

INNOVATION TRENDS

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MAIN SUBJECT **"Green" Innovations: Fashion or Necessity?**

In the US Investment Incentives Provided to Corporations Help to Drive the Development of Renewable Energy Sources



**Alex King – Director of the Ames Laboratory¹,
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Why alternative "green" energy is crucial today?

Public awareness of the global energy challenge is at a very high level, at least in the U.S., where I live, even though we do not have an energy crisis of the type that we saw in the 1970's. Energy prices, e.g. for gasoline and electricity, are reasonably stable, and there are no supply shortages like the ones that led to long lines at gasoline stations in the 1970's. Nevertheless, there are two issues driving a need to develop alternative energy sources.

First, climate change arouses concern among many people who wish to see a good environment for themselves and for subsequent generations. This is a very complex phenomenon,

but it is clear that growing carbon dioxide concentration in the atmosphere contributes to it. To reduce carbon emissions, we need to find alternatives to burning stuff, whether it be fossil fuels, wood, or other biofuels.

Second, the U.S. imports a very large fraction of its energy, generating a significant trade balance challenge, overall, and resulting in reliance upon a few foreign countries, particularly for oil. Developing alternatives, especially domestic ones, diversifies the market and is a powerful hedge against price increases in any particular area.

What role national governments play in developing new energy sources? What is the ratio of public/private investments?

Governments take many different approaches to this challenge, but there is certainly worldwide attention to it. In France, where electricity is provided essentially by a government-owned corporation, there has been great success in developing nuclear power. Other countries foster a much more diverse approach with a broader range of solutions, including combustion. In countries where decisions are nominally based upon free-market considerations, there still remain government interventions that tilt decision making in one direction or another. In Europe, motor fuel is taxed much more highly than in the U.S., resulting in a more highly-developed public transportation sector, and less reliance upon automobiles. In the U.S., investment incentives provided to corporations help to drive the development of wind, solar and other renewable energy sources, where they

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would not otherwise be able to compete with the low cost of coal, oil and natural gas.

Because of the complex interplay between private investments and government programs that take a wide variety of different forms, it takes some very sophisticated econometrics to make any reasonable comparison between different countries on the basis of the ratio of public to private

¹ The Ames Laboratory is a U.S. Department of Energy National Laboratory operated under contract by the Iowa State University of Science and Technology (ISU).

investment. In all cases, however, the government plays some role, either direct or indirect, in determining what kinds of energy sources are developed.

Are there any government programs aimed at supporting research in this field?

Governments are the primary sources of funding for research in all of these areas, and even in the challenging fiscal environment of today, where large increases in overall research budgets are difficult to achieve, we have seen significant new investments in energy-related research. In the U.S., the Department of Energy has made a broad range of investments, and sharpened its focus on several specific areas that hold promise.

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

There is no single approach, and no single breakthrough that will provide the world with plentiful, clean and secure

market. A major challenge, though, is that wind and the sun favor some locations more than others and these are not always where the energy is most needed. There is a need to distribute energy and store it for later use, much better than we do now. New “smart” grid technologies and new energy storage technologies are areas of great potential.

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?

Some countries, such as France and China, have large investments in nuclear power generation. In others, public suspicion, regulatory controls, or even international pressure make it very difficult to succeed with nuclear power projects, and there has not been very much new investment in this area since the 1970's.

Some new ideas are emerging, however, with small “modular” reactor designs starting to gain a lot of interest. These provide some attractive features, including being small enough to be manufactured in a factory, where quality control can be more rigorous, and economies of scale can be realized. Even with efficient and safe designs, however, there is still a need to deal with radioactive waste, making sure that it does not pollute the environment or fall out of the control of the government and into the hands of terrorists. New generations of nuclear technology, still on the drawing boards, may allow for operation that consumes radioactive waste, rather than generating it, using “fast burner” designs. There remain several technological challenges to realizing these, however.

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energy over the coming decades. Established economies have the option to look at reducing their energy needs, while emerging economies have the option to build greener sources of supply than are being used in the developed world; but in the end, we all have to find new sources of energy.

On the energy reduction side, building efficiency advances have a huge potential to make significant impacts at relatively low cost. Transportation technologies also have great potential, although the costs of shifting to public transportation or changing over from traditional internal combustion power to other vehicle technologies are higher. Still, buildings have a lifetime on the order of many decades, while vehicles tend to be replaced on a timescale that is much shorter.

On the supply side of the equation, solar energy is technically viable in many parts of the world. Although it is still too expensive to compete on a straightforward economic basis with coal or natural gas-powered electricity, the cost declines with every solar unit that is installed. Government incentives to install solar systems accelerate the rate of installation, and accelerate the rate at which the price becomes competitive with fossil fuels. Similar considerations apply to wind-based electrical generation, but with the added complication of the need for rare-earth magnets for the generators, and the current shortage of rare-earth metals on world markets. This shortage will certainly be relieved through economic and technological developments, though, and we are left with a situation where wind and solar, among other technologies, will slowly displace traditional power sources from the

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?

The first “industrial revolution” was driven by the development of energy sources that produced greater power output than a horse or a man: it was really an energy revolution at its heart. In recent years, we have described our most important technologies in terms of living in the “information age” and along the whole span of time, from the industrial revolution to the information age, the involvement of governments and financial markets has been essential. Governments and financial markets are both now much more complex than they have ever been in the past, and they play very complex roles in developing any new technology. As long as these institutions recognize that they can advance innovation by investing in clean energy, they will find ways to do so. In many cases, the methods may seem revolutionary, just as the banking innovations that enabled the first industrial revolution were revolutionary at the time.

What is your knowledge of the situation in Russia?

I am not really very familiar with the situation in Russia. I am sure, however, that just as in the rest of the world, a major issue is the development of expertise at all levels, including public awareness of the issues. Without broad awareness and deep expertise, no solutions will be implemented. Success will follow when knowledge about the issue, in all of its aspects, is widespread.

“Green” Construction as a Fashion



Sergei Zhuravlev – Head of the project “Russian Future House”

When did the buildings cease to be “green” and for what reason?

As little as 100 years ago, a mud hut, a log or stone house (not to be confused with the brick one) or a yurt were not only environmentally friendly, but also energy-efficient buildings, since in most cases, they were heated and lighted with “alternative” and renewable resources.

History is a cyclical process, and will certainly bring back to the houses their self-sustaining and rational nature, but this time on a different technological, aesthetic and functional level.

In countries experiencing shortage of resources, this process gets boosted. In countries with excessive energy resources it is slowed down, since it obviously contradicts the sales policy pursued by energy and utility monopolies.

Which countries are at the forefront of “green” building?

First and foremost, these are the counties of Northern Europe and Great Britain. The U.S. does a lot of innovation work. Deep down, it's an innovation-oriented country. America is very good at commercialization in a sense that solar panels are much cheaper there than in Europe or Russia. Things that America does for environmental protection can be described as a straight-line process. They don't make much fuss about it, which is partly due to the size of the country, fairly favorable climatic conditions and lack of strong energy dependence that is prevalent in Europe. Therefore, Europe is certainly taking the most drastic efforts to achieve autonomy.

How do Europe and America encourage private companies to engage in “green” building?

The way the U.S. government provides incentives is unusual for us. There's little of it in the form we are familiar with, such as subsidies, tax deductions, etc. However certain European countries come up with some serious incentives providing subsidies covering as much as 50% of such housing

construction. They subsidize materials and equipment used in improving energy efficiency. From the greening standpoint, they primarily support pilot projects with zero CO2 emissions, which implies the use of internal absorbents. The issue is about properly sealed homes, which use different CO2 disposal methods. For example, they use “green” walls or “green” ceilings, which are known to absorb CO2. Households emit low CO2 volumes, and the internal autonomous ecosystem can absorb CO2 in full using certain species of plants. This is the basic mechanism. In addition, they use environmentally safe materials and internal microclimate.

What is the percentage of “green” building in Europe?

In terms of volume, I would say the percentage is negligible. They have better progress with commercial buildings, because that's where the financial system and the building certification system have their focus on. They are more cost-effective.

“Green” building also includes construction of various eco settlements. However, I wouldn't say that it is a mainstream activity. Certainly, they increase energy efficiency up to about 85% as compared with conventional buildings. On the other hand, cost increases by 20%. The list of materials and equipment precludes any assumptions about this being a 100% environmentally friendly construction. Therefore, “green” innovations in housing construction have so far remained a thing related to enthusiasm, state propaganda, advertising and experiment.

How fast will these technologies be widely implemented and become common practice?

This will happen quickly, no doubt about it. I'd refer to what we do in the “Russian Future House” project as applied futurology. Ten years from now, this business will lose its status as something fashionable or experimental and become a routine occurrence. I think that this market will grow in Russia, as the market for imported materials for so-called «Eurostyle renovation» did in its time. Initially, these materials were used only by wealthy people, and later they became affordable to just about everyone. “Green” materials and equipment will get cheaper and become increasingly available.

It's been almost 200 years since the photovoltaic effect was discovered by Becquerel, but “solar house” has so far remained an exotic dream rather than a mass phenomenon. What could turn the tide, and under what circumstances?

Energy systems efficiency based on this effect will inevitably rise; however, two problems need be solved before such a breakthrough has a chance to materialize. First, power engineering needs be localized in the smallest consumer niche available, which is an individual residential house, aiming at energy redundancy right from the get-go. Secondly, build a range of standard (all-purpose) integrated all-in-one energy solutions, which would bring the strengths of multiple energy sources and systems in a single package. Today, such combination comes as a result of isolated research efforts, and equipment suppliers are few and far between.

How efficient is the use of solar panels in Russia given climatic characteristics in central Russia?

Solar panels alone cannot be a fix-it-all solution even despite the potential increase in their efficiency. Area of land around a modern house is not large. There's no way one can cover it all with solar panels. In a similar climate in Sweden, an energy-active building requires installation of fifty square meters of solar panels. Fifty square meters doesn't look like a lot of surface. However if you place these panels on the ground, they'll add up to cover a very significant area. At the same time, the main objective is not to boost the output of generated power, but to cut the consumption. In other words, there's need to improve the efficiency of lighting, heating, ventilation, household appliances, etc. The overall consumption has to go down. Actually, this process began long ago. With large-scale replacement of lighting bulbs with cheaper LED ones, the change will be fairly significant.

Then again, solar energy should be used in combination with other steps. In and by themselves, solar batteries do not provide the solution. There's need for additional installation of heat supply autonomization system, such as solar collectors, both heat and infrared ones, heat pumps, etc. I can see a market-based, efficient solution enhancing the overall efficiency only as a complex solution. This complex should be treated as a whole rather than a bunch of isolated units randomly installed according to individual designs.

If we manage to figure out such a solution, we'll certainly start moving ahead at greater strides. I believe we are heading that way. How is it going to be, what will it look like? Most likely, it will come as an all-in-one modular unit, which will provide access to solar panels and pipes buried in the ground or taken to the outside and to the ventilation systems. So far, I haven't seen an integrated system like that. They are effectively a craft, an unbalanced combination of units built by different manufacturers.

What are the international "green" building standards? Where, do you think, the "green" building standards have been most appropriately formulated?

These are primarily voluntary certification systems for buildings and developments (such as LEED), which are the focus of the national financial systems and government programs. I believe they are all imperfect, or rather archaic, since they had been developed more than 20 years ago. There's need for expansive approach, or should I say for transition from ecological compatibility to comprehensive efficiency.

How widely is LEED-like certification used in Russia?

So far, not at all. LEED has been recognized by the Olympic Committee, which means that Sochi 2014 buildings will be certified according to the LEED system. In fact, they are developing a Russian answer to the LEED system. The issue is about the corporate Olimpstroy standard and Green Standards Project under the auspices of the Russian Ministry of Natural Resources. In general, it's a direct loan from foreign certification systems that have not yet been adapted to the Russian climate and resource base.

First of all, Russia should strive to improve and adapt foreign "green" building experience for its own benefit. It should also focus on export-oriented sector of environmentally friendly production facilities in order to find its niche in the international division of labor.

Is there anything that makes it drastically different from foreign certification systems?

Nothing drastic at all. Unfortunately, we are still mastering the ABC of certification based on foreign systems. Now, at least three of them are being implemented in Russia. Eventually, these systems begin to compete. Or, in fact, they provide protection to domestic burgeoning seedlings. Maybe, these problems are due to the fact that the accumulated foreign expertise should have been reconsidered and then used in developing more integrated, more coherent certification systems, which would be capable of evaluating living space in a more detailed manner.

How do research and development projects in the area of "green" building blend with the national innovation system as a whole?

Fashion provocation is the best way to secure across-the-board implementation of ecological knowledge, innovations and business solutions. Such fashion is created using fashion runways, i.e. demonstration sites. All countries practicing (not declaring) "green" building begin with a demonstration of samples, ultimate goals and "carrots", and then create an incentive system (subsidies, tax breaks, etc.) to promote such samples, goals, etc.

How does the use of "green" technologies increase construction costs?

By about 20% in Europe, and I think this number will be as high as 60% in Russia. This difference is due to the fact that all equipment is imported and we don't have enough experience. Therefore, each project in Russia is much more expensive in terms of physical costs and design expenses. In addition to that, they have certain subsidy systems in the West, which bring down the costs in various ways. We don't have such subsidies in Russia. Therefore, everything falls on the builders. However, this is a very approximate number, since we build too few such facilities in Russia. Also, these facilities are built with partial use of these systems. Comprehensive solutions aren't available. That's why the "Russian Future House", two boards on environmentally friendly construction business, the Russian Union of Architects, the Social Development Fund and three magazines launched the prize project entitled Dom-Avtonom (Self-Sustaining House). The goal is to hang a carrot in the form of a prize for effectively built houses that have proved their environmental and operational efficiency. If we get any responses, we will at least be able to draft a roster of projects for environmental and energy efficient construction business and individual housing projects.

What does the contest winner get as a prize?

They have just begun to raise funds for the prize. We have announced the start of the project on December 1. Our goal is to raise 15 million rubles for three nominations, 5 million per nomination. Currently, the total prize amount stands at 150,000 rubles, but sponsors are becoming increasingly active, so we are quite optimistic about the outlook for the project. Moreover, we have a whole year to discuss criteria for evaluating the efficiency of such houses, and will begin to evaluate candidates and analyze the actually built houses only a year from now. The claimants, whether potential ones or the ones who had registered with us, have an entire year to build and begin to operate, prove the efficiency and popularize their project.

“Green” Construction is – First Insulation, Second Insulation, Third Insulation



Guy Eames – CEO of the Green Building Council

Why is green construction crucial today? When did the buildings and construction materials stop being environmental friendly?

The second half of the question shows you did your homework – but first things first. Buildings use around 40% of all energy in their construction, use and demolition, as well as huge quantities of water and other scarce resources (construction materials). Mankind spends increasing amounts of time indoors – at home, in the office, etc. So, logically the environment around him will affect his health, level of contentment and even level of productivity. Indoor air quality, levels and type of lighting, sound levels, ability to see outside are all proven to affect humans. Badly built or maintained buildings create a so-called “sick-building” effect. In Russia I think it’s best to be careful with this expression. To be positive we can say that there is a huge potential for improvement not only in resource use in the building stock but also in levels of productivity and a fall in levels of sickness at work. This will soon be testable as companies move to better “green” offices – by comparing the number of sick days.

To summarize, there are many reasons why green construction is crucial:

As the economy grows, more energy is required to power it. It makes much more sense to reduce power use in buildings and free up power than to create new capacity from the grid (is cheaper and less harmful for the environment);

The nation’s health and well-being is at risk (from not building green) – I would say here there is a huge potential waiting to be released, which is good for everyone;

Green construction creates new and better quality jobs – badly needed in the domestic economy, it is estimated in U.K. that 5% of jobs are in “green” industries;

Brain drain – green buildings inspire and encourage people to do great things – I went back to the U.K. to study when I saw the green university building (DeMontfort, U.K. – where I took an MSc in Climate Change).

Almost two centuries after Becquerel first observed the photovoltaic effect, “solar buildings” are still exotic rather than commonplace phenomena. What may change the situation and how?

I believe you are referring to solar PV – which is used to power batteries and then inverted to create 240V power supplies. Economically the priorities for building “green” are – first insulation, then insulation, then insulation, only after that to look at ways to reduce power demand. Right at the end, the most expensive item is solar PV – well after solar hot water. The idea in green building is first to use the natural elements – wind, heat/cool from the ground, the difference in day/night-time temperatures, rain, natural features (including water), solar heat and light. Many people forget that energy is not only used for heating but increasingly for cooling. If a building is designed and built to use to the maximum “passive” principles, then heating and cooling needs are minimum. These can then be powered partly by solar PV. Green architects in say the UK carry out a “feasibility study” for renewable energy generation (this is, for example, a recommendation of BREEAM), which will show the right combination for that building in terms of cost and reliability. Remember the sun doesn’t shine 24/7, neither does the wind blow. Personally I like solar hot water but agree that PV is very attractive, especially if used say with

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LED lighting. When eventually the price of PV is similar to that charged by the electricity companies or a “feed-in” tariff is introduced, PV use will increase drastically.

What are the most advanced “green” technologies in construction today?

Here I would split the answer into three parts: micro-generation, building envelope and engineering systems.

Micro-generation is the endless topic for engineers and “geeks” to discuss. It fascinates us all to think we can escape from the power companies and create our own free power. Usually this is a combination of various renewable power sources – ranging from PV to wind, water or biomass. From the power source innovative storage and power stabilizing and inversion systems are required – if we want to run our 240V appliances. At this point one starts to re-examine the appliances and dig deeper – plasma TV for example is out,

LED in, clothes dryer out, drying rack in. The deeper you dig, the more exciting facts you learn about energy efficiency and power use (not just changing your lighting). Real energy buffs start to talk about fridges which go into stand-by when there is a drop in current and low-powered kettles. Stumbling blocks – first cost, second is your wife – asking why you need it.

The second factor is much more boring but useful. Indoor air temperature depends mostly on the insulation (envelope) of the building – including walls, windows, ceiling and floor. Breakthroughs have been with glass technology and super-thin multiple layer insulation. I expect RUSNANO to come up with more technologies here – to produce thin walls but ultra-high insulation. These will keep out the Russian winter as well as keeping out that summer heat. The main barrier is cost – in terms of materials and skilled labor to install. High quality windows for example need to be installed by specialists to work properly. Believe me!

Engineering systems – breakthroughs are for systems for lighting, heating, cooling and ventilation which use passive or hybrid technologies. Light tunnels bring light deep into buildings; passive ventilation can come through underground tunnels in winter to pre-cool air and be “sucked” up through the building via “stacks” to reduce power use. Systems usually have a winter and summer mode. Often here it's learning lessons from the past – water chilled beams, night-time cooling for example. What to look forward to – phase change materials which store heat or cold. Problems – mostly people not understanding and low production numbers. The air conditioning industry lobby too.

What “green” building standards you are familiar with?

There are two main systems worldwide, in terms of numbers – BREEAM and LEED. To the best of my knowledge all the rest are “niche” products. The new market contender is DGNB from Germany. The three systems are “complex” – they examine many aspects of a building (from materials through to energy, water, waste, pollution, management, ecology, micro-climate etc). They are all “points” based. Each has its “character” – BREEAM is pragmatic English, LEED is appealing American (complete with tens of training modules) and DGNB is pedantically German.

Many other systems exist but to be honest I think the fewer the better, although “localization” would help.

How is green building R&D incorporated into national innovation systems in general?

R&D is applied at product level and technology levels. It is important that innovation is incorporated as soon as it's been tested and is ready for commercial roll-out. In the UK this is supported in many ways – through grants, support at science and innovation parks and via specialized “Knowledge Transfer Networks” (KTNs).

Centers like BRE (Building Research Institute) test such materials and then include them into their “Green Book”. They are often demonstrated in experimental buildings such as those in the innovation park. KTN's will bring together partners

and then support indirect promotion of products. There are numerous innovation awards to highlight new products.

Regarding stimulation of green construction – all new government financed projects should be made to be “green”. The problems start

then however – Russia is not yet ready. For example – how to measure it being green and who will do this (in an honest way); who are the installers of these green technologies and which ones to use? The issues of skilled workforce in green technology again pop up.

What is your knowledge of the situation in Russia?

This is a long story. I am based in Russia so of course we come across the problems daily. The situation is quite frankly many years behind the EU. The good news is that it can only get better and that because many of these technologies make economic sense, all chances are that they will be adopted sooner than later. The key argument here is the high cost of connecting electricity in particular (80,000 RUB – 140,000 kW in Moscow) makes many green building technologies immediately viable.

Mistakes to avoid – don't reinvent the wheel – many players are wasting time creating their own standards with the hope of controlling the market or making a lot of money. There is a real danger here of not only confusing the market but also of creating extra burdens to the construction industry, without adding any value. Better to adapt existing systems.

Positive experience is everywhere to be found – look to U.K. and U.S.A. – until recently very inefficient buildings with low levels of insulation and single glazed windows. Now they are “champions” of green building! Rather than to turn away from this foreign experience and say “we know better” is to carefully study it and with slight adaptations, launch it in Russia.

Last note – challenges abound are certification of products, skills gaps, building regulations and norms, lack of demonstrations, government support, willingness to change. This last year our council has however brought together 130 like-minded companies and individuals to solve these problems. Good luck to you all!

Regarding stimulation of green construction – all new government financed projects should be made to be “green”. The problems start then however – Russia is not yet ready. For example – how to measure it being green and who will do this (in an honest way); who are the installers of these green technologies and which ones to use?

Public Consciousness Should Change



Werner Sobek — Professor at the University of Stuttgart, member of the board of the German Sustainable Building Council DGNB, founder and owner of the Werner Sobek group

Why is “green” construction crucial today?

The construction industry uses a very important part of our natural resources (which, to a large extent, are lost once the house is torn down and cannot be reused again). Our houses consume a lot of energy and occupy much space. If we don't change our way of building and living, our natural environment will soon be completely destroyed. This is not so much the result of “buildings and construction materials stopping being environmentally friendly” – as a matter of fact they haven't been very ecological for quite some time. It is only that now problems really begin to show on a massive scale since the population in most countries has literally exploded in the last 150 years.

Almost two centuries after Becquerel first observed the photovoltaic effect, “solar buildings” are still exotic rather than commonplace phenomena. What may change the situation and how?

Subsidies by the government are certainly one way of getting more photovoltaic panels on the roofs of our houses. We have been doing this for quite some time in Germany, and the results are encouraging.

In the long run, government subsidies are not a sustainable solution – people have to realise that it is in their own economic interest to build sustainable houses, because in the long run these houses cost much less than conventional houses. Once this has been fully understood people will not accept anything but sustainable houses anymore.

What are the most advanced “green” technologies in construction today? How they contribute to sustainable development?

There have been some advances in improving the efficiency of facade insulation or the yield efficiency of PV panels. However, on the whole the construction industry has certainly failed to make the progress as was achieved in other industries, such as the car industry. For example, as yet we

don't have any convincing concept of how our buildings can be constructed in such a way as to allow a recyclability of one hundred per cent. Our problem is not the lack of individual technologies, but rather the lack of a general understanding of what would be possible if the construction sector would finally go through the technological revolution we know from other sectors.

What “green” building standards are applied in the countries you are familiar with? What countries have been most successful in establishing such standards?

Our consultancy works in many different countries, therefore we are also familiar with many different “green” building standards: LEED in the United States, BREEAM in Great Britain, AQUA in Brazil. Most important in my opinion, however, certainly is the DGNB system used in Germany as well as many other countries such as Austria, Bulgaria, China, etc. The DGNB system focuses on results and does not prescribe any methods or tools. It incorporates LCA (life cycle analysis) and has an extremely high standard of quality control. Moreover, it is not only a tool for assessing finished buildings, but can also be used to improve the planning process as well.

What role do governments play or should play in developing clean and environmental friendly construction?

Governments can and should establish guidelines and general rules, thus creating a basis the industry can build upon. They can also support and further basic research. However, in my opinion innovation has to be pushed by the market. Sustainability has to be understood as an incentive, not as an obligation. It offers many opportunities; where many different players act together for a common goal (such as was the case in the development of the DGNB system, which was basically created by more than 300 volunteers), the results are achieved much quicker and in a higher quality than would have been the case if it had been decreed by the government alone.

What is your knowledge of the situation in Russia?

My consultancy has an office in Moscow, and I regularly come to Russia. Thus I have certainly acquired certain knowledge of the situation in your country, it seems to me that the issues that require more attention are basically the same as in other countries:

- the use of natural resources (including oil) has to be limited drastically – no matter whether they will last for 20, 40 or 60 years: at some time in the future our resources will be exhausted, and we have to prepare for it NOW;
- the emission of carbon dioxide and other greenhouse gases has to be cut drastically if we want to stop global warming;
- the production of waste has equally to be cut down if we don't want to drown in our own garbage at some point in the future.

We have developed the Triple Zero concept in order to deal with these challenges: no waste - no emissions - no use of energy! I am convinced that this concept can and should also be applied in Russia.

Half of all Raw Materials that are Used on this Planet Goes into Building



Edward Schwarz — General Manager of the Holcim foundation for sustainable construction

Why is “green” construction crucial today?

I think that sustainable construction has always been important – but it’s only lately that people have become aware of it again. If you think about it – half of all raw materials that are used on this planet go into building. And over the life cycle of a building, it accounts for around 40% of total energy consumption and CO2 emissions. Building also produces half of the waste, so this is clearly the place where the greatest difference can be achieved to make a more sustainable world. “Green” building means a big change. Even a small percentage change generates an enormous difference.

When did buildings stop being “green”?

In former days, pre-history, we lived in caves. That was probably very sustainable in some way. But as soon as we began to develop more complex social structures and move away from subsistence, and the beginnings of urbanization – that’s when the balance began to tip and more energy and materials was used in buildings (heating, cooling, lighting, etc) than was used for their construction. We have since reached a point where the construction of a building only accounts for about 10% of the total energy and raw materials used throughout its life. It is the ongoing life of the building that uses electricity and produces waste. The building itself is only a small contributing factor to the total energy or raw material footprint of the building over its life span (construction, use, demolition and recycling).

Every industry is trying to reduce its footprint as much as possible and at the same time to create innovation. You try something – maybe it works, maybe it doesn’t, there’s a lot going on, there is not one particular thing, there are trends. Now there is a trend with alternative energy – everybody’s on energies.

There are different standards of “green” construction. Why do we need them?

There are certificate systems like LEED (Leadership in Energy and Environmental Design) – I think they are good

indicators. They indicate because they enable us to measure something that is otherwise just a perception. But I don’t think that there should be a complete focus on the figures generated by the process of certification. What counts is the building’s entire conceptualization phase from planning to construction – how much thought you’ve put into it and what you actually change. If you take ISO certification – everybody has that today. Twenty years ago nobody had it. There is no differentiation anymore. But getting there made everybody look through their processes, and achieve some degree of optimization – and I think with these certificates on “green” construction it’s a little bit the same.

So, it’s good to have them as indicator but you cannot rely on them 100% because you are measuring apples and potatoes. For example, you can have a fantastic building, but your employees all live in a nearest city 200 km away, there’s no public transport and they have to come by car. The building may in itself be brilliant – but its integration with the economic, social and environmental structures is completely flawed, and the certification counts for very little.

What does “green” construction have to do with the level of development?

Take Bangladesh – their key concern is to have a roof over their heads and they don’t evaluate levels of sustainability, they just don’t want to get wet. I exaggerate, but you know what I mean. In a city like Singapore where there is no space they have to be sustainable in order to grow. But I’ve seen excellent examples in Australia where they have space but want to discourage urban sprawl which moves people further away from employment and infrastructure and also encroaches on valuable agricultural land. Developing countries are also taking advantage of the lessons learnt and do not want to make the same mistakes that today’s so-called developed countries did 20–30 years ago.

Developing countries can “leapfrog”?

Exactly! I’ll give you an example from Bangladesh. Bangladesh used to have the lowest rate of telephone ownership per capita of any nation – around one connection per thousand people. But today, a surprisingly high percentage of the population has a mobile phone. They almost bypassed the conventional telephone system and its demand for physical infrastructure. They jumped and went straight to mobiles. And that’s what countries can do who haven’t yet been able to address sustainability in construction. They can “leapfrog” development phases by taking all the examples from the developed countries and implementing them in a new and improved sequence.

What role does the government play in “green” building in Switzerland?

Switzerland is rather complicated in organization, despite being relatively small: you have governments on various levels. They don’t always do the same thing at the exactly the same time. But in general there has been a large amount of legislation brought in to force, certain changes which have more to do with building, less to do with politics, and then more to do with politics and less with building. So, it’s a complex situation. But there is a growing awareness because

Switzerland is in the middle of Europe, we have very limited natural resources and have to import practically everything. There is strong public awareness of “green” issues generally, and of course there is a growing governmental pressure, also in terms of building and construction.

But personally I'm against governmental pressure because the industry has its own interest in being better, being, let's say, “green”. For example, Holcim reduced CO2 emissions. In Switzerland there was no legislation that forces the cement industry to produce less CO2. But Holcim did it all the same. The industry was faster than the legislation. Switzerland set a target to reduce CO2 to a certain level by 2010. The cement industry without legislation forcing it to action alone managed to reach the national goal! I'm much more in favor of initiatives taken directly by entrepreneurs than because legislation says you have to.

Why did the industry do that?

The industry can only contribute to a better environment and to society if it is able to remain successful economically; we talk of the so called “triple bottom line”. So, of course, reducing CO2 for the cement industry means developing new ideas on how cement that performs as good or even better can be produced using less raw material and energy. That's exactly what Holcim is doing: and when you can save costs in energy use, it enables financing of further innovation – or of activities like the Holcim Foundation for Sustainable Construction.

Government interference is not what is needed. A company that wants to succeed and wants to perform across the “triple bottom line” has to balance this. Legislation and sometimes even financial incentives from the state illustrate the direction the government prefers the industry to move in – but determining the best course of action on how to achieve ongoing sustainability is a matter for private initiatives – after all, it's our lifeblood!

Vision

Holcim's vision is “building foundations for society's future”. In order to do that you have to live up to the “triple bottom line”, balancing various issues to do with sustainability. It's important to have a balance: there are issues relevant to people – social responsibility; to our planet – environmental performance; and to prosperity – economic growth, which all have to be considered simultaneously.

In the center of all this is sustainability. So, it makes sense for a company in the construction industry to be engaged in sustainable construction. If you take the figures and the potential improvements across the technological, environmental, socioeconomic, and cultural issues affecting building and construction, you can see what an enormous difference we can make by building more sustainably. That is the whole idea of the Holcim Foundation. The idea is to influence the value chain of construction, to make all stakeholders aware of the fact that sustainable construction and “green” architecture can make a difference globally.

I have mentioned many times the phrase “sustainable construction”. Everybody has a different idea of what “sustainability in construction” is. The Holcim Foundation tries to take a holistic view of sustainability and translate the definition using a series of five “target issues” for sustainable construction. These five factors include the triple bottom line of environmental performance, social responsibility and economic efficiency. It's also critically important that

innovative approaches can be multiplied: breakthroughs and trend-setting approaches, irrespective of scale, must be transferable to a range of other applications – in one word: we seek progress. Finally, since we are referring to the built environment, a high standard of architectural quality in the way cultural and physical factors are addressed is important. With space and form of utmost significance, the construction must have a lasting aesthetic impact on its surrounding environment.

All activities of the Holcim Foundation must live up to these “target issues”. The Foundation also finances grants to PhD students working on research projects in sustainable construction and it also stages academic forums relevant to the topic of sustainable construction. And finally, but perhaps most prominently, the Foundation conducts regional and global competitions for projects and visions in sustainable construction, the Holcim Awards.

The 3rd International Holcim Awards for Sustainable Construction is open to anybody and any project, be it landscape infrastructure, urban design, building, civil engineering, products, technologies etc., that are relevant to sustainable construction. The only condition for participation is that production or construction may not have started before July 1, 2010. This emphasizes that we are not looking for completed structures, but for projects approaching the construction phase where the degree of sustainability could still be influenced and there is the greatest opportunity for knowledge exchange.

The total prize money per competition cycle is USD 2 million. In the 2nd competition there were almost 5000 submissions of which about two thirds were formally correct. 520 entries were evaluated by the independent jury for Europe – including 44 projects from Russia. Given the status of the Russian economy and the strong interest that appears to have developed in terms of sustainable construction, we look forward to receiving many more entries from Russia in the current competition.

Entering the competition is simple using a five step online entry form. In the spirit of an international competition, the entry form may be completed only in English, and a “Step-by-step” guide to completing the form is available in a number of languages at www.holcimawards.org/guides

The competition is open until March 23, 2011, and winners will be celebrated at a regional Awards ceremony in September 2011 in Milan.

Edward Schwarz, “Green Project – 2010”, 18.11.2010

It's Acute Innovation Dysfunction



Martin Burger — CEO, Founder, and Director Blue Energy Canada Inc., fellow with the World Innovation Foundation

Why do we need “green” energy for?

It is about the principles of sustainability. There were a lot of solutions that came and went this last century that didn't make it into the mix. The world is facing acute energy innovation dysfunction. It has a lot to do with the nature of power utility providers, their structure, their politics, their vested interests, preserving those interests and reluctance to try anything new. I've looked at probably 500+ technologies in the last 25 years and it's quite surprising the ones that we've missed. I think we have a clean low cost energy future ahead of us. It will just take some time so see some of these innovations propagate into the energy mix.

What role government plays in developing clean energy in Canada?

Canada is not a leader in clean energy. We have leadership in technology and innovation but our policy and regulatory structure lags considerably far behind. Leadership here is in the U.K. – Scotland and, perhaps, South Korea. These two areas have recognized that there is much higher energy densities in marine resources, there is predictability in these resources that there isn't in wind, and there is scalability and better economies of scale as a consequence of those.

Are you aware of any government programs aimed to support alternative energy in the U.K. or South Korea?

Yes, they have a policy and a framework for developments that is mature in the U.K., particularly in Scotland. These premiums that are paid to developers are essential at the early stages. The Scots, I think, understand that they risk less than, for example, Germans when they took their action in wind and now enjoy 10 to 12 billion British pounds annually in economic development in manufacturing spinoffs. The same will be the case in tidal power. It only will just be a bigger scale.

What are the main technological trends in marine energy development?

It's the early days right now. It's human nature to approach the unknown or new with the familiar. I think we are seeing these adaptive technologies, basically marine engineering and windmill, and putting them underwater.

How “green” energy R&D is incorporated into national innovation system?

Very poorly. We could have had low cost clean sustainable energy going back 75-80 years which hasn't made its way into energy mix. It's acute innovation dysfunction.

What role should government play in “green” energy development?

Policymakers rely on experts that sometimes are not interested in innovation. If you are running a nuclear power program or nuclear power plant that's the best solution. The same is basically for coal lobby and the hydroelectric developers. They all have got their interpretation of what we should be using for electricity and they are not open to new ideas. Nobody listens to the inventors and there is little motivation on the part of those who could assist them, to do so. There are some governmental programs but they are heavily influenced by the status quo. So, again, the innovators' voice is not heard.

Sometimes the controversy is about science that is involved. In our case it isn't. It's a simple technology with aerospace design. Today it's very doable. There is a determined willingness to preserve the status quo and that is the essence of the problem. The status quo includes the coal, the nuclear and hydroelectric and they dominate the space, the DOE, generally they have a monopoly. So, it's not that they have to compete. They just do what they think is a good job and the rest of it they could care less.

Why?

Any organization has self preservation as its core interest. And innovators have no resources. The status quo has all the resources. In our case – BC hydro (third largest electric utility in Canada, which serves 94% of British Columbia's population) – their operational communication budget exceeds our Federal election budget. If they need to tell the ratepayer that they have installed new transformers and hooked up 20 thousand houses in the last quarter that's 3 sentences in the envelope of local utility bill. Why does a local utility have to spend so much money on communication? They don't need a 150 million dollars annual budget to communicate their message. A big part of this communication is preserving their narrow interests and these interests do not always serve the greater good.

Whose positive experience may Russia use?

Scotland. They have a marine energy policy structured and they will produce results. They have created a “set aside feed in tariff” policy where a certain percent of power produced has to be sustainable. If that quota is not met then providers have to pay for these ROCs (Renewable Obligation Certificate). So, it creates a very powerful incentive that private investors can get behind and make these investments. And these

investments will pay enormous dividends. They are expensive premiums but they are relatively small in the overall scheme of things and for a short period of time and they will serve to get valuable new technologies into the energy mix.

It's a very attractive incentive and it creates the climate for investors to make these decisions and commitments to these projects. That will produce an economic development benefit for the Scots that they will be providing the support services and probably manufacturing for the whole EU as a consequence. So, again, for less technology risk than Germans took in early days of wind they will see much larger economic benefits as a result of it. Plus they will enjoy the benefits of significantly large, clean, low cost energy projects.

What's in South Korea?

The South Korean model is much different from the approach that the Scots have taken. The Koreans for the reasons I don't know recognized the kinetic energy of tides. They have very dramatic tides there. It was fairly obvious to them. Here in British Columbia we hardly recognized we are a coastal province. I don't know what they did right in Korea. They didn't provide the investment climate but they did provide a lot of research and feasibility government grant funded. It's a bit of a different approach. I would suggest that more efficient approach would be the Scots' of the two of them.

What about your own technology?

It started a long ago before I came on the scene. Frenchman George Darrieus 1927 is the inventor. He did no practical work but he patented it for wind application and also tidal application. I came on the scene 22 years ago. I was running a mining company up in Canada's arctic. The government changed the incentive policy they had for junior minors at the time and I was left stranded at Great Bear Lake near the Arctic Circle. I inquired at the Canadian National Research Council, if there was any way I could get hydro kinetic energy from fast moving stream or a river. And they said "Yes, we've developed something like that". I started looking at this device. It's very simple and elegant and yet very sophisticated in its design, very efficient and scalable. So, I thought there must be something

wrong with this invention. That's why it's not been used. But to my surprise this had some of the top scientists of the country behind it. Probably, these guys didn't know what they were doing. But these are the guys that are designing the most modern planes today and certainly they do know what they are doing. So, I started working to try to commercialize the technology and what should have been 3-4 months technical clarifying conversation with the local utility when they finally appreciate the merit of the development it is now dragged on for 22 years. You have to be determined and persistent to work in this pace that's been the story of the most of the century.

At the moment we are getting financing for our first commercial demonstration project. The technology has very well behaved and is scalable. I don't foresee long propagation curve that we saw in wind sector. I think the marine energy technology will propagate much faster.

I think Russia has got tremendous tidal resources. There was some interest shown by RusHydro over a couple of years ago but they seem to have lost interest or the conversation didn't bare any fruit. But the mid-term to long term looks very good for Russia in tidal power development.

Putting this technology in practice took you 22 years?

I know it's ridiculous. It's acute energy innovation dysfunction. This is a simple technology. The first commercial demonstration project will be in Scotland in 20 months.

What the public doesn't appreciate or the policymakers that there is a good number of innovations or invention that have gone by the way side this past century. I know in your own country you've got some of the most incredible scientists in the world and they too are frustrated on energy innovation side.

There has been very little success in energy innovation. I think the best we can point to is wind and photovoltaic. But they are just now achieving acceptable economies of scale. But it again speaks to innovation dysfunction. You people were using carbon submerged arc syngas back in the early part of the century and this has the potential to replace oil and gas and can be made from water or waste products. Again the acute energy innovation dysfunction that plagues contemporary society is absurd to a painful tragic comedy.

INNONEWS

Cisco and the Skolkovo Foundation Announced the Skolkovo Innovation Award

November 22, 2010 Cisco and the Skolkovo Foundation unveiled details of the Skolkovo Innovation Award: Powered by Cisco I-Prize is a competition for entrepreneurs, innovators, students and technologists who are both citizens and residents of the Russian Federation to help set the pace for innovation in Russia.

Announced recently during Cisco Expo Russia, the Skolkovo Innovation Award will solicit technology ideas in three specific areas: energy efficiency, healthcare and information technology. The award will grant three monetary prizes to the winning teams that can be used to invest in their ideas.

I-Prize began mid-November and will run for approximately five months. During the first three months, the Cisco team will collect new ideas through a community website. These ideas will be filtered and judged on the quality of the submission, the Russian market opportunity, and the transformational nature of the submission. The top 24 teams will be invited to develop their ideas further for a panel that will judge them during the last two months of the contest.

www.cisco.com

TechCrunch Moscow Conference

The popular technology blog TechCrunch has staged its first Moscow-based internet conference, reflecting the city's growing reputation as an important hub for tech talent. Matt Cowan reports.

The event was held December 13 at the first Russian private tech incubator, the Digital October Center, located in a historical manufacturing building Krasny Oktyabr.

The conference focused on the key issues regarding tech entrepreneurship in Russia, including:

opening the Russian market to multinational companies and competition;
developing tech entrepreneurship community in Russia as an aid towards modernizing and diversifying the economy;

Russian Going Global: What can Russia do to internationalise its tech entrepreneurship and to be more competitive in the global market.

www.tc.digitaloctober.ru

The Future is After “Mimicking Nature”



Anil K. Rajvansh — Director and Hon. Secretary of the Nimbkar Agricultural Research Institute (NARI). Mr. Rajvanshi has been a member of many prestigious committees of the Government of India (Office of the principal Scientific Advisor to the GOI, Advisory Board of Energy, MNES, etc.) and Government of Maharashtra (State Planning Commission, Maharashtra Electricity Regulatory Commission, etc.)

Why alternative “green” energy is crucial today?

It's crucial because the lifestyle of the Western countries, especially Europe and the United States, is consuming much more than what the world can produce. And developing countries like India and China and others want to catch up with the life style of the developed world. So, everybody is fighting for the same resource. That resource is not enough, so that is why it's crucial that people develop some other resource which is alternative energy. In fact, all the resources of the world have come from solar energy except for, maybe, nuclear energy. Everything has solar energy: solar energy today or solar energy many years ago. For example petrol is 100 million years old solar energy. Wind, tidal and all other kinds of renewable energy are all solar energies.

What role national governments play in developing new energy sources?

Government plays a very important role because initially renewable energy is very costly. Therefore no private party would like to spend high initial capital cost. Government's role as catalyst becomes extremely important. It initially starts the program and once this program gets going then naturally the private parties come in. That has been the case in the United States, in Europe, especially Germany. That is what is happening in India also. Government has a crucial role in starting and promoting clean energy.

What is the ratio of public/private investments in India?

I think it's very high. The amount of public investments is much bigger than those from private parties. I don't know the exact number, but I would say public to private investment would be in the ratio of 90/10 or somewhere near to it. Government investments are very high.

Are there any new government programs aimed at supporting research in this field?

In fact, in India all research in this sphere is supported by the government. And the same thing is happening in China. There are research programs in all areas: wind energy, solar energy, new fuels like bio fuels, and development of energy devices etc. You name any sphere of renewable energy and the government does the pushing in research.

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

I did my graduate work in solar energy in the United States back in 1970's. At that time the focus was mostly on solar thermal. Photovoltaic was just coming up. My laboratory was, probably, the only laboratory in the United States which was pushing for solar thermal. And I'm very happy to tell you that now one of the fastest growing solar electricity production technology is by solar thermal. You must have seen such electricity producing plants in the United States, Spain and other parts of Europe. And now they are putting very huge plants in Africa. That is a very major thing which is going on. But even more fascinating thing than this is how we have started mimicking nature. You have to follow nature since it has taken millions of years to perfect the solar energy conversion design. Nature uses solar energy by “green” plants. Researchers all over the world are working on this and billions of dollars are being spent on the research. They are trying to convert solar energy via the same photosynthetic process to produce new fuels like alcohol and other useful liquids. This is a major program and the latest technology. So, one is direct conversion of solar energy to electricity through photovoltaic and solar thermal, and another is conversion of solar energy via biochemical route into fuels like alcohol and others.

What are the latest programs in the sphere of clean energy at NARI?

We have done a lot of work in the sphere of renewable energy, especially in producing power from biomass. Our work on electricity production via biomass has become a part of national policy. We have also been working for some time on use of sweet sorghum as a source for ethanol production. Our scientists have bred varieties which produce grain and high sugar in stem so that the sugary juice can be fermented to produce ethanol. Our sweet sorghum has been grown all over the world. There is a huge interest in the United States and Europe in sweet sorghum.

How cost-effective this technology is?

This is very cost-effective. As you know, the major production of ethanol comes from sugar cane. And now sweet sorghum is becoming alternative crop for ethanol production. It matures in 4 months and uses about 50% less water than sugarcane. It's a major initiative.

How is clean energy R&D incorporated into national innovation systems in general?

Right now it's not very much incorporated. In national scheme of energy production in India "green" energy production is less than 1%. This is very small. But recently the government of India has started a major initiative to produce energy from solar energy. The mission called Jawaharlal Nehru National Solar Energy Mission envisages to produce 20 thousand megawatt by year 2022. If that happens then we shall see a substantial portion of national energy coming from renewable energy. But at the moment the renewable energy production in India is less than 1 % of the total.

this area. I'm sure our long standing friendship with Russia will help us move forward. We would like to have access to your technology. As you know Russia and India have collaborated for many years on many things. Russia is a good partner in the sphere of nuclear energy.

Whose positive experience may Russia use as a guideline?

Major portion of Russia is a very cold country and you need to have a large amount of heating of buildings in winter. I think use of solar energy to do that will be very beneficial. I think that Russia should follow the example of Germany. Germany has done very well in renewable energy. They've been working mostly on photovoltaic

INNONEWS

BT Pushes Boundaries of Super-Fast Broadband

BT has unveiled its latest plans for super-fast broadband further supporting the government's vision of creating the best super-fast broadband network in Europe by 2015.

The company plans to conduct a technical trial of one gigabit fibre broadband in Kesgrave, Suffolk and the inclusion of up to 40 rural market towns in the next phase of BT's deployment of super-fast fibre broadband.

The trial will start in early 2011 and will see BT deliver some of the fastest residential speeds over fibre broadband anywhere in the world today.

www.btplc.com

Businesses Should Support Innovation

Innovative businesses in Russia cannot exist at the expense of the state and entrepreneurs should take an active role in developing innovation in Russia, President Dmitry Medvedev said on Tuesday, December 14.

«Undoubtedly state funds should exist and they should be invested but this cannot last forever,» Medvedev said at a meeting with the national modernization commission.

«Absolutely private, freely running companies independent from the government should arise as a result of these investments,» the president added.

www.en.rian.ru

The Second International Forum on Intellectual Property Expopriority'2010

On December 7, Expocentre held an opening ceremony of the Second International Forum on Intellectual Property Expopriority'2010.

The Forum is important not only for Russia, but also for the World Intellectual Property Organization (WIPO) which delegated its experts to participate in the Forum. On behalf of WIPO and its General Director Francis Gurry, the WIPO Administration Director Michal Svantner welcomed the Expopriority'2010 participants.

www.expo-priority.ru

I think use of solar energy to do that will be very beneficial.

I think that Russia should follow the example of Germany.

Germany has done very well in renewable energy. They've been working mostly on photovoltaic and solar thermal. They had a very strong program starting in 1990's

You see, government is the one that starts the process of innovation through R&D projects. But we hope that the private sector will come in and do it in a very big way. And then we should see a major program. But the private sector can only come if they find that there is enough money to make like it takes place anywhere in the world.

Will private sector come in?

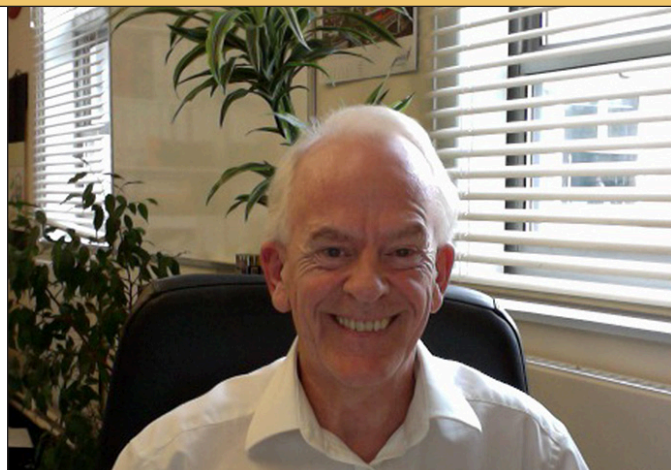
It will come in because the government gives a lot of tax incentives like income tax exemption, reduction in import duties, tax holiday etc. All these measures will hopefully make the private sector realize that they can make profits on renewable energy in the near future. Plus the government is also trying to help them by giving soft interest loans and part grants. So, all these things hopefully will make them to enter renewable energy sector.

What is your knowledge of the situation in Russia?

Russia has a very large and successful program in nuclear energy. India wants to work with Russia in

and solar thermal. They had a very strong program starting in 1990's. Spain at one time was doing very well in setting up renewable energy projects but now because of economic crisis quite a number of these projects have stopped. Some Scandinavian countries like Norway, Sweden etc. are doing well in renewable energy too. They have very large programs in biogas. Sweden is using biogas in running cars, buses and even trains. In Iceland there is a large program in geothermal energy. One of the things Russia can learn from India is that you should try to reduce the demand for energy. If Russians live a simple life and not copy the consumptive life style of Americans then you will have adequate energy for everybody. The motto should be "Simple living and high thinking".

We Don't Make Waste We Make a Range of Products!



James Clark — Professor of Green Chemistry at the University of York, Director of the York Green Chemistry Centre of Excellence, member of the U.K. Chemical Stakeholder Forum. Prof. Clark consults for several major corporations on the environmental impact of their operations

What is “green” chemistry?

“Green” chemistry is the concept of making chemical processes and products environmentally compatible. It reaches across the lifecycle of almost all articles in use today – since almost everything contains chemicals – using renewable resources as feedstocks; clean manufacturing involving the least hazardous substances, minimal auxiliaries, low energy and water use, and producing minimal waste; safe products that ideally are designed to release their components at end-of-life (zero waste). It is more essential than ever as we are running out of traditional resources, more and more people want the products, legislation and the costs of waste and pollution are very high, consumer demands for safer and more environmentally compatible products are greater than ever leading to increasing demands from producers and users for greener and more sustainable products.

Therefore, “green” chemistry goes beyond traditional chemistry, its environmental chemistry since not only its purpose is to decrease the environmental pollution but also to eliminate what causes pollution? Do you think that the major principle of “green” chemistry – “It is better to prevent waste than to treat or clean it up after it is formed” – became a part of people’s mentality, that society, legislators, corporations follow this principle?

I think that the principle has much broader significance than was originally intended. To me it’s no longer simply designing manufacturing processes that minimize waste, it’s a complete shift in attitude to the point where “waste” as defined as something no-one wants, is no longer acceptable in any quantity. Use must be made of everything that’s made in a manufacturing process – there can be a main product but all the other, admittedly less desirable products of the process, must have value somewhere – perhaps for recycling within the process or within the site for another application, or within

a business park to another neighboring company that can use them. We don’t make waste; we make a range of products!

What role national governments play in developing new “green” solutions in the given sphere?

REACH (Registration, Evaluation and Authorization of Chemicals) is the world-leading legislation that is challenging the use of dangerous chemicals and will force substitution with safer chemicals. China’s version of REACH is now on the way and similar legislation is being considered in many places. Many countries have had “green” chemistry research programs though they are often not maintained. Legislation is a powerful driver though we need to make sure the laws don’t inhibit good “green” chemistry, e.g. restrictions on the use of waste as feedstock. Some private investors are moving into the area and an increasing number of companies are investing in “green” chemistry research – probably more than government schemes now.

Profit is a major motivation for a company; if “green” chemistry was much more costly and it was economically unreasonable to develop it, do you think companies would rather lobby their interests than participate in so-called “green” competition? At what point and why it became profitable to develop “green” chemistry?

“Green” chemistry becomes profitable when the combination of consumer demand (and in some cases willingness to pay more for “greener” products – the premium being paid for “green PE” (derived from bioethanol) is a good example of this and shows that a value can be placed on “green”) and charges for inefficient and dirty manufacturing become high enough (waste disposal charges, fines for pollution, increasing costs of traditional e.g. petrochemical feedstocks). Lobbying to hinder legislation certainly happens – REACH was affected by this – and this reflects the traditional view that environmental legislation is simply an additional cost burden and reduces the competitiveness of companies or regions; a more positive and increasingly justifiable view is that customers will increasingly favor suppliers who have verifiably “greener” products and supply chains. How else will such giants as Unilever and Procter and Gamble achieve their “green” targets? The chemical industry needs to recognize that “greener” manufacturing is becoming a marketing advantage.

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

The recent breakthroughs are probably mostly in the use of renewable resources (e.g. products derived from polysaccharides, low temperature pyrolysis of biomass) and production of “greener” products (e.g. new bio-solvents). Generally the last 12 months has seen an increase in interest in “green” chemistry; in Brazil the industry association says they want to be world leading in “green” chemistry; at corporate level GSK have said something similar; Unilever and P&G have set ambitious targets on the use of renewable resources/ reducing environmental footprint; other companies including GE, and Dow are clearly moving in the same direction; retailers are increasingly demanding “greener” products that will require new “green” and sustainable supply chains.

It's a Myth than "Green" Chemistry Costs More



Francesca M. Kerton — Chemistry Associate Professor, Memorial University of Newfoundland

What is "green" chemistry?

"Green" chemistry is about the development of new chemical processes that have reduced environmental impact and reduced hazard associated with them. In short, it is about making sure that in any type of chemistry on a large or a small scale there is reduced risk of an accident or harmful chemicals entering the environment. If "green" chemistry methods are used, ultimately it will mean that we no longer pollute the environment and can use less energy. Often in this field – also known as sustainable chemistry – we have to balance several factors and it is very difficult to make something 100% environmentally friendly, but it is something we can aim for and along the way we often make very exciting and economically viable discoveries.

What governments do in order to promote the development of new "green" solutions in the given sphere?

"Green" chemistry is all about partnerships and collaborations as it covers many different types of chemistry and chemical engineering. So, it is really important that all countries and both public and private bodies are involved in its development. I have been a professor in the U.K. and I am now based in Canada. I have also reviewed proposals for the French national research agency and the National Science Foundation (NSF) in the U.S. All of these governments have highlighted "green" chemistry, sustainability and energy as areas they want to support through their programs.

How is "green" chemistry R&D incorporated into national innovation systems in general?

As I mentioned earlier, the federal government of Canada has set up centers of excellence for commercialization and research (CECR). These are little bit different from normal centers of excellence that focus on research and discoveries being made by a team of world-class researchers. The publically funded CECR program focuses on bringing the innovations of Canada's world-class researchers – particularly those in academia but assistance is also given to

researchers in start-up companies – to the marketplace more quickly and in addition to "green" chemistry, centers focused on a wide range of research areas have been established. They are all about innovation and making that jump from the lab bench to the marketplace.

The government of Canada recognized that discoveries in "green" chemistry could make a huge impact on the future economy of Canada and provided funding towards the establishment of GreenCentre Canada.

Also, in Canada, there has been a lot of effort made to encourage researchers in Academia and Industry to come together and collaborate and to tackle big problems. Clearly, the development of safe, economically viable and environmentally friendly technologies is one of these big problems, as populations and standards of living are increasing around the world and putting increasing strain on the planet and the sustainability of humankind. Through industrial collaborations with university researchers, undergraduate students, postgraduate students and more established researchers (those already holding a PhD degree) get valuable real-world exposure and industry gets access to new ideas and innovations. In these situations, everyone wins, and with "green" chemistry the planet wins too.

Do "green" chemistry technologies increase the costs significantly? If so, why would the industry develop "green" chemistry?

There is a myth surrounding "green" chemistry that it costs more. In many cases, it just isn't true at all. "Green" chemistry researchers are very aware of the triple bottom line while they are performing their research. That is it must benefit the environment, society and the economy. Although some of our discoveries turn out not to be suitable for commercial development, we can learn from this and develop new ideas from that starting point. In many cases, there are extra benefits to going "green". For example, using supercritical carbon dioxide to extract high value flavor and aroma molecules from plants means that the residue (waste material) can then be fed to animals (livestock). If hexane, a common organic solvent, is used in the extraction process the residue of the plant is now toxic and has to be incinerated – this would end up being a more costly process in addition to being less "green".

Are there any governmental "green" standards that regulate production and therefore promote "green" chemistry development?

In most countries there is growing legislation concerning chemical processes and pollution. Probably the most well known at the present time are global efforts to reduce greenhouse gas emissions. This means that both governments and industry are very keen to develop innovative processes with a low carbon footprint. This can be done in many ways. One way is to use biomass as a feedstock and this is likely one reason why the government of Canada recently invested in research efforts within the forestry sector. Added benefits to this investment would be the creation of sustainable employment in rural settings and management of the Canadian forest landscape.

We May Not Be able to Recover



**Joseph D. Sieber —Senior Electrical Engineer,
Founder & President of Solar Inspired Energy Inc**

Why do we need “green” energy for?

I believe that much of the world's erratic weather is attributed to climate change, to warming of our atmosphere. Much of that is directly due to carbon dioxide emissions from the use of hydrocarbons, primarily oil based products that pollute our atmosphere. About 2/3 of the oil that is used in the world goes to internal combustion engines in transportation and the automotive industry and to large scale generation of electricity. That is a huge amount of oil that is going to these two uses that are damaging our atmosphere irrevocably. We may not be able to recover. It is urgent that we try to change our energy usage as soon as possible.

What role government plays in the development of new energy sources?

At the moment most governments encourage the development of “green” energy. But in many cases it is an encouragement that is a sort of arm's length approach, not very much a real commitment to the development of the alternative energy. Yes, there are programs available in most countries that subsidize development on a 50/50 basis, such as in Canada or the U.S., or some combination like that. There are programs but the parameters are that the companies that develop the technology have to spend certain amounts of money before they can apply for equal amounts from the government. A company that doesn't have a meaningful cash flow would find it very difficult. As a retired engineer and entrepreneur I don't have that amount of money to develop a multi-unit project on the ocean. For a truly new and innovative technology, the Government should be prepared to evaluate the merits of the technology and react more proactively to encourage development.

What about the U.S. policy?

I don't believe there are any advantages in this regard in the United States. I believe that European countries, countries like the United Kingdom, put a lot more money into the development of “green” energy.

Are you aware of any governmental programs in the U.K.?

I know the UK has supported primarily wave, tidal, and wind energy. They also provide in many cases subsidies for generation of electricity by way of feed in tariffs of 20 to 30 cents/kWh, for example, that gives them a bit of an advantage over conventional generation of electricity. Organizations such as the Carbon Trust fulfill this function of evaluating “green” technologies.

To your mind, what government should do in order to stimulate the development of “green” energy?

I think what they should do is to be more pro active. They should analyze the technology that is introduced to industry by entrepreneurs and provide an assessment. If they feel that it is a good technology and it will work they should subsidize it upfront, directly, and promote it. But at the present time all alternative energies like wave energy and tide energy, it is left to each company to develop the technology and promote it. Much of this technology is not going to be very efficient, by my analysis. But nevertheless people are encouraged to develop it on their own, with the hope that they will succeed. Not everyone has the financial ability to develop the technology. It would be to the advantage not only to the entrepreneur and new company that develops it, but also to the government itself. If they recognize that this is a good technology by analyzing it, if they directly get involved to subsidize technology the country also becomes successful. It would speed up development of really new good projects that can be showed to be of minimal risk with good returns.

How is “green” energy R&D incorporated in national innovation system?

There is a fair bit of government support in the universities to develop clean energy, and clean energy approaches, but universities don't necessarily make the initial discoveries and achieve the original patents. More of this subsidy should be going directly to the development and commercialization of the technology once it has been given an honest assessment. Although there is fair bit of money going into the universities develop alternative energies, there is less going into ocean energy because oceans are seen as a very harsh environment. Storm waves are seen by the SIE-CAT technology as an opportunity, not an adversity. The surface floats of our technology are meant to writhe in the surf like kelp, having to endure only power takeoff forces.

What are the latest technological trends?

I am not sufficiently informed to be able to discuss technological trends in general. There are several tidal turbines being developed to emulate wind turbines. Wind turbines are getting ever larger and as such are being developed for off shore installations. Because of this they are getting too expensive and uncompetitive.

Our technology is completely linear, can be installed anywhere on the ocean's surface, and can provide electricity, potable water through reverse osmosis, and hydrogen by applying electrolysis. Our system is designed to be fail-safe, has no pollutants, and is totally greenhouse gas free.

What marine countries in the world are successful using wave energy technologies?

Countries that are actively developing wave energy technologies, to my knowledge, are: UK, New Zealand, Australia, Sweden, Norway, Germany, Israel, U.S., Canada, Portugal, Spain, and France.

Wave energy can't be harnessed effectively everywhere. Where wave power can be used and where it can't be?

Most of the current technologies are not able to effectively harness wave energy unless the waves are large, and then only with very limited

are convinced that the capture device must have substantial mass to allow it to drive the power takeoff in the down stroke. These are but two reasons, and there are several others. The result is that there have not been successful technologies to commercialize.

Issues that have prohibited the development of wave power include environmental impact issues, disturbance of marine life, high costs, concern over possible collisions with ships and other problems. How currently these problems are solved?

Many of these concerns, and others, still exist. All of these concerns can and are mitigated by the SIE-

Our SIE-CAT technology can be deployed anywhere on the ocean's surface, regardless of wave amplitude, to produce the three commodities listed earlier. This allows all countries, not just marine countries, to harvest the energy of the ocean. Electricity can be taken to shore with submarine cables and fed into national grids

results. Our SIE-CAT technology can be deployed anywhere on the ocean's surface, regardless of wave amplitude, to produce the three commodities listed earlier. This allows all countries, not just marine countries, to harvest the energy of the ocean. Electricity can be taken to shore with submarine cables and fed into national grids. Potable water and hydrogen can be taken to shore with tankers.

Although there have been attempts at using wave power since the late XIX – early XX century (in 1890-1910 wave motors of various designs were experimented with along Southern California's beaches, but the experiments didn't bare any fruit) wave power generation haven't become a widely employed commercial technology. Why?

These early, and most of today's, technologies were and are simply ineffective. They rely on a single concept without due regard for all the forces that come into play. For example, few if any consider the water as a very damping medium, and most

CAT technology. Our technology has no environmental impact, impact on marine life is minimal and in some cases is positive. Our design, deployment, decommissioning, and maintenance, using the Carbon Trust methodology, are competitive with the best conventional generation. Shipping lanes are clearly marked on navigation charts, and the fishing industry can be accommodated fairly to the benefit of all society. As the SIE-CAT technology can be deployed anywhere, the maximum protrusion above the ocean's surface of less than 3 meters, will not form a visual obstruction, and in fact will not be visible at all.

INNONEWS

RUSNANO and S-Group Ventures to Invest in RMT, Producer of Innovative Thermoelectric Units

The Russian Corporation of Nanotechnologies has announced that it will invest 150 million rubles in automated mass production of thermoelectric micro coolers, cooling systems, and related devices, a project proposed by Russian company RMT. The project also attracted co-investment from the private venture capital fund S-Group Ventures.

Russian company RMT is one of the world's ten largest producers of thermoelectric micro cooling products. It currently holds a two percent share of the world market, selling its goods in Russia, the United States, Canada, Europe, Southeast Asia, and Japan.

The thermoelectric modules, which operate on the Peltier effect, cool a range of devices: semiconductor and other types of lasers, powerful light-emitting diodes, highly sensitive photoreceivers, elements for high-performance integrated circuits, microprocessors, and biomedical instruments. The miniature thermoelectric coolers that RMT specializes in are integrated into the body of microelectric units; the closer the cooling elements are to the heat source, the more effectively the units work.

www.rusnano.com

Mikhail Prokhorov Unveils Russia's First Hybrid Car

Russian billionaire Mikhail Prokhorov has unveiled the country's first hybrid car that is anticipated to hit the streets in 2012. Christened the e-Mobile hybrid car, the vehicle is the first in country, where motorists don't often show much regard for the environment. The fuel-efficient vehicle is a joint venture between Mikhail Prokhorov's financial holding company Onexim Group and car maker Yarovit.

The car, which is expected to sell for \$14,500, is powered by a combination of electricity and petrol. The ultra-cheap hybrid will offer a top speed of 81mph and a fuel efficiency of 67 miles per gallon.

www.ecofriend.org

"Green" Chemistry – the Building Blocks of Sustainable Development



John Warner — President, Chief Technology Officer of the Warner Babcock Institute for Green Chemistry. Dr. Warner has published nearly 200 patents papers and books and is considered one of the founders of the field of Green Chemistry

Why do we need "green" chemistry?

One of the most startling realizations is that there are many professions—doctors, lawyers, nurses, teachers, architects, engineers – that at least in the U.S. and in most parts of the world require some kind of licensing, require some kind of certificate from the government that says that you know how to do something safely. For example, an electrician: he could not enter your house and change a light ball unless he had a document from the government saying that he has been appropriately trained and he knows how to do it safely. For some strange reason chemistry has evolved that the only people in the world who are capable of making a new molecule that has never existed ever before never had any trainings or any requirements of training of toxins' environmental impact.

Every chemist on the planet when he goes to the lab can potentially make a neurotoxin, carcinogen or some other kind of highly toxic material, and yet no education on how to identify and avoid making hazardous materials was ever required in his education or training. I found that shocking as I developed as a chemist. "Green" chemistry is the correction of that education failure. We need to make sure we've covered the issues related to toxins and their environmental impact. It should shock you that chemists are not taught even the most basic information about what makes a molecule toxic and how to avoid it.

How government supports "green" chemistry?

The thing is that the industry itself is promoting "green" chemistry. The world has changed in the last decade in that consumers are demanding sustainability, whatever form they consider it to be. Companies are demanding to make sustainable products. Yet, the scientists that are working for these companies have no training. So, any organizations that can learn the principles of "green" chemistry not only do an ethical and moral component of taking care of the environment but also have an incredible competitive advantage. Because if nobody else is going to school to learn this and all the companies are struggling; anyone who does learn these skills and incorporates them in their products will have a massive competitive advantage.

Are there any governmental programs in the U.S. purported to stimulate the development of "green" chemistry?

There are two ways of looking at governmental impact. Remember, "green" chemistry is the science of the sustainable solutions. It is the science of invention; it is the science of innovation. It's very difficult to government to tell people work smarter. However, the other side – chemical policy which is not "green" chemistry, but when the governments ban hazardous materials or impose regulations, they are indirectly promoting the development of a safer alternative. But that's not really a "green" chemistry.

What the government isn't doing yet is coming up with ways to stimulate education in developing "green" chemistry technologies, at least not in the United States. In India the government is in the process of mandating that all chemistry students take a one year course in "green" chemistry. And it's been piloted in Delhi. In China they've opened up something like 15 national research labs just to do "green" chemistry.

Every chemist on the planet when he goes to the lab can potentially make a neurotoxin, carcinogen or some other kind of highly toxic material, and yet no education on how to identify and avoid making hazardous materials was ever required in his education or training

It's kind of funny; In the United States if an academic wants to get research funded he must have the word "nanotechnology" in the title of their grant. United States have overwhelming amount of money

supporting this concept called "nanotechnology". Every college, every university has nanotechnology program not necessarily because scientists think it's a wonderful thing but because the federal government has allocated over 10 billion dollars to do that. If the government allocated a similar amount of money into "green" chemistry you would find every university and every college now would have had a program in that.

Is this situation going to change in the future?

I'm hopeful. I believe that it's going in the right direction. I think that for the last 30 years government policy has been focusing just on the demand side: coming up with laws and regulations of what not to do. The revolution of "green" chemistry is that instead of the government saying what not

to do, how about scientists saying what to do? Instead of looking at the demand, how about the supply? It is my belief that a regulation cannot possibly work until an alternative has been invented. If an alternative isn't invented, then the government regulation must necessarily fail because the companies must hire lawyer to fight it. But if invention exists then the government regulations will succeed because it will just mandate the adoption of the alternative technology.

To be clear, I am not saying these regulations are bad or unnecessary, I am just saying they are not enough. Some people historically think that the regulations force companies to be innovative and to create alternative technologies when in fact it isn't true. Regulations often force the industry to

bioavailability the dosage is much smaller, you've got less getting out into the environment. That's one example. Another example is a hair coloring system. It is believed that one of the most significant causes of bladder cancer in the U.S. population and, probably, global, is hair pigment that is very toxic. We've invented a hair coloring system that is environmentally benign and non toxic. Another technology is cleaning solutions for silicon wafers. In the microelectronic industry they use some hazardous reagents to strip the photopolymers in silicon wafers. We've invented a technology that has non-toxic components to that. It just goes on and on. There is a dozen things that we working at right now.

The point of "green" chemistry is that "green" chemistry isn't an

People consider solar energy to be a sustainable technology. But you could make a solar panel with hazardous reagents and a lot of energy

hire lawyers to fight the regulations. If industry already has alternative technology regulations then can help support mandating of that technology, the incorporation of it. That's where government and industry go hand in hand to support innovations that are going to supply the alternatives.

What are the latest technological trends in "green" chemistry?

In general I would say bio-based alternative is our huge trend. That's definitely a megatrend for a variety of reasons. Bio based polymers, bio based materials – that's one big trend. Another big trend is bio catalysis, new synthetic transformations based on catalysis. And I would say a third trend is continuous flow reaction chemistry to move away from batch processes. If I had to pick up three things going on in chemistry I would choose these three.

What are the most interest and promising projects your institute is involved into?

We have a number of projects going on at our institute. One of them is the increasing oral bioavailability of the Parkinson disease drug. By coming up with a technology to increase oral

application. It's the science behind the application. People consider solar energy to be a sustainable technology. But you could make a solar panel with hazardous reagents and a lot of energy. So, ironically, is the solar panel really sustainable if you are creating pollution while making it? Same thing is with water filtration. Many water filtration membranes are manufactured of hazardous materials. They create more water pollution than membrane is going to actually remove. So, "green" chemistry isn't about the application. It's about the fundamental building blocks. Whether you are making a pharmaceutical, a cosmetic or an electronic component, if the building blocks are sustainable, one can assume that the product will be sustainable.

INNONEWS

Games Innovation Conference 2010 (GIC2010), Hong Kong

Following the success of the inaugural conference in London last year, the IEEE Consumer Electronics Society announced the 2nd International IEEE Games Innovation Conference 2010 (GIC 2010).

The conference aims to be a platform for innovative research in game design and technologies and to focus on the multi-disciplinary aspects of the subject and make it more accessible to researchers and practitioners from different disciplines in academia and industry.

Special timing of our 2010 conference (21st-23rd December) is chosen to bring GIC 2010 together with the Asia Game Show 2010 held in Hong Kong between 24-27th December 2010. It is also important to note that SIGGRAPH Asia 2010 is in Seoul between 15-18th December 2010. These events provide a unique opportunity for having the biggest names and events of the year around the same time in the same area.

www.eng.spb-venchur.ru

RTS Stock Exchange wins FOW Awards for best innovations in Eastern Europe

The winners of the FOW Awards for Innovation 2010 were announced on December 1, 2010 at the close of FOW's Derivatives World conference in London.

RTS Stock Exchange won two FOW Awards for Innovation 2010:

Best innovation by an exchange in the field of product design – Eastern Europe

RTS Standard Index Futures

Best innovation by an exchange in the field of customer service – Eastern Europe

RTS unified settlement on FORTS and RTS Standard

A futures contract on the RTS Standard Index started trading on FORTS, the derivatives market of RTS, on February 15, 2010. The RTS Standard Index is made up from 15 blue chips of the Russian cash equity market and is used as the underlying asset for the futures contract. The contract gives the opportunity to buy a portfolio composed of the 15 most liquid instruments of the Russian cash equity market through one trade. As a result, transactions are more cost-efficient and show maximum results compared to usage of these assets separately

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