

The Sun shines brightly on the Solar industry.....

It is within reach...

If you covered an area of 335 square kilometres in the Great Saharan Desert (covering only 1.2% of its landmass) with solar panels, you could produce 100% of the world's electricity needs¹. Practically possible? Currently not, but it does show that with a little planning, ingenuity, and financing (costs significantly less than the bailouts of banks in 2008), you can produce the world's energy needs in a distributed and easily accessible manner, very simply, with solar energy. However, we do not suggest that the world should run on solar energy alone. There are horses for courses, and for examples in the most northern and southern hemispheres, where the sun is weaker, wind and other renewable energies will be more suitable. Solar however, is becoming, and has the potential, to be a very important part of the renewable energy mix in the post carbon era.

Financially, a no brainer!

Fourteen years ago, solar energy produced 0.1%² of world electricity and cost per MWh was \$359³ compared to coal at \$111. Today, this picture has changed and solar is **price competitive** at \$60, with wind at \$50, gas at \$70, and coal at \$117. This is all cheaper than nuclear at \$180, and that's without any subsidies! This is a fact that many are not aware of, but it is starting to sink in among smart business leaders who are now piling into solar to make good returns on investments on pure commercial terms. It is interesting that the three main renewable

energy sources; solar, wind and hydro are all cheaper than oil, gas, coal and nuclear. Today, a typical residential solar PV installation has a payback time of less than 5 years!

Creativity galore...

As solar has reached this cost competitiveness, it has also evolved from only having large solar panels in solar farms and on rooftops, to now come in many shapes and forms. There are large dual side panels for solar farms, panels for roof tops (both commercial as well as residential buildings), solar roof tiles that blends into existing or new residential roofs, thin film solar materials that can "wrap" a building, solar cells on horizontal surfaces of electric cars, agriculture solar to shield crops from too much sun to save water and give a better crop yield, embedded in wearables, floating on water, etc. Looking behind the scene, significant R&D is currently taking place with new products and technologies coming to market in the approaching years that will further make solar more suitable, in many more use-cases, cheaper, more efficient and flexible (literally). This will further allow ingenuity and optionality in use of solar, further driving growth of the industry.

The sun does not always shine...

That is true, but this old argument from global warming Nay Sayers and carbon investors, has limited relevance nowadays. Solar, and other renewable energies like wind, hydro and biomass, along with

¹ Forbes, 2016

² Our World in Data, 2022

³ Lazard, 2023

increasingly efficient storage technologies, can create a balanced grid as good as you can with traditional sources like coal, gas, oil and nuclear (specifically nuclear cannot easily be turned up or down). As an example, solar and wind power in Germany is being supplemented by hydro power from Norway (via underwater cables) to balance supply and demand (by day and hour). Huge progress has been made in batteries, on a utility scale to household level, that can store solar energy when supply outstrips demand and reverse electricity back into the grid when demand outstrips supply. Even Ford is now offering up electric trucks that store electricity for a household and balance into your home when you need it there and that can extend to your electricity supplier who can use all households' batteries to balance the entire grid. In addition to charging batteries, surplus energy can also be used to pump water into water reservoirs (for later release), produce hydrogen that can be transported around the globe, gravity contraptions, fly wheel systems, etc.

Energy security – we have been here before...

During the 2000's, the solar industry was driven by Europe and the USA. From about 2010, China has become the dominant producer of solar cells/modules and now have a +90% global market share. Never underestimate the short-term memory of politicians. In 1973, Europe and the US had petrol rationings when OPEC turned off the oil taps and rattled the West. Since then, the US has become self-sufficient in oil, but Europe have since become all too glaringly dependent on gas from Russia.

At this moment (Q3 2023), we have in the last year endured huge spikes in oil and gas prices as Russia again played games with Europe via the war in Ukraine. How come that we again have become energy

dependent on others who can use it as a political tool? This should not happen with solar. There are already signs that countries outside China are building up their solar industry so as to not be so dependent on China. India, Europe and the US (and others), are building new solar cell and module plants and more are planned in the years to come. Europe and the US are also stepping up funding into R&D in solar and other renewable sources. There should not be any reason why Europe and the US do not have their own **end-to-end value chain** in solar and be in control of a key energy source in the years to come. **It makes economic and business sense, not to mention political sense.**

The US has its IRA act and the EU, and individual countries in it, have many programs promoting the solar industry, and there is more to come. The US took the lead with its IRA Act, which has distorted the market with its heavy subsidies, but in the long term, this is the right thing to do. Europe has still to fully reply to this "distortion," but work is ongoing so watch this space.

This feels like a "man on the moon" target for the US and Europe, and is what is right to do at this moment – finally we have politicians that are moving. In the meantime, we have individual countries in Europe putting in place incentive schemes targeting solar and other renewable energy schemes to speed up transition to a carbon free world and cut reliance on energy from unreliable sources.

Long, long time ago...

Solar energy has come a long way since Edmond Becquerel discovered the photovoltaic effect in 1839 and later was further developed by Charles Fritz when he in 1883 created the first working selenium solar cell. However, it took until 1954 when

the first photovoltaic cell was invented and appeared in space on satellites in 1958.

Solar energy was initially not energy efficient or cost effective so only used in unique use cases (i.e., space). However, over the last 30 years the efficiencies by solar cells to convert solar light to electricity, have steadily increased in its effectiveness in harvesting energy from solar to where we are today with a cost competitive energy source.

Research and development have not stopped, but we believe is accelerating and we should expect significant new developments in the years to come. One promising development is the use of perovskite in production of solar cells. Perovskite will be layered on top of silicon and increase efficiency further for the solar cells.

What's next...

Solar and other renewable industries are still quite new and many developments are taking place. As the industry grows, there are inevitably bumps along the road. Solar is no exception and currently the industry is suffering from being somewhat cyclical (shortage of polysilicon in 2022 to drastic drop in price in recent weeks), shift of production of cells and modules to Europe/US, etc.

R&D is rapidly intensifying from research into new materials, production techniques, inverters, storage, grids, batteries, new software solutions for planning, building and operating solar assets, etc. In the years to come, we should expect better solar cells, in many shapes and forms that are more efficient and flexible to cover many more use cases and get the most energy yield out of any installation.

So where to invest or buy...

The PV industry, and its entire value chain, is changing rapidly in Europe and North America. As we have now realised that we need to get this entire value chain back, from polysilicon to ingots, wafers, cells, glass, modules and associated software and services, new companies are coming up and opportunities to invest and also buy into this industry are rapidly accelerating.

Stay tuned for our next paper in September outlining the current value chain in Europe, who the movers and shakers are, the issues being faced by the industry, and a possible view on what we should expect in a few years' time.

Solar energy is not just here to stay, but to grow exponentially over the coming years!

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About Renevo Capital Limited:

Renevo Capital Limited is a global investment bank headquartered in London, with offices in Lisbon, San Francisco, Shanghai, and Beijing, specialized in providing M&A and private capital advisory services to companies in advanced technology industries. For additional information please visit: www.renevocap.com.