Hometown Connections

Newsletter

October 2025

INSIDE

An Energy Transition Roadmap for Electrical Utilities - Dimension 1

Written by Richard Ganton and published on Acumen's blog September 2, 2025.
Photos and article reprinted with permission from Acumen.

Defining the Energy Transition

What is the Energy Transition? The goal of the Energy Transition is to move away from fossil fuel generation on the production side of the Bulk Electric System and work toward using electric power to replace the use of fossil fuels on the customer side, e.g. electric cars and ground source heat pumps.

The ultimate Energy Transition goal for electric utilities is to have an electric power system that produces, on balance, zero or fewer Carbon Dioxide emissions from generation to customer. It allows for some emission producing resources (e.g. Natural Gas turbines for emergency use), as long as this is balanced by carbon capture and sequestration. For generation sources, this means producing almost all power using non-emitting resources that result in zero carbon dioxide production. Over time, producers of electric power will increasingly shift to non-emitting power production.

In parallel, customers will convert their processes from fossil fuel use to electricity use. For example:

1. Transportation moves from gasoline/diesel to electric vehicles.
2. Space heating moves from natural gas and other fossil fuels to Air Source and Ground Source Heat Pumps.
3. Industry moves from fossil fueled to electrified and hydrogen fueled processes.
4. Restaurants and home/institutional kitchens move from gas cooking to electric cooking.

The energy transition presents several significant challenges. Chief among them is the need for power producers to move away from fossil fuels while greatly increasing non-fossil fuel energy production. This is necessary to meet the growing demand for electricity, as customers increasingly shift from fossil fuel-based processes to electric alternatives.

The Energy Transition Roadmap

An Energy Transition roadmap for an electric utility is to define rational and achievable objectives that enable the utility to transition away from fossil fuels by continually increasing its emission free generation as its customers move to all electric processes.

There are many dimensions to an Energy Transition plan:

- Dimension 1: The Power System Dimension - Generation, Transmission & Distribution and Customers.
- Dimension 2: Technical Dimension - Power System Monitoring and Control.
- Dimension 3: Financial Dimension - Producers and Customers Market and Money Rules.
- Dimension 4: Cyber Security Protection.
- Dimension 5: AI Applications for the Energy Transition.
- Dimension 6: The Details of an Energy Transition Roadmap.

Dimension 1: The Power System Dimension

Dimension 1 includes the following:

1. Electricity production and storage.
2. Evolving customer electricity needs, including shifts in the technologies they use and how this can be controlled to assist the stability of the electric power system.
3. Changes to the transmission and distribution system to enable the electricity to flow from its sources to its customers, including electric power sources/storage at the transmission, distribution, and customer level.

Dimension 1a: Electricity production and storage

How do you get from your current resource mix to a non-emitting mix of generation and storage? There are a lot of organizations around the world that are actively pondering this question and coming up with many scenarios. Some of them only focus on ensuring there is enough power capacity without considering the reliability issues. One can easily build a production system that is non-emitting with enough capacity to provide enough electricity. However, the problem is that there are sometimes long periods of time when the wind isn't blowing and the sun isn't shining. There must be a mix of resources that are available and controllable to ensure that power is available when needed, and that there are backup resources available for contingencies.

Most utilities currently have a mix of resources that involves some or all the following:

- Waterpower.
- Fossil power.
- Renewable resources (wind, solar, geothermal, wave).
- Nuclear.
- Direct load/demand control.
- Voluntary load/demand reduction.
- Storage (Battery Energy Storage Systems or BESS, pumped water storage, other).
- Geothermal (in its beginning stages in most places, but California has 800 MW of it).
- Third party Virtual generators (that combine small renewables with customer load control and storage into a reliable capacity resource).

The following are emerging resources that are not yet available but are the focus of significant investment totaling billions of dollars:

- Hydrogen based generation – Some utilities are experimenting with a mix of natural gas and hydrogen at this time. The goal in future would be to have hydrogen made from renewable energy and stored for use in electric generation to provide power during intervals when the sun doesn't shine and wind doesn't blow. While the sun shines and the wind blows and there is too much generation, you make hydrogen and store it.
- Hydrogen would also be made for use in long distance trucking and for industrial high temperature processes.

There will also be a need for carbon sequestration facilities to not only remove carbon dioxide from the gas output of natural gas plants but to also remove it from the air. The article "Clearing the Air" in the November 2023 issue of National Geographic looks at many different approaches to removing carbon dioxide from the atmosphere and storing it somehow. Some of these systems are running on a smaller scale, but there are problems with them that are still being worked out.

Each utility needs to look at their current mix and envision what a future feasible mix would be, based on proposed plans, projections and industry research. The main objective is to plan for a resource mix that does not include fossil fuels, except as an emergency resource.

The second step is to look at what the projected costs would be for various scenarios of resource mixes. There are many BESS facilities in existence, so projecting costs for such facilities would not be difficult. Wind and solar can be easily costed. Nuclear power is in a transition phase where large plants are costing billions, and small modular plants are not yet built and working. The projected cost of those has gone up as well. Recent new Hydro facilities have also been very expensive.

There is much work being done and large sums of money being spent to figure out how to make it work.

Dimension 1b: Customer Load

Determining the amount of capacity that will be needed to support customer load is another facet of the future plan. There are many good methods for projecting load growth for normal customer activities. However, there are new uncertainties related to the conversion of customer fossil-based loads to electric loads. There are some experience and efforts to estimate the resources needed to support electric transportation. There is also now research available that estimates the capacity needed for switching from fossil fuel heat to Air Source Heat Pumps (ASHP) or to Ground Source Heat Pumps (GSHP) (which are more expensive but require less electric capacity). The uncertainty lies in multi-unit residential buildings and commercial and industrial facilities. However, there are ways to estimate these.

	Challenges	Potential Solutions
1. System Stability	The existing system has large generators that come with heavy turbine-generator inertias that help the system ride through system contingencies. Renewable generation does not respond to faults with large currents.	The potential solution is to have large BESS(s) with Grid Forming Invertors that can provide simulated inertia and/or other large current injection supports to help the system remain stable during faults.
2. Fault Response	Existing generation produces large current flow in response to faults that is used by relay protection systems to identify fault locations. Invertor based resources don't naturally provide such large currents.	Wind/Solar Farms integrated with BESS with Grid Forming Invertors could be set up to provide enough additional current to enable the relay protection to work correctly.
3. Intermittent Renewable Resources	Supplying load with a large percentage of renewable resources that depend on wind and sun that is intermittent.	Use short term storage like BESS, Pumped Hydro, and others to fill in some of the hours when sun and wind are absent. Produce and stockpile hydrogen when there is an excess of renewable energy available so it can be used to generate power for the longer periods when sun and wind is not available.

The much larger challenge is planning how to replace the fossil fuel energy used in industrial and institutional processes with electric energy (e.g. electric Arc furnaces) or using Hydrogen, which requires electric resources to produce.

One of the goals of the customer estimate is to have a geographically based load and demand forecast. This may be more complex as more distribution customers add renewable resources, battery storage and load control. There are already many virtual power plants in existence using these resources at the distribution level. Virtual power plants can act like a production resource as well as a load control resource. This means that a feeder may have a forecastable load based on the customers' electricity needs that should be considered the base load. This is the electric energy and maximum demand each customer will require when their Distributed Energy Resources (DERs), including generations sources, storage and controllable loads are not in service. The utility then must determine the capacity and location of DERs on the feeder. A given customer may have a maximum load consisting of their base load plus the load for charging their BESS when no other DERs are available. A customer's minimum load would be their base load minus their DER supplied energy minus controllable load minus BESS discharging. The difference between maximum and minimum load could then be quite large. As customers electrify their transportation and add EV charging and electrified heating, this will greatly increase the load.

The main issue at the distribution level will be that the combination of load, renewable resources and BESS (large and small) will make it harder to predict the load profile over time. It may be relatively easy to project the peak loads and the valley loads, but how they vary over time will be complex. There may be market forces in place that send price signals that greatly vary how customers use their production and storage resources versus their own load. Cloudy days with no solar will likely mean higher loads, while sunny times may mean clients charge up their BESS and this may not result in lower loads. Many of the customers with renewables and BESS will participate in a Virtual Power Plant (VPP) that brings some discipline to how the customers will act.

In order to gain some control of the loads and resources, there will need to be a market that involves VPPs and complex customers, not part of VPPs, as well as simple load-only customers (however, they may also have controllable loads).

	Challenges	**Potential Solutions**
1. Load Complexities	Seeking to understand and quantify the complexities of customer loads and how they vary.	Use smart meters to track hourly customer loads (or smaller intervals) and compare with weather using smart analysis tools and AI. Get customers to register their battery/solar and charging resources.
2. Optimize Resources and Loads	How do you enable customers to optimize resources and loads while also helping to maintain a reasonable power profile for Grid integrity.	Implement a distribution market that incentivizes smoothing the load curve. Allow for Virtual Generators/Loads to be assembled by 3rd parties to play in the market. Market also incentivizes balancing load of feeder as necessary.
3. Complex Power Flows vs Outage Response and Safety	The existence of numerous power sources will complicate how utilities respond to system outage and restore power using Smart Grid tools.	Smart Grid tools will have to become much smarter and there will need to be many more sensors. Utilities, customers and markets will have to agree to rules that ensure the safety of line crews while maximizing distribution customer uptime.

Dimension 1c: Transmission and Distribution

For a long time, the power system consisted mostly of large power plants and some small ones outside of populated areas with transmission that connected from the plants to these areas. This power was then distributed to the loads in the populated areas. Now there may be many power resources away from the populated areas and many power resources within the populated areas.

There will be a need for many new transmission lines. Some of these will be for large renewable resources to transmit power a long way and may be DC transmission lines. There may be a need for trunk transmission lines around a large city to ensure that power can flow where it needs to. There will also be a need for BESS systems and perhaps synchronous condensers to provide for system stability.

Many customers are going to require an increase in the amount of electricity in order to replace the fossil fuels previously used. This may require upsizing the distribution system to handle the increased loads. However, it will also require handling two-way power flows within the distribution system. The distribution resources will consist of numerous small local solar facilities, some with local storage. There will also be controllable loads. Some distribution level industrial, commercial and institutional (ICI) facilities may have large controllable loads in addition to renewable facilities plus storage that can greatly affect the amount and direction of the local power flow.

The utility may need to upsize the substation transformers and customer transformers while greatly modifying the protection systems and safety procedures to handle the two-way flows. Subdivisions with electric cars, house charging facilities, and ASHPs may need upsized power cables. New subdivisions may be built with all houses having solar roofs, car chargers, ASHPs and local battery storage. Such houses may have large loads in winter when the sun isn't shining, the battery isn't charged while the ASHP is working, and the EVs are being charged.

Each distribution utility will also need to increase the capacity of each feeder to handle the maximum load and to have the flexibility to handle the minimum load and even two-way flows.

It will be harder to schedule generation resources when the load pattern is erratic or doesn't follow a consistent pattern over the seasons. Markets may be put in place to smooth out the load. However, large amounts of storage may be able to smooth out the load enough to sustain grid reliability. One possible solution would be for every Transmission Substation to have a large Grid forming BESS (e.g. a storage resource that can support system reliability). This TS BESS would be used primarily to smooth out the distribution load profile while enabling the local distribution power market to function. The TS BESS would also be able to contribute to Grid reliability when there are contingencies (e.g. a system fault that means a large loss of generation or load) that affect the stability of the Transmission Grid. Grid operators will need to develop new approaches to responding to contingencies; having the TS BESS could be part of this.

	Challenges	Potential Solutions
1. Load Electrification	Each utility will have to increase the capacity of its whole system as the load grows and changes.	1. Installing additional or large transformers at substations; 2. Increasing the feeder conductor sizes for more flow capacity; 3. Installing larger distribution transformers or adding parallel transformers to increase the capacity of the final customer segments
2. Two Way flows	Substations will need to handle two-way flows for times when there is more DER output on a feeder than load.	This will require new protection schemes at the substation to handle reverse flows. There will need to be additional schemes at the transmission level to handle the complexity at the distribution level.
3. Manage flows for stability	The Transmission to Load interface will be more complex and varying.	Transmission utilities may need to get more involved in managing where power goes to maintain system stability and balanced flows. There may need to be a power market that incentivizes power being exchanged at different times in different ways to support system stability and maximize the use of renewable resources.

The Energy Transition is not just an aspirational goal for electrical utilities - it's a critical imperative for the long-term future of our planet. As we have outlined in this roadmap, the Energy Transition is complex and multifaceted, requiring a blend of innovative technologies, strategic planning, and collaborative efforts. For utilities ready to embark on this transformative journey, the right support and expertise are essential. Acumen specializes in guiding utilities through every step of the Energy Transition, from initial assessment and strategic planning to implementation and continuous improvement.

Reference:

Ganton, Richard. “An Energy Transition Roadmap for Electrical Utilities – Dimension 1”. 09/02/25 https://blog.aesi-inc.com/an-energy-transition-roadmap-for-electrical-utilities-dimension-1/.

North California Power Agency 2025 Annual Conference

The 2025 North California Power Agency (NCPA) held their annual meeting in Monterey, California from September 23-25. The conference featured multiple presentations.

Randy Howard, CEO of NCPA, gave a welcome address and Scott Corwin, CEO of APPA, made a presentation titled "Public Power and the Road Ahead" which talked about advocacy when it came to policies that determine affordability and reliability.

Links to their presentations and others can be found here: https://www.ncpa.com/meetings/events/ncpa-annual-conference/.

Randy Howard, CEO of NCPA.


Scott Corwin, APPA CEO.

There were also several opportunities for networking. One of the networking events was held at the Monterey Bay Aquarium and provided visitors with a musical experience and an opportunity to experience some of the wonders of the ocean.


Scenic Monterey, CA.

Mary Malone, HCI Partner Questline, and Scott Corwin, CEO of APPA.


Live entertainment at the networking event.

Image created by Gemini. Google.

Cybersecurity Awareness Month is an annual campaign each October to educate the public about online safety and the importance of good cybersecurity practices. The campaign aims to inform the public and organization about digital threats and to empower them with knowledge to protect their information and devices. This effort encourages individuals to adopt safe online habits, such as using strong passwords, enabling multi-factor authentication, and expanding awareness of phishing attempts. Cybersecurity is very important to public utilities as there are many documented cases of Chinese infiltration of American computer networks which could potentially disrupt U.S. critical infrastructure like public utilities.

A “60 Minutes” segment aired on October 12, 2025, detailed how Chinese hackers compromised critical American infrastructure, including a water and electric utility in Massachusetts. Littleton Electric Light and Water in located in Littleton, Massachusetts - a small town with a population of just 10,000 and not located next to a big industry or a U.S. military base. Why it was chosen it unknown. However, in November 2023, the FBI confirmed that China had hacked into the utility’s computer system. Littleton was one of 200 utilities hacked by China’s cyber operations. Once inside the small utility’s network, China didn’t install malware but instead stole log in credentials and masqueraded as a legitimate employee. The Chinese gained access to the system but lay dormant although they could have potentially used that access to disrupt the utility. Luckily, they were discovered and “kicked out” of the utility system before they could inflict damage.

Nick Lawler is the General Manger of the utility spoke to “60 Minutes” host Scott Pelley. He came on the show to help make other American utilities aware of the “real and present” danger. According to Lawler, chemicals in the water treatment plant tanks are precisely controlled to deliver clean water. The wrong dose of those chemicals can poison the water supply. He said they were lucky that the Chinese were stopped before they could gain operational control over those chemicals. The FBI was involved and with

Lawler's permission, the FBI observed what the Chinese did in an effort to stop future attacks. Nick Lawler had to rebuild his network at a cost of $50,000.

Tim Haugh also appeared on the "60 Minutes" broadcast. Tim is a retired 4-star general who used to run the National Security Agency (NSA) and is considered one of America's best cyber sleuths. He had this to say, "This is a national threat and violated international norms and needs to be understood by every American." The question is, "How many Chinese attacks are happening in the United States?" The answer isn't known, but the Whitehouse is working to assess exposure and mitigate the damage. The United States is good at cybersecurity, but the scale of the attacks is formidable," according to Haug.

We need to stop things before the damage is done. It is extremely important, and less expensive, to prevent hacking before it happens, rather than try to repair the damage after it has been infiltrated. **Basic cybersecurity measures help protect the utility systems upfront.**

Other recent incidents Involving the Chinese:

- **Public warnings:** In January 2025, U.S. authorities and allies reported that Chinese state-backed hacker groups known as "Volt Typhoon" and "Salt Typhoon" had targeted U.S. critical infrastructure and telecommunications firms.
- **Covert admission:** In April 2025, reporting by the Wall Street Journal revealed that Chinese officials secretly admitted to being behind the Volt Typhoon hacks in a clandestine December 2024 meeting with U.S. officials.
- **Joint advisory:** In August 2025, the U.S. Cybersecurity and Infrastructure Security Agency (CISA), NSA, and FBI issued a joint advisory with international partners, confirming that Chinese state-sponsored actors were continuing to target critical infrastructure globally.
- **Strategic intent:** Analysts believe these cyber intrusions are intended to pre-position malware to enable disruptions in case of a future conflict with the United States, particularly one over Taiwan.

Resources:

Pelley, Scott. "Chinese Target U.S. Infrastructure." *60 Minutes*, CBS, October 12, 2025.

KnowB4 Website, "Gear up for this October's Cybersecurity Month," www.knowB4.org
Accessed: October 14, 2025.

Cybersecurity and Infrastructure Security Agency (CISA), National Security Agency (NSA), and Federal Bureau of Investigation (FBI). "People's Republic of China State-Sponsored Actors Compromise and Maintain Persistent Access to U.S. Critical Infrastructure," Cybersecurity Advisory AA24-038A (updated January 2025). https://www.cisa.gov/news-events/cybersecurity-advisories/aa24-038a.

CISA, NSA, and FBI with international partners. "Countering Chinese State-Sponsored Actors Compromise of Networks Worldwide to Feed Global Espionage System," Cybersecurity Advisory AA25-239A (August 27, 2025).

Upcoming Conferences

2025

Oct 20-22 **Electric Cities of Alabama (ECA) 2025 Engineering & Operations Conference, Hoover, AL**
https://eca.memberclicks.net/2025eando#/

Oct 23 **Energy Northwest Public Power Forum, Kennewick, WA**
https://web.cvent.com/event/a3ccf305-44e4-4d38-97ad-f893f246b0d1/summary

Oct 28-29 **FMEA Energy Connections Conference & Trade Show, Jacksonville, FL**
https://www.flpublicpower.com/events/2025-fmea-energy-connections-conference

Nov 2-5 **APPA Customer Connections Conference 2025, Salt Lake City, UT**
https://my.publicpower.org/s/community-event?id=a1YUT000003DVdl2AG

Nov 11-12 **CEATI Transmission & Distribution Conference, Orlando, FL**
https://www.ceati.com/event/transmission-distribution-conference-2025

2026

Jan 11-13 **APPA Joint Action Conference, Destin, FL**
https://www.publicpower.org/event/joint-action-conference

Jan 20-22 **2026 POWERGEN International, San Antonio, TX**
https://www.powergen.com/

Feb 8-11 **2026 NARUC Winter Policy Summit, Washington, D.C.**
https://www.naruc.org/events/all-events/2026-naruc-winter-policy-summit/

Feb 23-25 **APPA Legislative Rally, Washington, D.C.**
https://www.publicpower.org/event/legislative-rally

Mar 13-14 **FMEA 25th Annual Florida Lineman Competition, Tallahassee, FL**
https://www.flpublicpower.com/events/fmea-2026-florida-lineman-competition

Mar 24-27 **2026 WEF/AWWA Utility Management Conference, Charlotte, NC**
https://www.awwa.org/event/awwa-wef-utility-management-conferenc

Mar 27-28 **APPA Lineworkers Rodeo, Huntsville, AL**
https://www.publicpower.org/event/lineworkers-rodeo

Mar 29-Apr 1 **APPA Engineering & Operations Conference, Huntsville, AL**
https://www.publicpower.org/event/engineering-operations-conference

Mar 29-Apr 1 **APPA Safety Summit, Huntsville, AL**
https://www.publicpower.org/event/safety-summit

To have your conference listed, please send information to acdupont-ewing@homtownconections.com

HCI Blog

HCI Blog: A Platform for Collaboration and Innovation

https://blog.hometownconnections.com/

HCI warmly invites all its Partners and Affiliates to actively contribute to the blog. Whether it's sharing a recent project, providing commentary on industry trends, or offering advice based on your experiences, your input is highly valued. This collaborative effort will not only highlight the incredible work being done across the network but also provide a valuable resource for continuous learning and development.

How to Contribute

Contributing to the HCI blog is straightforward. Interested Partners and Affiliates need to follow these simple steps:

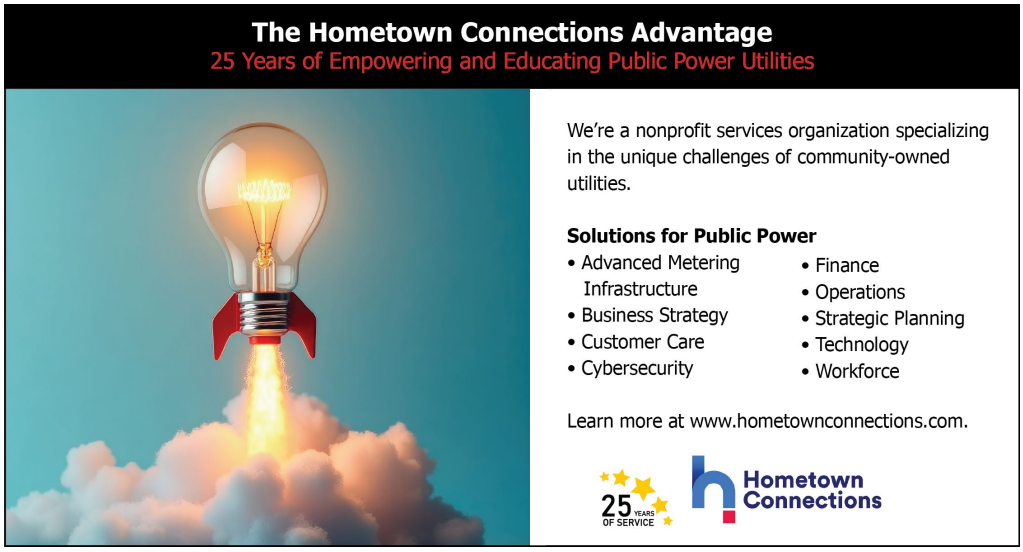
- **Write your article**: Focus on topics that you are enthusiastic about and that would benefit the HCI community or public power in general.
- **Submit your article**: Send your completed article to acdupont-ewing@hometownconnections.com.

Want to
STAND OUT
in a Crowd?

Advertise on the HCI Blog and/or in the HCI Newsletter!

Reach a targeted and engaged audience by advertising in our professionally rebranded newsletter, distributed by HCI Affiliate members (Joint Action Agencies) to their utility customers. This is a great opportunity to promote your company and services directly to decision-makers and create business opportunities across multiple communities.

Ad rates:
– Half-page, full-color ad: $250
– Full-page, full-color ad: $400



Owners

American Municipal Power, Inc.
Energy Southeast
Missouri Public Utility Alliance
Northern California Power Agency
Vermont Public Power Supply Authority

Marketing Affiliates

Energy Northwest
Florida Municipal Electric Association
Illinois Municipal Electric Agency
Indiana Municipal Utilities Agency
Michigan Municipal Electric Association
Minnesota Municipal Utilities Association
Missouri River Energy Services
Municipal Electric Systems of Oklahoma
Nebraska Municipal Power Pool
Southern Minnesota Municipal Power Agency
Tennessee Municipal Electric Power Association
Texas Public Power Association

Sales Affiliates

American Municipal Power, Inc.
ElectriCities of North Carolina
Energy Southeast
Indiana Municipal Power Agency
Missouri Public Utility Alliance
Oklahoma Municipal Power Authority
Piedmont Municipal Power Agency

Partners

Acumen
DivDat
Energy Southeast, A Cooperative District
Exacter
Great Blue
Hometown Connections
Katama Technologies, Inc.
Leverage Leadership
Marsh USA
MFP Connect
PowerSecure
Questline Digital
SpryPoint
Stem
The Energy Authority
Utility Financial Solutions

HCI Board of Directors:

Randy S. Howard, Chair
Brandon Renaud, Vice Chair
Ken Nolan,Treasurer
Jeff Haas, Secretary
Mark Ennis, Member
Branndon Kelley, Member

HCI Team

Marc Gerken, P.E., President and CEO
Nilaksh Kothari, P.E., Executive Consultant
Mark McCain, Exec. Consultant for Strategic Planning
Annette DuPont-Ewing, Director of Marketing