Will the transmission system remain a critical element of future power grids? What role(s) will future transmission systems play? If the need for transmission infrastructure remains critical, will current return on equity provisions be adequate enough to encourage investment in these systems?

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Meet the Author:

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Distributed Energy Resources portend a series of changes to the grid that Tesla (and Edison) triggered several tens of years ago. While the word DER can mean many things to many people, the NY REV effort has defined it as a series of technologies that include PV, Battery storage, Fuel cell, Wind, Thermal, Hydro, Biogas, Cogeneration, Compressed air, Flywheel, Combustion generators, DR and Energy efficiency.

The main takeaways from DERs are that

- *They are very often small, distributed, and can be installed almost anywhere with very little or simple permitting process.*
- *Many of them are generating energy from renewable sources*
- *Some of them can also consume energy – store energy*
- *Their prices are coming down and in some cases, very quickly*

So what, who cares?

These new technologies are causing a dramatic shift in how electricity is generated, transmitted, and consumed. Instead of depending on large remotely-located generators to bring in the power some of the power can now be generated locally thereby reducing the dependence on both the remote generators and also the transmission lines necessary to bring in the power from generating centers to the load centers.

These distributed resources also result in reduced losses mainly due to the potential for the generation and consumption located close to each other.

So, where is the problem?

The real problem with DERs can be the following:

- *They are still expensive and not cost-competitive with the centralized generation + Transmission + Distribution system paradigm that exists today. However, as identified before, the costs are coming down.*
- *·The ones that are generated from renewable sources, for e.g., when the wind is blowing or when the sun is shining can be somewhat erratic and require support from other technologies such as storage to provide a stable source of power – thereby increasing costs.*
- *The ones that are not generated from renewable sources have some of the same problems as the centralized generation such as pollution, the release of GHG emissions, and so on*

Lastly, as more DERs get installed into the distribution network, they create a 2-way power flow in a system that was designed inherently for 1-way power flow leading to a need for a (1) dramatic redesign of the system from radial to network and (2) redefinition of the protections in the system and (3) new mechanisms to control the flow of power – all of which lead to increased costs.

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So, will the electric grid go local and there is no need for centralized transmission infrastructure?

The interesting fact is that regardless of all the upsurge in DERs coming into the grid, customers are still connected to the electric grid and utilities are still responsible for maintaining a reliable and resilient grid. As long as this is the case, it is still their responsibility to ensure a reliable flow and availability of cheap electricity. This means that utilities need to plan for a grid that:
(1) has access to cheap and reliable sources of electricity supported by
(2) a grid that is designed to bring those sources of power to the customer.

The electric transmission infrastructure is analogous to the highway system in North America or the rail infrastructure. Just because planes have arrived, does not mean that the need for highways or railways lines went away.

As long as customers are connected to a utility and as long as the utility is still the responsible party to ensure access to cheap and reliable power, there will always be a need for a Transmission and distribution grid that allows power to flow from the source to consumption