones. Accordingly, we will also see a change in the labeling scheme from the unit of Active power (W), to that of Apparent Power (VA).

Taking energy as an example what are the proper roles for national governments and businesses to play in innovation? Is it the state or the market that draw the guidelines? Their cooperation today, how close is it to your perception of how in fact it should work?

In the energy sector, it is appropriate for the national government to draft the framework and guidelines for innovation, while businesses are expected to innovate using these guidelines. However, it seldom works in this manner. We find market forces acting as a driver and giving the necessary impetus to innovation. Though we find an increased co-operation between the government and the businesses, a lot more needs to be done to make a national innovation system a reality. It is important for the government to take the first step. Businesses will be bolstered to take up innovation seriously only when they see the government taking this step. In India, this step was taken only in 2009 through the formation of the National Innovation Council. Earlier, the absence of such a council showed up as a serious impediment to economic growth.

How tough is international competition in the energy innovation market? What did it bring about and what may it introduce in practice?

Competition, both of the national and international kind, is conducive for innovation and, thereby, economic growth. It is tough for any industry to face international competition, but the reward through innovation is equally sweet.

It is important for the competition to be a healthy one, otherwise it could have a detrimental effect. Take for instance, the introduction of Compact Fluorescent Lamps (CFLs) by the western countries. Actually they were developed with an intention to replace incandescent lamps. However, in the developing countries, the marketing strategies were changed, and the more efficient straight 4 feet long fluorescent tube market was targeted. Though CFLs (<60 lumens/Watt) are less efficient than their straight counterparts (100 lumens/Watt), and also inject undesired harmonics into the lines, the consumers in India were cheated. The advertisements by CFL manufacturers depicted the CFL lamps to be very efficient when actually they were not. Also since the CFL lamps "appear" much brighter to a naked eye, the wrong advertising tactics reinforced the wrong impression gathered by the gullible consumers.

How effectively energy innovation may influence national policies and international relations?

Energy innovation play a vital role in every aspect. They hold the potential to influence and change not only national policies but also international relations.

For instance, the use of apparent energy meters for billing and tariffs will be responsible for changing the basic unit of energy measurement from Wh to VAh and that of power from W to VA, as described earlier. This has a ripple effect, since soon the labeling of electrical appliances would be changed in terms of VA instead of W.

INNONEWS

High Technologies. Innovations. Investments (Hi-Tech'2011), 17th International Exhibition Congress, St. Petersburg, Russia.

Dates: 15-17 March 2011

Venue: Lenexpo, St. Petersburg, Russia

International exhibition congress "High Technologies. Innovations. Investments" is one of the leading Russian events in the field of high technologies, innovations, investment projects in scientific and technical sphere and provision of efficient collaboration of scientific organizations and enterprises with industry and potential investor.

"High Technologies. Innovations. Investments" exhibition congress is held together with St. Petersburg Technical Fair, the leading Russian project in the field of metallurgy, mechanical engineering, automobile industry, metal processing and industrial innovations. Russian and foreign scientific organizations, state scientific centers, scientific and research centers, industrial establishments, small business organizations and institutes of higher education will participate in the exposition

www.restec.ru

Private Equity and Venture Capital in Russia, 22 March 2011

The second forum of the BVCA International Series will focus on Russia. In partnership with the Russian Venture Capital Association (RVCA), the Russian Venture Company (RVC) and the Russian Private Equity Initiative (RPEI), the conference will bring GPs from the UK and Russia together with international institutional investors with an interest in investing in Russia.

GPs based in the UK within an interest in emerging markets will benefit learning from investors and fund managers with hands-on experience investing in the Russian market. Institutional investors will have the opportunity to talk about the challenges they face when investing in Russia while also highlighting where they feel the best opportunities are for the future.

www.bvca.co.uk

Gold-rush Like Moment in Solar Thermal Power Generation

Sean Pool — special assistant for energy, and science and technology policy, Center for American Progress

Who or what institutions set targets for innovation in energy e.g. consumers, producers, scientists, government etc.?

Almost everyone you've mentioned has some sort of target for innovation in energy. But because the US has a very decentralized political system, the question of who set the targets for energy innovation is more rhetoric rather than substance. Many different political actors have set targets, but few of them carry the weight of law.

Certainly the Obama administration has been very vocal about setting targets, maybe not necessarily very concrete ones – about raising the issue of energy innovation to one of the mainstream of national stage. His administration recently released a visionary document called the Strategy for American Innovation, which includes several references to clean energy innovation and deployment. In his State of the Union address in January 2011, President Obama called for our nation to achieve 80 percent clean electricity by 2035.

The Obama administration also created APRA-E, or the Advanced Research Projects Agency-Energy. It was funded for the first time with the recovery act which Obama signed in his first month in office. This is an institution that fills a major gap in energy innovation lifecycle between research and development and commercialization of new clean energy technologies.

How efficient is ARPA-E?

Dr. Arun Majumdar who was the first and present director of ARPA-E, is doing a very good job. The agency is modeled after the Defense Advanced Research Projects Agency, or DARPA, which has helped to develop many of critical innovations in the defense and civilian sector, including the original idea that led to the internet. ARPA-E is setting targets for innovation and especially commercialization. They help to leap frog young technologies that would otherwise not be able to get private backing and help them in their research.

How do they choose projects at ARPA-E?

ARPA-E sets goals they want innovators to accomplish and then uses a competitive grant process to put money into the hands of the best candidates. Some of these goals include better batteries, smart grid technologies, building efficiency systems, and creating fuels from sunlight using synthetic biology. It has to do with both clean energy properties of potential technologies, the quality of the business plan, and the ability for the technology to achieve megawatt scale and market penetration.

Who are the people who work there? Are they appointed officials or are they elected?

They are appointed officials, they aren't elected. They are working very closely with the private sector. It's a very innovative public-private partnership. It's a model where you have these appointed officials talking directly with people from venture capital industry and entrepreneurs who are developing these technologies. I think there is quite a lot of communication going behind the scenes and that's what helps these officials to understand what projects to take on. It is a very well integrated program. It leverages the unique capabilities and expertise of energy industry professionals and researchers from the private sector with public sector direction and funding.

The majority of projects that are funded by ARPA-E include private investors and entrepreneurs, but not all. The agency develops technologies at a range of levels of technological readiness, and helps move them from lab to assembly line. Some projects that they are funding are university-based projects, or projects run by national laboratories.

Which of the two sectors – generation and saving – scored more impressive results so far and why?

That's a tricky question. That being said I do think that at least in the US there are pretty systemic problems in keeping private investment out of energy efficiency innovation. Some of it has to do with split incentives between building owners and tenants, but there are a range of market barriers and information failures that make efficiency a particularly challenging area. At the same time, efficiency is also where the greatest opportunity lies for profitable, job-creating investments in new technology and innovation.

How do energy standards affect national innovation strategies? Can you name some of them?

For example, the EU ETS coming online and putting a price on carbon in Europe; Spain is putting very aggressive subsidies for solar-thermal, and it led to an almost gold-rush like moment where private investors were just pouring money into concentrating solar thermal power generation projects. In fact, the private sector response surpassed what the government was ready for and they had to scale back the program a bit. Many European countries have clean energy standards in addition. These policies have had a really big effect overseas in helping to build markets that drive innovation.

We've also seen standards being very effective at driving deployment in the United States. California for example, which has a very aggressive renewable energy standard is also home to about half of the nations venture capital investment in clean energy startup companies. So the evidence does show that these standards can have an effect on not just deployment but also on investment in the earlier stages of

innovation: research, development, and commercialization.

California and Spain are just a couple of examples, but there are many similar ones where you've seen national standard coming on and shooting life into the industry.. When there are long term standards and ensured demand in the future, investors are more willing to pump money into risky innovative technology companies whose products may not be ready for 5 or 10 years. It's those kinds of investments that you need to make incentives for if you want to move innovation forward.

Is energy innovation an integral part of national innovation system?

Certainly energy innovation is a part of national innovation system. But when I think of national innovation system I think of it more specifically. You have energy national innovation system, and within that you have a wind energy innovation system, and within that you have off-shore energy innovation system. Each of these are overlapping networks of scientists, producers, entrepreneurs, and researchers working together and creating a sort of informal network. So it is all connected and energy is a part of our national innovation system.

Let's say innovation systems means there is a communication "chain" that links scientists, innovators, businessmen, universities, government. Given this we assume that success of innovation depends on how efficiently they communicate. To your mind, how efficient is communication in energy innovation comparing to other spheres?

Absolutely. The formation of productive and innovation networks with diverse actors all communicating is one of the most critical goals of clean energy innovation policy. Like you say, you want researchers to be talking to investors, manufacturers, and ultimately to the end consumer of the technology, for example the utility who buys the wind turbines or deploys the solar panels. In productive innovation ecosystem, these different types of players are linked by exchanging money, information, and risk.

I don't have data to give a really definitive answer to that question but I think it's safe to say that energy innovation systems in the U.S. have really started to crystallize in the last 5 years. By no means does energy constitute the largest part of our national spending on research and development or private sector investment in technology. Energy is not the most significant part of innovation coming out of the U.S. But it's a growing part, rapidly growing part. Clean energy venture capital investments have grown nationwide from 2% of overall venture investments to 16% in the past 5 years. That's an indicator that you are starting to get better communication between researchers, manufacturers, investors, and consumers.

How much the government spend on energy R&D?

Government investments in energy R&D in 1980-es were 9 billion, and in 2006 it has declined to 3.2 billion. The stimulus bill put a big jolt of money into the system, only a small part of that went specifically to R&D. The stimulus bill did fund the creation of ARPA-E, which needs to continue. But overall we are investing about a third of what we were investing 30 years ago in energy. That needs to change.

How tough is international competition in the energy innovation market?

International competition in energy innovation is extremely tough. We have 2 reports that we have recently put out. One of them is from June 2010 and it's called "Out of the running." The other one we released recently is called "Rising of a challenge." Both of these reports go a lot into details about the extremely competitive nature of international investments in clean energy innovation.

In the more recent report we looked at China investments across the board of innovation. We looked a little bit at renewable energy within that. I was just telling you the US spent about 3.2 billion dollars in 2006 on clean energy innovation. China by some estimates spends up to 12 billion in dollars every month. So it's the whole other scale of public investment in driving clean energy innovation. In 2008, China had nearly twice the installed capacity of renewable electricity of the United States in absolute terms.

Six of the top 10 global photovoltaic solar cell manufacturers are now in China, and the country's solar manufacturers produced nearly 2 gigawatts of panels in 2008, or roughly one-quarter of global production. The question is whether making these technologies and selling them cheaply translates into long-run innovation that pushes the frontiers of new technology. China is good in copy method of innovation: they take something, improve it a little bit and make it more cheaply. But it remains to be seen, and the report talks about it much more in detail, whether that ability translates well into the ability to actually invent new technology and push the frontier of innovation in a new way.

And the U.S. is really falling behind because our public policy is not attuned to the opportunities of these new markets, nor to the risks of climate change. This is the take away. We Americans feel that we have contributed to these technologies

So, certainly there is an acute international competition. It's not only China. It's also Germany, Spain, Denmark of course, depending on what sectors of the clean energy economy you are looking at. And the U.S. is really falling behind because our public policy is not attuned to the opportunities of these new markets, nor to the risks of climate change. This is the take away. We Americans feel that we have contributed to these technologies. For instance, photovoltaic cell was invented in America and now it's mostly sold in China. We've developed one of the first wind farms and now they are made much more in China, Denmark, Germany. So there's a sort of American sense that we are falling behind in this race for clean energy innovation.

Why is America behind?

Part of it has to do with what you were talking about a bit earlier about standards and government policy. Certainly U.S. has been one of the slowest among industrialized countries to adopt federal-level incentives to correct the market failures that are reducing investments in clean energy. We still don't have a national clean energy standard. China has a national

energy standard despite the fact that they are still a transitional economy. They have been more aggressive than we have.

Europe has the EU Emissions Trading System (ETS). Most countries have a number of other incentives. U.S. federally has almost no structural market incentives to make investment in this kind of innovation profitable. That's been a major problem. Conservatives in American think that market should take care of it. And market doesn't take care of it because you have market failures around clean energy, climate change and innovation. In the U.S. our policy does not reflect this realization. Our politics haven't caught up with what the economists have realized for decades, what Europe has realized maybe a decade ago, and what China has realized in past couple of years.

Government has a strong role to play in correcting for these market failures to promote the appropriate level of private investment in clean energy innovation. Without federal policy to be signaling to the market that they should be investing in this sector they aren't going to. Instead as we saw they are going to pump money into trillions of dollars of securitized mortgages because that's what seemed profitable to investors, and that's what caused a financial crisis.

We need to be figuring out how to use government influence to introduce higher standards that are clear, long term, and transparent. We need to figure out how get private capital off the sidelines and into investments in clean energy innovation, commercialization, and deployment.

What American Progress does? Do you consider yourself a part of innovation system?

There are two very specific things that we do. First, we provide a service for the people in government that they aren't able to do themselves. We are able to step back a little bit from the day-to-day politics and think a little bit more long-term and more structurally about policy. As in any country politicians are often so wrapped up in the day-to-day business of legislating and fighting political battles that they don't often have time to really think and develop long term policy strategies.

So, on the one hand, we try to provide that big-picture thinking that those in office can't often do, and then offer them our advice. On the other hand we also have Center for American Progress Action Fund that is a sister organization that takes those policies and develops a message for them and an outreach strategy to help them get exposure and visibility in the media and on Capitol Hill. It's almost like marketing policy ideas. We are trying to put progressive energy values and ideas out into the mainstream political discourse and do active outreach not just by writing reports but also by talking with the media, getting on radio, by visiting Capitol Hill and talking to the leaders.

Can you name examples when you influenced the government policy?

In fact I can name a very recent example. We've put out a report called "Focus on competitiveness". It detailed a 5-point strategy for how the administration could build a greater awareness of international economic competitiveness into our economic development plan. It identified the fact that we don't have any long run competitiveness-focused economic policy. Most of other countries in the world do. Those governments are thinking that they are in this sort of a game, competing for technology and innovation. They act strategically to bolster those activities.

In the U.S. we don't have a very coordinated policy to meet demands of international competitiveness. There is no planning process so that people think about it in a structural way. We made that report called "Focus on competitiveness" and within couple of months the Obama administration announced they were going to implement one of the policies pretty much directly out of this report. It suggested that the President form a council on competitiveness in the White House to promote cross-agency collaboration on competitiveness policy. The President actually enacted that Council and its being led by GE CEO Jeffrey Immelt. It's a very good example of a policy we've developed being implemented. Our report on "Green Recovery" also was very influential in helping guide the energy portions of the 2009 American Recovery and Reinvestment Act, also known as the stimulus bill. Of the roughly $80 billion in energy investments that were made, about three quarters were tied to an idea that we had proposed in our report.

INNONEWS

Cisco to develop "Virtual Skolkovo" in follow-up MOU with Skolkovo Foundation

Cisco and the Skolkovo Foundation unveiled further details of joint efforts under the Skolkovo Project plans to develop a "Virtual Skolkovo". Based on the proposal from the Cisco Internet Business Solutions Group (IBSG), Virtual Skolkovo will be a business innovation ecosystem that pushes the advantages of traditional clustering beyond physical boundaries into the virtual realm of new possibilities.

The memorandum of understanding signed during a Cisco Telepresence meeting between Victor Vekselberg, President of Skolkovo Foundation and Mohsen Moazami, a Vice President of Cisco IBSG, outlines a three-tiered approach for Virtual Skolkovo that will look at operational collaboration for faster decision-making, creating a community from across different ecosystems, and building global alliances through a multitude of networks and exchange with international research centers, universities and economic players in various markets.

www.i-gorod.com

Yandex Supports Startups

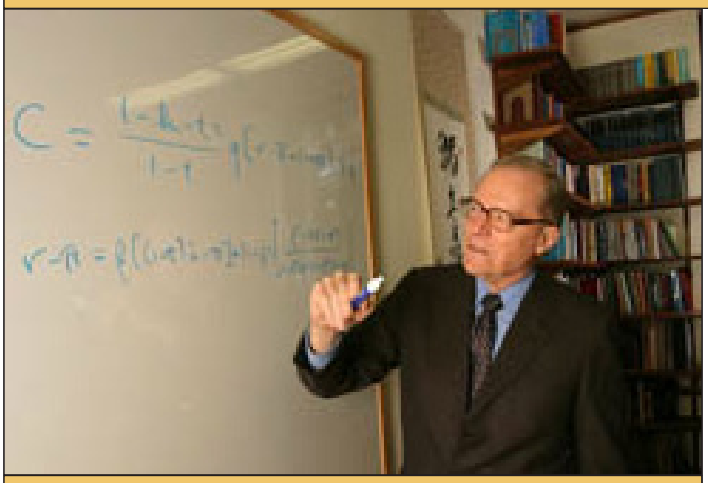
Yandex, the leading Russian search engine, has purchased WebVisor technology. The acquisition is a result of the "open days for startups", a Yandex initiative under the Yandex.Start program.

Yandex launched its startup-support program last summer. The company is primarily interested in developer teams in multimedia, data processing and data structuring, geo information systems and advertising technologies. Yandex.Start is aimed at supporting emerging talent, encouraging young companies and the industry as a whole. Yandex supports startups by offering its technologies (as APIs), computing facilities and expert advice.

To find new and interesting projects, Yandex partners with a number of startup communities in Russia, including the GreenfieldProject, the Glavstart, the Higher School of Economics' Business Incubator, the Academy of National Economy's Business Incubator and the Techno Cup at the Moscow Institute of Physics and Technology. Yandex gives the most promising developer teams an opportunity to join the Yandex.

www.company.yandex.com

Wasteful Investments



Dale Jorgenson — the Samuel W. Morris University Professor at Harvard University, President of the American Economic Association in 2000, Founding Member of the Board on Science, Technology, and Economic Policy of the National Research Council in 1991 and served as Chairman of the Board from 1998 to 2006

What are the most impressive innovations in the sphere of energy?

The most impressive innovation in energy relate to the discovery and extraction of fossil fuels. The example most relevant to Russia is the extraction of offshore petroleum, like that in the Soviet Arctic. This will be the focus of the joint venture of Rosneft and BP. BP will provide up-to-date technology based on their experience in such areas as the Gulf of Mexico and the North Sea.

In North America the most important example is hydraulic fracturing, combined with horizontal drilling. This is an old technology but it has been developed in a way that has already had a huge impact on the availability of natural gas in the U.S. A third example is the extraction of petroleum from tar sands in Canada. This is competitive with more conventional petroleum resources at current oil prices.

Energy conservation is also very impressive. Most of the technology has been developed in Japan and Europe, following the imposition of high energy taxes and other conservation measures after the energy crises of the 1970's and 1980's. These technologies are now coming into widespread use in the U.S. With high petroleum prices low prices of natural gas make substitution of gas for oil and, especially, for coal more attractive than conservation at the present time.

Progress in wind energy production is mainly the consequence of government subsidies in China, Europe and the U.S. Solar energy is almost wholly supported by government programs, but is unlikely to be economic in this century.

What institutions set targets for innovations in energy?

Due to the popularity of government intervention in energy markets, government institutions such as the U.S. Department of Energy are very important is setting targets. Wind and solar are the most dramatic examples. However, these are not economic and most of the investment is wasteful. A particularly egregious example is the U.S. biofuels industry, which is wholly a result of government intervention.

China appears to be following this approach, leading to wasteful investment in so-called renewable energy. Both the U.S. and China would benefit from less government intervention and more reliance on business institutions, whether private or public, for decision-making on energy technology.

China needs to substitute coal in electricity generation in order to clean up the air. This can be done through properly designed environmental taxes, as proposed in the 12th Five Year Plan now under discussion in Beijing. This would also have substantial "ancillary" or subsidiary benefits for China internationally, such as the reduction in greenhouse gas emissions.

China also needs to develop domestic natural gas resources from shale, using technology already available in the U.S. The Chinese do not know how to manage this and have made very little progress. This would be highly complementary with the imposition of environmental taxes, which would fall mainly on coal. To substitute coal by natural gas is probably the most important single opportunity in energy policy for China.

To what extent energy innovation can be regarded as integral part of national innovation systems?

Better methods for minerals exploration and extraction, such as hydraulic fracturing are largely privately supported without much government intervention. Wind energy is the result of government support. Bio-fuels are a political scam, the American political system at its worst. It would be misleading to think about these disparate developments as part of "national innovation systems".

Wind energy is the result of government support. Bio-fuels are a political scam, the American political system at its worst. It would be misleading to think about these disparate developments as part of "national innovation systems"

Taking energy as an example what are the proper roles for national governments and businesses to play in innovation?

As I have already suggested, there is too much reliance on national governments in so-called innovation. The U.S. relies on markets for most of its innovation in energy, but there are also large government-sponsored programs leading to wasteful investment. Industry-government cooperation is through government subsidies. These should be eliminated.

In the age of globalization is it appropriate to say that a universal innovation system is in the offing?

Globalization is leading to a universal innovation system based on market forces. This is particularly apparent in petroleum, limited but important in coal, and significant in natural gas.

To your opinion how Russia may effectively participate in it?

Russia has major resources and can acquire the technologies required to participate in international markets through joint ventures like Rosneft/BP.

It will be tempting for government officials to get involved in the management of these ventures, but so far this seems to have been successfully avoided. Russia has now acquired quite a bit of experience in dealing with foreign businesses and

I realize that this is an unfamiliar situation for many leaders of science and technology in Russia, who were trained and grew up in a totally different situation, involving military competition between Soviet and Western blocs. However, younger leaders who have come forward in the past two decades are more capable of dealing with the new environment brought about by globalization. This is also true of business leaders of post-Soviet enterprises.

How effectively energy innovation may influence national policies and international relations?

International co-operation has to be good for international relations, especially if both sides are committed to a long-term relationship requiring a stable legal framework and continuing support through national policies.

Learn from the Norwegians! They faced a similar situation and have had three decades of experience. Government policy makers, technologists, and Russia business people in the energy industry could benefit a great deal from a program of international exchanges with the Norwegians, who would be delighted to share their experiences. They speak good English

President Medvedev rightly points out that this has been productive and should be expanded considerably. This appears to be the trend in policy-making circles.

How tough is international competition in the energy innovation market? What did it bring about and what may it introduce in practice?

Competition is very tough and this is why so many new technologies are coming forward into implementation. I should emphasize that many of these technologies have been available for a long time, such as hydraulic fracturing. Development to fit new circumstances is much more important than research. This is why a market-oriented approach is the most appropriate. Russia should continue to emphasize international collaboration rather than exclusive reliance on foreign or on domestic firms. There are many gains to be made through business-like co-operation.

Given the importance of energy resources in Russia this is a particularly fertile area for national policy-makers. They can learn how to formulate policy in a global environment, beginning with energy, which is a highly globalized industry.

Learn from the Norwegians! They faced a similar situation (on a much more limited scale) and have had three decades of experience. Government policy makers, technologists, and Russia business people in the energy industry could benefit a great deal from a program of international exchanges with the Norwegians, who would be delighted to share their experiences. They speak good English.

INNONEWS

RUSNANO supports the Smart House project

First Smart House in Russia complying with the ecological BREEAM standard at the "Excellent" level will be constructed in the Chuvash Republic.

The contract for designing of the passive house was signed in RUSNANO on February 11, 2011. The Mortgage Corporation of the Chuvash Republic and the TUS building company acted as the project originators, and the famous British company AECOM, one of the world leaders in the sphere of designing and building of modern and ecological buildings and constructions, was chosen as a contractor.

The project of the passive house is implemented with the support of the Chuvash Republic Government and the Fund of Assistance to Housing and Communal Services Reforming State Corporation.

"Participants of the project have set for themselves a very ambitious task. The corporation actively supports this project as a possibility to show the operational qualities of innovative building materials, including the unique characteristics of nanotechnological products of our project companies", said RUSNANO Managing Director Dmitry Lisenkov.

www.rusnano.com

HydroVision Russia
March 28 – 30, 2011

HydroVision Russia is the hydroelectric power industry's premier event for addressing the challenges, issues and advancements associated with hydro energy production, maintenance and technology in Russia. Supported, by RusHydro, HydroVision Russia's 3 day exhibition and conference showcases the changing future of the Russian energy mix and highlights the great potential of this prevalent energy source.

HydroVision Russia comprises a high level conference programme covering the key business issues and latest technologies to promote the use of hydropower in the Russian energy mix. The conference is supported by a world-class Exhibit Hall featuring the leading Russian and international power technology suppliers, offering unrivalled networking opportunities for attendees and exhibitors alike.

www.hydrovision-russia.com

How Can One Promote Innovation without Electrification?

The material is prepared by Sergey Serebriannikov, Rector of the Moscow Power Engineering Institute (Technical University) and other distinguished scientists from the MPEI

The Basic Innovative Trends in the Field of Generation and Conservation of Energy

The basic trends in the Russian power production sector that apply to generation, transmission and distribution have for decades relied on the construction of large generating capacities, unified inter-system electricity networks, and single operational management of a unified energy system. Thanks to this we have achieved impressive results such as reliable energy supply to large cities (agglomeration) and large industrial enterprises.

The offer right now to build gigantic power plants with capacity of up to 8–10 million kW, and the revisiting of the offer to build direct current transmission lines of 750kV (or transmission lines of 1,150kV) only emphasize this trend. Looking forward towards 2030, both in terms of energy strategy–2020 and on the basis of the general plan presented by RAO UES, Russia envisages meeting energy demands with annual growth of between 25 and 60 billion kWh, focused on doubling of maximum consumer load. Achieving such indicators is planned via construction of new generating capacity. Here it is important to note the intention to build nuclear power stations for 13 cities with population of over 1 million in the five years after 2015, and thermal power plants with capacity greater than 20GW.

It's worth saying simply: the electric power industry in Russia can be proud that in the past 20 years, the needs of industry, business, and the population have been fully met. We can't help but take note that even the accident at the Sayano-Shushenskaya plant did not lead to serious consequences for Siberian industry, particularly metallurgy, or for housing and public utilities. This was possible thanks to utilization of reserve capacity and redistribution of the load.

Setting Goals in Energy Innovation

We have maintained the approach wherein the goals and tasks are set by the President and the Government of the Russian Federation. In particular, they have identified the large investment projects up to 2020, which are included in the state sector strategies and targeted federal programs. These projects are published and are subject to discussion and oversight, including by the public.

In order for the consumer to evaluate electricity strategy, it is necessary to consider the structure of work being conducted in this field and the various forecasts for 2020 and 2030. The structure is governed in accordance with political decisions on energy in Russia, physical and technical fundamentals, and social, economic, and ecological limitations. On the basis of long-term forecasts, we have developed a general plan to place electrical utility installations and a program of development for electrical energy. These documents detail the subjects of electrical utilities which are developing events, technological plans and program, and complying with the administrative and territorial hierarchy. Realising the general strategy is handled in the context of division of AO-Energo, which over the past decades have worked on the energy provision in every subject of the Russian Federation.

Work on the plan for development of the energy sector is carried out on orders of and under control of the Ministry of Energy and the Ministry of Economic Development, which prepare reports on the basis of decrees by the Government of the RF and legislative authorities. A unified concept for forming the development strategy is left to the President of the RF and the cabinet. The general strategy of development for economy and energy is entrusted to RAN (Russian Academy of Sciences), which in turn delegates to its institutes. Design studies are done by institutes which had started conducting such studies prior to 1990 (ENIN (Krzhizhanovsky Power Engineering Institute), Energosetproekt, Teploelektroproekt, and others).

The law On Electrical Utilities and the experience in working on the development of the electric power industry dictate the structure focused on the idea that the central requirement for a unified energy system is reliability. This reliability is guaranteed by innovations, investment, the guarantees of political development, and organizational management taking into account the consumer side. This excludes review of the "backcountry" (by which we mean the many consumers not connected to the grid, as well as small energy providers using secondary and renewable sources).

The influence of international standards is manifest in the required frequency maintenance. This limits our entrance onto the European energy system, which has led in turn to the construction of special equipment on the border with Finland, which converts alternating current into direct current and vice versa with the necessary frequency. We can't help but mention the switch to a five-wire power supply at low voltage, which dramatically changes circuit designs and requirements for electrical equipment. It's worth looking separately at the energy conservation program which envisages, in particular, new technologies and a switch to energy-saving lighting and new light sources.

Innovations in the Energy Sector in Russia as a Part of a National System of Innovations

Innovations in our country have been linked to the actual situation in the energy sector, which was characterized by average annual growth in demand for electricity between 2000 and 2005 in the amount of 1.7 percent. In 2009, private and state generating companies added generating stations with total capacity of 1,694MW, and the total input to wholesale power generators and regional power generators on agreements capacity supply amounted to 809MW on a plan of 4,826MW. For 2005-2010, the total investment program of all energy companies grew more eightfold. In 2010-2011, the plan is to add more than 10GW. The key aspects are Rostovskaya Nuclear Power Station (GK Rosatom) – 1,000MW, Kaliningradskaya TETs-2 (JSC Inter RAO UES) – 450MW, TETs-26 (JSC Mosenergo) – 420MW, Sredneuralskaya State District Power Plant (JSC Enel OGK-

5) – 410MW, Shaturskaya State District Power Plant (JSC OGK-4) – 400MW, and Tyumenskaya TETs-1 (JSC Fortum) – 231MW.

Similar program in various fields of industry are being carried out by private investors, but with state support, for example the reconstruction of the Novolipetsky, Kuznetsky, and Oskolsky Metallurgical Plants included in the federal program. Reconstruction of the Oskolsky Plant is tied with substations 750/330 and 500/220kW and electricity networks that affect provision of energy to the centre, including Moscow (the ring is 750kW).

In defining the role of innovation in the energy sector it must be noted that power sector has taken upon itself the provision of energy and the construction of generating capacities of 25MW and higher. But at the same time the extensive area, serving 90% of consumers, who need from between 1-3kW up to hundreds and in some cases up to 1,000kW, some may slip through the cracks of innovation and investment. More precisely, most of the innovative discoveries in the field of generation and consumption are in fact borrowed and come to us from a number of countries, most recently China, although many solutions are still being offered by Russian scientists.

The fact that even now, not all of Russia is connected to the grid, that two thirds of territories remain without reliable electrical supply (this includes up to 20 million people), requires massive construction of small-scale generation, the distribution of which by capacity is regulated by fundamental laws not less important as the laws of development of large-scale energy. For example, we note that in December 2010 Belarus adopted the law On Renewable Sources of Energy. We have long needed a similar law, aimed at consumer electrical energy and offering structural diversity between networks and generation, to guarantee the connection (if necessary) to the electricity grid in order to distribute the surplus power generated by small-scale generators, and for payment. In Germany, such payment is guaranteed within 20 years for each individual person or corporate entity that builds a wind or biofuel plant, sun energy roof that provides energy. The situation is almost the same in the Czech Republic. Freezing rain, snow, wind, and other winter surprises cannot block progress. We need massive individual construction of private generation and networks. And in Russia the renewable and secondary energy sector so far remains an incomprehensible and unpopular step-child to the energy industry.

The Government and Business: Determining Roles in Innovation

In order to intensify innovation and investment by attracting the widest possible circle of commercial interests, it is urgently necessary to adopt a law on the consumption of electrical energy (power). Essentially, alongside the electrical supply program anticipating the development of generation of 25MW and higher, there must be a program of consumer electrical provision that encompasses all far-flung territories and small businesses. It is expected that by 2030, the structure of electrical consumption in Russia will have been in the following proportions: industry – 48 percent, service industry – 16 percent, consumer (popular) consumption – 22 percent. In the USA, where by 2030 they anticipate electricity consumption three times greater than that of Russia, the proportions are different: service industry – 39.6 percent, consumer (popular) consumption – 34.3 percent. There, since 2003, industry has been significantly reducing its share of overall consumption, and the service industry has practically doubled. If we add to this that in China the total power output of wind generation reached 42 million kW (in the USA that figure is 35.2 million kW), while in Russia it is somewhere around 20,000kW (an unacceptably low figure for our country), then we should talk about the necessity of a fundamentally new strategy for development in electrical energy. In particular, we should address the development and adoption of those innovations such as are used in Germany, where for example by 2050 they anticipate meeting 90% of demand from renewable sources.

In summary, we can say that it makes sense to transit from single large investments to numerous investments in medium and small electrical power generation facilities that generally belong to consumers as private property.

Such a change in the structure of energy production is also necessary in connection with the stated plans to

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A New Milestone in Russia-UK Collaboration in Space Research

On February 17th a tripartite Memorandum of Understanding was signed between UCL Mullard Space Science Laboratory, the Institute of Physics of the Earth and the International Science and Technology Center on future collaboration in the TwinSat Project that combines Russian and UK technologies to build new generation Earth observation satellites to monitor seismic activity such as earthquakes and volcanoes.

The joint project will offer real time monitoring of sensitive seismic areas such as Iceland and Kamchatka. The two planned satellites aim to investigate precursors to earthquakes and volcanic eruptions through effects in the upper atmosphere and will coordinate its observations with ground based facilities.

"This is a weakly studied area and it demands more serious considerations. If this project is successful, it will significantly enhance understanding of earthquake precursors and may lead to a new tool for their prediction. This project represents a new milestone in UK – Russia collaboration in space", stated Alan Smith, Director of the UCL Mullard Space Science Laboratory.

The project will be officially presented in the UK on March 16th at the conference "Yury Gagarin's Legacy – 50 Years On".

www.istc.ru

Aluminium Technologies Russia 2011

Aluminium Technologies Russia 2011 is an international exhibition of aluminium industry that will take place at Crocus Expo International Exhibition Center April 5 – 8, 2011. Aluminium Technologies Russia 2011 exhibition will create a platform for aluminium and others related industry, will showcase aluminium processors, and supplies in markets.

www.tradeshowalerts.com

build up to a million individual homes in the depth of the country, which will require electricity, leading to orders for equipment and creating several million jobs.

International Competition on the Energy Innovation Market

In the international energy system, Russia will for the foreseeable future retain its role as a raw materials power, with insufficient attention to improving industrialization, modernization of existing machinery, and heavy and light industry.

International competition on the energy innovation market is quite tough, and Russia does not play a part. In particular reference to our country, the issue is to replace electrical equipment, obsolete up to 60% and more. More precisely – we face the issue of a forced transition to innovative technologies, changing technologies, and parameters of getting electrical energy at thermal energy plants (in building 20GW Combined Heat and Power Plants after 2015, we can ask the question about closing and modernizing existing power stations).

The influence of Innovative Energy on the Policies of Individual Countries and on International Policy

In all countries, energy issues influence policy: should we or shouldn't we build nuclear power plants? Should we cover the entire country with wind turbines? Should we develop biofuels and geothermal? The increase in oil prices, continuing growth of the population, and intensification of global conflicts point to the need to open up new energy resources. The increased costs of extraction and delivery, including maintenance of global infrastructure, leads us to search for alternatives to oil and gas, erosion of old industries, and development of innovative technologies that can take the sting out of meeting our energy needs.

Forming a World-wide System of Innovation in the Era of Globalization. Russia's Place in That System

A world-wide system of innovation is being formed and determined by the USA, China, and the EEC. Russia's share of global GDP is somewhere around 1 percent. This, naturally, determines Russia's role in the modern financial system. The investment climate within the country is thus far not aimed at mass attraction of capital, the flight of which still exceeds imports from abroad.

The freezing rain in central Russia graphically demonstrated that modern electricity distribution networks cannot provide reliable power supply and cannot be quickly restored within the timeframes envisaged by the rules governing installation of electrical utilities. The only way forward, which many countries are taking (for example, California after their power crisis), is transition to individual power generation, but without disconnecting from the mains grid. In particular, industry should look to provide its own power generation and fast-acting ATSs, which would prevent problems with IT in the event of an interruption in the power on the level of 100 milliseconds.

Our civilization is entering its sixth phase of technological development, marked most importantly by a radical change of priorities regarding the use of energy resources. Throughout its history, humanity has already undergone several key, or branching, transitions: from wood resources to coal, and from coal to oil and gas. Now all around the world we are seeing a shift towards new energy sources, most importantly renewables. We are approaching a transition to electrical transport, electro-technology, electrical heating, and so on. That's where the future lies, and Russia must play an active role in it.

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19th International Trade Fair of Electrotechnics and Electronics "AMPER 2011" March 30, 2011 at Brno, Czech Republic

Within the framework of 19th International Trade Fair of Electrotechnics and Electronics "AMPER 2011", the Enterprise Europe Network Czech Republic organizes on 30 March 2011 the matchmaking event focused on electrotechnics and electronics and their applications in various industrial sectors.

The AMPER matchmaking event 2011 is designed for technology developers and technology seekers. The aim of the event is to encourage international technological, research and business cooperation. Representatives of companies, technology centres, R&D institutes, research laboratories and universities have opportunity to present their know-how and innovative technologies, meet potential business partners and make new contacts, find new technological solutions, find partners for European R&D projects.

www.eng.spb-venchur.ru

2nd International Specialized Exhibition "Innovation Materials and Technologies"

The annual exhibition Innovation Materials and Technologies is unique the international specialized exhibition which visually shows achievements in sphere of developments, manufacturing and implementation of Innovative Materials and Technologies in different branches, promoting exhibitors in establishing of new business contacts and partner relations. In this year the exhibition will realize in March 1 – 3, 2011 at Crocus Expo, IEC, pavillion 1, hall 1, Moscow, Russia

The event purpose is defined by three components:

Industrial and Economic Relations' Development;

Scientific and Technical Information Exchange;

Wide introduction and application of innovation materials and technologies in industry.

www.rttn.ru

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Managing Editor:

Mikhail Rogozhnikov

Editors:

Aleksandr Mekhanik

Marina Vasilevskaya

Interviews:

Marina Vasilevskaya

Sergey Borisov

Design:

Allan Rannu

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