

**Report on Talk on “Clean & Green Technologies – What is the Fuss All About?”**

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Summary of talk presented by Engr Kee Wai Fun, Senior Industry Analyst of Technical Insights Business Unit, Frost & Sullivan, which took place at IEM on 13 October 2010

During a recent talk organized by the IEM Women Engineers on 13 Oct 2010, speaker Engr Kee Wai Fun (Senior Industry Analyst at Frost & Sullivan's Technical Insights), provided an informative session for IEM members, discussing what the fuss is regarding the recent clean and green movement. Frost & Sullivan is a global growth consulting company covering various industries including energy and power systems as well as environmental and building technologies. One of the areas in which the Technical Insights division closely monitors is Clean and Green Tech.

According to Frost & Sullivan, Green and Clean Technology has been identified as an important mega trend. Mega trends are defined as global, sustained and macroeconomic forces of development that ultimately impacts business, economy, society, cultures and the way mankind will live in the future.

Engr Kee Wai Fun's presentation was full of information as well as highly structured to give the audience an insight to Green and Clean Technologies. She also highlighted the economics and potential outlook for green technologies, and the green trends that will define the economies, societies and cultures of the future.

As an excerpt from her presentation, Engr Kee Wai Fun shared the findings of the Fourth Assessment Report (AR4) of the United Nations' Intergovernmental Panel on Climate Change (IPCC), titled as Climate Change 2007:

Climate Change 2007 is the fourth in a series of reports intended to assess scientific, technical and socio-economic information concerning climate change, its potential effects, and options for adaption and mitigation. The report is the largest and most detailed summary of climate change situation ever undertaken, involving thousands of authors from dozens of countries, and states in its summary:

“Warming of the climate system is unequivocal.”

“Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations.”

Engr Kee Wai Fun also projected that the key mitigation technologies and practices that will be commercialized before 2030 are:

- **Energy Supply:** Carbon Capture and Storage (CCS) for gas, biomass and coal-fired electricity generating facilities; advanced nuclear power; advanced renewable energy including tidal and wave energy, concentrated solar and solar photovoltaics (PV).
- **Transport:** Second or third generation biofuels; higher efficiency aircraft; advanced electric and hybrid vehicles with more powerful and reliable batteries.
- **Buildings:** Integrated design of building technologies, such as intelligent meters that provide feedback and control; solar photovoltaic integrated in buildings
- **Industry:** Advanced energy efficiency; CCS for cement, ammonia, and iron manufacture; inert electrodes for aluminum manufacture

- **Agriculture:** Improvements of crop yields, driven by improvements in biotechnology and genetic engineering
- **Forestry:** Tree species improvement to increase biomass productivity and carbon biosequestration.
- **Waste:** Biocovers and biofilters to optimize CH₄ oxidation.

Part of her presentation also focused on the common industry perception of Clean and Green Technologies. Of these, Solar Photovoltaics, Carbon Capture and Storage and Green Buildings were highlighted as key areas of interest. She then proceeded to give the audience a sneak peek into recent developments and technology highlights of these areas.

Solar Photovoltaics – Energy Generation

Amongst all the potential renewable energy sources, solar power is deemed to have the greatest potential. The enormous power and potential of the sun's energy is approximately 1,800 times bigger than the current demand for primary energy. Thus in the future, a strong growth of solar power is expected, as it has the potential to meet more than 50% of global primary energy consumption.

Solar power can be divided into two main segments; concentrated solar power (CSP) and photovoltaics (PV). Currently, most solar power is generated using PV technology. Within North America alone, PV has an installed capacity of 1,626 MW. In Europe, the use of PV is widespread, with an overall installed capacity of 12,926 MW. In Asia Pacific, the use of solar is relatively high when compared to North America, with an installed capacity of 3,317 MW. Engr Kee Wai Fun explained that up to 81% of the PV solar market currently utilizes crystalline silicon as a material for solar cells. However, a shortage of polysilicon has limited the growth of crystalline silicon technologies within the last few years. This has provided a great opportunity for the PV thin film industry (known as 2nd generation PV technology) to grow and establish thin film as a major PV technology. She further noted that thin film technologies are expected to develop quickly within the next ten years.

Several major players that have been identified within the PV industry were companies such as First Solar Inc, Sun Tech Power, Ja Solar Holdings Col. Ltd, Q-cells SE, Sharp Electronics Corp and Sun Power Corp.

Carbon Capture and Storage (CCS) – Environmental Remediation

Engr Kee Wai Fun also discussed the technology developments as well as highlighted the key innovations within the field of carbon capture and storage (CCS). In CCS, carbon dioxide gas is harvested from the off-gases as a result of fossil fuel combustion. The cleaned and scrubbed flue gas will then be captured via various proposed methods. The captured carbon is then transported through a series of high pressure pipelines, trucks and ships to a suitable storage site. The high pressure carbon dioxide gas will finally be stored in various natural geological storage options, such as underground saline formations, oil and gas reservoirs, as well as deep exhausted coal seams.

There are currently several developments within the CCS technology field, including advances in pre- and post- combustion technologies, oxy-fuel technologies and tests for carbon dioxide storage. However, CCS faces the challenge of high costs, lack of proven long term storage and reduction in the efficiency of power plants resulting in low amounts of power produced.

Green Buildings

Apart from that, Engr Kee Wai Fun also highlighted green buildings as one of the key clean and green technologies. Some of the key drivers that will aid the growth of green buildings are increased focus to reduce energy consumption and operating costs, and the reduction of carbon emissions.

Engr Kee Wai Fun also noted that the challenges that might be faced when implementing green building technologies is a lack of incentives for buildings to go green, since market demand is not yet fully established and there is a need for increased research and development (R&D) efforts in Asian countries.

Current industry trends that she highlighted was the consolidation of the green buildings industry, standardization of design and associated processes, complexity and cost reduction in technology use, greenhouse gas (GHG) inventory and management, green building certifications, zero energy buildings, and new carbon regulations. Future trends that are predicted to increase the number of green buildings include the use of eco-friendly materials, favorable legislations, efficient automation of commercial buildings, use of only low-VOC paints and coatings, integrated renewable energy systems, and efficient insulation of enclosed spaces.

Conclusion

It is important to note that countries across the globe are investing substantial resources to develop and initiate Green Technology. China has taken a strongly “green” approach, with the introduction of a green credit and green insurance system, as well as plans for green taxation and green trade to help clean up the economy. Japan plans to designate as many as 10 environmental model-cities to help reduce greenhouse gases. The United Kingdom has also launched a Low Carbon Transition Plan to provide a framework strategy on how to tackle climate change.

The talk concluded with a short question and answer session, in which the audience had the opportunity to ask Engr Kee Wai Fun questions regarding clean and green technologies. The strong turnout has shown that Malaysians especially our Engineers are truly concerned and are interested to find out how they can help to preserve our Earth and sustain a better living by applying green technologies to their everyday lives. After a brief chat session, the talk adjourned with its participants much more knowledgeable about emerging trends within the green technology area.

