Could Hybrid Energy be the next energy source?

Could Hybrid Energy assist in greening fossil fuels? The unique potential or high availability of both solar and fossil resources in Southern Africa can be seen as complementary to one another and not competitive. On the 20th and 21st August at Glen Hove Conferencing in Johannesburg, the Fossil Fuel Foundation, North-West University, CSIR and SolarPACES will host the Hybrid Energy Conference with presenters from leading international institutes.

The "business-as-usual" energy operating model is facing growing environmental sustainability pressures for the fossil fuel community, not least because of the imminent South African carbon tax. On the other hand, renewable solutions are not yet seen as financially competitive with current fossil fuel production.

Hybrid solutions may be a bridging approach of benefit to both the renewable and fossil energy communities. Working together in hybrid systems, concentrated solar thermal energy may be used to reduce electrical and/or fuel usage in many industrial processes, and may even be used to convert carbon dioxide into useful commercial commodities.

The popularity of hybrid energy systems is growing and could become a niche-industry in itself – with custom systems being engineered for specific functions. SolarPACES and partners are investigating the integration of solar technology for virtually any process producing Solar fuels (hydrogen, syngas, or liquid fuels such as methanol, diesel, and jet fuel) and chemical or material commodities (metals, lime, and cement), as well as to provide solutions for thermochemical storage.

Dr. Anton Meier of the Paul Scherrer Institute in Switzerland explains. 'Using only 0.1% of the earth's land space with solar collectors that operate with a collection efficiency of merely 20%, one could gather more than enough energy to supply the current yearly energy needs of all inhabitants of the planet.'

Most areas in Southern Africa average more than 2 500 hours of sunshine per year, and solar-radiation levels ranging between 4.5 and 6.5kWh/m^2 in one day. The solar energy reserve is essentially unlimited, and its use is ecologically benign.

Although solar radiation is available only during daytime, and under clear-sky conditions, this challenge can be overcome by converting solar energy into chemical energy carriers — solar fuels. These can be stored long-term and transported long range to where energy is needed.

These solar fuels can be burned to generate heat, further processed into electrical or mechanical work or used directly to generate electricity in fuel cells and batteries to meet customers' energy demands. This means reduced greenhouse gas emissions from the combustion of fossil fuels for heat and electricity generation.

Would coal-fired power stations still have a role to play? Hybrid energy systems often consist of a combination of fossil fuels and renewable energy resources. The capital cost of a coal-fired power plant is heavily dominated by the cost of the boiler, power block and electrical infrastructure, which are all common to both conventional and solar inputs. However by selecting a good site one has low solar fuel costs for the lifetime of the project. In the case of coal, the cost of the fuel itself is by far the most important input.

Currently, two competing technologies vie for primacy in the solar electricity market: direct-steam generation receivers, and molten-salt receivers. Jose Barak, senior Vice President of California based BrightSource Energy is presenting "**Solar Technology Selection and Cost of Solar Fuel in Hybrid Power Plants'** in which comparison is

made between the cost of solar fuel inputs and coal in South Africa for both solar technology options.

It is proposed to install an interdisciplinary National Centre of Excellence which aims at, among other goals, reducing the country's carbon footprint using South Africa's abundant solar energy to recycle carbon dioxide to liquid fuel. Liquid fuels (e.g. methanol, petrol, and diesel) are easy to transport over large distances with existing infrastructure, and can be stored in large amounts to supply peak energy requirements.

However in order for this to take place a major collaborative effort between universities/academia and industry in fundamental research, up-scaling and transfer of knowledge, is needed to create a responsible solution for one of the most worrying environmental problems.

As Southern Africa has an inexhaustible, untapped, renewable energy supply of sunlight, could we, by the end of this century, be totally independent of fossil fuel? And provided we could store and transport energy in the form of a liquid fuel, could we perhaps become an exporter of renewable energy?

This conference examines the possibility!

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All wishing to attend this conference should contact the conference secretariat:

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