Understanding the Changing Renewable Energy (RE) Market: the new designs, new products and how they affect the energy landscape

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Renewable energy forms –
Large scale Wind farms, Distributed Generation Solar Farms
Biomass co-generation – are quickly becoming the resources of choice for developers, users –both large and small scale, investors and Utilities…

The broad adoption of RE is also accelerating because of the development of the full *life-cycle cost analysis* required by the results of climate change science…

The American Chemical Society (ACS) highlights full life-cycle cost analysis in their Position Statement on Climate Change*

"A carbon pricing strategy is a critical foundation of the policy portfolio for limiting future climate change. It creates incentives for cost-effective reduction of GHGs and provides the basis for innovation and a sustainable market for renewable resources" (National Research Council-NRC, 2010b). This carbon-pricing strategy should take into consideration the *full life-cycle costs* and sustainability implications of the carbon effects from various energy options.

*http://www.acs.org/content/acs/en/policy/publicpolicies/promote/globalclimatechange.html

This “full life-cycle cost analysis” will be used in all of the major energy market developments including those in:

- Energy Storage
- Transportation
- Solar Generation
- Wind Generation

These energy market developments are heralding what is being called a Third Industrial Revolution…

Significant opportunities are manifold…

With the development of **new forms of storage** and the expected widespread use of electric vehicles the distributed energy model is changing the market *and* investors approach to it…

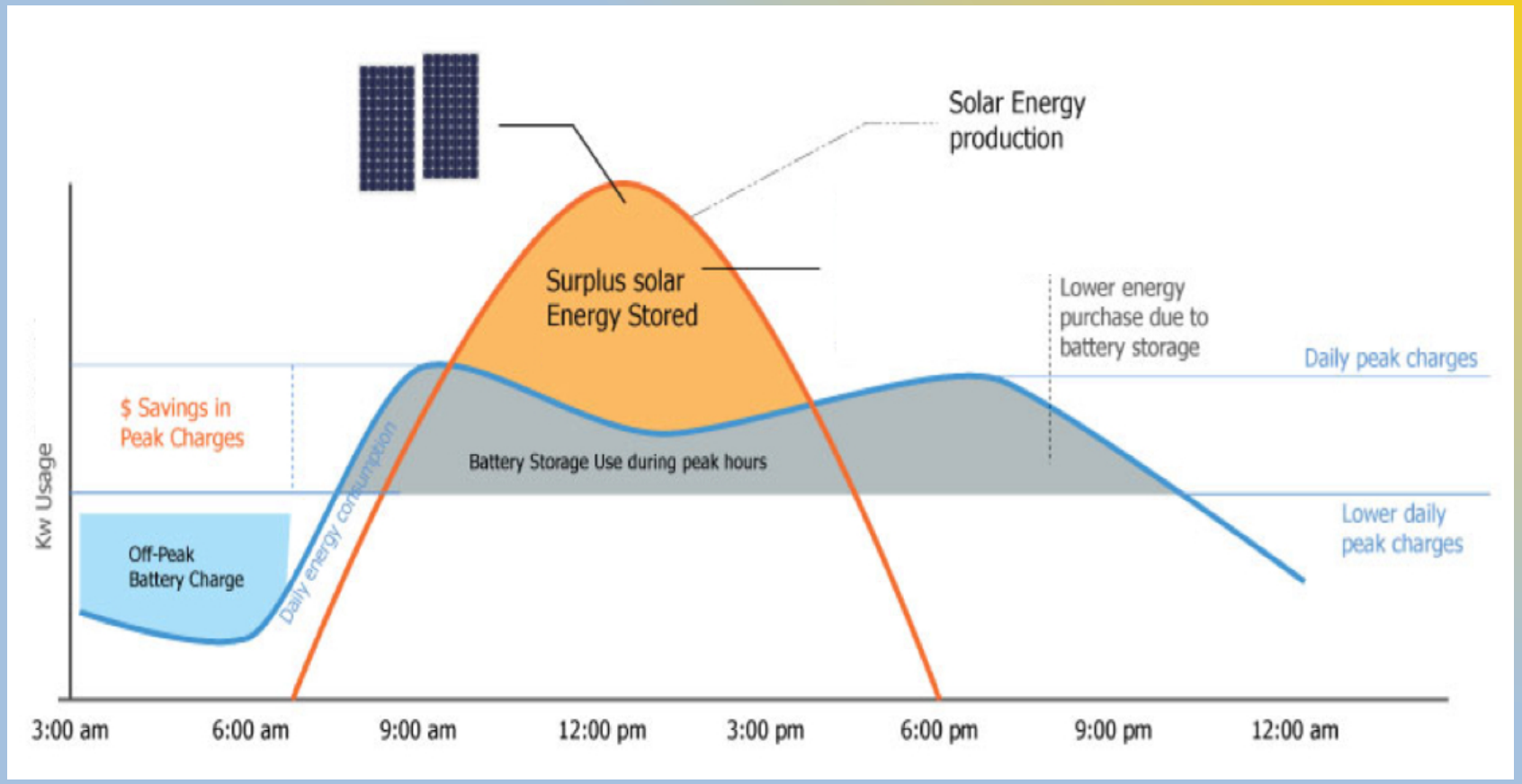
Storage:

After Tesla made the headlines many players are ramping up their offerings in this rapidly developing field…

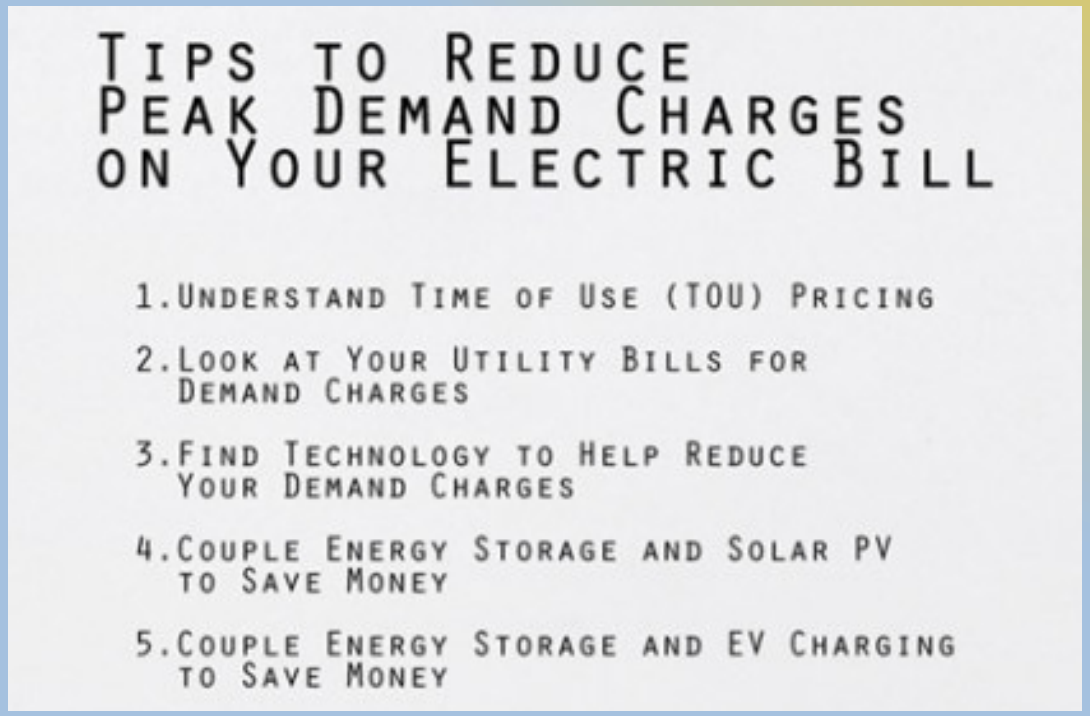
For commercial customers, Sonnenbatterie's system will help reduce demand spikes that lead to costly peak load charges and takes advantage of varying tariff rates.

The GreenStation reduces the demand charges on your facility's energy bill through a process known as "peak demand shaving". By tracking and learning from your commercial, industrial, or municipal facility's energy usage, the GreenStation automatically charges or discharges its batteries to maximize your savings.

Tesla highlighted the residential use of storage – but – in near term applications the big winners will be commercial users that shave peak loads and thereby limit their peak demand charges….



Peak Demand Charges – and the potential for them to be introduced to the residential energy market – will be the major influence in the deployment of RE and Energy Storage Systems…



Transportation:

Rapid development of electric and hydrogen vehicles is straining the ability for infrastructure to meet the new demands for charging and fueling stations.

Several visionary companies are beginning the scaling process and both transmission companies and utilities stand to reap great benefits of the shift toward RE based logistic systems…

Distributed Solar Generation – is quickly becoming cost-effective in many world markets… grid parity has been reached in more that 15 states in the US and cost continue to

Richmond CA.

Major corporations and large utilities are finding their sweet- spots for employing distributed solar generation to reduce grid-upgrade and other infrastructure costs…

Large-scale Wind Generation continues to be one of the lowest cost Utility-scale generation sources deployed nation wide.

Bison

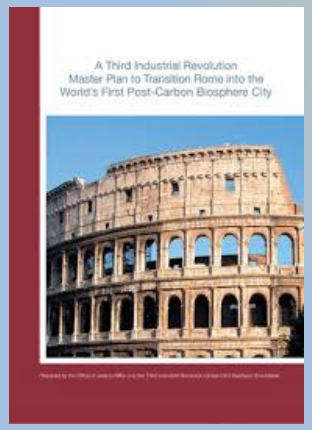
Utilities that have led the way – including Minnesota power – continue to reap the profits of this form of RE deployment.

Taconite Ridge

Individuals, businesses, communities, municipalities, states, and the nation are all positioning themselves to profit from the new distributed energy model… This model will be a significant part of the

3rd Industrial Revolution

SIEMENS



Nord-Pas de Calais

Schneider Electric

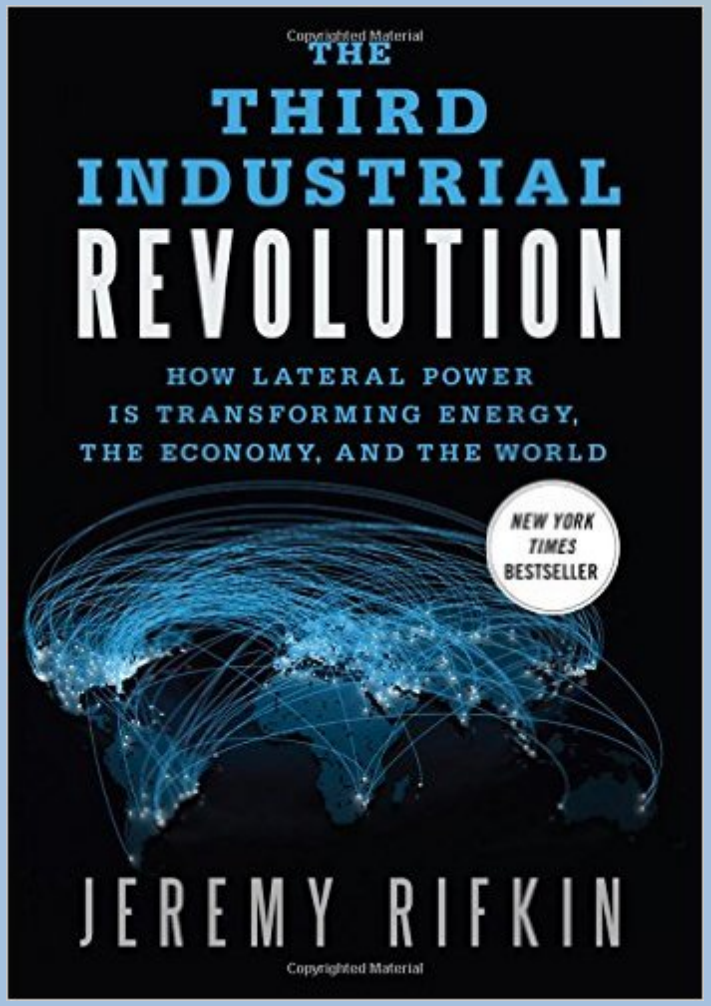
EU

IBM Cloud

CISCO

Jeremy Rifkin is the principle architect of the European Union's Third Industrial Revolution long-term economic sustainability plan to address the triple challenge of the global economic crisis, energy security, and climate change. The Third Industrial Revolution was formally endorsed by the European Parliament in 2007 and is now being implemented by various agencies within the European Commission as well as in the 27 member-states.

The 5 pillars of the 3rd industrial revolution…

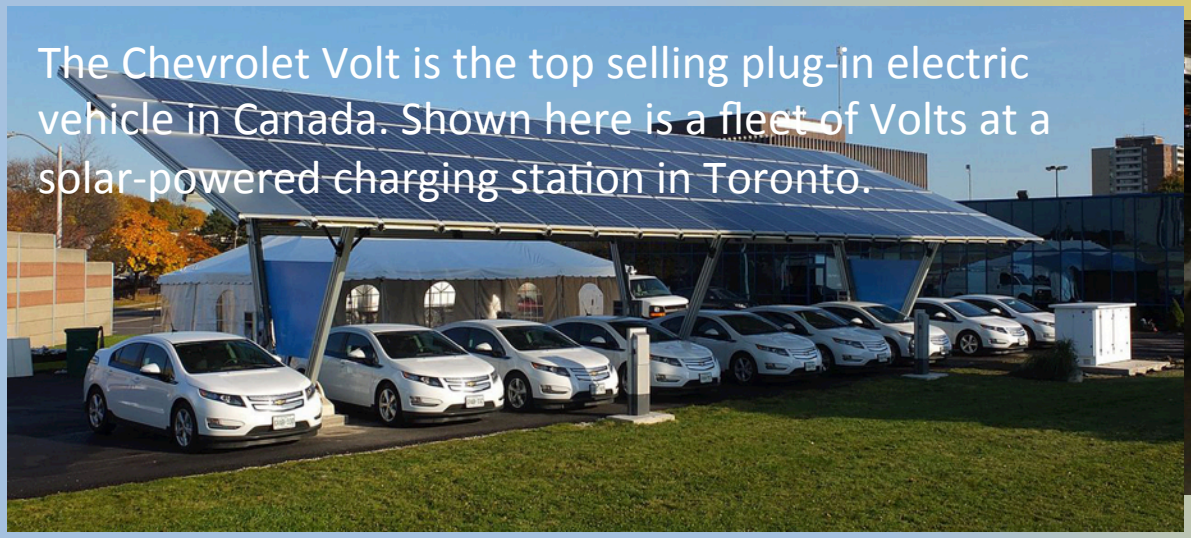


1) **Shifting to renewable energy.** Transition from fossil to renewable energies…
2) **Transforming the building stock of every continent into green micro-power plants to collect renewable energies on site.** Transformation of all buildings into mini generating plants…
3) **Deploying hydrogen and other storage technologies in every building and throughout the infrastructure to store intermittent energies.** Development and build-up of energy storage technologies and capacities…
4) **Using Internet technologies to transform the power grid of every continent into an energy-sharing intergrid that acts just like the Internet (millions of buildings generating a small amount of renewable energy locally, on-site, selling surplus green electricity back to the grid and sharing it with their continental neighbors).** Capitalizing the internet technology for the development of a smart and bi-directional (peer-to-peer) energy-sharing-grid…
5) **Transitioning transportation to electric plug-in and fuel cell vehicles that can buy and sell green electricity on a smart, continental, interactive power grid.** Transformation of the transportation system to electric plug-in and fuel cell vehicles…

The integration of the major components is underway world wide..

For Pillar 5 to work, a comprehensive network of charging points for electric vehicles is required. This will be possible as millions of buildings are converted to mini power plants (See Pillar 2 above). And the vehicles themselves are small mobile power points on wheels: *Since the typical car is parked 96 percent of the time, it can be plugged back into the interactive electricity network to provide premium power back to the grid. An all-electric and hydrogen fuel cell fleet powered by green energy has four times the electricity storage capacity of the existing national power grid in the United States. If just 25 percent of the vehicles were to sell energy back to the grid….it would replace every conventional centralized power plant in the country. (Source: The Third Industrial Revolution).*

Positioning yourself for the benefits of the 3rd industrial revolution…



Los Angeles - Mayor Eric Garcetti and city departments to lease green energy vehicles. Garcetti, speaking at a news conference Friday outside Los Angeles Police Department headquarters, announced a commitment to lease 160 pure battery EV vehicles, which he said will give L.A. the largest pure EV fleet in the nation. LA Times - 9/11/15

Real World benefits:

Consumer goods companies who reposition themselves will reap hard business benefits of: higher sales, lower supply chain costs, and better margins.

In product portfolios, expect to see the development of innovative products that better serve the world, like low-energy cars, wind turbines, organic food, and products with a low energy and raw material footprint.

Millions of people are already transferring bits and pieces of their economic life to the global Collaborative Commons. Prosumers are not just producing and sharing their own information, entertainment, green energy and 3-D-printed goods at near zero marginal cost. They are also sharing cars, homes and even clothes with one another via social media sites and cooperatives. About 40 percent of the U.S. population is actively engaged in the sharing economy. Millions of Americans are now using carsharing services like Uber, Lyft and RelayRides.

Unilever CEO Paul Polman said recently that it is essential for sustainability to be part of the company strategy and that this will be rewarded in the future by higher sales growth and higher profits.

By establishing sustainable sourcing policies, and through development of a local supplier base, their margin growth will also be above average.

Potential losses by not moving to the 3rd IR…

Staying entrenched in the Second Industrial Revolution may leave companies with fewer economic opportunities, slowing sales, diminishing productivity, employment challenges and an ever-more pollution challenges—could set businesses on a long-term course of economic contraction and decline.

Even if business upgrade their Second Industrial Revolution infrastructure, they are unlikely to not have any measurable effect on efficiency, productivity or growth. Fossil fuel energies have matured and are becoming more expensive to bring to market. Furthermore, the technologies designed and engineered to run on these energies, like the internal-combustion engine and the centralized electricity grid, have exhausted their potential productivity gains.

Keeping up with the Changes and Trends:

Consult the online listing of our Bibliography

and Hyperlinks list…

Available on line after the completion of the Energy Design Conference…

Thank you for your interest in Renewable Energy and the trends coming in our Collective Future…

Christopher LaForge

GREAT NORTHERN SOLAR