International Consortium for a Low-Carbon Society (ICLCS)

Keynote Speech :

Views on a Low-Carbon Society- a USA and Stony Brook University Perspective on Research and Education

Dr. Eric Kaler,
Provost and Senior Vice President for Academic Administration, State University of New York, Stony Brook

Dr. Kaler began his presentation with a brief institutional snapshot of Stony Brook University, which is a party of the State University System of New York, and the Brookhaven National Laboratory.

Dr. Kaler spoke of the capabilities of the researchers and technological advances having been made at Stony Brook, in particular in the areas of energy and sustainability. He then described the background to current challenges for energy and sustainability, future courses of action to address these challenges, and what needs must be taken care of to support these actions from private, public, and educational institutions.

Basing his presentation on a 1998 article in Nature “Energy Implications of Future Atmospheric Stabilization of CO_2 Content”, the Kaya Identity, the IPCC “business as usual” model, and predictions on CO_2 levels by Wigley, Richels, and Edmonds from their WRE model Dr. Kaler spoke of the carbon intensity of the energy mix commonly available – wood, coal, oil, and gas. A “massive decarbonization of fuels” by 2050 is needed, in addition by 2030 we must have emissions from all energy sources that are cleaner than natural gas in order to meet. The solutions to these energy challenges are not always clear, or technology has not caught up to the need developed through understanding and insights gained through these models and projections. As a result, the research points to the way we need to go as a society for our economy and our environment. At present there are strong economic forces driving research and design on green technology leading to increases in so-called “green jobs” and other opportunities. In addition if the cap and trade mechanism being promoted by the Obama Administration comes about there will be an even greater demand for trained economists to deal with these areas. This is just one example of the type of openings and specialised areas based on traditional fields that are to come. Dr. Kaler explained that while the current phase of investment and interest in “green” or “clean” technology is similar to that of the 1990s and Information Technology in Silicon Valley with venture capitalists showing great interest, what is interesting and different in the case of clean technology is the amount of money involved. He gave the example of Google starting up for $25 million, but with green technology the costs are far greater. He then expressed two concluding points of his presentation – public and private partnerships are absolutely necessary; likewise we need to take action on education now to prepare for the future job markets. Stony Brook’s Southampton campus is well positioned to address these growing areas of interest and opportunity with a curriculum designed around environmental sustainability, public policy, and natural resource management. At Stony Brook and the Brookhaven National Laboratory in particular they are currently focusing substantial research efforts on energy storage in batteries, energy delivery through Smart Grid management and materials, biofuels, and education.

Discussion

In response to a question about clarifying what specifically is “renewable energy” in light of the discourse in Japan on what exactly is renewable, Dr. Kaler responded that as there is a massive need for renewable, the only feasible renewable energy in the long term is solar. If we accept that as true then the medium term will see a large mix of fuels – starch based (corn has been a disaster however he noted), genetically modified fuels, and nuclear which needs to play a larger role. All these options are only short to medium term bridges to ultimately relying on solar power.

When discussing solar energy it was noted from the audience that grid stability and storage are major problems for smaller countries in particular. Dr. Kaler acknowledged this and gave a comparison of the automobile industry in the early 20th century. At that time it was generally understood that the automobile would be the way of the future, but how it looked and how it would be produced was still unclear – leading to many models, many failures and the lesson that no one-size solution will be suitable for all. Many storage modalities are in play and can be developed further, we’re simply in the design and idea generation phase of development for suitable technologies.

Another participant felt that the point remains that the main issues now are cost and storage. Technology is certainly the key to resolving these issues, but from a social and political aspect we need to stop looking at countries as individual blocks. We can bring synergies by taking a regional and global perspective, rather than a country by country case.

Other participants were relatively optimistic about Asia being well placed to address energy concerns. It is not going to be easy and will take sustained long-term commitment.

Dr. Kaler noted that given the alternating patterns of development based on tax and policy structures put in place by various governments, the most important point is to have a stable policy approach.

Prof. Peter Pearson added that new investment is risky, in particular due to the “enduring value of carbon” so the government must allow for profits in the early stages – especially to stimulate sustained commitment from the private sector.

In response to a question about geoengineering, Dr. Kaler clarified that the question was about putting sulphur in the atmosphere, and that it is a frightening and largely uncontrollable experiment with great danger for rogue nations to be toying with the technology. The risks are far too high, as are the risks associated with carbon injection.

The discussion turned to Japan where the employment situation cannot absorb the number of students who studied environmental topics in economics and society. Dr. Kaler felt this is a general pattern, that scientists do the technology while others do the policy aspects. There is a substantial need for policy specialists who understand the technology but this demand is less than for technologists. Ideally, he would like to see more cross-over between the technologists and political scientists. Complacency in this area is the wrong view, especially for developing countries.

There was a call for greater efforts on persuading sharing technology between developed and developing countries. Dr. Kaler added that there is a need to finance emissions and enable a clean energy infrastructure in developing countries. In addition it was mentioned that there is no job market for clean energy students because the product for the market has not been fully developed yet.

There needs to be a market for research to contribute to for the research itself to be sustainable. There will certainly be a winner one day, but for the moment public-private partnerships and investment is the key. As with the human genome project there was a race between public and private to reach the general public first with the discovery. In that case the public sector made the first announcement, making the technology open and accessible to the public. In the same way clean energy can be made public, with a market created for it by government policy.

Panel Session 1:

Breakthrough Low-Carbon Technologies – with Focus on New and Renewable Energy

Facilitator: Dr. Paul Friley,
Energy Sciences and Technology Department, Brookhaven National Laboratory

Bio Energy

Prof. Devinder Mahajan,
Director of the Center for BioEnergy Research and Development (C-BERD),
Stony Brook University; Brookhaven National Laboratory

Prof. Mahajan introduced the Brookhaven National Laboratory, which is one of the US DOE National Laboratories, and the research done there. Biomass Feedstock, using non-food sources for biofuels such as forest and agricultural resources, is one of the focus areas in the Laboratory. The options to convert biomass into bio-energy can be biochemical or thermochemical. The thermochemical route is using a syngas platform and the challenge is total carbon utility with product specificity.

He stated that for economical biomass processing, biomass should be collected locally, produced locally and use simple processes. This is the technological challenge for R&D and there is long way to go in the area of conversion technology.

There must be links between education (training students at all levels), industry (developing energy technologies based on renewable) as well as research.

His centre, C-BERD, is industry driven, and has six main focus areas, on feedstocks, bioprocessing, new platform technologies and modelling. The themes of research are efficient biofuels production and storage, and fuel use coupled with carbon sequestration. He outlined various sample projects being conducted by C-BERD.

Prof. Mahajan then introduced an enabling approach with the goal of developing atom-economical processes. This approach combines process engineering and process chemistry, in order to maximise the product. The Liquid Phase Low Temperature (LPLT) concept of nano catalysis has huge potential in terms of lowering costs, giving more control and reducing the size of facilities.

Finally he talked about biofuels being a path to sustainable development, citing issues such as resource consideration, distributive fuel production, the need to integrate process chemistry for product flexibility and a transition to a hydrogen economy. Finding sustainable sources of energy is a global problem.

Discussion

Questions included what the effects are of removing the residue left on the fields after harvesting, since the residue actually provides important ecosystem services such as returning nutrients to the soil. Moreover, additional energy would be required to remove the residue and replace the soil nutrients, which could increase GHG emissions. There are also issues regarding how to get the biomass to the bio-refineries. Studies could be conducted in the same way they were for motor fuel – there may be 20 processes tried before finding the best way. It emerged that liquid fuels were not economically feasible, and the storage is a problem because biofuel degrades over time. There also needs to be avoidance of a food/fuel conflict.

Dr. Junichi Fujino, Senior Researcher, NIES, stated one key issue is energy efficiency improvement. He noted that NIES has coordinated research on the role of technologies to design a LCS. There are various scenarios towards 2050, highlighting the need for innovation to realise visions. They also require intervention policy and investment. He stated that high efficiency appliances reduce energy demand, and that good information on the economy and environment influences people's behaviours for a LCS. Good design of appliances is needed for good technology and policies to be accepted. The gap between these must be filled.

To make a low-carbon life a reality, policies and financing, as well as design, are necessary. Construction skills to build environmentally friendly buildings are also vital. He mentioned that sequence is important, with all options being taken in order.

Policy Considerations for Renewable Energy

Dr. Mark Elder,
Principal Researcher and Manager, Policy and Governance Team and Biofuels Project, IGES

Dr. Elder asked the question of what the best form of renewable energy (RE) is. He said that there is no universal answer, and the criteria used to determine what is "best" include GHG reduction potential, other environmental impacts and cost. There may be trade-offs between these criteria. All forms of renewable energy have some disadvantages, and local conditions may determine the most appropriate form. There is no "one-size fits all" solution and which technology is best may change over time.

He stated that we need make sure that policies designed to promote specific technologies are flexible, and we should avoid "locking in" policies. There are fears about the effects on economic competitiveness because RE is more expensive than fossil energy and so countries should agree to coordinate increases in RE targets to minimise effects on relative competitiveness. Increased trade in electricity could help increased the physical capacity to use RE by expanding access to base load power. It would also help increase energy efficiency and reduced need for local peak load capacity. However, electricity trade is limited in many parts of Asia, so grid interconnection, upgrading and maintenance would be desirable. Another issue is that many countries have good RE promotion policies on paper but often they are not effectively implemented due to various factors such as subsidies for fossil fuels, inadequate regulatory framework, lack of public and private capacity, lack of knowledge, insufficient financing, and insufficient emphasis on maintenance. Often projects are donor-driven but not self-sustaining.

He also mentioned that biofuels may have some potential to contribute to LCS, energy security, and rural development. However, there is no consensus on the extent of this potential. Moreover, there are concerns about environmental, economic, and social sustainability of biofuels, even for second generation ones, including land use, deforestation, resource shortages (such as water), and potential food-fuel conflicts, resulting in higher food prices and food shortages. The financial costs are still high, and if government support is needed, there should be more conclusive demonstration of social benefits.

Dr. Elder concluded with some thoughts on biofuels and sustainability, stating that overall, biofuels have some potential to contribute to GHG emissions reduction, energy security and rural development. Such potential depends on land use change effects and use of sustainable production methods, etc. Of course, there is a need to emphasise energy conservation and other renewable energy sources in the context of broader energy and transport policies. It is important to make sure benefits can be achieved before committing to promotion policies. He also observed that overall it has not yet been determined to what extent biofuels can contribute to the LCS.

Discussion

It was stated that because of the urgency of the situation, governments have to take risks by supporting research with policies and public money. In this case, governments are not neutral. Biofuels may well play some role in solving climate change. The use of combined fuel, using biomass and fossil fuel, is one solution, with the hope that technology can deal with the carbon emissions. It is necessary to avoid political criteria when deciding government funding, but governments need to take a long term view in cooperation with the private sector.

Panel Session 2:

Low-Carbon Multiple Benefits for Sustainable Development, Human Health and Ecosystem Services

Facilitator: Prof. Kazuhiko Takeuchi, Vice Rector, United Nations University

Low-Carbon Society and Environmental Health: China's Case

Prof. Xinbiao Guo,
Professor and Chair, Department of Occupational and Environmental Health Sciences,
Peking University School of Public Health

Prof. Guo talked about the health effects of climate change in China and stated that LCS can mitigate health effects related to climate change and bring about a good lifestyle to prevent chronic disease. Knowing that the average temperature has increased over the past 50 years, China has carried out investigations and analysis of the impact of air temperature and pollution on mortality, revealing that there has been a significant increase in mortality from air pollution. There has also been an increase in the incidence rate of infectious diseases in China, related to climate change, which is a big challenge for China. Scenario modelling has been carried out in areas of high potential for disease epidemics.

Chronic disease is also a major problem in China compared to developed countries, with cases of hypertension, diabetes and obesity all increasing, especially in urban areas, where most people do not do any exercise.

China hopes that establishing a LCS will make life more comfortable and healthy for the population. It is important to consider city planning and changes in urban lifestyle when looking towards a low-carbon society.

Discussion

In relation to the issue of black carbon and particulate matter, Prof. Guo mentioned that this was a major burden in most parts of China, and measures are being taken to decrease air pollution. Such decreases would have a positive benefit on health, with less stress on the cardiovascular system.
It is important to combine the local and global challenges, and there are co-benefits to reducing CO_2 emissions in the form of addressing local health issues.

China has a short history of monitoring, and so must establish an active surveillance system.

Low-Carbon Multiple Benefits for Sustainable Development, Human Health and Ecosystem Services

Dr. Ritu Mathur,
Associate Director, The Energy and Resources Institute (TERI)

Dr. Mathur aimed to show the relation between sustainable development and climate change. She mentioned that India currently has a large problem with infrastructure, with over 50% of the rural population having no access to electricity. There is a need to first focus on improving energy efficiency before looking at renewables. India's concerns are energy security and it is necessary to look at the options and implications of renewable energy. She introduced four scenarios: reference (business as usual), evolution (address local problems such as energy security), resolution (reflecting the Prime Minister's commitment that per capita carbon emissions would never exceed those of developed world) and ambition (setting aside common but differentiated responsibilities, to take on more stringent emissions reduction targets). She outlined issues under each scenario, such as energy consumption, energy mix, and energy security. However, even in the best scenario, there is still fossil fuel dependency. It is important to move towards renewables, but it is currently not possible for India with its current technologies. There is also a large difference in terms of CO_2 emissions, and on the economics side, transaction costs, infrastructure and R&D need to be considered.

The key results are that the resolution scenario has the highest level of savings, would lead to a lower level of fuel import dependency and prepares for de-carbonising the economy.

Some strategies include focusing on energy efficiency and DSM, planning for supply and investment in fossil fuels, opting for biofuels, and moving to cleaner transport. India needs to focus on one energy efficiency for a "win-win" situation, for example renewables, such as solar energy. There are policy and other barriers that must be broken down, and the developed countries need to bring down the cost of technology and provide international financial support for energy solutions.

Discussion

As far as the technology used for each scenario, Dr. Mathur mentioned that it must be decentralised, using mainly electricity (solar and others). There may be fluctuations in the time period model, but in any case fossil fuels would slowly taper off. Solar storage is a major issue, and coal would become economically unfeasible. In response to a comment about emissions reduction targets, it was pointed out that CO_2 emissions in India would continue growing but in the best possible manner so that development needs could be met. These are what-if scenarios, to show the benefits but to prevent deep investments that would cause lock-in or regret later. There was a comment that use of renewables would put pressure on transport and distribution systems both financially and politically. The National Action Plan is looking into promote policies and look at various options.

It was pointed out that India has a huge gap between urban and rural GDP and that in 2050, 50% of the population will still be living in rural areas. Biomass has the greatest capacity for India. It was also clarified that these ambitious models show only commercial or industrial use of biomass, not rural home use.

Low-Carbon Multiple Benefits for Sustainable Development

Dr. Mikiko Kainuma,
Chief, Climate Policy Assessment Research Section,
Center for Global Environmental Research, National Institute for Environmental Studies (NIES)

Dr. Kainuma stated that a vision is needed to achieve LCS, and that LCS has many good concepts and offers multiple benefits for sustainable development. One important co-benefit is the reduction of air pollutants. Using China as an example, she showed the drastic reduction in emissions and health impacts when policy is implemented compared to a Business as Usual model. It would also be possible to reduce air pollutants by shifting to energy forms such as electricity and hydrogen.

LCS requires local renewable resources for local demand and could improve living standards, due to increases electrification and local-scale technology development. Such technology must contribute to the economic livelihoods of local communities and integrate with the local natural resource base so as to be accepted and diffused. Training local citizens in design, assembly, delivery and maintenance of new technologies is also important, with the added benefits of poverty alleviation.

She stated that LCS infrastructure, such as transport systems, should be well designed to improve living standards, and comfortable, green building helps to reduce emissions and supports a sustainable building industry. Planning a city so that location of homes and work places are closer would also reduce emissions and improve lifestyles.

Finally, a very important aspect of LCS is enhancement of energy and food security. Substitution of gasoline with domestically produced alcohol as a vehicle fuel avoids CO_2 emissions and reduces the demand for foreign currency. Energy efficiency improvement and local renewable resources could enhance energy security. LCS promotes seasonal local food and contributes to reduce the impacts on crop productivity. Local production and consumption also cuts transport energy, and enables local farming, low-scale processing, and trading communities economically.

Discussion

The many benefits of lowering carbon intensity are beginning to be recognised but we must shift gears in vocabulary and thinking. We need to move from co-benefits to multi-benefits. For example, the benefits of health and well-being are very important. In both developed and developing countries, pollution is having an impact on health, and subsequently health is becoming a driving force to enhance environmental awareness and develop technology for CO_2 reduction.

City planning is needed to create eco-compact cities that eventually combine issues of LCS with e.g. the ageing society. If most facilities are at the city core, then older people should be encouraged to live within walking distance of the core, so no cars are needed. Friendlier cities mean more walking, with the added health benefits of reduced obesity and other related diseases.

There was a question on where to focus efforts in very poor societies, where infrastructure would be more relevant and applicable than training. In reply, it was pointed out that energy is the important issue but regional differences need to be taken into account. For example, house and stove design should be improved for certain areas (but may not be an issue in other areas). It was also pointed out that energy security is generally most important. However, rural communities may have very different priorities.

The conceptual question of whether LCS supports globalisation. Most of the business society supports globalisation up to now, but this may change.

Towards a Low-Carbon Society: Forest Management and Utilisation

Dr. Henry Scheyvens,
Manager, Forest Conservation Project, IGES

Dr. Scheyvens began his presentation on forest management and utilisation towards a LCS by noting that the concept of LCS is very new to the forest sector, indeed almost unheard of. Existing forest management instruments address some LCS concerns, but it is important to recognise that they were created for values such as biodiversity, livelihoods and sustainability, rather than to achieve LCS.

In his presentation, Dr. Scheyvens noted that deforestation is continuing at an alarming rate on a global scale. The percentage of forests managed under sustainable management plans remains low. He explained that the drivers of deforestation are many and usually occur in combinations. Papua New Guinea, where the main drivers of deforestation are logging, subsistence agriculture, plantations, mining and forest fires, was used as an illustration. Underling problems of forest management in many tropical countries are a lack of resources to effectively enforce forest laws and weak governance.

Dr. Scheyvens explained that forest loss impacts climate and, conversely, climate change impacts forests. Climate change is projected to result in storm damage, an increase in the range and abundance of pests and invasive species, and the drying of some forests making them more vulnerable to fires. All these impacts will increase forest emissions. A positive impact of climate change could be carbon fertilisation, though research on this issue is not conclusive.

Dr. Scheyvens stressed that because deforestation is responsible for about 20% of global emissions, that it is impossible to move towards LCS without addressing this issue. To achieve LCS, we need to transform our consumption of wood-based products by refusing to use products from unsustainable sources – if the wood is from sustainably managed forests, then the carbon footprint is relatively low. Certification systems exist that use product labelling, traceability systems and independent forest monitoring that can provide consumers with confidence that wood materials are from well-managed forests. We need to make fuller use of forest certification for both public and private consumption – Japan's Green Purchasing Law, which requires that wood products are from verified legal sources, provides a good policy example. There is also considerable potential to recycle waste wood that needs to be tapped.

Finally, Dr. Scheyvens introduced ways to learn from forest communities for a LCS – use renewable materials, develop and use local food economies, and use carbon neutral transport.

Discussion

The presentation showed that the social and legal systems are as important to emissions and LCS as technology. There should be a change in mentality and in government policies, as well as enforcement of laws. One of the major issues is the lack of public awareness, especially in Japan, where there is almost no demand for assurance of sustainability of forest products. NGOs can only do so much, which means government involvement is crucial.

With regard to REDD, there has not been much discussion linking REDD with LCS. REDD is evolving rapidly in the Asia-Pacific, and a decision on a global REDD mechanism is expected at COP15. The capacity of tropical developing countries to implement REDD is low and the costs of establishing national REDD systems is high. However, the prospects for REDD are enhanced by significant commitments of financial and technical assistance from international and bilateral agencies, and others. Interest from the voluntary market in REDD projects has also grown rapidly, at least partly because of the biodiversity and community co-benefits that carbon forestry projects are thought to offer. There are still many uncertainties, but there are also reasons for hope. A final comment was about the power of the consumer to bring about changes in practice.

Panel Session 3:
Policies and Economics for Low-Carbon Society Pathways

Facilitator: Prof. Peter Pearson,
Director, Imperial College, Centre for Energy Policy and Technology

Policies and Economics for Low-Carbon Society Pathways

Mr. Martin Krause,
Team Leader, Climate, Environment, Energy, UNDP Regional Centre

Mr. Krause stated that it is important to work with developing countries' Assessment Data Inventories Baselines to show that what is measurable is manageable. This needs to be followed by policies, implementable sector strategies and commercially-viable action plans. Pilot projects can then demonstrate technologies that can work, for example wind technology that works from all areas – technology, infrastructure, existing energy agreements etc. It is necessary to leverage investments from public and private sector but there need to be the building blocks otherwise the project would be risk for a private investor and without an enabling environment through policy, investment will not be forthcoming.

The UNDP perspective and role is to support developing countries to work on these issues with GEF funds etc. It also points out that low-carbon growth and climate resilient development cannot be separated, and cooperation on a regional, national and sub-national level is also important. To move towards a LCS, countries need to access, combine and absorb new sources of environmental finance, e.g ODA, loans and private investment. Capacity development is also important, on an individual, institutional and systemic level. There also needs to be policy dialogue.

One of the key barriers to moving towards LCS is financing, and for this area, ODA cannot achieve much, as far as on the scale of investment needed.

He then highlighted pilot projects for mitigation and adaptation which prepare the ground for investments by transforming markets and increasing resilience.

These three issues require inter-related attention. The UNDP's Territorial Approach initiative assists sub-regional authorities in addressing climate change challenges and understanding the risks and opportunities of climate change. A key element is the Integrated Territorial Climate Plan (ITCP) which helps regional and local governments to prepare integrated climate change action plans to priority mitigation and adaptation measures and then provides guidance to public authorities on how to choose and design the most appropriate policies and financing schemes to implement the priority measures.

In summary, there needs to be a rapid scaling-up of climate change management efforts, involving capacity of countries and local authorities to assess risks, prepare plans, access funding and monitor implementation.

Discussion

A question was asked on the Integrated Approach and the experience so far. This approach was only launched in October 2008 and is a new concept piloting in 50 municipalities globally. The first step is to come up with the ITCP plan, covering a limited geographical area, and considering mitigation and adaptation at the same time. There was mention of the intercity collaboration of Kitakyushu City and ICLEI for the Kitakyushu initiative.

Policies and Economics in Developing Low-Carbon Economy in China

Prof. Xia Kunbao,
Member of the Board of Directors and Advisor, All-China Environment Federation

Prof. Xia outlined four main points to developing a low-carbon economy in China. First is to adopt low-carbon production with a sustainable production pattern. This can be achieved by practicing a circular economy and cleaner production. Two recent laws have been enacted that have been enforced with good results in sectors such as power generation, iron and steel, the chemical industry

and light industries. There are also policies and plans in place to develop LCS.
Another measure is to adopt low-carbon, sustainable consumption. With the emergence of a well-off class in China, excess consumption is developing rapidly. For example, private cars are replacing bicycles, and there have been policies to restrict driving based on licence plates, for example.

A third measure is to control the development of high-carbon industries, to speed up the adjustment of economic structure and improve quality of development. Policies include phasing out pollution processes, raising the criteria for approval of construction projects, and formulate penalty measures such as discharge fee system.

He mentioned that in the process of economic re-structuring, it is necessary to make adjustments in China's export oriented economic development strategy. Limits must be put on high-carbon production and export, and greater efforts made to increase low-carbon production and export.

The final point is to carry out international cooperation and attract investment of foreign companies to build low carbon facilities in China. Existing international mechanisms could be used such as CDM under the UNFCCC.

Engaging China in Copenhagen and Beyond: Will G-2, and Co-benefit Concepts Work?

Dr. Guodong Sun,
Assistant Professor, State University of New York, Stony Brook

Dr. Sun spoke on engaging China in Copenhagen and beyond, and asked the question "Will G-2 and co-benefit concepts work?"

He stated that the main problem for China is coal-burning, so there are new strategies being proposed to engage China, to push it into making legally-binding commitments. There are two strategies that have received great attention with respect to the Group of Two, namely to address global issues including climate change, and to integrate energy security concerns into the post 2012 climate regime.

The G-2 concept is a top-down approach with China and US, two countries that could address issues including the financial crisis and climate change. The question is will the G-2 work well on climate change. It is appealing because of China's desire to be a responsible power and sense of being recognised as a major player. However, it will not work well because of mismatched interests, values and capabilities. A top-down approach is extremely hard, and there will be resistance from local governments who want fast growth. There would also be problems in enforcement of laws and accountability for violation.

In fact, the Chinese premier has said that it is impossible for a couple of countries or group of big powers to resolve all global issues. The international community must find better ways to engage with China to mitigate GHG emissions as most legal options are not effective.

Policies and Economics for Low-Carbon Pathways: The Role of Technology RD&D Policies

Dr. Paul Friley,
Energy Sciences and Technology Department, Brookhaven National Laboratory

Dr. Friley gave a presentation on the role of technology RD&D Policies. He mentioned that there is a variety of potential policies to combat climate change including taxes, cap and trade, emission offsets, etc. One option is the potential impact of technology RD&D as a key enabling policy for climate change legislation, as it can reduce the economic cost of other climate change policies and make those policies politically easier to enact and keep in place.

He presented results from a study that tested different sets of energy technology assumptions, with a base Business as Usual technology set, and US DOE R&D goal technology sets. Carbon prices ranged from $0 to $100 per ton of CO_2. The studies examined wind turbine R&D goal technology set at different levels of success. The economic models show different options that can lead to significant cost saving for society. Wind power options are on the edge of becoming economically viable, so modest improvements could make them more viable.

Panel Session 4:

Trans-discipline Capacity Building: Education and Training

Facilitator: Prof. Ryokichi Hirono, Professor Emeritus, Seikei University

Panel 1:

Prof. Sudip K. Rakshit,
Vice President for Research and Professor, Asian Institute of Technology (AIT)

Prof. Rakshit emphasised his key points for innovative and transformational partnerships, namely that we must be multidisciplinary and build a language that we can all understand regardless of discipline or department. He asked whether we want to see jack-of-all-trades or specialists in climate change research. Research in higher education is not only about increasing knowledge in particular areas; education and research must be more diverse.

He stated that financial matters and science are the main issues for poverty and climate change, as they both support the means and ends to solutions. Sustainable development is a bigger umbrella than climate change, and so climate change should be seen in the context of other social, environmental, and economic issues.

This type of research has already been undertaken by Prof. Rakshit's institute, and included strategies on a low-carbon economy with Viet Nam and Thailand as project areas. These approaches must be trans-disciplinary and multi-sector, and carried out with a strong network of collaborators. He expressed strong support for radical innovation, and this must include private enterprise.

These economic and environmental problems impact on the society and on each citizen. There is also the issue of limited energy resources. Thus, solutions will not be discovered and dispersed by just one area of technical or social science.

In summary Prof. Rakshit stressed that specialists from different disciplines should be patient and understand the point of view of colleagues from another discipline. Overcoming the tendency to reject ideas from a person from another field often prevents formation of stronger teams. He highlighted this by saying that working in this manner will like calculating 1 + 1 and finding the sum is greater than 2. This was the difference between inter-disciplinary teams and transdiciplinary teams, he explained. He reiterated that what is need is a common language to achieve effective multidisciplinary results. The results depend on how well the disciplines can talk to each other.

Discussion

The discussion session began with educational practices in Asia where students tend to cram for exams, more so than undertake critical thinking. Addressing this is important for multidisciplinary education and it is vital to do our best to promote critical thinking which considers multiple aspects rather than expertise or knowledge in one specific field.

Prof. Rakshit followed up on these remarks by saying that at his institution they definitely want to start a course on climate change but was concerned about the content of such a course. At the academic level we still need the specialist, but when it comes to decision making we need to be much more transdisciplinary. We need specialists who listen to other lectures and technologists who listen to social and economic issues.

Panel 2:

Prof. Hironori Hamanaka,
Chair of the Board of Directors, IGES

Prof. Hamanaka presented on the conclusions from other ISAP sessions, in particular the session on educational leaders. Much of the success for the development of future leaders depends on financial sustainability, mainly from the government and business sector. A number of practical experiences were shared, including the newly launched graduate course at Keio University on Low-Carbon Society. There is a plan for a similar programme at the Asian Institute of Technology. A number of points were raised such as how we can improve the quality and content of education; how to cooperate in producing the necessary knowledge and skills for providing appropriate programme content; and quality control and relevance of course content. Although we are in the early stages of implementation, we must make sure these experiences are shared with other stakeholders. In this regard a market study is urgently required, so that the students who are educated and trained are able to find a suitable and appropriate job. There needs to be communication with business leaders and government on these points. A number of opportunities exist between and among universities such as joint programmes and faculty or student exchange. These challenges will be addressed but it is necessary to have government support for facilitating cooperation between universities, and between universities and businesses to ensure students have practical ground skills and experiences.

IGES will make sure the information presented this afternoon will be shared among stakeholders.

The institute would also like to proceed with the necessary mechanisms to develop future environmental leaders and programmes, such as a market study. In Japan a multi-stakeholder consortium was started, but now the question is how to proceed with a similar attempt in other Asian countries. It will certainly be challenging, but we would like to move forward.

Discussion

The discussion session began with emphasis on the necessity of a market study. It is essential to make sure graduates can find a job. Two points were raised in this regard. Firstly, industry, government, and academia must carry out collaboration and share view points. Secondly, there must be a balance between the needs of the three sectors and actually attracting students to the educational programme in the first place, by having course content that is both interesting and useful.

India was mentioned as being well-positioned to match the needs at all levels due to existing programmes, current capabilities and future plans.

Social and cultural differences in career expectations must also be considered, such as the end of lifetime employment in Japan and the increasing tendency for youth to change jobs and even sectors during their career path. Often it is the case that some industries are not accepting of these practices that stray from the past despite different economic conditions.

Prof. Hamanaka mentioned key points including the importance of educating new leaders. The important thing is that new leaders should be trained in traditional disciplines such as economics and natural sciences, and at the same time be educated in a way to understand the current urgent needs to tackle complex issues such as climate change and other sustainability challenges. However, many companies hope new recruits would become accustomed to the company's core mission and business areas after being hired. Only after that can environmental issue be addressed – when asked by the company to do so. This situation needs consideration from the business sector and universities.

Undergraduate programmes in which students can take core courses along with specialisations can get them started thinking in a very focused area, but also thinking about the broad subjects to prepare them for shifts in their career later on.

In the fields of climate change and LCS, we have not come to a place of maturity where we have that broad base; we only have specialists.

It is important to develop a multidisciplinary programme as both the faculty and students need a supportive and protective environment. "Pure" discipline students have a hard time competing with transdisciplinary students at discussions such as at the ISAP forum.

At many universities in North America, the EU, and Asia there are certain aspects of a university education that are not imparted to the students, such as how to listen, how to solve problems and how to interact with other disciplines. These attributes would help the student later on in life. Teachers need to be taught the ability to impart knowledge of how to be multi-disciplinary.

So while it is important to ensure students get jobs, the other role of a university is sustainable human development.

Panel 3:

Prof. Peter Pearson,
Director, Imperial College, Centre for Energy Policy and Technology

Prof. Pearson spoke of the importance of patience for inter-disciplinary work stating that it might take 18 months for new disciplines to work well together after the beginning of a new department or project.

In his own university courses, specialists are brought in so the students encounter practicing experts in their fields. After two semesters the students do a 5-month long research thesis. He mentioned the range of topics that drew on inter-disciplinary work, such the effectiveness of business models to rural Africa, and carbon pledges. Prof. Pearson felt it is a powerful thing to have students take a few years between undergraduate and graduate studies to get a broad view with a particular focus. Students can then choose to work in the area that interests them based on their own personal experiences, leading to more highly committed students. This benefits the student and certainly makes it easier for the school, too.

He mentioned that his university has had little difficulty in finding employment for its students. There is a strong international demand for students from engineering courses.

In addition to universities and industry, there is tremendous potential for local governments to be involved with climate change, and this can often require training and knowledge sharing. In this regard, it is especially important to have post-experience training to follow up on topics learned in a training programme.

In summary, research, education, and training partnerships should account for student empowerment in decision making, thinking outside the box with how to educate different groups and recognition of life-stages and timing in training.

Discussion

It was noted that it is important to help with implementation of projects by training implementers to do a better job. It is often assumed that the implementers have the capability to implement but with such broad and technical topics capabilities should be considered. Prof. Pearson noted that this is a good reminder to not only be thinking of people who have a high level of education.

Panel 4:

Prof. Fengting Li,
Professor and Vice Dean, UNEP-TONJI Institute of Environment for Sustainable Development, Tongji University

Prof. Li mainly spoke of experience and lessons learned in China in partnerships between institutions. He pointed out environmental issues that have underlying factors which lead to a particular event occurring. He gave the example of an algae bloom in a lake in China that affected the drinking water and the appearance of the lake itself to visitors. This may have appeared as an “environmental issue” but looking deeper we can see that enforcement was very weak and many failures occurred among those who could have prevented such an environmental issue from happening. To prevent this,

integration is needed between the public sector, universities, and industry.

The UNEP Institute was built as a platform for the whole university to offer courses for Master and PhD students with multiple perspectives on the environment, not just technical or scientific but ethics, economic, and other areas. This approach involves plenty of cooperation with other institutes and programmes such as a young environmental leaders programme for sustainable development and a short training programme for PhD candidates in cooperation with other countries. For the LCS network we need joint research projects so we can work together closely as they are doing at their school already. Most resource persons are from the Asia Pacific region so cooperation can be quite close and local.

The IESD is open for international cooperation including cooperation with universities, and for the LCS network as they have a good base already in cooperation and joint research.

Summary and Closing Remarks: Prof. Ryokichi Hirono

Prof. Hirono offered inspiring words based on his past experiences to wrap up the final discussion session. He mentioned meeting American actress Marilyn Monroe, while at the University of California-Berkeley in the 1950’s. At that time there was a student uprising against environmental degradation. Marilyn Monroe was invited to the school to speak and she spoke of four things that are important in life - 1. You need to have a vision – she had studied acting since she was 13 years old. 2. You have to study hard – you have to have a good head for knowledge and analysis. 3. You also need skills to transform knowledge into practice. We need technology to help with that. 4. You need to have a heart.

Prof. Nay Htun also gave his final comments for the session. He said there had been one and a half days of extremely rich sharing of information on LCS and the pathways towards LCS. He came in with a good idea of what a LCS could or should be, but now after hearing all these ideas he will have to go back and rethink the process.

Technology plays an extremely important role, but there is no one single technical process that is risk or impact free. There are always going to be pros and cons. What is important is how wide we look, and where that technology comes from. In that regard, society will have to make a choice. Each choice does generate less CO_2 and use less fossil fuels, to be sure. The challenge is the overall mix of technological and other social and political factors. Technological choice is at the centre of these decisions though. We also need to think about how to devise incentives to change human behaviour.

At this transition stage to a LCS, there is a need for more and more scientific evidence-based knowledge to formulate policies. Financial investment for moving towards a LCS is huge compared to the IT revolution, and the impact of a wrong choice in the financing is huge. We must generate better knowledge, information, data and evidence to help the decision makers.

Most important in all this is capacity building, education and training. Prof. Htun commented that he particularly appreciated the point made by Prof. Rakshit that from a transdiscipline aspect – 1 + 1 would equal more than 2. This would lead to paradigm changes we all are aiming for. At all the forums the transdiscipline and shared experience, built on past shared experiences to work towards a LCS. If we want to plan for 10 years we grow trees. If we want to plan for 100 years we educate and train. That is our approach here. The fierce urgency of now.

Dr. Shuzo Nishioka commented that ISAP was successful because we can see and tackle the reality, what is happening in the world. To meet with such approach, we have to change the education systems, which will require a reshuffling of the sectors and disciplines. So far humans are appropriately adapting to the changes around us by expanding our frontier. However, the problems now surrounding us have different characteristics to frontierism. We are working with the limited common global resources and the question is how we can create harmonise among us. This first meeting has been able to quite appropriately express this situation, by emphasising the “Pathway to a paradigm” .

Whether we are going to change the paradigm itself, or apply the old-style methodologies to new problems – this is a huge turning point for human beings. However, we are a long way off from finding the new paradigm. Scientists are suggesting we have to change so much but at the same time we are dealing with a great deal of social inertia.

Prof. Hironori Hamanaka expressed his sincere appreciation to the speakers and those in attendance for the very productive and fruitful discussions. This is a first step, but we have been able to share the basic ideas, and the basic direction. We are now ready to face the challenges ahead.