

The Clean Energy Revolution

The COP29 talks have just ended, with an agreement - to kick the can down the road. After three decades of talks to reduce global carbon emissions, instead they have increased by two thirds, and are still increasing. This year is about to be declared the first that exceeds the target of 1.5C warming that was agreed in Paris, less than a decade ago.

So it is easy to get depressed. But there are some bright spots, in particular clean electricity generation has reached a tipping point, where it is becoming the cheapest energy source. In this seminar we will try to be optimistic, and look at how wind, solar, nuclear, battery storage and other technologies, could help the world avert disaster.

As well as the technical aspects, I want to examine the social and economic changes, and how the switch to clean energy can be encouraged. India is a poor country with a huge population, and without assistance it will go down the industrialization route of using whatever is cheapest in the short term, and that means lots of carbon emissions. China though has passed through that stage, and is now investing heavily in clean technologies – they are building roughly twice as many solar and wind plants as the rest of the world combined, and half their car sales are electric. But they control huge percentages of the world's materials and manufacturing capacity critical to the new technologies. How will this play out as the world needs their products?

And let us not forget that the cleanest way forward is not producing more clean energy, but using less energy. Insulation of buildings, more efficient machines, and using less of everything is not only clean but also very cost-effective. How can society, both here and around the world, be nudged in that direction?

There is no single change or technology that will save us, what we need is “all of the above”. That's what this seminar will study.

Some Suggested Topics

Technologies

Electricity generation, storage, and transmission:

- Rooftop solar, optionally with batteries
- Grid-scale solar
- Wind
- Carbon capture and storage
- Nuclear - no longer the environmentalist's enemy?
- Fission - for over 60 years it's been about 20 years away. Maybe now it really is!
- Grid-scale storage (battery equivalents)
- Electric grids, both local and long-distance

Transport:

- Cars, trucks – batteries, charging stations
- Airplanes – batteries, hydrogen, other fuels?

Manufacturing:

- Cement, blast furnaces (steel, aluminum, etc)
- Fertilizer for farming

Buildings:

- Insulation
- Heat pumps and other efficiencies

Other global warming reductions

- Methane
- The environment – forestry, carbon sinks
- Geo-engineering – swapping one risk for another?

Economics and Politics

- Carbon trading – domestically and internationally
- Carbon offsets
- Carbon taxes, green subsidies and incentives
- Electricity demand shifting – time (to reduce peaks) or location (to reduce transmission needs)

International

- How policies vary around the world, and how much progress is being made
- China – the big bad wolf, or the country which will defeat global warming?
- The developing world – how to stop countries doing what the rich world did