Integrated Resources Network

Doing the Work

Set a goal, commit, make a plan, do the work, have fun. Common sense that reminds me of Integrated Resources Network (IRESN) colleague, Ronnie Holland's, approach to life. Everyone, of course, does their work. Not everyone is purposeful about the other four steps. In his essay, "Headwork", Edward Hoagland reflects on the notion of "work". He says that "work…can become second nature, and you can't stop, don't want to stop, don't need to know who benefits – continuing with it for its own sake but with the destination of reaching other ears and minds."

That might just sum up IRESN's 2014. We set goals, committed, made a plan, and 2014 was about doing the work. We had some fun. Not much time left for IRESN communications. Making more time for communications will be a 2015 goal.

A Small City Reviews its Energy Service Choices…
One 2014 goal was to wrap up and communicate the work of the Davis Energy Service Options Technical Advisory Group (TAG). We launched the TAG as part of the City of Davis's initiative to consider how best to provide energy service to Davis residents and businesses. As cities are prone to do when they need to make a complicated decision, Davis hired consultants. The TAG's charter was to advise and review the consultants' work.

Bottom line: The consultants concluded that creating a municipal electric utility would better support the city's goals than forming a community choice energy agency or staying on the sidelines watching the incumbent utility do its work. The TAG advised the need to do some serious business planning around the matter of costs as a first step toward implementing the consultants recommendations.

Benchmarking Electricity "Rates": Apples, Oranges, and….
The ensuing discussions among city leaders led us to dig deeper. The results, as yet unpublished, included some important insights.

For starters, it's advisable to do some serious benchmarking. Comparing the consultant's budget assumptions with the Sacramento municipal electric utility's latest detailed annual budget points to a favorable scenario. Specifically, a Davis municipal electric utility's cost-based, post-start-up electricity prices could, subject to business planning results, be at rough parity with the regional for-profit utility's prices.

That said, rate comparisons are tricky. Comparing tariffs for both publicly owned and for-profit northern California electric utilities revealed a surprising range of structural and quantitative variations. Some tiered rates. Some not. Some top tiers very pricey. Some not. Some seasonally differing rates. Some the same the year round. Some costly public purpose programs. Others bare bones. Also, average

annual *non-residential unit* (kWh) costs can be either significantly higher or significantly lower than average *residential* unit costs.[1]

Cost drivers are diverse and vary widely. Some high per capita and/or per meter usage. Some much lower. Some fairly efficient asset utilization (reflecting the relationship of peak to average demand). Some not so much. Some usage dominated by residential customers. Some more balanced among residential, non-residential.

If there is a bottom line, it's probably that looking at *historical or even current* economic statistics does not suffice. Some serious modeling needs to be done. (More on that later.) Plus, the power industry is in transition between 20th and 21st century business models… which brings us to the next bit of work.

Local Dollars for Local Energy.
In 2013, Stan Hazelroth and I addressed the question of how energy infrastructure is financed and the difference it might make if it were financed more with local dollars…vs. dollars that have to run the Wall Street gauntlet on their way from and to Main Street.

We collaborated, generated a report, received thoughtful comments from IRESN colleague, and presented our results at the 2014 Energy Policy Research Conference in San Francisco. Our conclusions and recommendations identified gaps in policy level understanding of a globalization counter-trend, i.e. on-going energy localization. So, our next step may be to talk with policy research sponsors about our recommendations.

Beyond that, Stan has a web page on the IRESN site devoted to energy finance. Please be sure to check it out.

21st Century Energy: Capital Intensive Decentralized Supply.
We feel we more than scratched an important surface. Energy sector finance is changing; adaptive innovation addressing local conditions and priorities is possible. It is needed because historical power sector finance models were designed to solve a problem that no longer exists, i.e. to enable electricity service providers to secure capital for expansion of generation systems during decades of rapidly growing demand. Nowadays, expansion of the most capital intensive generation, i.e. renewable power, is typically not financed by utilities. Rather in some cases, notably Germany, it is financed mostly by people and smaller businesses.

The cost of money for capital-intensive decentralized electricity generation, storage, and local delivery, exchange and sale already matters a great deal. Especially in areas where solar PV accounts for a significant and growing share of local electricity supply. Historical global statistics cited by fossil fuel advocates seeking to portray solar PV as a still relatively small contributor to global energy supply can be especially misleading in a local context. For example, by the end of 2015, locally produced solar electricity in IRESN's home town, Davis, California, is projected to cover more than 10% of local electricity consumption.

For reasons explained in our paper, publicly owned utility weighted average costs of capital are typically about 5% below the costs of capital paid by for-profit utilities, which in turn are about 5% below the returns on investment targeted by for-profit corporations when evaluating recommended capital

[1] For example, In Davis, California non-residential customers currently pay three times the average residential rate during summer peak periods.

projects, e.g. manufacturing plants. Some state infrastructure finance programs, including a new "green bank" in New York and "resiliency bank" New Jersey, are starting to offer loan guarantees and direct low interest loans for targeted infrastructure.

An existing for-profit utility's capital requirements can be financed on its balance sheet, but financing local solar generation that way would be unaffordable. Nevertheless, local solar generation will be a long term infrastructure asset for local communities. A transition from current, highly leveraged, financing of local solar investments to a framework enabled by local energy service providers will be needed. It merits near term innovative attention, pilots and policy support.

Energy Localization Topics.
In 2014, thanks to David Sweet and the World Alliance for Decentralized Energy (WADE), IRESN's work benefitted from opportunities to attend and contribute to events organized, co-sponsored or endorsed by WADE.

Power Market Transformation…conference on in San Francisco, April 2014. Recent rapid solar PV industry growth has apparently taken US utilities and their regulators by surprise. Combined with low, no, and, in some cases, negative growth in electricity demand and enabled by a revolution in information technology, the emergence of new and successful rooftop solar business models is challenging the traditional commodity-based electric utility revenue model. Conference sessions aired both sides of a debate on the consequences and equity issues of net metering. Especially noteworthy in this context were presentations on solar tariff models in Minnesota and Austin, Texas that account for the economic value of solar.

"Death spiral" scenarios (shrinking revenues-driving cost increases-driving reduced consumption-driving shrinking revenues) are not new. They attracted a modicum of interest in the early days of electric market restructuring. Now they have US for-profit electric utilities manning the barricades, seeking regulatory and legislative "relief" and, following the lead of the Edison Electric Institute, advocating for evolutionary vs. revolutionary change, or in other words, a preference for business as usual.

Be that as it may, what has actually changed, evolutionary or not, is the relative size and political heft of two industries, electric utilities and national solar energy retailers. The conference featured several panels on which each industry and/or their regulators and customers were represented. The sub-text was an interesting difference of opinion regarding "ownership" of customers. Monopolies, almost by definition, own customers. The question is whether and how electricity service monopolies should now share or compete for customers now that customers can cost-effectively generate their own electricity and now that the policy rationale for private sector energy monopolies has pretty much evaporated.

Opportunities for Distributed Energy in the San Diego Region…community energy systems roundtable in May. SANDAG (San Diego Association of Governments) and CADER (Communities Advancing Distributed Energy Resources) convened a roundtable to discuss trends, perspectives and opportunities for distributed energy resource (DER) projects in the San Diego region. IRESN organized a session on the need and funding for distributed energy resources projects**.** Originally organized around distributed generation information and advocacy, CADER adopted a mission to facilitate dialog and collaboration between utilities and the communities they serve.

The roundtable's premise was that both utilities and communities have an economic stake in orderly and cost-effective use of local energy resources. The roundtable demonstrated CADER's ability to organize informative sessions and thoughtful conversations among utility technology experts and

community leaders. It also demonstrated potential for serious engagement between communities and the energy utilities. But it was also apparent that neither local communities or regional energy utilities are yet prepared and committed to more consequential dialog and engagement. This means that CADER's new mission will be at risk until there is policy and funding support for the necessary work.

Two Definitions of Energy Resiliency…WADE's annual meeting and distributed generation conference in New York in October**.** Stan and I attended. While WADE's historical core constituency has been organized around natural gas and combined heat and power (CHP), the 2014 agenda included at least some reference to distributed solar generation. My task was to speak to the impact of California policies and markets on the progress of decentralized energy. I took the opportunity to advocate for integrative models enabling more rapid deployment of *both* local renewables and CHP.

The conference agenda focused on recent policy initiatives in New York and other east coast states in the wake of Super Storm Sandy. "Resiliency" was an over-arching theme. Resiliency is also emerging as an integrative theme in California. It evokes a notably different meaning in New York than in California.

The measure of east coast resiliency, for now, is the ability to absorb a devastating blow like Sandy without losing energy and other basic services across a broad area. An emerging debate centers on whether existing distributed generation should come into play during a major weather event in support of the big grid, *or rather* in support of insulating local energy users from a regional grid's temporary collapse, or somehow both.

The measure of energy related resiliency in California can be broader, i.e. the extent to which local economies depend less on imported energy and more on locally produced energy that empowers a more robust local economy as well as a more robust overall electricity grid.

Entry Market for Smaller Grids….November conference in San Diego on commercial and military "micro-grids" One welcome highlight was Byron Washom's progress report on UC San Diego's small (not so micro) grid. UCSD's 20 year old micro-grid continues to serve as a working laboratory for the integration of emerging technologies that reduce costs of operation and carbon footprint at the same time.

Parallels between the early global small grid market and early solar PV markets came to mind. For most of its first three decades the solar PV industry expanded rapidly. Profitability depended on applications that saved money in cases where the alternative was (often prohibitively) costly. For example, small bits of power far from the nearest electricity grid.[2]

According to market analyst Peter Asmus, the global small grid, aka micro-grid, market is already measured in billions of dollars and is strongest in areas where it is especially costly to provide electricity service according to the centralized grid model. Not surprisingly, the regional market Asmus projects to be most active in the near term is Africa. Island states and nations are also opportune and likely transitional market as the overall small grid market matures.

Military base small grids, apparently the leading edge of the US market, are essentially at one end of the global market spectrum. At this end, resiliency does in fact mean the ability to isolate from the regional

[2] Peter Varadi, co-founder of Solarex, for many years the leading company in the emergent solar PV industry, published a book in 2014, Sun Above the Horizon, that tells the little known solar industry creation story extremely well.

grid and maintain operational continuity across a whole military base, not just building by building, critical load by critical load, relying on back-up generators.

Integrated Energy Analysis for a Small City (Davis, California).

The last months of 2014 have been to devoted primarily to research and advocacy around the topic of Davis, California's energy future. In a recent op-ed, Richard McCann and I summarized energy service options available to Davis, pointing to the benefits of locally accountable energy service delivering clean, low carbon electricity to Davis residents and businesses. In another recent op-ed, Lorenzo Kristov and I review trends in the costs and performance of clean energy technologies that are now poised to offer an energy future that can be small-scale and local. Meanwhile, Davis's Coalition for Local Power is turning its attention to Community Choice Energy.

Davis may lead. Davis may follow. Davis may watch from the sidelines. That will be a political decision. IRESN's work in the last months of 2014 in support of a decision will have other uses. Specifically, we created an integrated model of Davis's energy usage, supply and imports and used it to evaluate and compare the main scenarios for local renewable energy deployment. Results will be summarized via a free webinar scheduled for mid-January.

Work to date confirms one of the Integrated Resources Network's main premises, i.e. that local energy infrastructure will, within the next couple decades, need to be much better integrated, economically, technically and especially locally. Push-back against this technically and economically driven need is already a factor in local decision-making. Unfortunately, no model can predict how the politics will play out. The best that can be hoped is for a technically and economically well informed local decision-making process, specifically one that can be broadly replicated.

Please e-mail me at gbraun@iresn.org if you have questions or comments on any of the work summarized above.

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