ABSTRACTS - Plenary Addresses

Tuesday, 8 November 2011
Plenary Session: Global Leaders
1100 - 1145 hours

WEATHER AND CLIMATE SERVICES FOR THE ENERGY INDUSTRY

Mr Neil Plummer

Bureau of Meteorology, Australia

The Australian Bureau of Meteorology provides a range of energy-related products and services directly to industry and the public, in partnership with other organisations, and as basic information supporting a competitive services market.

Climatological analyses have wide application, from renewable energy resource assessment to optimisation of aviation routes. Time series data from an extensive weather monitoring network are used to simulate the power output from a solar plant, the energy efficiency of a building, and the increased electricity consumption during a heat wave. Seasonal climate outooks tailored for the energy industry provide insight into the coming months, while high quality data sets facilitate detection of trends in longer term climate patterns.

Advanced forecasting services from the Bureau's Next Generation Forecast and Warning System provide valuable information to assist optimising fluctuations in energy generation, transmission and consumption; with some forecast fields out to 216 hours. Wave model forecasts assist sea transport, maintenance of oil platforms, and have potential in wave energy generation.

Underpinning these services is a strong collaborative research program between the Bureau and CSIRO, which has successfully developed a number of tools to support the energy industry, primarily centred on enhancing wind and solar forecasts. While collaborative partnerships with universities and industry continue to improve our capability in short term forecasting, a strong climate variability and change program seeks to develop tools and knowledge to assist industry and policy development on longer time scales.

Tuesday, 8 November 2011
Plenary Session: Global Leaders
1145 - 1230 hours

WEATHER AND CLIMATE INFORMATION DELIVERY WITHIN NATIONAL AND INTERNATIONAL FRAMEWORKS

Prof. John Zillman

Ex Bureau of Meteorology, Australia

Weather and climate impact on almost every sector of society – few more so than the energy sector – and society benefits greatly from effective use of meteorological information. Meteorological service provision has a long history and a unique international system of cooperation through which all countries and all user sectors have access to all the basic weather and climate information needed for their protection from natural hazards and support for their safety, prosperity and general well being. Meteorological services for the energy sector include the provision of long-term historical records, short-term weather forecasts for day-to-day operations and climate predictions, projections and scenarios for future energy system planning. They include both basic services provided as public goods and specialised services provided on a commercial basis. The global framework for cooperation in meteorological observations, research and data processing provided by the World Meteorological Organization (WMO) supports the full range of basic and specialised services provided by National Meteorological Services (NMSs) and user-specific services provided by the private sector. The nature of the services and the sophistication of their provision and use vary greatly from country

to country – depending not just on the national climate and the composition of the energy sector but also on the effectiveness of the links between the meteorological and energy communities. Considerable effort has been invested in recent years in enhancing the application of weather and climate information in the energy sector. The establishment of the World Climate Programme in 1979 and the convening of the Third World Climate Conference in 2009 sharpened the meteorological focus on energy issues. The 2007 Madrid Action Plan and the 2011 WMO Congress decisions on service delivery and the Global Framework for Climate Services provide a solid foundation for enhanced meteorological support for the energy sector over the coming decades.

Tuesday, 8 November 2011
Plenary Session 1: World Experts
1515 – 1600 hours

A PROBABILISTIC VIEW OF WEATHER, CLIMATE, AND THE ENERGY INDUSTRY

Prof John Dutton

Prescient Weather Ltd and The World Climate Service, USA
Richard P James, Jeremy D Ross, Prescient Weather Ltd

Modern decision strategies in the energy industry must be designed to take account of the uncertainties and probabilities of a wide variety of weather and climate phenomena. Thus the interactions between meteorology and the energy industry centre on the observed frequencies of unusual weather and climate events and on the skill of predicting them on scales ranging from days to seasons or longer and then foreseeing changes that may be expected in the decades to come. Different prediction methods can be used for different scales, ranging from very high-resolution numerical models for severe weather to statistical methods that use long-term variations in key oceanic and atmospheric indexes to foresee local climate variability. Both meteorology and the energy industry must understand and quantify the skill of predicting probabilities as interest moves from the medians to the tails of the probability distributions of both atmospheric and industry variables.

The critical challenge is to integrate meteorological methods for probabilistic prediction of weather and climate variations with the decision processes and models of the energy industry in ways that will ensure reliable service and adequate return on investment. Today we can envision an end-to-end decision system that transforms the probabilities of atmospheric events into the consequent probabilities of success for alternative actions in the energy industry and thus leads to robust recommendations for action and to optimum results for the industry.

Tuesday, 8 November 2011
Plenary Session 1: World Experts
1600 - 1645 hours

RENEWABLE ENERGY AND CLIMATE CHANGE MITIGATION - IPCC SPECIAL REPORT

Prof Ralph Sims

Massey University, New Zealand

The findings of this IPCC Special Report, released in July 2011, are presented. Currently meeting a relatively small portion of global total energy demand, (excluding traditional biomass), rapid growth in renewable energy is apparent with improved performance efficiencies being demonstrated in several heat, power and transport fuel technologies. Given appropriate supporting policies and removal of fossil fuel subsidies, there is the potential for renewables to reach a 70% share of total energy supply by 2050. Cost trends, opportunities and barriers to increased renewable energy deployment will be discussed.

Wednesday, 9 November 2011
Plenary Session 2: World Experts
0900 - 0945 hours

THE VULNERABILITY OF ENERGY GENERATION TO PRESENT WEATHER AND FUTURE CLIMATE: THE CASE OF RENEWABLES AND BIOFUELS PRODUCTION IN BRAZIL

Prof Roberto Schaeffer

Federal University of Rio de Janeiro, Brazil

Renewable energy will play a fundamental role in a future low carbon emission economy aimed at coping with the challenge of global climate change. However, because of its dependence on climate conditions, renewable energy is most susceptible to climate change. While the first part of this "paradox" has been thoroughly studied, just recently the international scientific community has started to investigate the impacts that global climate change may have on renewable energy itself.

For instance, hydropower generation depends on the hydrological cycle, wind speeds determine the wind power density and the amount of electricity that can be generated, and biofuels production rely on crops that are affected by weather conditions. The natural climate variability influences dramatically the production, planning and operation of these energy sources and power technologies. These energy sources and power generation systems are built based on historical records of climatic patterns, which greatly determine the amount and variability of energy production. In the operational side, biofuels and power demand fluctuations, both hourly and seasonal, may not match natural variations in weather conditions, river flows and wind speeds.

Global climate change can add a significant amount of uncertainty to the natural climate variability and, hence, to the production, planning and operation of renewable energy technologies. Focusing on both hydro and wind power generation and biofuels production in Brazil, the objective of this lecture is to present the state of art of the scientific literature on some of the climate impacts on energy and to point out some methodological challenges for future developments.

Wednesday, 9 November 2011
Plenary Session 2: World Experts
0945 - 1030 hours

INTEGRATION OF RENEWABLE ENERGY INTO THE EXISTING ENERGY INFRASTRUCTURE

Prof V.V.N. Kishore

Centre for Energy and Environment, TERI University, New Delhi, India

Energy security, climate change and access to clean energy for 2 billion people facing energy poverty are considered as energy concerns of the current millennium. In spite of several international climate negotiations, fossil fuel consumption and related carbon emissions are increasing rapidly, especially in developing countries. Due to Chernobyl and the recent Fukushima accidents, the nuclear energy option is increasingly considered as unsafe and renewable energy is emerging as a clear winner.

An end-use based approach and integration of renewable energy into the existing energy infrastructure in a big way is now considered both feasible and desirable. However, resources like solar radiation and wind speed have a large spatial and temporal variation. Hence accurate estimation of realistic potential, using techniques such as GIS, and accurate prediction of these resources for locations not covered by the existing network of meteorological stations becomes crucial. Bold programs being launched, such as the Solar Mission in India and incentives provided for renewable energy use, like the Renewable Energy Certificates (REC) and Generation Based Incentives (GBI) can be fully explored only if micro-level resource estimation is reliable. Thus the need for increasing the infrastructure for collection, analysis and forecast of resource parameters has become quite urgent.

Wednesday, 9 November 2011
Plenary Special Session: World Experts
1530 - 1615 hours

APPLICATION OF CLIMATE SCIENCE ADAPTATION TO THE ENERGY INDUSTRY

Mr Shianti Majithia

Energy and Climate Advisory (ex National Grid), United Kingdom

Energy companies are at the forefront of Climate Change adaptation in UK. Energy is essential to society, and energy needs will undoubtedly continue to grow. Energy production is, however, particularly vulnerable to the effects of Climate Change and it is in this sector where the effects will be felt first.

This presentation aims to provide guidance and practical tools in preparing the sector to adapt to climate change leading to formulation of adaptation planning strategy.

There has been some ground breaking work, based on scenarios, developed in partnership with the Meteorological Office in UK which helps in predicting the energy needs and climate constrain operation over the next 10 – 50 years. In order to develop the scenarios that were relevant and useable the importance of linking climate science data to business application was and remains critical.

Few practical examples and a case study of the development of a toolbox on flood warning system will be shared.

By presenting a detailed analysis of Energy blueprint for adaptation, Shanti will show the inherent complexity involved when dealing with so many different challenges all at once, for example, protecting assets; bringing new resources on energy on stream; and changing behaviour of the end users. A key challenge is to manage the degrees of uncertainty embodied in the climate science in order to assess the likelihood of possible outcome, thereby plan more effectively for extreme events.

Throughout the entire strategic planning process knowledge transfer is an essential ingredient which will result in an effective strategy that combines adaptation and mitigation planning.

Wednesday, 9 November 2011
Plenary Special Session: World Experts
1615 - 1700 hours

VULNERABILITY OF AND ADAPTATION IN ENERGY SYSTEMS TO CLIMATE CHANGE AND EXTREME WEATHER EVENTS

Dr Ferenc Toth

International Atomic Energy Agency (IAEA), Austria

The Fourth Assessment Report of the IPCC (2007) concluded that due the immense inertia of the Earth's biogeophysical system, a considerable degree of climate change will be unavoidable even if very ambitious efforts will be made to curb greenhouse gas emissions over the next few decades. There is a great deal of scientific uncertainly regarding the nature, magnitude and frequency of different extreme weather events as climate change unfolds but many studies indicate increasing frequency and intensity of such events in most world regions. Extreme weather events will possibly increase old and spawn new threats for energy installations and infrastructure. The presentation will address the related key scientific and policy relevant issues.

While there is a reasonably good understanding of the impacts of non-weather natural hazards on energy systems and some initial assessments of climate hazards have been made, there are still many open issues that need to be explored in order to consider the new knowledge in national energy planning. The scientific importance and timeliness of these issues is demonstrated by the fact that the IPCC will complete a Special Report on "Managing the Risks of Extreme Events to Advance Climate Change Adaptation" in 2011. The policy relevance is apparent from the fact that globally tens of trillions of dollars will need to be invested in energy systems over

the coming decades and many of the new installations and infrastructures will be subject to significantly changing weather patters over their multi-decade lifetime.

The proposed presentation will address the following topics:

- the impact of climate change and extreme weather events on energy installations and energy supply infrastructures;
- technological options and policy strategies to reduce exposure and vulnerability and to increase the resilience of energy systems to climate- and weather-related hazards;
- integration of promising options and strategies in national energy planning and international energy strategies.

The presentation will cover the impacts of gradual climate change and selected extreme weather events (including temperature, precipitation, wind; tropical cyclones, floods, droughts, coastal storm surges (also considering sea-level rise); forest and wild fires, landslides) on key components of the energy system:

- coal fuel cycle (front end: mining, transport, etc. to back end: CCS)
- oil and gas: extraction, transport, processing, delivery
- thermal power plants (coal, oil, gas)
- hydropower (dams, water, power plant)
- nuclear power (fuel cycle and power plants)
- solar energy (heat, PV, CSP)
- wind power (offshore, onshore)
- electric grid (transmission, distribution, transformation)

and methods for incorporating weather extremes in energy planning tools (energy supply models, risk assessment frameworks, etc.).

The presentation will draw on the results of an international workshop organized by the author at the International Centre for Theoretical Physics (ICTP) in April 2010 and on the ensuing papers commissioned for a special issue of Climatic Change. The joint IAEA-ICTP workshop involved experts from climate change/extreme events, energy systems, risk assessment and energy planning to review the state-of-the-art in the relevant fields and provided a platform for exploring linkages and for synthesizing knowledge across these domains. The presentation will report the outcome in terms of a better knowledge base to integrate emerging climate change related risks into energy systems planning, particularly in developing countries.

Developing countries require special attention because mainstreaming climate change impacts, vulnerability and adaptation in development planning is one of the four major components of the Bali Roadmap. For energy planning it means that there is a need to assess the risks from changing patterns of climate and extreme weather events for energy systems and account for them in national energy planning for expanding the energy infrastructure. These issues are of particular importance for developing countries where the fast expansion of energy systems will take place in regions projected to be exposed to increasing extreme weather events.

Thursday, 10 November 2011
Plenary Session 3: World Experts
0900 - 0945 hours

EMERGING METEOROLOGICAL REQUIREMENTS TO SUPPORT HIGH PENETRATIONS OF VARIABLE RENEWABLE ENERGY SOURCES

Dr David Renne

National Renewable Energy Laboratory (NREL), USA

With the emergence of favourable policies and effective financing schemes to allow for large penetrations of variable renewable energy resources to be tied into the electricity grid, there are increasing R&D efforts to understand and predict how this variability can best be managed in grid operations. Weather variability is key to the cause of solar energy technology variability. This paper focuses on R&D programs and key results on weather-driven energy resource variability, especially in the U.S. and with a particular emphasis on solar technologies. Special field measurement campaigns, data processing techniques, and modelling schemes have been devised to quantify and forecast the characteristics of this variability in the electricity grid. This talk will cover studies underway at the 25 MW DeSoto (Florida) PV power station as well as other field campaigns throughout the U.S., with special emphasis on characterizing system output variability associated with rapid cloud passages or changing weather patterns. This talk also highlights studies where the use of weather satellite imagery is allowing us to characterize short-term variability in the absence of ground observations. The talk also reviews key outcomes of a significant international collaboration established under the International Energy Agency's Solar Heating and Cooling Programme's Task 36 "Solar Resource Knowledge Management", and a new Task 46 currently underway titled "Solar Resource Assessment and Forecasting".

Thursday, 10 November 2011
Plenary Session 3: World Experts
0945 - 1030 hours

UNLOCKING THE POTENTIAL OF RENEWABLE ENERGY WITH STORAGE

Dr Peter Coppin

Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

The issue of how to cope with the inherent variability in renewable energy generation from weather driven sources such as wind, solar and wave is well known. Shifting energy from windy or sunny days is seen as an ideal role for storage. While there are storage technologies such as pumped-hydro and compressed air which are able to achieve this, the current power generation, transmission and market systems are, in fact able to cope with these longer term-trends while variable renewables remain at modest penetration levels. There are more pressing issues than energy shifting by hours or days. When highly convective or stormy weather conditions are widespread, the fluctuating wind speeds can produce substantial variations in wind energy generation with periods of 1 hr or less. Similarly, intermittent cloud can produce very sharp changes in PV solar power generation. These conditions can lead to very significant problems on the grid, reducing carrying capacity of lines and increasing the amount of spinning reserve and regulation services required to unachievable levels. The only alternative is to curtail the renewable generation which is already being done in several markets.

A number of electrical storage technologies are being developed to both remove these rapid fluctuations and provide support to grid systems with large amounts of solar and wind power. Most of these are now being demonstrated at the MW-scale. The example will be given of CSIRO-developed smart energy storage systems which utilise Ultrabattery technology. This battery combines the benefits of low cost lead acid (VRLA) energy storage together with an internal ultra-capacitor enabling faster charge/discharge and longer life. The storage system is designed only to remove the short-term variations and does not attempt to store total generation. This results in an effective system without the normally high capital cost. The smoothing system is controlled by predictive algorithms

which utilise solar and wind forecasting techniques which can significantly reduce the amount of storage needed. Results from a commercial, MW-scale trial of this system will be outlined.

Thursday, 10 November 2011
Plenary Session 4: World Experts
1315 – 1400 hours

THE ELECTRICAL GRID AND THE ENVIRONMENT

Mr Giovanni Pirovano

Ricera sul Sistema Energetico, Italy

The steady increased use of renewable energy sources, such as solar and wind-energy, characterized by strong daily and seasonal variations, is creating new challenges and new stresses for the electrical grid. In order to cope with this situation and to allow an optimal utilization of the assets for the present ageing grids as well as for the transition towards future grids, one of the main the key issues is the assessment, mainly by monitoring, of the status of the network. In this framework the atmospheric variability plays a fundamental role and the monitoring and forecasting of its parameters are more and more important for the reliability of the grid.

The presentation illustrates the activities that are carried out in Italy aiming in particular at an increasing the transmission capacity and the reliability of the electrical grid by measurements and modelling of the atmospheric parameters.

Thursday, 10 November 2011
Plenary Session 4: World Experts
1400 - 1445 hours

ENERGY FORECASTING FOR WIND AND SOLAR GENERATION IN AUSTRALIA'S NATIONAL ELECTRICITY MARKET (NEM)

Mr Tim George

Australian Energy Market Operator (AEMO), Australia

With the recent growth in renewable generation, the Australian energy markets are becoming increasingly influenced by weather. As result, forecasting capability, taking weather into account, is becoming more important for the energy industry and is an area of increased research.

This is also the case for the Australian Energy Market Operator (AEMO), operator of the electricity system and market operator for the gas and electricity markets in the Eastern and Southern states of Australia. AEMO is also the national transmission planner, a function that requires it to take a long-term view on developments within the industry.

This paper deals with:

- Operational aspects, which tend to be weather driven; and
- Planning aspects that are influenced by longer-term climate considerations.

In an operational context, the increasing development of wind energy has lead to the development of the Australian Wind Energy Forecasting System (AWEFS). This national forecasting system plays an important role in mitigating the effects of intermittency in the National Electricity Market (NEM). Weather also drives electrical and gas demands, given the dependency energy intensive air conditioning (electricity) and space heating needs (both gas and electricity). Operational demand forecasting tools are also being developed to improve intra-day and short-term forecasting.

In the planning context, the energy markets will need to adapt to a range of climate related issues and emerging weather dependent generation technologies, among others, in order to retain a secure and reliable energy supply.

On the technology side, AEMO must:

- Plan for managing the increasing level of wind generation incentivised by the Renewable Energy Target (RET).
- Monitor and plan for large-scale introduction of solar technologies including increased PV (distributed or large-scale) and solar-thermal generation.

In relation to climate change, AEMO should take into account the potential impacts on:

- Demand for electricity and gas due to changes in average and peak temperatures.
- Generation of electricity from wind and hydro based resources.
- Transmission capability due to changes in temperatures (line ratings).
- System risks due to extreme and widespread events such as bushfires, floods and storms.

The planning processes require, ultimately, a trade-off between reliability and cost. Increased penetration of weather dependant technologies and climate change impacts are affecting:

- Reliability through physical impacts on the power system and wind/solar generation.
- Costs through the need to revise design standards and, potentially, provide for increased diversity to manage large environmental events.

The paper will attempt to deal with the key aspects of power system operation and planning as affected by weather and climate.

Editorial note:

This abstract is using the following definitions:

Weather is the instantaneous state of the atmosphere, or the sequence of the states of the atmosphere as time passes. As we know, the behaviour of the atmosphere at a given place can be described with number of quantities characterizing the physical state of the air, such as its temperature, pressure, water content, motion, etc.

Climate has not a generally accepted, over all used definition. Usually, we define climate as an ensemble of all the states of the atmosphere at a place experienced in the course of years and over the years of some large but finite time interval. The expression of the length of the time interval could be 'sufficiently long' or a 'large but finite', for which we have a free choice to take a sample of the atmosphere's states. [http://www.atmosphere.mpg.de/enid/1__Weather___Fronts/-_Weather_and_Climate_15x.html]

Thursday, 10 November 2011
Plenary Session
1515 – 1600 hours

ZERO CARBON AUSTRALIA STATIONARY ENERGY PLAN

Mr Matthew Wright

Beyond Zero Emissions, Australia

Last year, Beyond Zero Emissions released a detailed report outlining how Australia could transition to 100% renewable energy in a decade, with commercially-available renewables. This also involved some aspects of solar and wind resource assessment. The report has received numerous awards, including the 2010 Banksia Environmental Award, and one of the lead authors, Matthew Wright, was the 2010 Young Environmentalist of the Year.

Te plan Endorsed by the International Energy Agency's Renewable Energy Division, demonstrates that it is technically possible to reach 100% renewable energy for Australia within a decade. The Zero Carbon Australia Stationary Energy Plan is a research collaboration between Beyond Zero Emissions and the University of Melbourne.

Wind will supply 40% of Australia's electricity in the ZCA plan. This is comparable to Denmark's 50% by 2025 goal, and Spain's 25% by 2020. In another comparison, China's wind energy industry has been growing by 100% per year for the last four years. Australia has one of the best solar resources in the world – solar thermal power in the ZCA plan will supply 60% of Australia's electricity. The plan sets out detailed resource and labour requirements. A transition to 100% renewable energy will create around four times more permanent jobs than currently exist in the domestic fossil fuel sector. This plan shows that it is technically possible to reach 100% renewable energy for Australia within a decade and the technology to achieve this transition is commercially available now. (Solar thermal with molten salt storage replaces baseload power currently sourced from fossil fuels.) The ZCA Plan will generate an investment of $370 billion over ten years – a stimulus to the Australian economy that is equivalent to a bit less than 3% of Australian GDP over ten years.

The investment required for the transition is affordable for households at $8 per household per week.

The synopsis of the report is available here: http://media.beyondzeroemissions.org/ZCA2020_Stationary_Energy_Synopsis_v1.pdf

Thursday, 10 November 2011
Plenary Session
1600 - 1645 hours

WEATHER MEANS BUSINESS

Mr Peter Cowling

GE Asia-Pacific, Australia

Weather forecasting has long been an important input into the operating strategy of electricity networks. But in a low carbon future-Australia, it will be all the more so. Picture for a moment an average day in the life of a NEM grid operator in 2025 (assuming that Australia is well on the way to achieving our 80% reduction on 2000 emissions by 2050). What generation should we expect today from the 15,000MW of wind power, 3000MW of large-scale PV, 5000MW of rooftop PV? In addition to traditional demand predictions, what will Australia's one million electric cars be doing….if it's a weekday and the weather is fine, most will be left in garages, if its the weekend, they'll be driven and need charging. And the inverse if it's wet.

Weather more than any other factor will drive the demand management opportunities at the disposal of the grid…by 2025 there could be as much deferrable load as there is peaking plant today.

The digital grid will enable this complex web of options and challenges to be managed to keep the lights on…traditional notions of base load will mean less and less. GE Energy has technical solutions to every part of this picture…and will be watching the weather forecasts with increasing interest.

Friday, 11 November 2011
Plenary Special Session: Developing Countries Focus
0900 - 0945 hours

CLIMATE CHANGE AND SUSTAINABLE BIOENERGY IN AFRICA: ISSUES AND POLICY OPTIONS FOR LIVELIHOODS, ENERGY AND CLIMATE SECURITY

Mr Mersie Ejigu

Partnership for African Environmental Sustainability, Uganda

Africa's energy profile underpins a complex and nonlinear development equation. Low level energy consumption, a rural sector that is dependent on traditional biomass energy, a modern sector that is entirely dependent on oil, high population growth, pervasive poverty, subsistence and rain fed agriculture, environmental degradation and vulnerability to climate risks reinforce each other.

Endowed with abundant and wide ranging energy resources, Africa can take pride in its potential: huge solar and wind resources; over 1.1 million GWh of exploitable hydro capacity; over 9,000 MW of geothermal potential; 59 billion barrels of petroleum; 8 billion cubic meters of natural gas reserves and, over 60 billion tons of coal (FAO 2008). Yet, Africa has the lowest production and consumption of energy in the world, with over 90 percent of the households dependent on traditional biomass (fire wood, cow dung, twigs). Given existing technology, the IEA forecasts that there will be 54 million more Africans (compared to 2004) dependent on traditional biomass. Hydropower once thought to be the most dependable and least cost (on long term basis) is no longer reliable because of recurrent drought and consequent decline of water volumes. Solar technologies, despite advances made are not yet fully in reach.

This paper argues that sustainable bio energy development has the potential to be a major contributor to Africa's energy solution, and thus merits special consideration. Derived from biomass and produced in the form of liquid, gas, or solid material, bio energy is used for agro-industry, transportation, cooking, and lighting. Bio energy helps reduce greenhouse gas emissions as it burns off less carbon with negligible emissions of sulphur dioxide and nitrate, which are urban pollutants. The carbon dioxide emitted during burning is absorbed by the new plants and recycled, rather than being released into the atmosphere like fossil fuels.

Climate change and variability impact the choice of feedstock, level of production, costs, where it is produced and how it is produced (rain fed or irrigated). Undoubtedly, while the availability of water will continue to be a major constraint in the production of bio energy, the range of bio energy feedstock is so wide that it is possible to increase energy supply while at the same time mitigating climate change and recurrence of drought. Further, Africa's tropical climate is suitable for fast growth of almost all types of crops and plants all year round while rapid advances in research in developed countries have brought new energy crops into production and second-generation lingo-cellulosic technologies to come into full production before the closure of this decade.

Recent media reports express concerns about the effects on food prices, land grabs and displacement of small farmers induced by bio fuels investments, monocultures of big producers, policies that tend to favour producers in developed countries and do not create in-country processing capacity, poorly negotiated investment deals in terms of economic, environmental unsustainability with the conversion of pristine forests and wetlands that actually make bio fuels more GHG emitting than fossil fuels, which all need to be taken into account. Indeed, the economic, social and climate benefits of bio energy depend on how it is produced, where it is processed and how benefits and risks (which are high) are managed. Africa has the potential to reduce risks and maximize benefits through developing a sustainable bio energy strategy, which the paper presents elements of.

Friday, 11 November 2011
Plenary Special Session: Developing Countries Focus
0945 - 1030 hours

CLIMATE RISK MANAGEMENT APPROACHES IN THE ELECTRICITY SECTOR: LESSONS FOR DEVELOPING COUNTRIES FROM EARLY-ADAPTERS

Dr Pierre Audinet

Energy Sector Management Assistance Program (ESMAP), World Bank, USA

Climate change adds a new source of unknowns for electricity sector decision-makers. Currently, use of present-day or historical weather and seasonal climate data and information is part of everyday risk management for many utilities and regulators across the world. However, the integration of forward-looking information on a changing climate in decision-making remains limited. This paper takes stock of initiatives by electricity regulators and utilities to assess and manage the risks of a changing climate, and extracting transferrable lessons for developing countries. Overall, the electricity sector is at the very early stages of its 'climate adaptation journey'. Electricity systems in developing countries are faced with a large number of challenges: sustaining economic growth, increasing access to electricity for the poor, enhancing security of supply, and improving environmental performance. Utilities, regulators and governments in developing countries will need to balance these pressing challenges against the cost of future climate risks, and take cost-effective and pragmatic. A number of useful lessons from 'early adapters' in the electricity sector are presented in the paper for developing countries. Some of the key lessons discussed are: develop high quality and tailored climate data and information; support development of operational information on impacts, risks and adaptation strategies; create a favorable environment promoting adaptation responses beyond 'business-as-usual'; help to build the economic case for adaptation; and encourage robust and integrated climate risk management approaches.

Friday, 11 November 2011
Plenary Session 5: World Experts
1330 - 1415 hours

WEATHER INSURANCE AND ITS APPLICATION IN THE ENERGY SECTOR

Mr Andre Martin

Swiss Re, Australia

Since the invention of weather derivatives some 15 years ago, firms have slowly but surely begun to recognise the value of managing a risk that was long thought to be un-manageable: weather. Nearly every business or industry is somehow affected by the weather, but few more so than players in the energy sector. Many of those energy companies, including several in Australia, use weather protection instruments to manage this risk, both on the supply side as well as the demand side. The presentation will review the basic principles of such weather instruments, compare them to traditional insurance products and show examples of their application in the energy sector.

Friday, 11 November 2011
Plenary Session 5: World Experts
1415 - 1500 hours

WIND ENERGY INTEGRATION AND FORECASTING: WHAT'S IT WORTH?

Mr Keith Parks

Xcel Energy Services, Inc., USA

Wind energy is both variable and uncertain which increases operating costs for the electricity utility. These "integration costs" are due to inefficiency of commit (turning on and off) and dispatch (turning up and down) of non-renewable energy resources tasked with balancing the renewable energy output. If follows that better wind energy forecasts provides greater certainty, saving utilities and, ultimately, energy customers, money. Some forecast issue times and forecasted horizons are more important than others – largely dictated by the prevailing energy market rules. This presentation will detail the experience of Xcel Energy, the largest provider of wind energy in the United States. Xcel Energy integrates over 4GW of wind across three market structures. The presentation will describe a wind forecasting solution developed by the National Center for Atmospheric Research and how it is utilized to lower wind integration costs. Thus far, the value to customers has been over $6M in 2010 with an additional $1.5M in 2011. While energy forecasting may be cost-effective, it is not sufficient to reliably integrate ever increasing amounts of renewable energy on the grid. Other strategies such as fossil-based flexibility, demand side management, wind curtailment, and energy storage will be briefly discussed.