

Notes from 10/26/09 talk

Taken by Nick Stelzenmuller

**Speakers: Steve Klein—GM of Snohomish PUD
Dave Kaplan—ex-CEO of V2Green**

Dave spoke first:

Working in this sector (clean tech) is very rewarding; things are moving very quickly.

- The core technology exists
- The smart grid is very achievable, no fundamental new science is necessary
- We need to start applying IT to the grid
- This is required and necessary work, we need to get it done.

The state of Washington can be complacent re: energy (because we think we use all clean hydro), but 71% of total energy used by Washington is not delivered through the grid.

- Hydro can't expand (environmental, agricultural constraints), we will be lucky if it stays flat.
- There is little appetite in Washington for nuclear expansion (especially after bond default debacle, also environmental and health concerns).
- We need to take advantage of “less bad” non-renewables such as nat. gas for transition.
- In order for Washington to meet the demand curve while keeping carbon emission at UN recommended levels we need dramatic energy conservation efforts and dramatic expansion of clean energy production.
- Viable clean energy options are mostly wind and solar
 - wind well underway but very unpredictable
 - solar catching up, more reliable than wind, but also somewhat unpredictable (clouds, etc.)
- Biofuels must expand
 - Serious questions of land/water allocation arise from biofuels
 - Society should limit the use of biofuels to applications not conducive to electrification—planes, long-distance shipping, etc.
- Electric vehicles move energy use from fuel combustion to the grid
- **Two big ideas: Move energy use from combustion to the grid, clean up the grid**

The (smart) grid

Grid breakdown:

Generation (power plants)-->
transmission (high-voltage, long-distance lines)-->
Substations(step down voltage for distribution)-->
Distribution(lower voltage feeder lines)-->
meters(end of utilities responsibility)

Smart grid components:

- Squeeze efficiency out of existing loads **first** (low hanging fruit)
- Communication between loads and control center (software responsible for allocation)
 - loads like HVAC, water heaters, the meter itself can be remotely controlled (in the jargon: “Demand management”)
- Meters are either new smart meters or retrofitted old meters (smart implying communication capable)
- Demand management the goal
- Substations need to be smart, transmission grid needs to be automated, general grid intelligence (“everything talks to everything”)
- If you have the above, you can support clean power generation
 - Wind is only really effective on large scales
 - Solar effective on many scales
- e.g. if the wind stops blowing then the sensors detect drop in generation immediately, control system turns off some water heaters, automatic stabilization occurs
- Electric vehicles come pre-equipped with IT (it is cheap relative to car prices), effectively making them smart grid ready when plugged in
 - telemetry to charging point and/or car itself
- Grid based storage is starting to appear; energy storage will act as “energy shock absorber”, which will be very helpful as more (unreliable) renewable energy sources come on-line

Steve Klein:

Steve is a UW engineering grad, hence thinks critically, in that spirit some cautionary words:

- The smart grid is the least risk, lowest cost option in the long-term. There may be some short-term cost barriers
- Demand response (demand management) is not much benefit in Northwest because of cheap, steady-source, generation, it may be more effective in other regions
- Smart grid security benefits may be illusory, in fact new security risks may be appearing as system goes from closed to open/inter-connected
- Fear of invasion of privacy may slow growth of demand management, e.g. engineers think its great that utility can turn off your water heater, you might not
- Advanced smart meters are hyped, but are nothing without the IT infrastructure needed to use their capabilities
- Utilities in general are very conservative, Snohomish PUD still buying old-style meters as recently as 3 years ago! They are responsible to citizens who resist rate increases.
- Substations are still mechanical relay—most utility equipment is very old.

That said, things are changing...

- In the Snohomish PUD
 - Lead nation, possibly world, in tidal energy research (in partnership w/ UW)
 - rolling out large new solar program
 - starting geothermal plant
 - within 10 years of full smart grid
 - Have biomass generation
- Other utilities are benefiting from California's push to upgrade grid, which is driving standards development, economies of scale, etc.
- The utilities have a solid business case for the smart grid
 - Fewer repair & maintenance crews
 - No physical meter reading
 - Better usage information to customers prevents disconnection/reconnection headaches
- Many applications on utility side and consumer side
(Note: Steve ran out of time to go into detail here, see slides for elaboration)

- Industrial consumers have had energy management for a while, which is now starting to trickle down to residential customers
- NIST working on standards, also Zigbee, SAE working on protocol for charging stations