



Scientific frontiers in clean energy

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New clean energy technology is an imperative for the world, and also one of the biggest business opportunities of our time.

At the world scale, the fundamentals are obvious: direct sunlight provides over 99% of the energy available on the Earth, and more of it arrives every two weeks than the world's *total* fossil fuel reserves. Other sources such as wind, hydro, wave and tide are nevertheless locally significant, particularly in cooler climates. But how to tap these sources and provide enough energy in convenient, concentrated forms for our energy-hungry lifestyles? (Even if we go on an energy diet and cut our use of it through efficiencies).

Photosynthesis, the biological conversion of energy from sunlight to a chemical form, already exceeds all other renewable energy sources (as well as providing food for virtually all life on Earth). Scientific understanding of how photosynthesis works, and our ability to design both living and non-living light capture systems, are advancing rapidly. This gives rise to the prospect of very low-cost, widely distributed solar energy, and to being able to convert it into a variety of useful forms, including electricity, hydrogen, and hydrocarbon fuels.

Photosynthesis is not the only important biological system receiving intensive study. Clean-up of waste streams combined with energy recovery is beginning to be achievable through microbial fuel cells, although this technology is still in its commercial infancy.

Critical to our vision is the new discipline of synthetic biology. This includes an ability to manipulate bacterial genetics effectively and safely, as well as to understand the physics and chemistry of electron transfer in biological systems and design and engineer them appropriately. Through our partnerships with world expert academics, Ortus Energy is developing the knowledge and tools to develop technologies with a dramatic impact on energy supply.

As well as biological systems, the study of a variety of light capture mechanisms provides the basis for further improvements in photovoltaic cells – essential for their full deployment. Ortus Energy is investigating a number of new approaches to break out of the traditional trade-off between cost and efficiency, which could be of direct interest to the solar cell supply chain.

Ortus Energy works in partnership with leading universities and industry to develop and commercialise breakthrough science for clean energy. We bring expertise in realising the value of academic work, to the benefit of customers, inventors and investors. Ortus Energy invests its own funds, creates and aggregates intellectual property, and builds commercially attractive offerings. This helps to lower the risk for industrial partners and make early stage, transformational technologies viable.