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# The Capacity of a Public Utility Commission to Steward Power Sector Transformation

Carnegie Mellon University

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# What do I mean by Power Sector Transformation?

- Overhaul of resource types, grid function
- New expectations, behaviors by citizens
- Adaptation of regulation to climate science
- Changed utilities role and culture
- Changed utility regulators

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# Alternate Titles

- Why is Progress so Hard?
- Why does Progress take so Long?
- Despite obstacles, why is Progress Inevitable?

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# Sections

- Trends
- The PUC
- Utility Performance
- **How Transformation Happens**
- Risk
- **A Menu of Options**
- **Examples**

# 1 Trends

Foundation to the rest



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# Forcers

## Technology

Digital  
Information  
About grid  
system  
About  
customers

## Citizen- Consumers

Active  
participants in  
energy system

## Climate Science

Policy  
imperative.  
(to some)  
overlaying on  
existing  
system

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# A walk through time and trends

- **60s:** Growth, growth pays for growth
- **70s:** Oil crisis, growth slows
- **80s:** Responses, a wide range
- **90s:** Competition (dissatisfaction with utilities)
- **00s:** digesting competition, slowing continues
- **10s:** clean energy costs plummet, smart tech and the Internet, climate science (electrification)

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# Reflection on PUC task from one RAP staffmember

- **00s** about perfecting a relatively static system
  - Fix incentives
  - Illuminate value of planning, energy efficiency
- **10s** about keeping up with raging progress outside the PUC
- PUCs with a few exceptions react to utility ideas, avoid pro-active initiative
  - Exceptions of a few states, decoupling, choice



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# Emerging Power of Customers (not just choice of supplier)

- More service options outside utility
  - Efficiency
  - Generation and Resilience
  - Free-standing
  - Sounds like competitive substitutes
- Is a new relationship between utility and energy consumer is emerging?



# Efficient Building Code



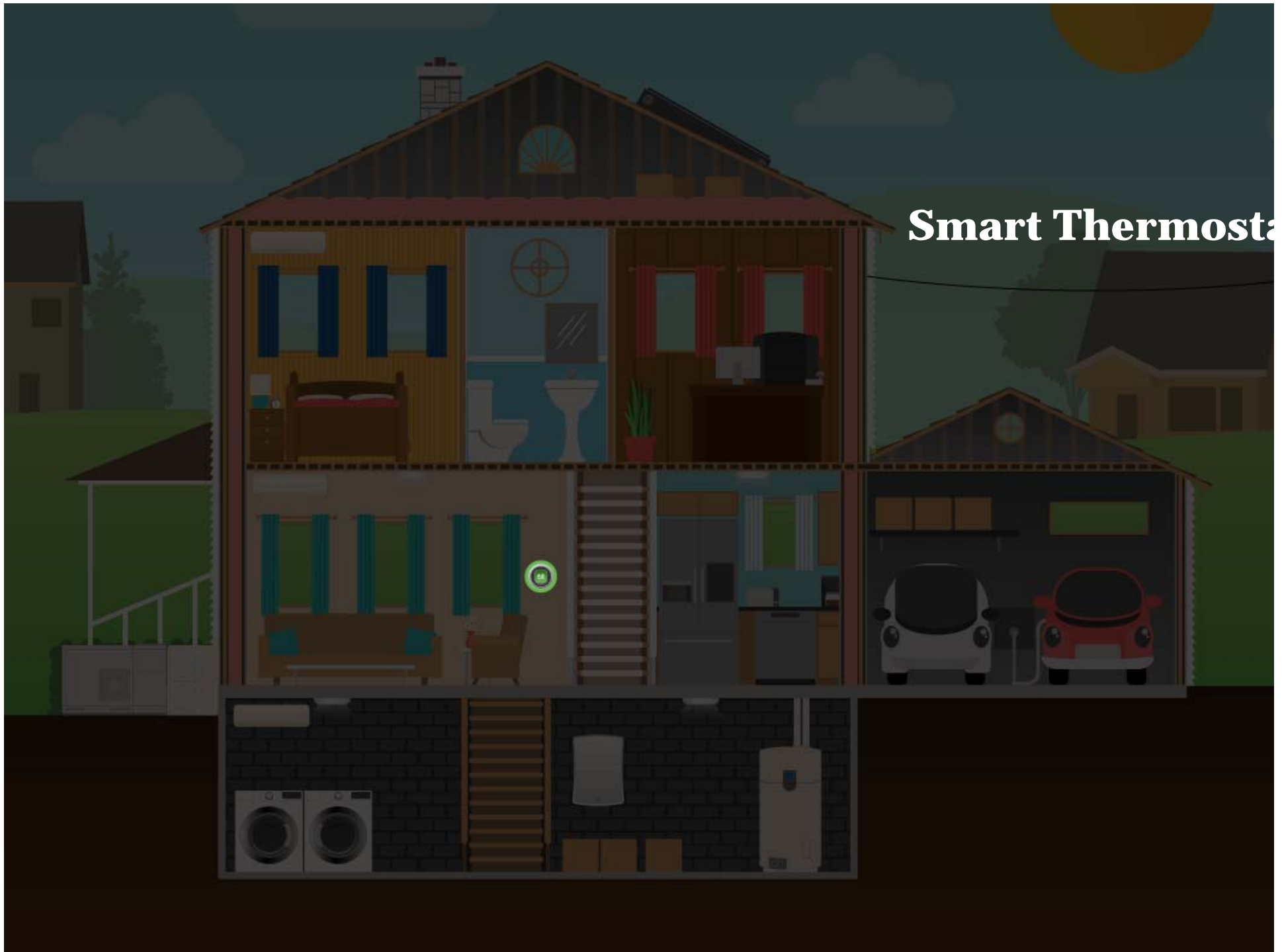
# High-efficiency Heat Pump with Air Exchangers



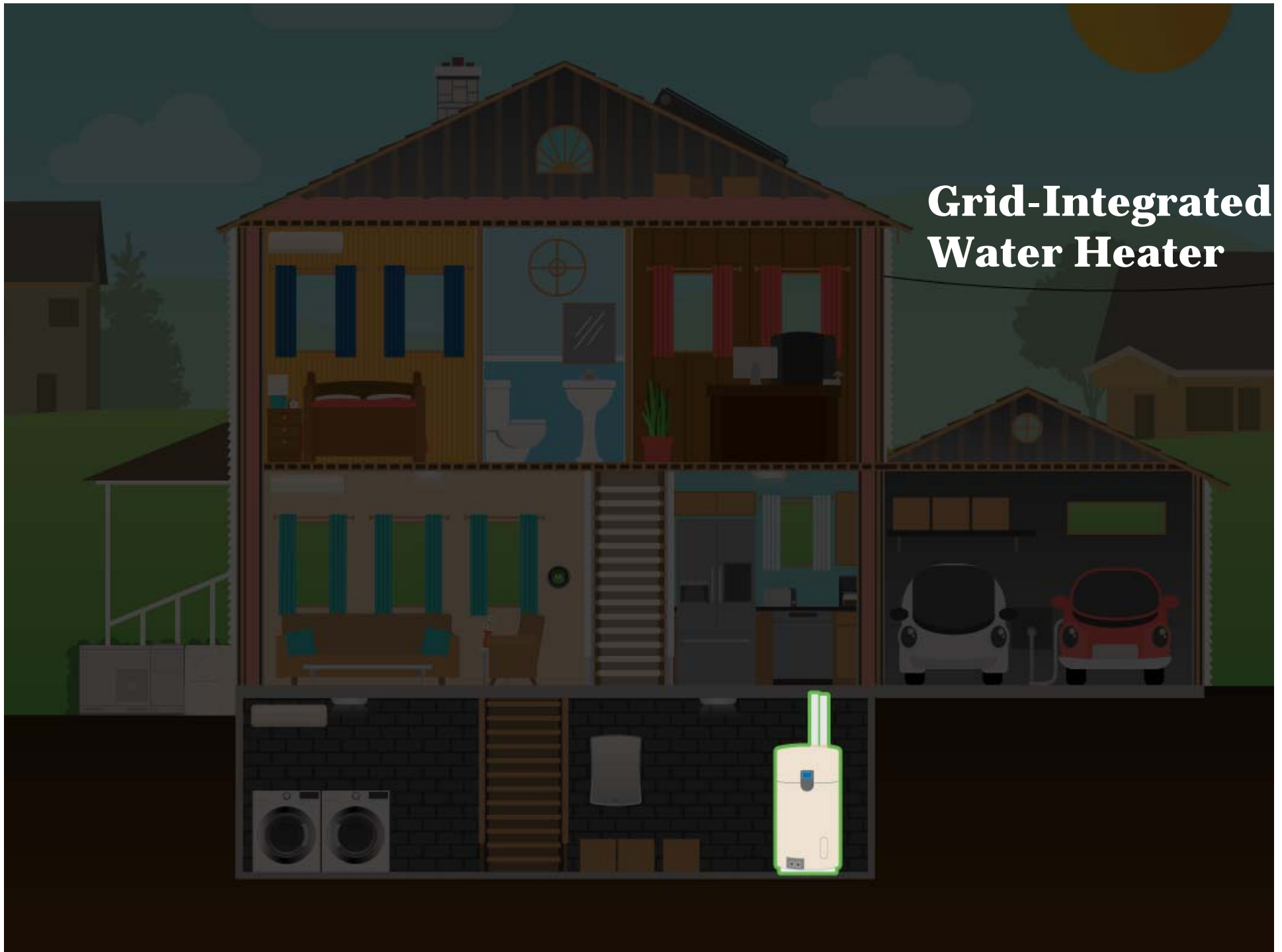
# Ice Storage

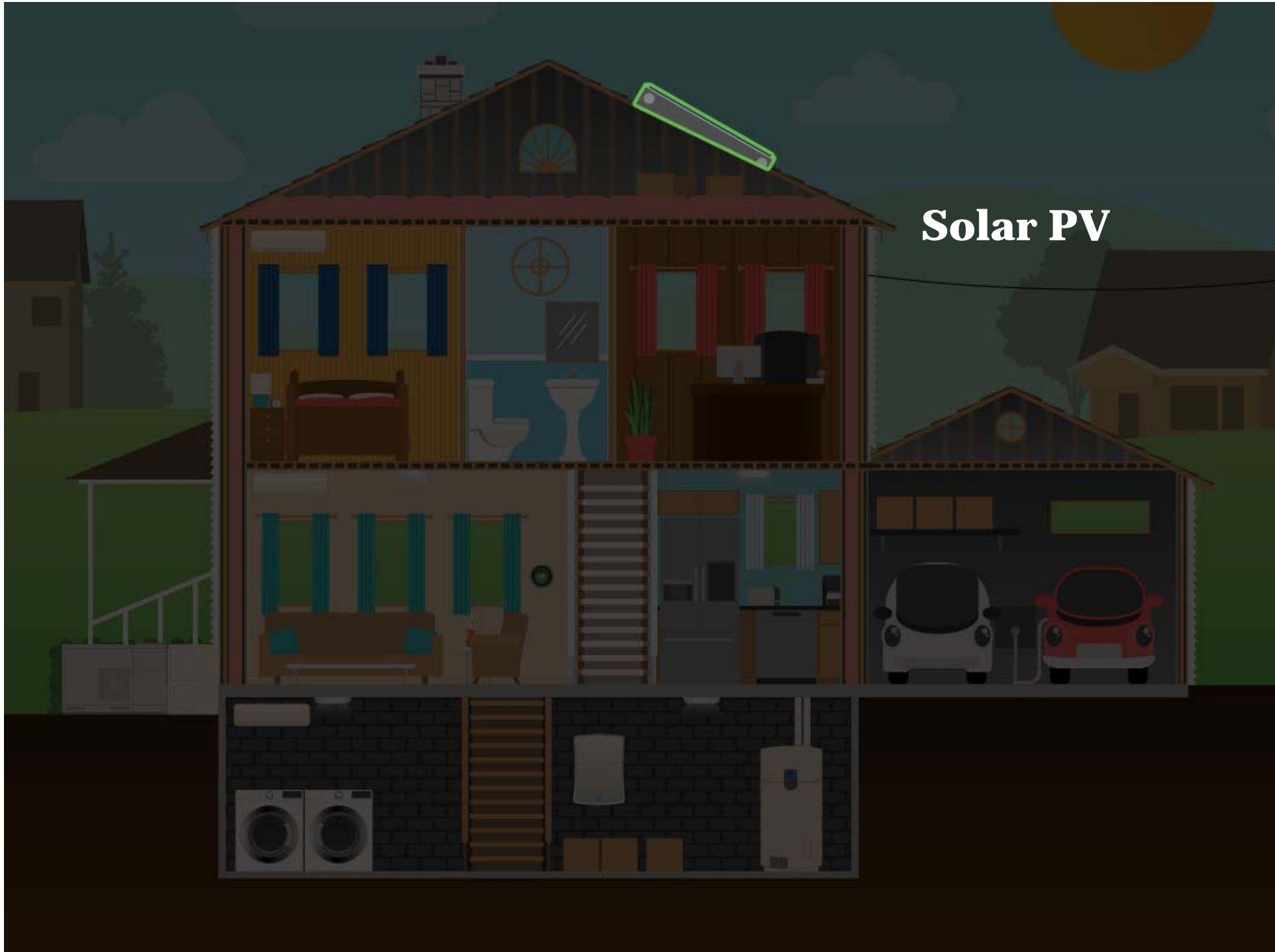


# Smart Thermostats



# Grid-Integrated Water Heater

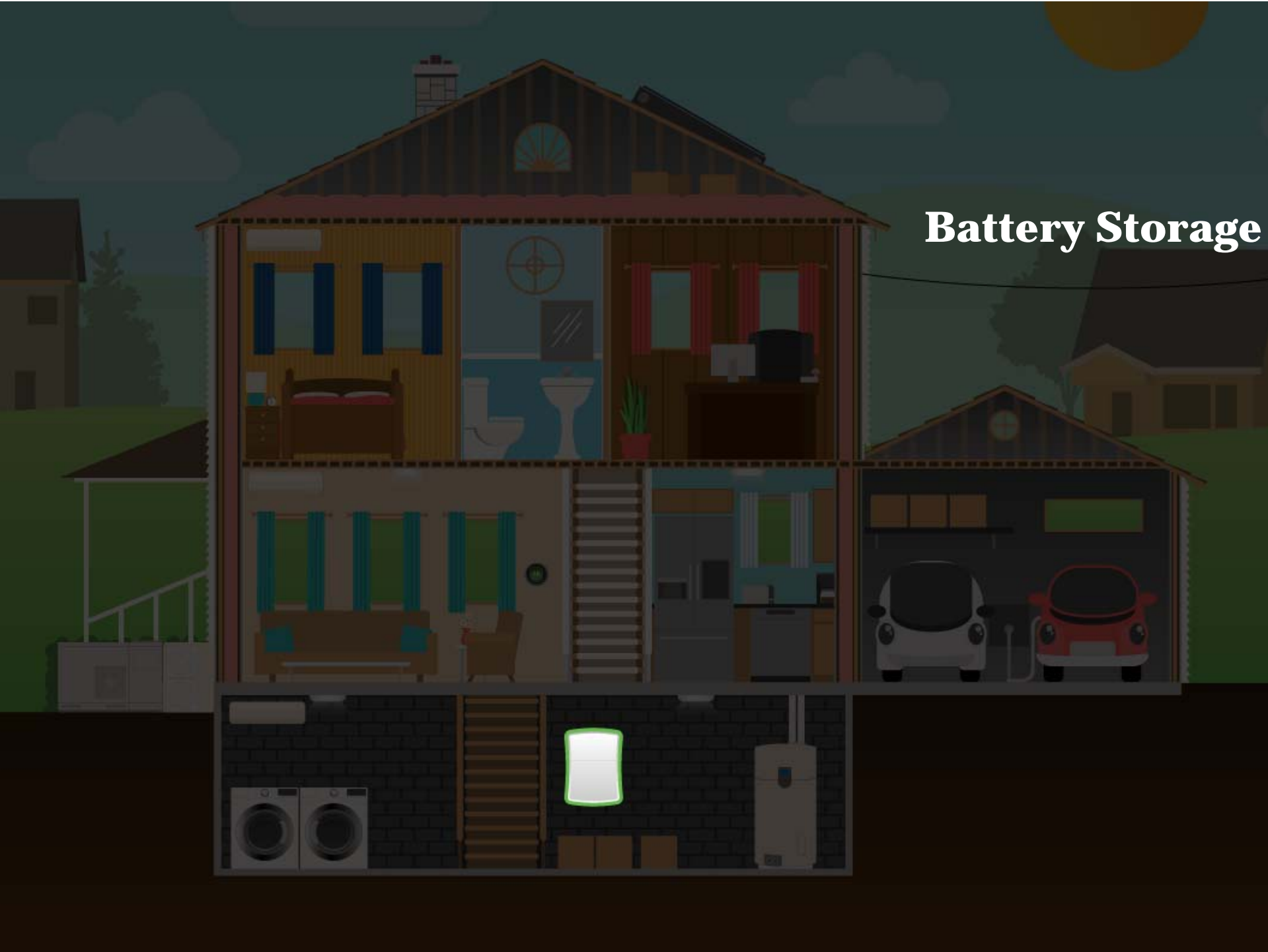




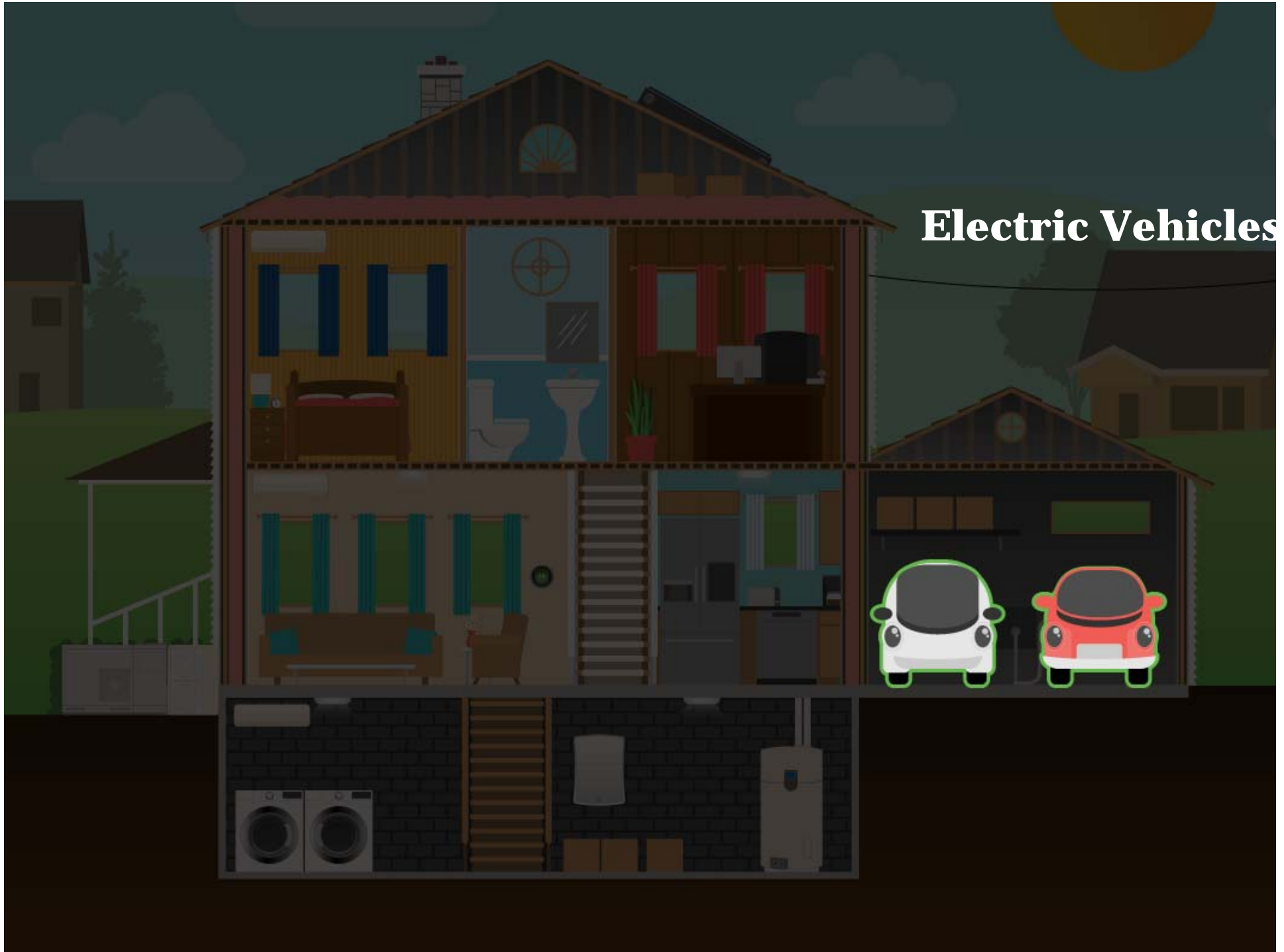
**Solar PV**



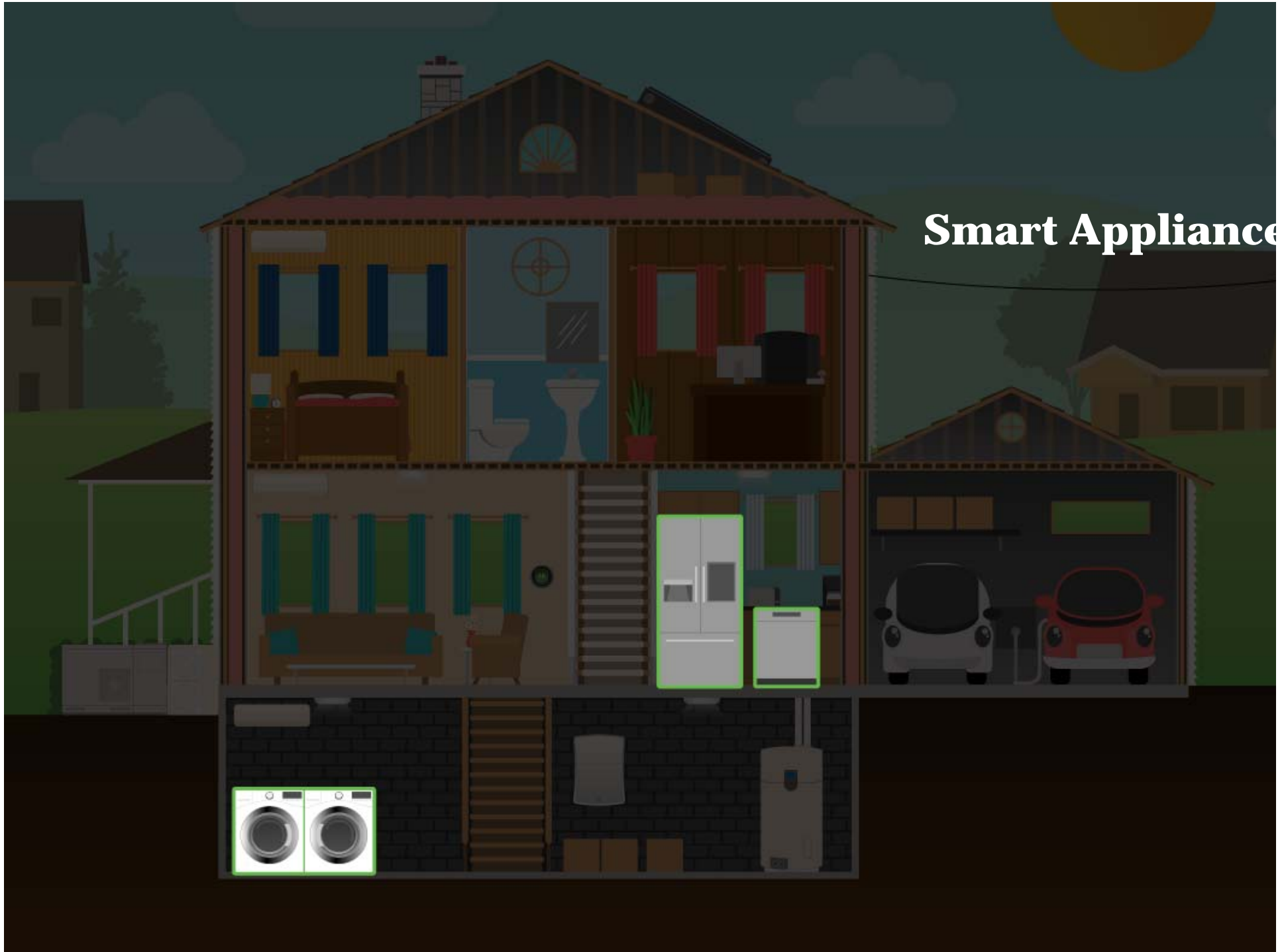
# Battery Storage



# Electric Vehicles



# Smart Appliances



**Still Connected to  
the Grid**



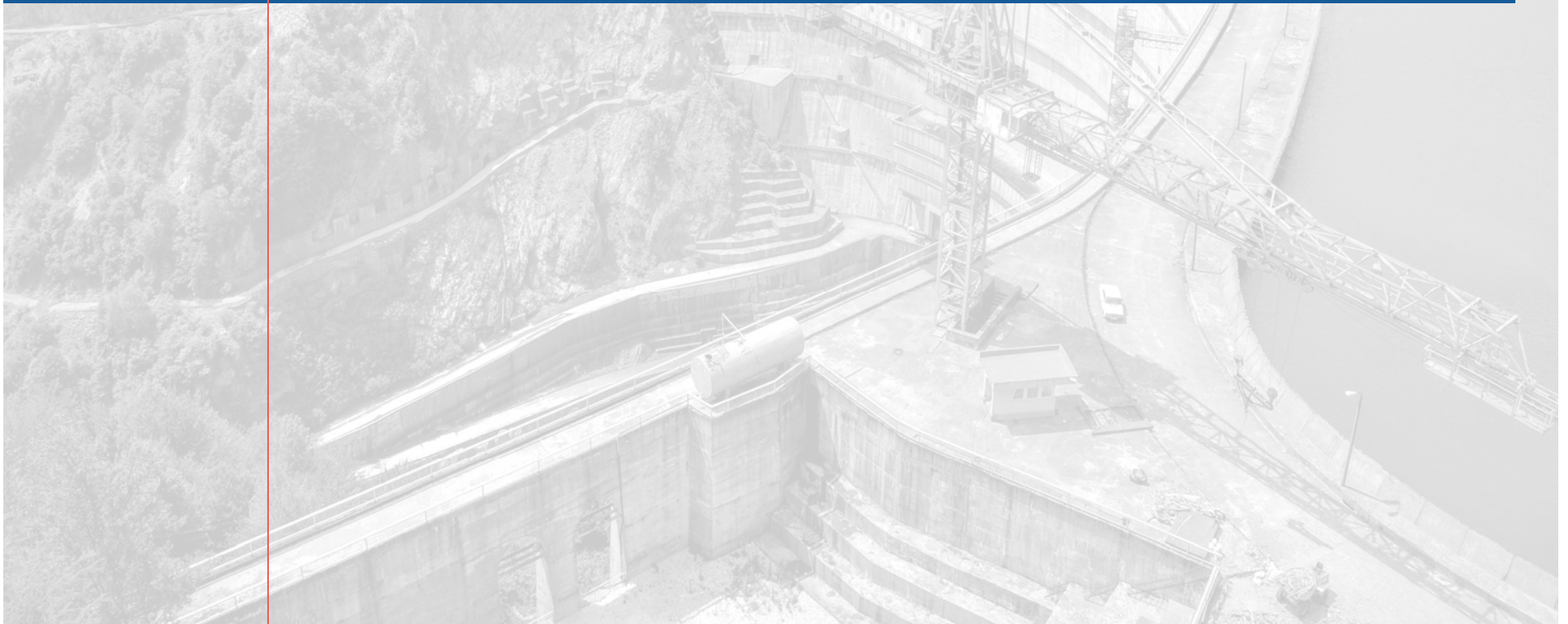
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# Where is the utility in the trends?

- Astute assessments of trends
- Guarded about leading
  - “No good deed goes unpunished”
  - Astute assessment of risks to cash flow, return
- Will follow government lead to solutions
- Will protect itself with vigor
- May rise to the occasion as a solutions provider

# The Public Utility Commission

The place to resolve Power Sector Transformation Details



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# The Public Utility Commission: What is it?

- $\frac{3}{4}$  of states+, commissioners are appointed by the governor
- $\frac{1}{4}$  of states, commissioners are elected in varying ways
- Many learn want to be reappointed
  - Some don't care

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# The Public Utility Commission: What is it?

- Authority over monopolies
- Authority comes from statutes
  - Statutes leave varying openings for implementation judgment
- Expert staff
- Quasi-judicial
  - What is this “quasi” thing?



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# PUC staffs: very important

- Staff composed of administrative lawyers, economists, power system engineers
  - **Influential** esp. with non-expert commissioners
  - Well composed for **routine** work

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# The Public Utility Commission: What does it do?

- Routine work
  - Sets revenue requirement and rates
  - Evaluates large investments and plans
  - Siting (many, not all)
  - Rules
- Exceptional work
  - Generic investigations

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# The PUC Exists in a Context (it is not all-powerful)

- An expert administrative agency, deference
- Nested in a **political** environment
- Statutes only begin to describe **limits** of PUC authority
- Latitude varies by state
  - “Leash” can be pulled by governor, legislature
  - Acting on behalf of stakeholders to “nudge” the PUC to **do/not do**

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# Stakeholders: A Rainbow of Interests

- Utility
  - What it specifically does
  - How it makes money (allowed return on equity)
  - How it raises money\*\*\* (investment grade debt)
- Consumers (all sizes, types, groups)
- Other interests (eco devo, environment, innovator)
- The Public Interest: some states have an office  
that advocates in the broad public interest

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# Regulatory Capture

- When the PUC is more interested in one group of stakeholders' interests than the public interest
  - Not always easy to determine that this has happened until time passes
- Indicators of regulatory capture
  - Uneconomic behavior permitted, approved
  - Utility business protected against innovation

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# PUC staffs: very important, possibly miscast for the future

- Staff composed of administrative lawyers, economists, power system engineers
  - **Influential** esp. with non-expert commissioners
  - Well composed for an earlier time
  - **New challenges** (cyber-security, climate)
  - **New opportunities** (behavioral science, digital, population statistics, distribution engineering)
  - **Transition** (process capabilities)

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# Comments on Existing PUC Process

- Rigid: evidence-based and legalistic, apart
- Routine: designed for typical types of litigation
- Expert: arcane jargon speaks to regulars
  
- Think of a Victorian Era dance with all the rules and repetition and the bowing
  - Except these partners are trying to win





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# Why is the PUC Process the way it is? Protection

- Regulation is basically about protecting citizens from monopoly power of the utility
  - And in doing that, clarifying for the utility its job and how it will earn money
- “Sunshine” thought to avoid corruption
  - Public deliberations become theater, inhibit honest engagement by decision-makers

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# Manifestations of Protection

- Access to service for all
  - especially Hard to Reach Customers
- Fair dealing on
  - Connecting
  - Pricing
  - Many other actions we rely on
    - Increasingly, barriers to entry

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# What business should the utility be in?

- A: Monopoly businesses only
- B: A plus business lines with economies of scope
- C: Anything the utility wants to do

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# What business should the utility be in? Answer:

- If you want the easiest answer to manage for the PUC, then A, monopoly business only
- Typically in the US, the answer is B, monopoly +
  - See energy efficiency
  - Now, what about EV charging, other customer solutions
- Effects on competition and innovation: complex

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# What's the Concern about utility business lines?

- On the one hand, utility scope is powerful
  - Great way to **stoke demand** across population fast in infant industry
- On the other hand
  - Could also be a great way to **stifle innovation**
  - Monopoly power could be a problem unless actively managed by the PUC

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# Protections if Utility gets Competitive

- Complicated, but PUC has tools
- Create **Affiliate** to compete
  - With Affiliate Transaction Rules
- Codes of Conduct for **competitive activity within the utility company**
- Harder to oversee than a pure bright line test
  - Accept this burden if there is a public interest

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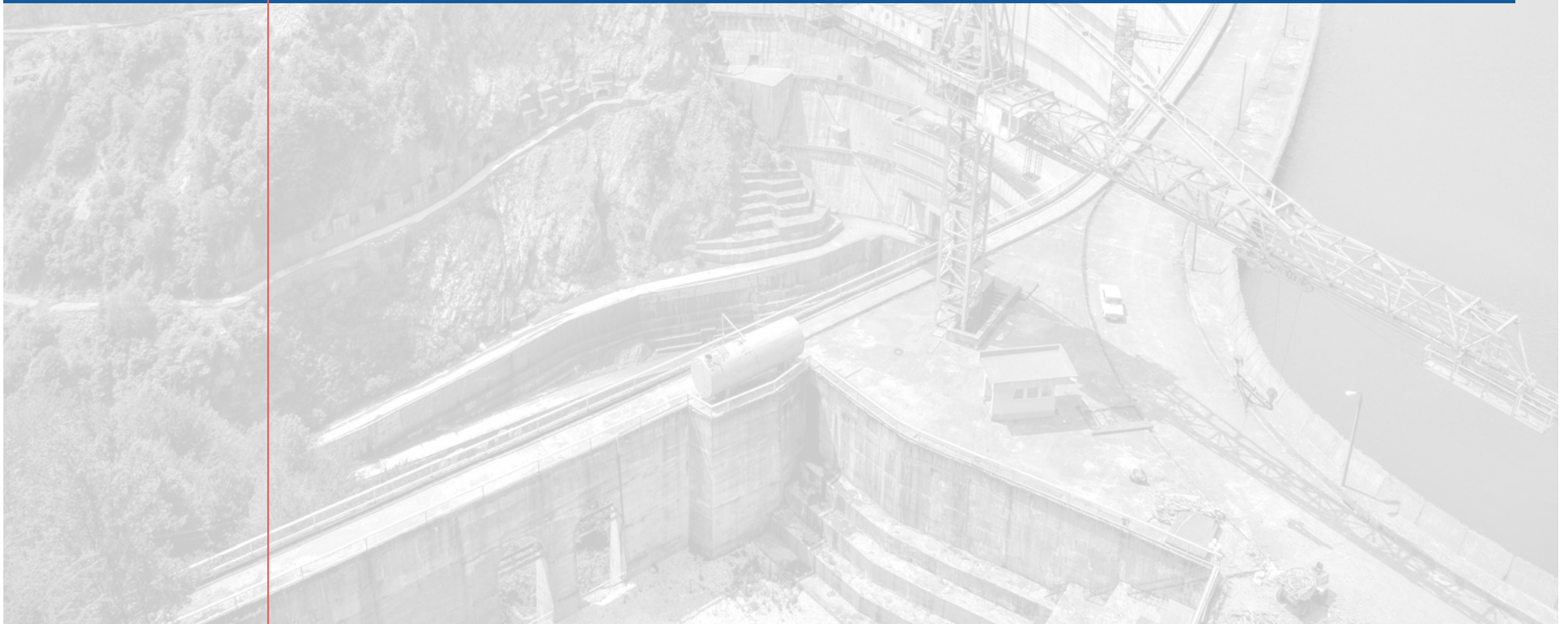
# One way to think about Power Sector Transformation:

- Reset the balance between Regulation and Markets



# 3 Utility Performance

As the Power Sector Transforms, how do we know how we are doing?





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# Let's look at utility performance

- Should we measure performance?
- How to measure performance?
  - Performance of what?
- How much should performance matter for utility earnings?
- Does public airing of utility performance do all we need to motivate the utility?

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# Reflection: What we want from the utility changes

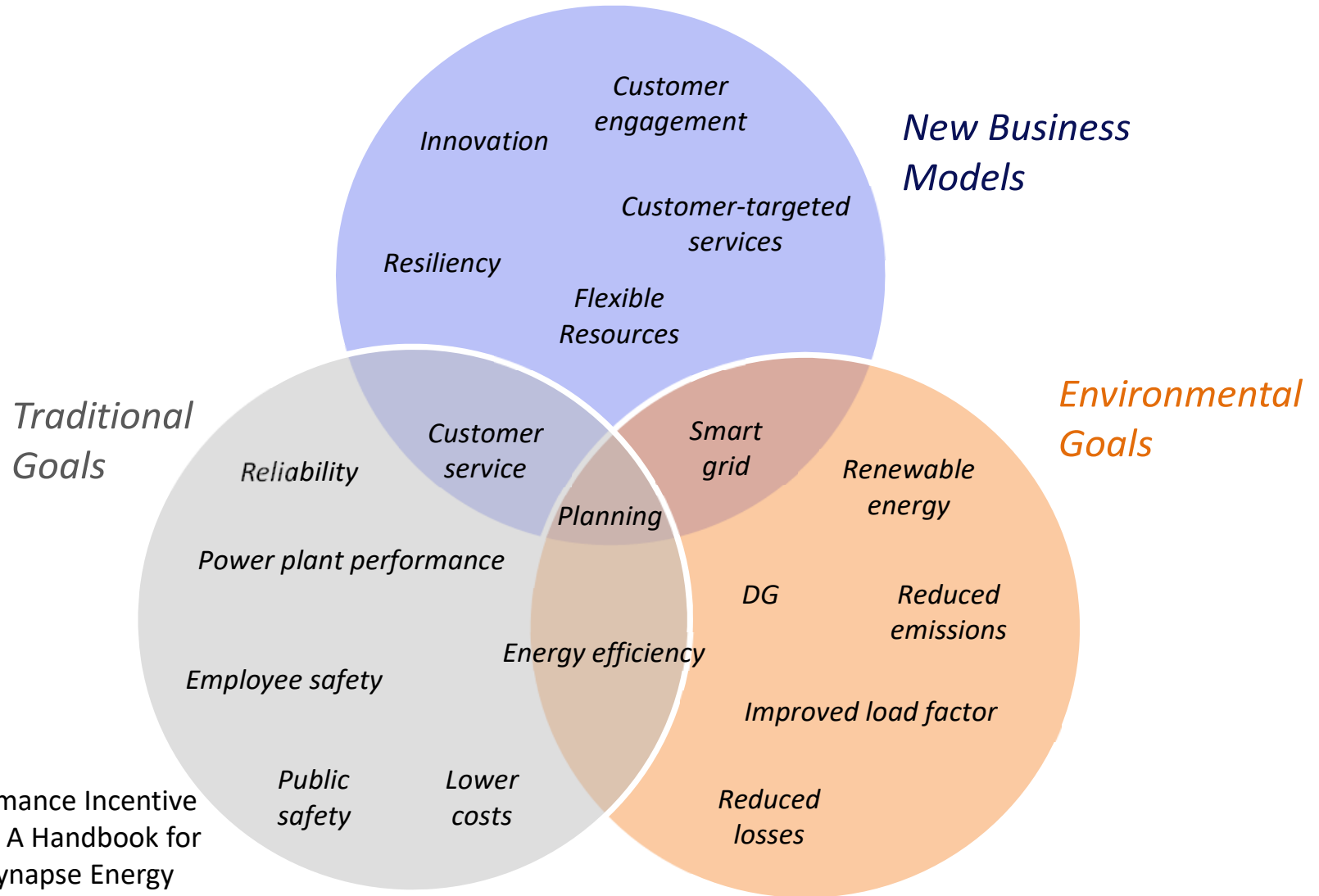
- 60s and previous: we wanted growth the match the nation's
  - Earnings on invested capital matches imperative
    - Plus positive margins on sales growth
- Since: utility growth increasingly problematic
  - Cost, Risk, Environment and Land use
  - Service more important
  - Externalities more important

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# Likely categories of performance metrics

- Cost
- Carbon

**Figure 2. Dimensions of Utility Performance That May Warrant Tracking or Incentives**

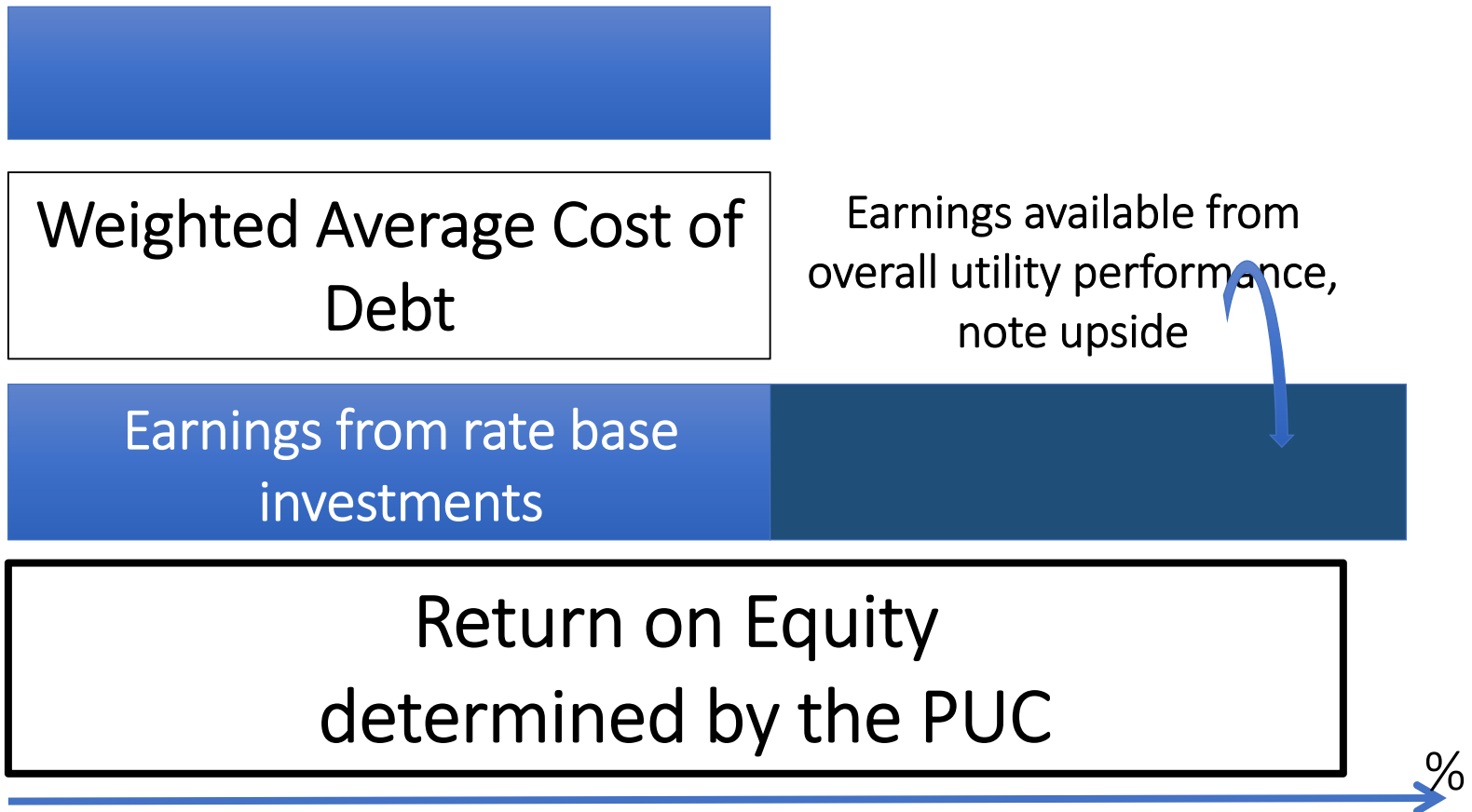


Utility Performance Incentive Mechanisms: A Handbook for Regulators, Synapse Energy Economics for Western Interstate Energy Board, March 9, 2015

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**How are these changes in public interest and expectations reflected in utility earnings?**

# Performance-Oriented Earnings

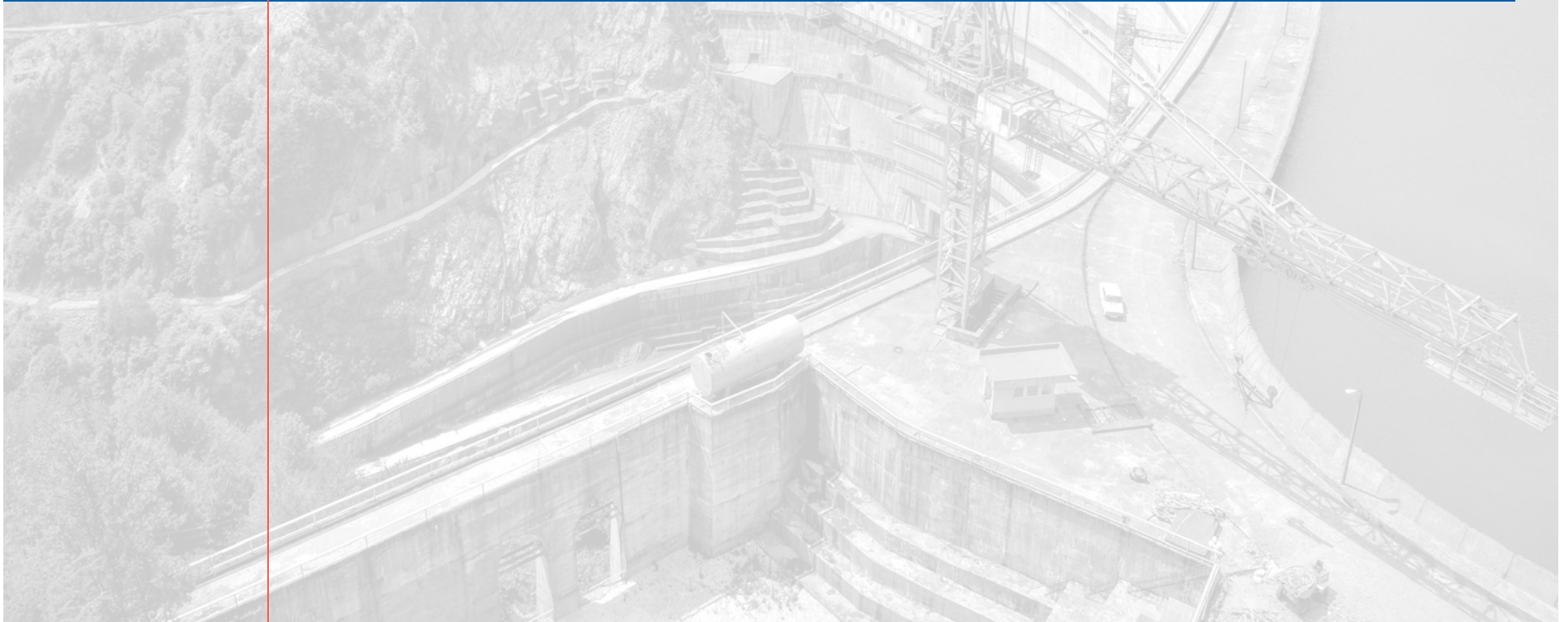


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# What goes into Rate Base? And is there a Capital Asset Bias?

- Assets go into rate base, of course
  - Traditional system motivates utilities to expand rate base by building more assets
- What about asset substitutes?
  - There are more of these than ever
    - Non-wires alternatives to grid challenges
    - Software as a service (cloud computing)
  - States finding ways to **reverse capital asset bias**

# 4 How Transformation Happens





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# Pressure for Transformation has been building (this is global)

- A visit to a home store will discover many ways the utility business is under siege
  - Citizen/consumers/communities taking more agency in their energy choices
    - Saving or electrifying
    - Managing
    - Producing
    - Storing

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# What Triggers Transformation as Government Policy?

- Leadership
- Crisis

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# Nature of Innovation Applied to Power Sector

- Sources and Effects of innovation need space and dialogue, need perspectives of market actors
  - Many of these voices are unfamiliar with the PUC

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# Innovation and PUC process

- Safest path for utility is what got approved before
- Innovation is in opposition to routine
- Other vested interests use PUC process to block innovation
  
- If PUC only responds to utility proposals, transformation is far less likely

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# Once Transformation is Policy, what now?

- Process innovation is key
- Innovation not compatible with a hearing room
- Innovation is about new ideas, new voices
  - Many not comfortable with rigid PUC process
- Engagement in informal settings
- Dialogue, best if facilitated with direction based on state priorities

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# Process Innovation > actual innovation

## Hint: think ADR methods

- Open it up
  - Diversify from Evidence-based hearings
- Deploy workshops and informal opportunities
  - Dialogue, engagement, synthesis
- Build community of problem-solvers
- Tee up solutions for required decision hearings
- **Process Innovation for Actual Innovation**

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# A new dance: Policy Adoption Iterates with PUC Implementation

- Informal process engages community
- Informal process must lead to action at the PUC
- Action at the PUC leads to new questions suited for informal process
- And back and forth
  
- Informal process may need to be led by executive branch if PUC can't/won't

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# As many ways forward as there are states

- Common qualities for progress
  - Recognition by leaders of opportunity
  - A problem solving culture
  - Engagement of anyone
  - A dedicated website

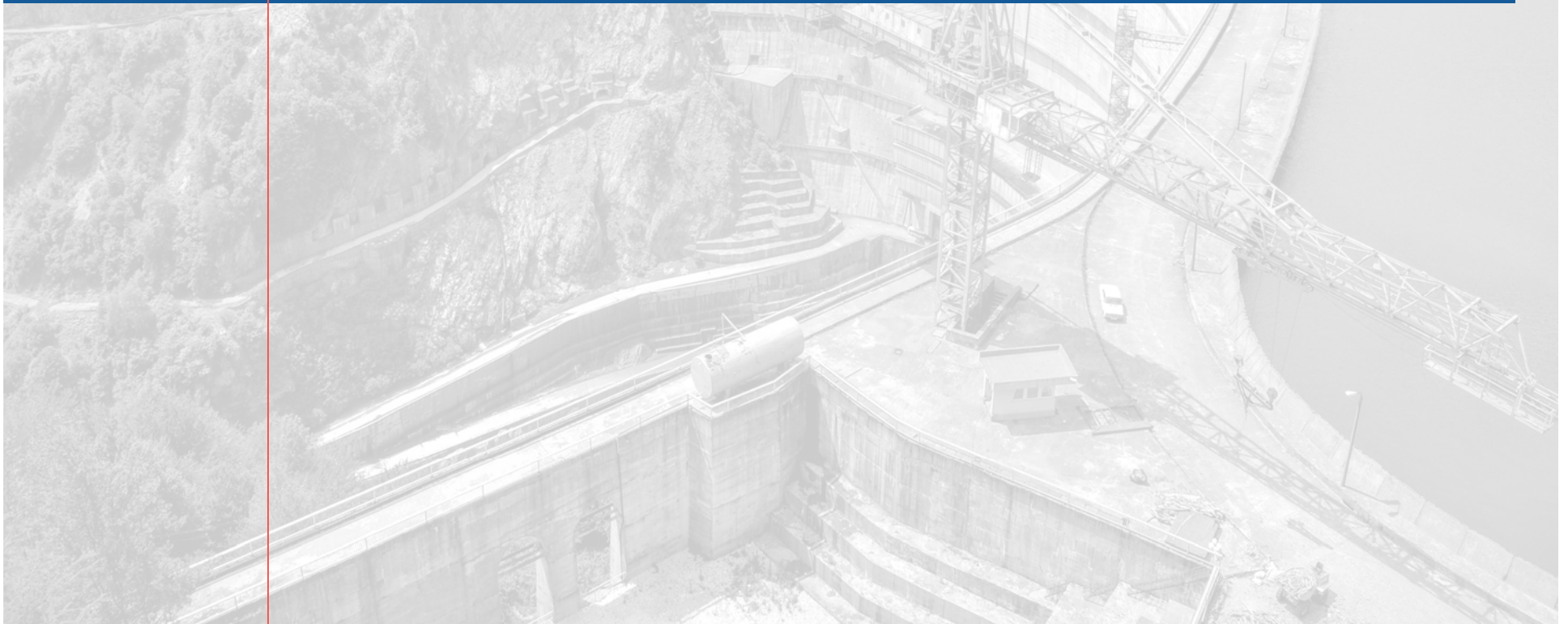


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# A+ efforts

- Integrated state interests, redefining scope of the utility
- State leadership in command of issues, taking initiative in an orderly, stable manner
- Regional awareness
  - Including effects on wholesale markets

# 5 Risk



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# Risk Aversion is a Characteristic of Utility Regulation

- Instinct to Protect
- Traditionally, best strategy is “stay out of sight”

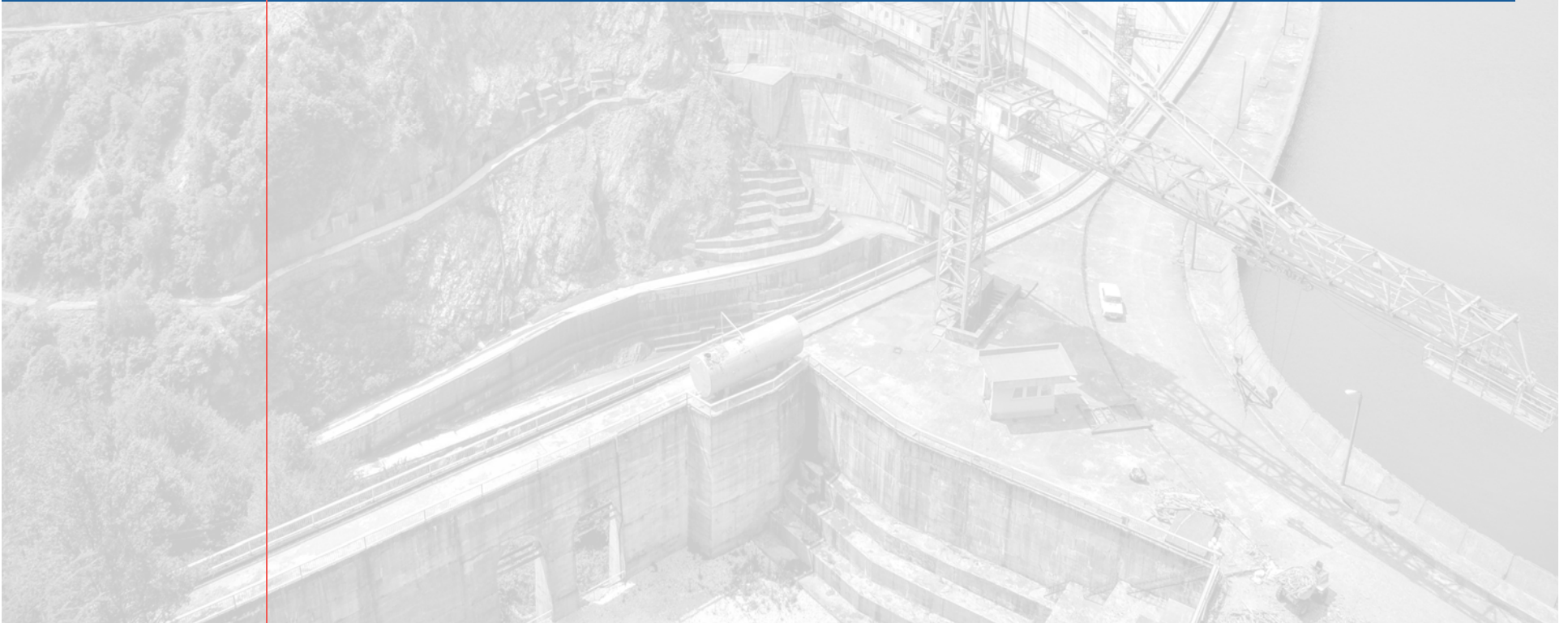
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# Some Risks we worry about

- Spending too much money
- Spending money on the wrong stuff
  - Other stuff more suited for public interest
  - Obsolescence, no longer useful
  - Poor decision criteria (ex. Lost Externalities)
- Personal career path
- Inaction, indecision, lost opportunity
- Consumer confusion, abuse, backlash

# 6 A Menu of Options

With all this complexity, the way forward can seem foggy  
Good news, there are solutions



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# How to approach this big honking issue of PST? Prioritize

- **Money** issues
  - How we pay? (time sensitive pricing, others)
  - How utilities earn? (return on performance)
- **Engineering**
  - Push technology out (smart grid, smart meters, data management and analytics)
- **Planning**
  - Open up distribution system

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# How to approach this big honking issue of PST?

- **Resources** Overhaul Options
  - Which ones are **rising/falling in cost/risk?**
  - More **efficient** devices, processes, enterprises
  - Drive **renewables** faster (portfolio standards)
  - Keep the **nuclear** we have (ditto)
  - **Procurement** (esp at distribution level)
  - **Aggregation** (consumer choice aggregation)
  - **Pricing** as a resource (big data and behavior)

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# How to approach this big honking issue of PST?

- Role of delivery utility could be quite different
  - Utility as a **Platform**
  - A business environment matching sellers and buyers of energy products and services
  - All consistent with managing the system with baseline reliability and protections
    - Utility compensated in ways consistent



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# Process Innovation

- Stable problem solving
- With political leadership
  - Inter-agency collaboration
- With clarity, vision from PUC
- With increasingly capable community of interests
  
- Don't fail to take advantage of a crisis

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# What if Climate Science were as important as Protection?

- Greening grid, electrification
- Social Cost of Carbon would factor into all utility investment and operating decisions
- Barriers to entry for clean energy resources would be minimized
- Customers free to choose more clean energy, causing additional investment
- Utility earnings connected to reducing carbon

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# State to State Competitiveness

- Race to the Top
  - In innovation
  - In spreading innovation to hard to reach places
  - In cost/carbon management

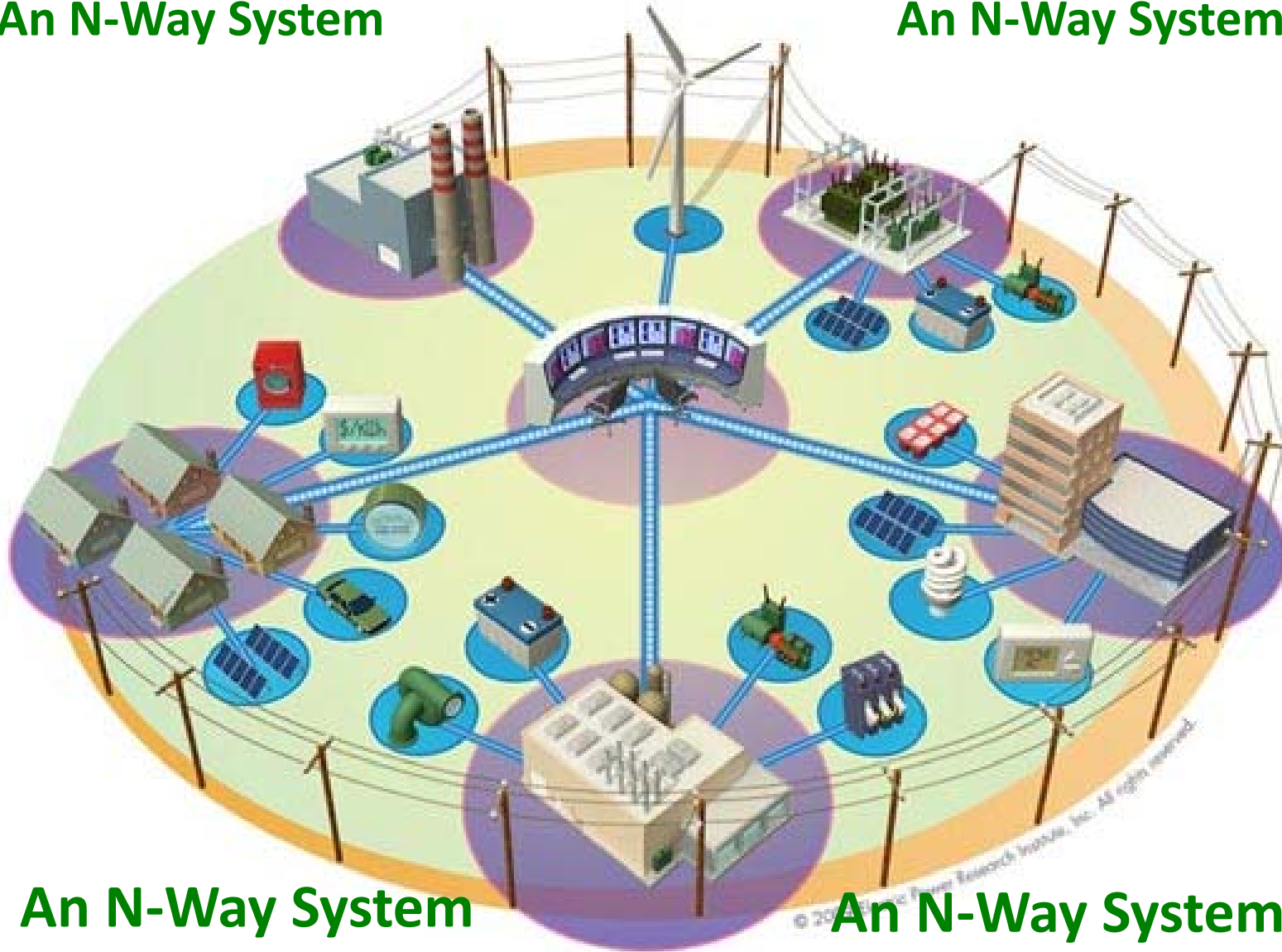
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# Transactive Energy: A visionary concept or a likely destination?

- Peer to peer transactions
  - On a platform
  - An N-way system, participants have full access and visibility to markets to monetize services and grid capabilities they produce

An N-Way System

An N-Way System



An N-Way System

An N-Way System

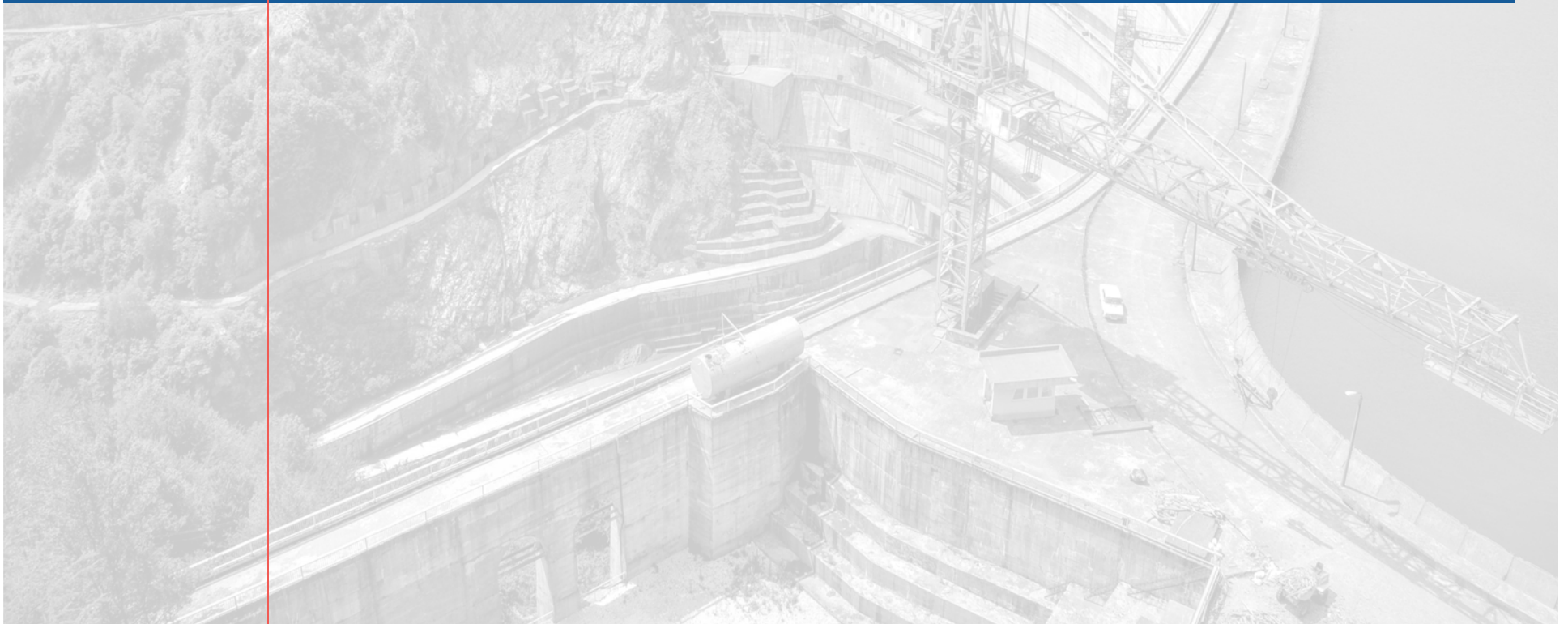
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# Are Grid Operators a Part of this Innovation?

- Challenge/Opportunity to “manage” millions of points of entry to the grid (EVs, DG, GEB, storage)
  - Evolving from “controlling” a some thousands for grid assets
  - New skills and perspectives
  - New awareness from FERC, redefining (while not fundamentally changing) jurisdictional line

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## Experiences of some note



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# New York

- Ambition to change everything
- Minimal use of traditional regulatory methods
  - Staff white papers
  - Workshops and working groups
  - Comments and Reply Comments
  - Public Hearings (outside the state capitol)



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# California

- Approaching topics serially
  - Meanwhile, fires are disrupting everything
- Rate design
- Smart grid deployment
- Aggressive reform of wholesale markets

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# Most states don't relate to NY and CA – others to watch

- Rhode Island – Power Sector Transformation
- Minnesota – e21
- Michigan – Power Grid
- Maryland – Empower, PC44
- Arkansas – DER and Grid Mod
- Illinois – Future Energy Jobs Act
- Nevada, Oregon, Carolinas, Washington, Texas



**Suddenly, knowing a lot about the U.S. power grid became sexy at cocktail parties.**

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# Resources: Transformation Websites

- [New York Reforming the Energy Vision](#)
- [Transforming Maryland's Electric Grid PC44](#)
- [Rhode Island Power Sector Transformation](#)
- [Michigan Power Grid](#)
- [Minnesota e21](#)
- [North Carolina Clean Energy Plan](#)



# About RAP

The Regulatory Assistance Project (RAP)<sup>®</sup> is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at [raponline.org](https://raponline.org)



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