

*Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?*

---

**Executive Summary**

1. Energy policy choices must take into account the substantial complexity that is involved in making decisions about how the energy sector can best meet the needs of society. At the foundation of any policy decision there must be a deep understanding of the nature of electricity and the vital role it plays in society
2. The U.S. electric infrastructure was built on the foundations of a regulated model. After a century of electric regulation, it is only in the last 15 years that some states have chosen to experiment with the regulatory model
3. Electricity has historically been regulated because it is truly unique, with four fundamental characteristics that differentiate it from any other product or industry. All of these characteristics mean that the electric industry must ensure the availability of substantial “excess” supply (that goes unused most of the time) to meet and exceed the highest peaks of demand
  - a) Electricity is an essential service with no substitutes
  - b) Demand for electricity is highly variable
  - c) Electricity cannot be stored in “inventory” to smooth out that variable demand
  - d) The electric industry is one of the most capital intensive and there is a long lead time to build new capacity
4. The reliability of electricity (provided for by excess supply) is what economists call a “public good” – everyone benefits from it and no one can be excluded from benefiting from it, even if they do not pay for it. Public goods like electric reliability tend to be under-supplied in a pure free market economy, and usually need to be provided for through government regulation or intervention

---

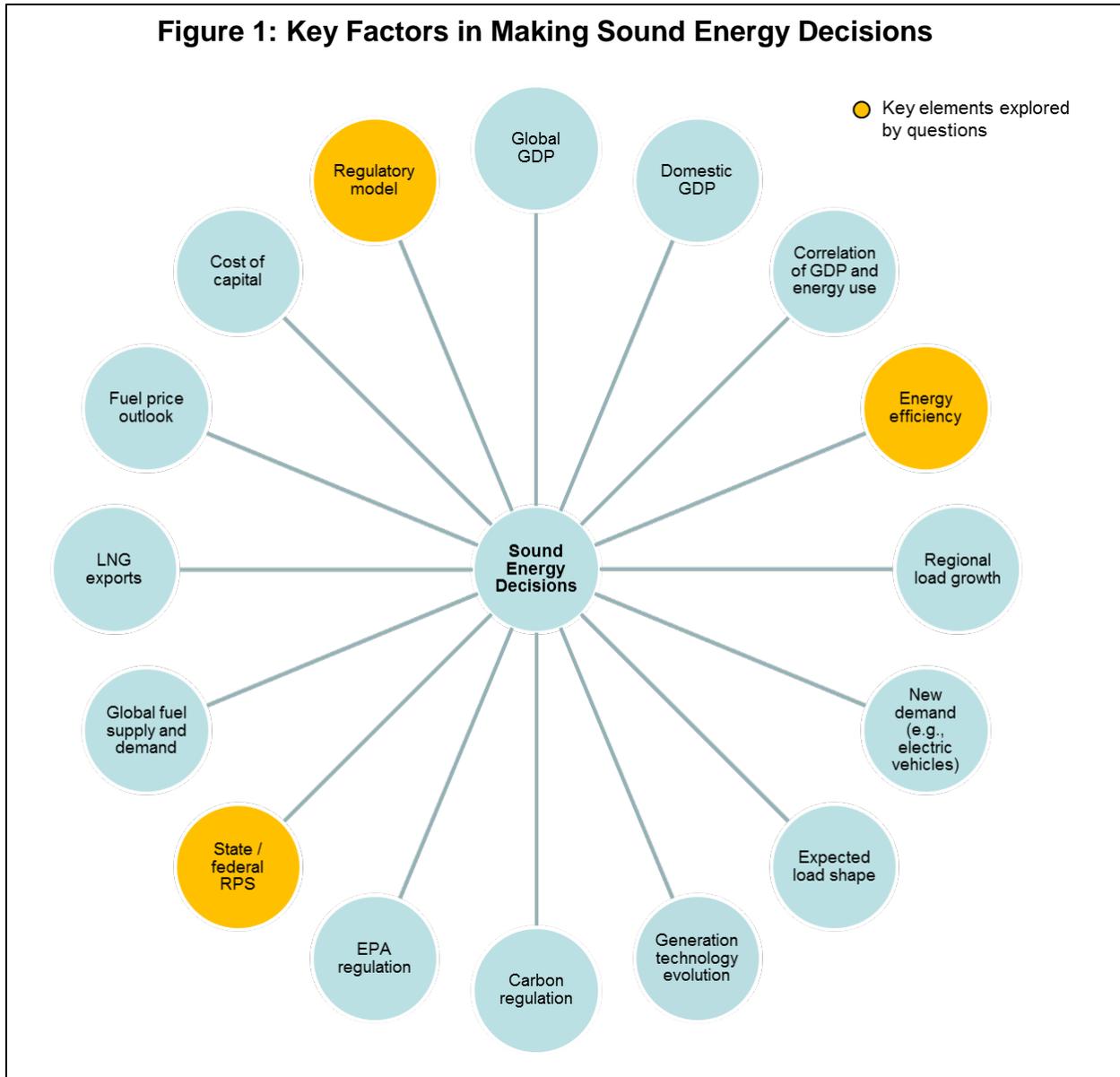
**1. Energy policy choices must take into account the substantial complexity that is involved in making decisions about how the energy sector can best meet the needs of society**

Meeting energy needs involves a thoughtful balancing to ensure reliable service at the most reasonable price possible, in a way that protects the environment and the health of people.

Companies that are involved in producing and distributing electricity must take into account numerous factors when making decisions around how best to provide that service. The decisions companies make have ramifications that last decades and are influenced by factors that cannot be predicted.

*Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?*

Figure 1 provides an overview of some of these factors, highlighting the main ones that are addressed in questions posed by the “Readying Michigan to Make Good Energy Decisions” process.



In order to make good energy decisions for the long term, policy makers need to consider the complexity of energy industry dynamics, develop an understanding of the factors that influence these dynamics and craft policies that allow legislators, regulators, the public and energy companies to adapt to circumstances that simply cannot be foreseen. Some of these factors are addressed through this process, while others need substantial discussion so that their implications on policy choices can be well understood.

*Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?*

---

At the foundation of any policy decision there must be a deep understanding of the nature of electricity and the vital role it plays in society – discussed below.

**2. The U.S. electric infrastructure was built on the foundations of a regulated model**

In its early infancy, the electric industry was not regulated. Utilities competed to supply the same customers, inefficiently building multiple power lines to the same house or neighborhood. Utilities focused their service on densely populated and wealthy neighborhoods where they could make more money. In response to these developments, state regulation of utilities began in the early twentieth century. One of the regulators' initial requirements was that electric companies offer "universal service (to poor as well as rich customers)" – recognition of the essential role electricity would play in the nation's economic growth and prosperity.

[Source: U.S. Department of Energy 2002, "A Primer on Electric Industry Restructuring"]

Through the twentieth century, regulation supported the extensive build out of the nation's electric infrastructure and service. Regulators today are involved during every step of the electric value chain – generation, transmission, and distribution. As shown in Figure 2, regulators' roles include ensuring system safety and reliability and protecting consumers and the environment.

In addition to these safeguards, the regulated model provides benefits through the industry's vertical integration. Numerous academic studies demonstrate that vertical integration in this industry provides valuable cost savings and efficiencies.

[Source: Robert J. Michaels, "Vertical Integration and the Restructuring of the U.S. Electricity Industry," *CATO Institute Policy Analysis*, No. 572]

Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?

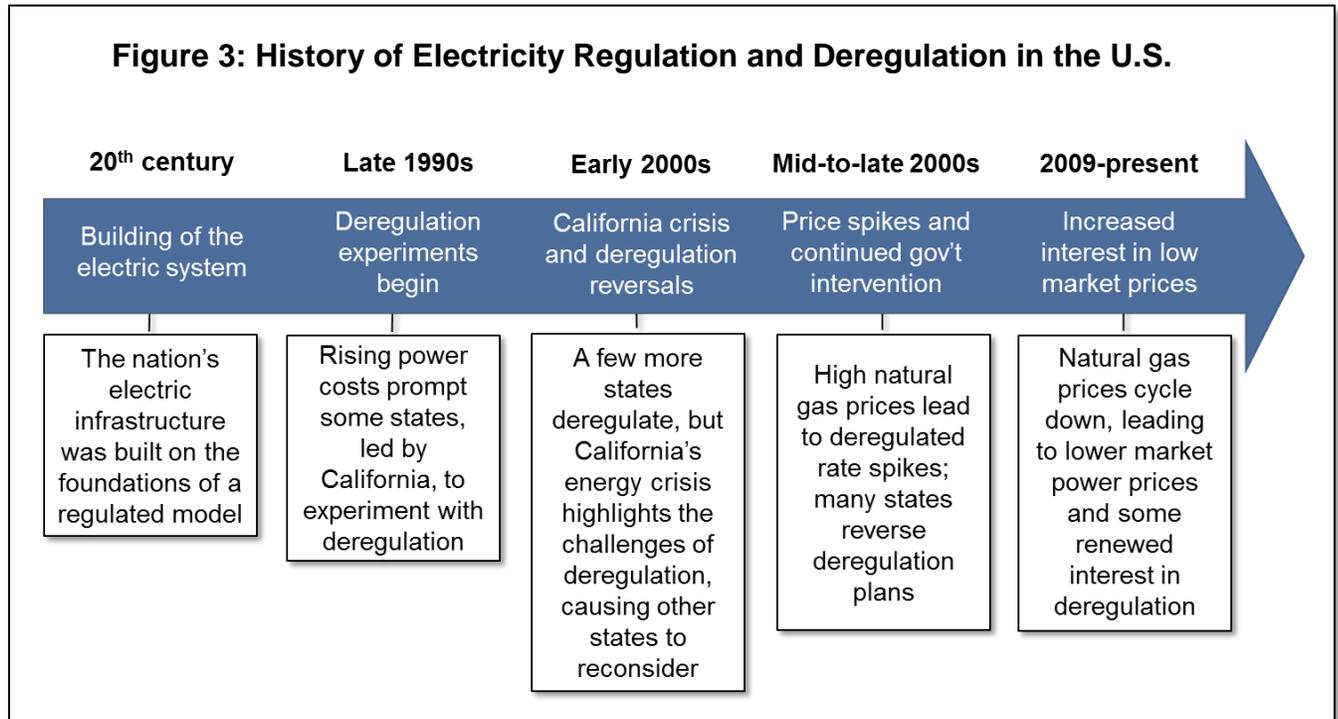
**Figure 2: Key Regulators of Michigan’s Electric System**

Regulator	Primary role(s)
	<p>1</p> <ul style="list-style-type: none"> <li>• “Establish fair and reasonable rates”</li> <li>• “Assure adequate and reliable supplies”</li> <li>• “Assure the security of the State’s critical infrastructure”</li> </ul>
	<p>2</p> <ul style="list-style-type: none"> <li>• Coordinate dispatching of most cost-effective generation in Midwest</li> <li>• Support operating reliability of Midwest electric supply</li> </ul>
	<p>3</p> <ul style="list-style-type: none"> <li>• “Protect reliability of ... interstate transmission”</li> <li>• “Regulate ... wholesale sales of electricity in interstate commerce”</li> <li>• “Monitor and investigate energy markets”</li> </ul>
	<p>4</p> <ul style="list-style-type: none"> <li>• Regulate nuclear power reactors to “protect the public health, safety, and the environment”</li> </ul>
	<p>5</p> <ul style="list-style-type: none"> <li>• Develop and enforce regulations to ensure electric system operations protect human and environmental health and sustainability</li> </ul>

1. [http://www.michigan.gov/documents/mpsc/2011\\_MPSC\\_Annual\\_Report\\_378366\\_7.pdf](http://www.michigan.gov/documents/mpsc/2011_MPSC_Annual_Report_378366_7.pdf)  
 2. <https://www.midwestiso.org/AboutUs/Pages/AboutUs.aspx>  
 3. <http://www.ferc.gov/about/ferc-does.asp>  
 4. <http://www.nrc.gov/about-nrc/organization.html>  
 5. <http://www.epa.gov/aboutepa/whatwedo.html>

Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?

After a century of electric regulation, it is only in the last 15 years that some states have chosen to experiment with the regulatory model, with deregulation and vertical de-integration.



**3. Electricity has historically been regulated because it is truly unique, with fundamental characteristics that differentiate it from any other product or industry**

**a) Electricity is an essential service with no substitutes.**

Regulators recognized this when, back in the 1900s, they required utilities to provide service to *all* customers, not just those who might be most profitable to serve. Not only do utilities have to serve all customers, they also are required to serve all customers' entire electric needs, at all times.

According to a Department of Energy report,

*“Electricity has been deemed to be an essential public service. Everyone is expected to have access to power to meet minimal health and safety needs... Regulated utilities have an 'obligation to serve' all customers with all the power they require”*

*Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?*

---

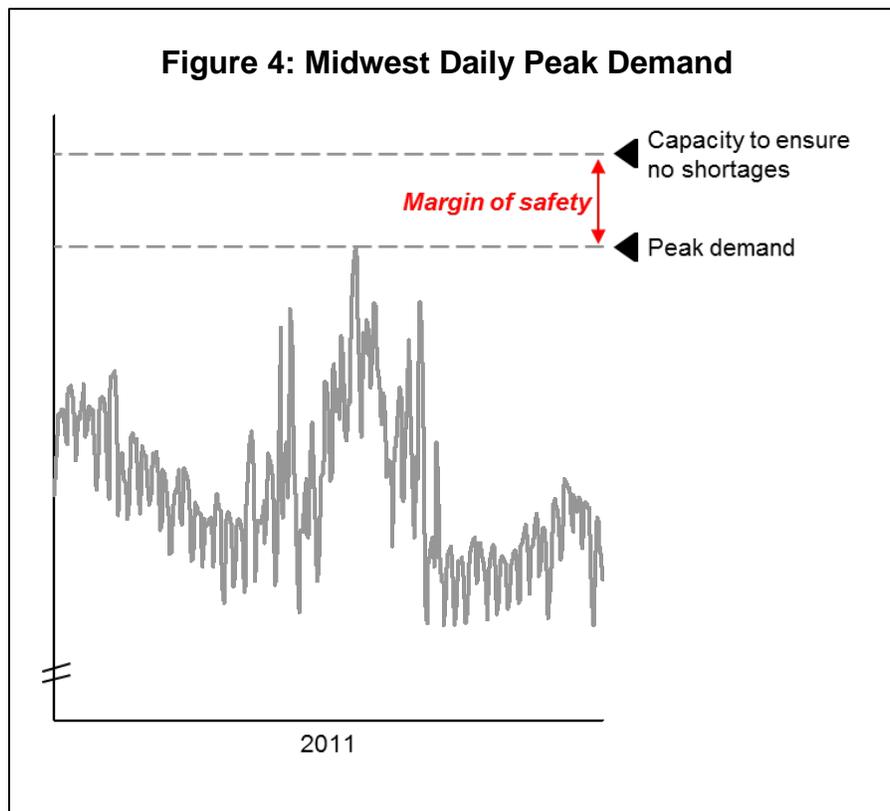
[Source: U.S. Department of Energy 2002, “A Primer on Electric Industry Restructuring”]

Given its essential nature, customers are not willing to accept shortages of electricity, and they have repeatedly indicated that reliability – having the power when they want it, without fail – is their primary concern.

[Source: Martin Kushler, “Restructuring and ‘Customer Choice’: *Vox Populi* or *Dictum Dictatorium?*”, *The Electricity Journal* 11(1), p 30-36]

b) Demand for electricity is highly variable.

Electric companies are required to meet customers’ electric demands at all times, but this demand is highly variable and “peaky”, with high demand spikes for short periods of time. Figure 4 below shows how, over the course of a year, daily demand for electricity in the Midwest varies tremendously. To ensure they can meet the peak demand and protect against shortages, utilities must maintain a significant amount of excess generating capacity (usually ~15-20%) as a “margin of safety”.



*Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?*

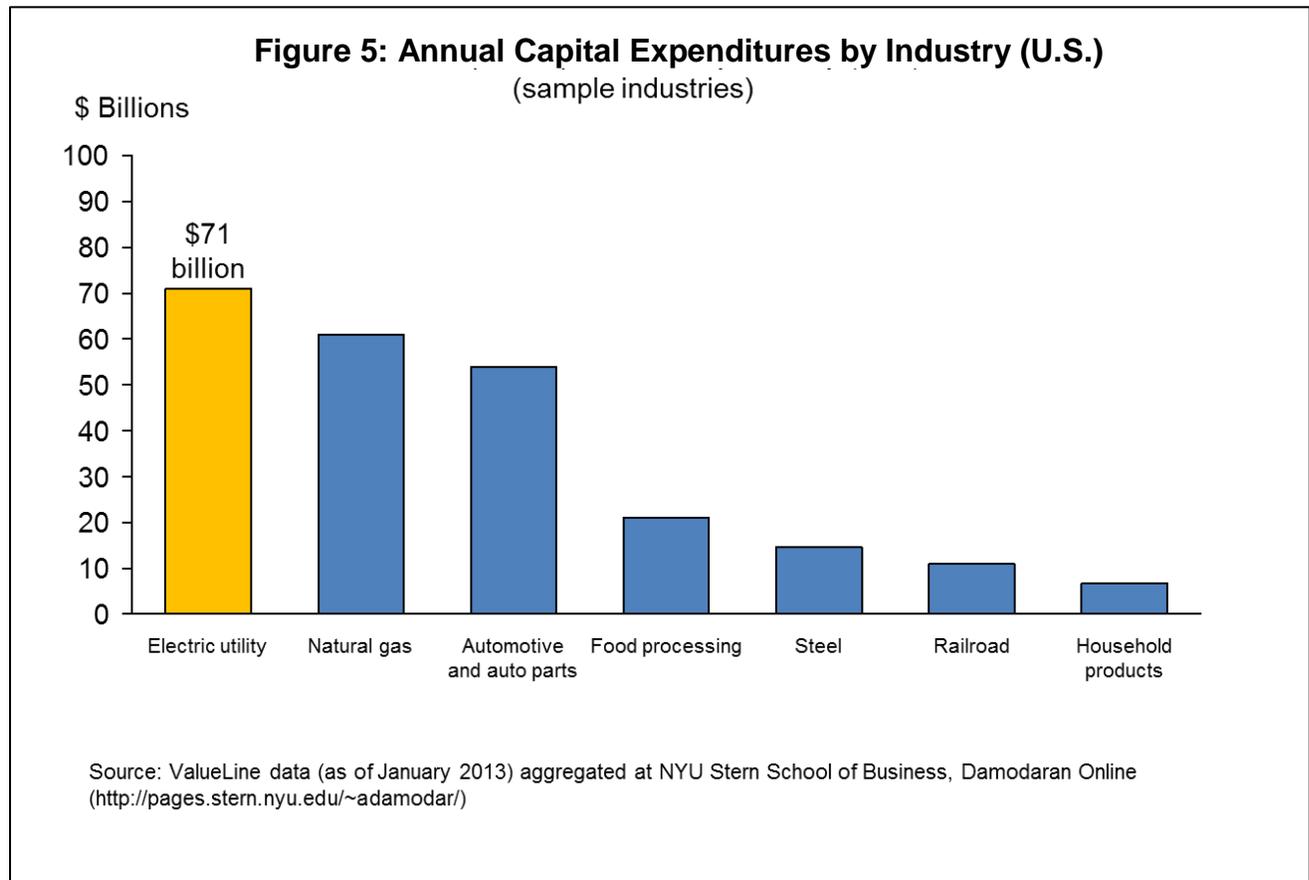
c) Electricity cannot be stored in “inventory” to smooth out that variable demand.

Unlike virtually any other product, electricity must be used at the time it is produced. There are few ways to store energy and extract it on demand. Pumped hydro storage like Michigan’s Ludington operation is limited, and a few emerging technologies like flywheel storage are not yet commercially viable on a large scale.

Without storage, the electric industry must have enough generating capacity to instantly meet the highest possible demand (plus a margin of safety above that), even if that peak is only reached for a couple hours per year. That means that a significant portion of generating capacity goes unused much of the year, but is nonetheless extraordinarily valuable to the system as it ensures reliability.

d) The electric industry is one of the most capital intensive and there is a long lead time to build new capacity.

As Figure 5 shows, the electric utility industry is far more capital intensive than many other industries. Since utilities need a lot of money and a lot of time to change and expand their systems, they must begin planning and building new generating capacity well in advance of when it is needed. This is another reason why utilities must keep excess supply in the system to ensure that they have enough power to supply growing and changing customer needs over time.



*Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?*

---

These characteristics of the electric industry – the fact that it is essential, has highly variable demand, cannot be stored, and is capital intensive – combine to require the availability of substantial “excess” supply that benefits the entire system regardless of individual demand for it.

Because of its “public good” characteristics – discussed below – this excess supply is difficult to provide under a competitive free market, and is best supported by a regulated market.

- 4. The reliability of electricity (provided for by excess supply) is what economists call a “public good” – everyone benefits from it and no one can be excluded from benefiting from it, even if they don’t pay for it. Public goods like electric reliability tend to be under-supplied in a pure free market economy, and usually need to be provided for through government regulation / intervention**

Economists define a “public good” as one which an individual cannot be excluded from benefitting from (even if he or she does not contribute to paying for it) and for which the benefit by one individual does not reduce the benefit available to another.

[Source: Auburn University, [http://www.auburn.edu/~johnspm/gloss/public\\_goods](http://www.auburn.edu/~johnspm/gloss/public_goods)]

Reliability of electric supply meets the criteria for a public good. Even if customers could choose not to pay for reliable supply, and were themselves willing to accept interruptions in their personal electric supply, they would still benefit enormously from the system’s reliability. Reliable electric supply is essential to the nation’s strong and stable economy, and protects residents’ health and safety. An individual cannot be excluded from reaping these benefits even if he or she does not want to pay for it. And, the availability of these benefits to one person does not diminish their availability to another person.

Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?

---

This characteristic of electric reliability has been recognized by industry experts, such as The Brattle Group, which explains:

*“Reliability cannot generally be differentiated between those customers who are willing to pay for higher reliability and those who are not willing to pay for such reliability. This creates a “common good” problem that invites “free ridership” by customers (or Load Serving Entities) who hope to benefit from high reliability paid for by the common pool of market participants without incurring such payments themselves.”*

[Source: The Brattle Group: “A Comparison of PJM’s RPM with Alternative Energy and Capacity Market Designs”  
([http://www.brattle.com/\\_documents/uploadlibrary/upload807.pdf](http://www.brattle.com/_documents/uploadlibrary/upload807.pdf))]

As The Brattle Group explains, the fundamental challenge with public goods is that some or many customers will choose to be “free riders” and not pay for the provision of the good from which they benefit. That distorts the market for the public good and can make provision of the good unprofitable.

Indeed, economics supports the idea that “public goods” provide an exception to the theory of a free market providing the optimal and efficient quantity and price for a product. “Public goods” tend to be underinvested in under a pure market system, and generally need to be provided outside the pure free market system – by nonprofits or through government taxation or regulation.

[Source: Auburn University, [http://www.auburn.edu/~johnspm/gloss/public\\_goods](http://www.auburn.edu/~johnspm/gloss/public_goods)]

The regulated electric model addresses this potential problem of underinvestment: regulators ensure that utilities provide reliability of power supply and that all customers contribute to paying for it.

However, in deregulated markets, this reliability may be placed at risk:

*“In a competitive market [there may] be an underinvestment in new generation capacity because the owners of new capacity will not be able to capture its full value to consumers. This means that generators may possibly maintain slimmer reserve capacity margins than consumers demand.”*

[Source: Malcolm Abbott, “Is the Security of Electricity Supply a Public Good?”, *The Electricity Journal* 14(7), p 31-33]

*Overall Question 1 – Making Good Energy Decisions: What information do energy policy makers need to consider in order to make good energy decisions?*

---

Indeed, reliability has already been placed at risk in deregulated markets like Texas, where regulators are worried about insufficient capacity margins (see response to Electric Choice Question 7 for detail).

Electricity is truly unique – it has fundamental differences from other goods and industries. In particular, the industry requires a substantial “excess supply” as a margin of safety to ensure reliability, and this reliability is a public good that benefits everyone. These characteristics are why the industry was built on a regulated model and why, despite the virtues of a free market, a regulated model still makes the most sense for the electric industry today.