Climate Change – existential challenge and opportunity. How the power industry can lead.

The time has come for straight talk. We are not going to meet the Paris Accords target of keeping the global average temperature below 2 deg C. Even though US emissions remain 11% below their 2011 peak\(^1\), the rest of the world is tending upward, and that is pushing us towards worst case models. Given this reality, what should our resiliency plans be (even as we do everything possible to reduce carbon)? The power industry has a deeply vested interest for obvious and perhaps not so obvious reasons. What should the power industry do now and how might they play a leadership role on the front lines of our unfolding planetary climate crisis? Before proceeding, let’s take a quick look at planet earth and what worst cast, or even moderate case climate scenarios might entail.

Today, areas of the planet are nearing temperatures and humidity levels that exceed human survivability for parts of the year. 1.5 billion people are at risk\(^2\). This includes South Asia, but also the African Sahel, central Africa, and really parts of every continent. One million species face extinction. No one has fully appreciated what this means for humans. The coral reefs, cradles of life in our oceans, will be extinguished. Human infrastructure and political systems are already being stressed by sea level rise, more powerful storms, and significantly increased precipitation (think Houston). This will only get worse, much worse. A number of crises today can be attributed in part to the impact of global warming – the war in Syria, the refugee crisis in Europe, the flight of people from the northern triangle of Central America.\(^3\) There are many unknowns. Atmospheric CO2 is now at levels not seen for millions of years; no one knows what will happen. But we have indications. Sudden climate shifts are recorded in the geologic record. (As climate scientists learned about how our climate has changed in the past, the more alarmed they became.\(^4\))

We are in the midst of a human induced climate shift with a still limited understanding of many of the mechanisms involved while hurtling forward essentially unchecked. All signs indicated we will continue down this path for some time. Early on, scientists assumed for understandable reasons that climate change happened slowly on the human time scale. (And they were concerned that they would be called alarmists as have many. Greta Thunburg’s address to the French parliament was recently boycotted by conservative MPs, one calling her the “guru of the Apocalypse”.\(^5\)) But gradual change is not necessarily the rule in all cases. The data showed that rapid change, even on the order of a

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4. [https://history.aip.org/climate/rapid.htm](https://history.aip.org/climate/rapid.htm)
decade or less, has happened in the past. Given this reality, we return to the original question – What should our climate resiliency policy be and specifically, what actions must the power industry take? Anything approaching a worst cast climate outcome will result in untold death and suffering and a diversion of much of our time and energy towards basic survival and security concerns. We can improve our odds while we strengthen our built and environmental infrastructure to withstand climate change with set of robust resiliency actions. But it will require nothing short of a revolution in the way we live on this planet to achieve.

One definition of resiliency is the capacity to bounce back after trauma. Another, interestingly, is for an object to return to its original shape after being deformed. For climate change, we are primarily dealing with the former, but also, hopefully in some distant future, to have our earth return to something closer to what we were given.

The power industry is in a unique position vis-a-vis climate change. The industry could lead a revolution in the way we think about energy, what it is, and how it is used. Today much of the industry remains stuck in traditional thinking and saddled with significant debt from stranded assets. To succeed, such a revolution would require a complete rethinking by the power industry about what it is, who it serves, and centrally - it’s business model. It would also require taking some big risks, something for which the power industry is not known. Currently, the power industry does one thing – it produces power and delivers it to customers. While there are important programs to improve end use efficiency and expand into renewable energy, they are not central to the industry’s mission or business model. This needs to shift as dramatically as our climate is shifting. Understandably, the power industry is digging in its heels resisting those things which can most help reduce carbon emissions like distributed renewable energy production. The use of natural gas, in addition to the very negative collateral environmental damage, is an unfortunate detour from the path to a carbon free energy system. Nuclear will remain too limited and expensive to meet global power demands.

What the power industry should being now, is to transform itself into an entirely different business. It should shift from operating traditional power generation facilities to helping coordinate 100% renewable power production, storage, transmission (wheeling), and end use services. This means abandoning hope to recover investments sunk in stranded assets. Clearly, the industry writ large will need assistance to accomplish this, mostly likely through increased utility rates and tax breaks and perhaps even direct payments from the government.

The power industry should also become a key player in carbon sequestration – not by trying to clean up coal or pumping carbon back into the ground, but by embracing restoration of environmental infrastructure to prevent additional carbon release and recapture the excess already in our atmosphere. This is a multi-faceted approach that would have no place for old style power plants and transmission lines. Instead, it would be distributed renewable production from solar roof top arrays to modular utility scale photovoltaics to wind generation. It would have

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significant interests in building operations and efficiency, home construction and efficiency standards, the built environment encompassing regional planning, land use planning, agricultural practices, reforestation, and electric transportation. In short, it would be everything about energy use and carbon but old style power production.

Cost is a major issue raised when proposing to shift to 100 percent renewable power. Reliability of the resource is another, and then there is storage. How much would it cost to shift from where we are now to a society that runs on renewable energy? Full decarbonization of our energy system would cost an estimated $4.5 trillion USD according to a recent Wood Mackenzie analysis. How would this be paid for and who would pay it? It would be paid through utility bills and taxes and we would all pay for it. Technical challenges remain with storage and system reliability, but these are expected to be resolved as we move forward with deployment of large scale renewable power production with its associated smart grid and storage systems.

However power production, distribution, and storage is only one aspect of a systemic challenge. End use is another. One of the key truths of renewables is that when using an intermittent, distributed resource it is essential to have the most efficient use possible of that resource. Investment in demand side management has been important and helped significantly. But some programs may have tapped out easily available savings. We need to step up our game. This means deep green building technologies, extensive retrofits of existing building stock, and adoption of innovative HVAC and lighting systems. It means green roofs, urban forests, walkable cities. Transportation will transition to hybrid and full electric systems. Biofuels will supplant fossil fuels in aviation. Land use planning is another key factor in energy use and one in which power companies are already deeply implicated. The fire in Paradise California is only one tragic example.

Utilities and the power industry face enormous pressures and challenges in the transition to a clean energy economy. The impact of our decisions today will be felt for generations, just as we still both benefit and live with decisions made early in the history of electric power generation. Every challenge is an opportunity. Every opportunity involves risk. We can no longer delay. The time for action is now.

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