

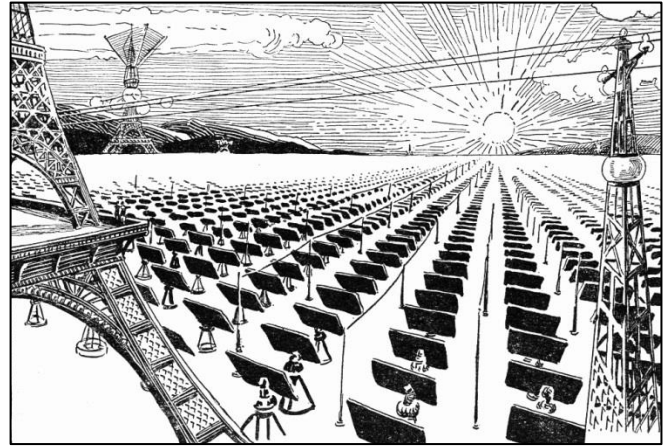


Immense Helio-dynamophores¹

Born in 1884 Hugo Gernsback was a child of the nineteenth century - he was also a visionary. In 1911 he wrote a twelve-part serial for his magazine, "Modern Electrics", entitled "Ralph 124C 41+" in which he presented with a "lively mix of plausible speculation and sheer fantasy" the technological wonders of an America in the year 2660.² Today he is credited with a vast range of successful predictions including: fluorescent lights, television, radar, space travel - and the generation of power from solar energy.²

"They alighted onto an immense plain on which...were the... Helio-dynamophores, or Sun-power generators. The entire expanse, twenty kilometres square, was covered with glass. Underneath...were photo-electric elements which transformed the solar heat direct into electric energy."¹

"It is easily understood what an enormous power the entire plant could generate. In fact it supplied all the power, light and heat for ...New York."¹



This vision of a world powered by sunshine was written over one hundred years ago - but over the intervening decades it has been ignored and forgotten. The industrialised nations remained wedded to their vested interests and the burning of fossil fuels - energy sources that emit CO₂ into the atmosphere.³ It is the sun's energy trapped by such greenhouse gases that results in Climate Change - but it is perhaps this same energy that could be the solution to the problem?

The Sun is composed predominantly of hydrogen, helium and approximately 1% heavier elements.⁴ Energy is generated by the fusion of hydrogen atoms into helium in the central core.³ This migrates to the outermost layer, the corona, which has a temperature of around 2,000,000 K. Almost all the energy emitted by the sun is radiated into space.⁴ Only a tiny proportion of this radiation reaches the earth - estimated to be 1×10^{18} kWh per annum³ - but this is still "equivalent to around 10,000 times the world's energy requirements."³

Therefore we would need to harness only 0.01% of this energy to provide all mankind's current total energy needs.³

It has been calculated that if PV modules of only 10% average efficiency were installed on 1% of the earth's surface - that is some 500,000km² or 1.3% of the earth's total desert area - would produce enough electricity to supply all the worlds current energy requirements.⁵

"PV has the... potential to become one of the world's leading energy sources."⁵

Solar radiation can be converted directly into electricity using photovoltaic (PV) cells and therefore have the potential to provide an energy source that is both sustainable and inexhaustible.⁵ PV cells make no carbon emissions and therefore do not contribute to Climate Change.⁶ It's now common place to see PV modules mounted on the roofs of buildings but large-scale systems, with hundreds of thousands or even millions of solar panels, have also been playing an increasing role the growth of solar generation over recent years.⁶



Following the 2015 Paris Agreement there has been increasing numbers of solar farms being built as governments strive to contribute to reducing global carbon emissions.⁷ Some of the biggest in the world today include: the Kamuthi solar farm in Tamil Nadu, India, which comprises 2.5 million individual solar modules covering an area of 10 Km² and providing a capacity of 648 megawatts (MW).⁷

Similarly in Qinghai province, China, the impressive Longyangxia Dam Solar Park solar project consists of 4 million solar panels spread over more than 25 km² giving a capacity of 850MW.⁷



Obviously there are constraints - large-scale solar projects require large amount of land and can have impacts on existing plant and animal habitats.⁶ One approach is to locate projects in the desert or on already degraded land. For example some 47 acres of the former New York City Freshkills Landfill on Staten Island - once the largest landfill in the world - has been turned into a 10 MW solar farm.⁸

Today we are moving towards Hugo Gernsback's vision of a solar powered world.

It has been asserted that 100% of the worlds energy needs could be met by renewable generation by 2030.⁹ To achieve this ambitious target we need an international agreement to implement a sustained programme of research and design, financing, production and installation of a PV system of global-scale.

This is no longer "*sheer fantasy*" - some responsible and farsighted nations are even now building a future powered by...

"immense helio-dynamophores."¹

Dean



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