

Consultants find Germany in better shape than US to integrate renewables

October 23, 2014

By Mark Hand

U.S. energy industry officials traveled to Germany in September on a fact-finding mission to learn about the country's energy transition, including its plans to add greater amounts of renewable energy capacity. Organized by the Solar Electric Power Association, participants met with German government and energy industry officials.

Among the participants were Chris Vlahoplus, partner and clean tech and sustainability practice leader at ScottMadden Inc., and John Pang, partner at ScottMadden. During their trip, the ScottMadden consultants learned that the German energy transition has been highlighted by a growth of renewables, electric market deregulation and nuclear shutdowns.

Vlahoplus has been a management consultant to the energy and utility industry for more than 20 years. He is also co-leader of the firm's nuclear consultant practice. Pang, with more than 15 years of consulting experience in the energy industry, focuses on business planning within electric utilities. Vlahoplus and Pang agreed to participate in an email interview about their trip to Germany. Below are their joint responses to SNL Energy's questions about the trip.

SNL Energy: What did you learn from your trip to Germany and your meetings with German officials that surprised you about Germany's electric power grid?

Chris Vlahoplus and John Pang: There were three things of interest:

* The starting point: The German grid, as described to us, was robust when they started the transition to renewables. The transmission and distribution systems were destroyed after World War II and then built in a way that was a "Cadillac." Unlike the U.S. where we have, in some cases, historically underinvested in transmission and distribution, the Germans have a robust grid.



Chris Vlahoplus
 Partner and clean tech and sustainability practice lead, Scott Madden Inc.
 Source: Scott Madden Inc.

* Reliability is very good to start with. The conventional view going into the trip was that reliability has suffered in Germany. While performance has slipped slightly recently, overall reliability remains very good. This was a big surprise to the U.S. utility executives in the sessions. Outages are rare. One German engineer speaking to us commented that justification of investment for reliability improvement is difficult because many people "don't know what an outage is."

* There is a bottleneck of transmission from north to south which is relieved by loop flows through Poland — putting stress on their

system and market. Wind in the north, often in excess of demand, cannot get to the south where it is needed (in part due to nuclear plant shutdowns and an influx of distributed solar).

How is Germany's transmission system operator system similar and different to the RTO system in the U.S.?

The German TSOs are similar to the U.S. RTO/ISOs in some ways — they plan and manage the transmission system and make the market for energy. There are four major TSOs in Germany. The big difference is that the German TSOs actually own the assets. This means the interests of the transmission owners are distinct and separated from the interests of the generation owners. The quest for independence has led to TSOs being sold to independent owners. In the U.S., this is not always the case. The TSOs are regulated by a federal agency that approves investment plans and rates. The four TSOs are required to jointly present a single long-range plan to the regulatory agency for approval.

How is the German model similar and different to what Electric Reliability Council of Texas Inc. oversees in Texas?

The German model is fundamentally similar to the competitive markets in the U.S. where there are generators, retailers, delivery companies, and a RTO/ISO. Like ERCOT, Germany is an energy-only market.

Some of the key differences are:

- * The TSOs own the assets.
- * The compensation for reliability must-run plants in Germany is limited to marginal cost. This is unlike the U.S. where RMR includes compensation for return on capital. In stark contrast, the nuclear plant shutdowns in Germany were forced with no compensation.
- * The distribution utilities (DSOs) in the German model have their franchise territory for a 20-year period. They must "rebid" competitively for the territory. However, this program is new and the rebid process has not been fully tested.
- * Germany is well-interconnected with its neighboring markets at a scale unlike the U.S.

What can U.S. policymakers learn from the German model as the U.S. increases the amount of renewable energy capacity and the amount of distributed generation?

Large amounts of renewables can be integrated successfully but at a cost. Germany has achieved this in part through: 1) reliance on their neighbors to export excess and import when in deficit and 2) cross-subsidization. Industrials have been protected from much of the increased costs in order to keep industry in Germany. The win-



John Pang
 Partner, Scott Madden Inc.
 Source: Scott Madden Inc.

ners have been the renewable generators, including solar FIT [feed-in tariff] beneficiaries.

It is important to understand that what Germany has done is part of a cohesive public policy, which has broad-based political support. Germans take pride in conservation. They believe the social benefit of higher rates and more conservation is worth it. So, if it takes higher rates to get more renewables, so be it — less electricity will be used and that will be a good thing. And, the effect of higher rates is easier to rationalize because residential bills are a smaller share of wallet due to smaller housing on average. This is a little bit like the European policy on gasoline — high taxes mean people will drive less and this is a good thing. In the U.S., our public policy environment is not as cohesive — we want low rates, more renewables and energy efficiency. In Germany, they have made their public policy decision and are willing to pay the associated costs. In the U.S., we are still making ours and weighing the costs, benefits and tradeoffs.

With the nuclear shutdowns and its hopes to transition away from coal, how will Germany be able to maintain a reliable electricity system? Are Germany's plans for sustaining reliability something that can be used as a model by RTOs in the U.S.?

We shall see. The Germans are exploring many avenues to manage this with no single silver bullet.

- * Storage: There are many options being investigated from batteries, to hydrogen production and injection into the gas supply, to residential heat pump/heat storage.

- * Long-term vision of connecting to Scandinavian hydro.

- * Better forecasting and data analytics.

What about the need for natural gas for power generation. Can Germany diversify its supply sources for natural gas or will it rely primarily on Russian gas?

The current cost of natural gas is high enough to drive most gas generation out of the stack. Coal is the fuel of choice right now. Germany does use natural gas for home heating, though. There was little talk of alternate sources of gas (e.g., fracking).

In the U.S., we have three advantages for fracking, which are not readily available elsewhere: property rights (landowners own the mineral rights), supportive environmental rules (state rather than federal and generally accommodating), and a strong technology and E&P infrastructure (we have been doing this for a while and are good at it). It does not appear that a supply surge from fracking is in the offing in the very near term for Germany, absent a forcing function.

Can you describe how the renewable energy generation varies depending on which part of Germany you're in?

The utility-scale wind is in the north, and there is more distributed solar in the south. As offshore wind is developed, this will make it even more concentrated in the north.

How are Germany's plans to relieve transmission congestion similar to U.S. utility/company efforts to relieve congestion in order to move more renewables to load centers?

The current plan has significant investment to bolster the system and provide access to the north and south. This is similar to the transmission build-out occurring to bring wind from the Midwest wind farms to load centers.

Germany's electric transmission system operators



Are incumbent utilities resisting distributed generation in Germany in a similar fashion to how some utilities are resisting DG in the U.S.?

Utilities initially resisted and missed the window to profit from distributed generation. The generation arm of the incumbents saw significant value destruction. Some industry leaders would say they missed the boat and this was a mistake. The core delivery utility now has incentives to make renewables work within their territory. The utilities appear to be embarking on a period of significant "creativity" in exploring ways to make the system accommodate the renewables.

Germany has also faced the issue of "value of solar" charges in a way. The EEG charge is now being extended to larger self-consumption uses.

Is Germany or the U.S. in better shape to handle a dramatic increase in renewables and DG? Why?

Germany is in better shape for a few reasons:

- * They have a clear and cohesive national energy policy.
- * Germany is more of an analogy to California (U.S. to E.U.). Because they are part of a greater geography, backstopping is possible.
- * Their grid, if you take their description at face value, is at a better starting point.
- * German power prices are higher to start with, so many options for managing renewables are open (38-cent power vs. 11-cent power makes alternatives possible). *i*