

## TOWARD DYNAMIC MARKETS IN ELECTRIC POWER, WATER, AND WIRELESS SPECTRUM

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On April 23, the Silicon Flatirons Center for Law, Technology, and Entrepreneurship and the Getches-Wilkinson Center for Natural Resources, Energy, and the Environment hosted a conference on markets in electric power, water, and wireless spectrum. This conference convened experts in different domains to explore the development in markets in these three diverse arenas.

The first panel explored markets in the electric power sector. Professor William Boyd moderated the panel that included the following experts: Rimvydas Baltaduonis, Assistant Professor of Economics at Gettysburg College; Raymond Gifford, Senior Adjunct Fellow at Silicon Flatirons Center, Partner at Wilkinson Barker Knauer, LLP, and Former Chairman of Colorado Public Utilities Commission; Dave Hurlbut, Senior Analyst at NREL; and Wendy Moser, Vice President of Regulatory Services and Resource Planning at Black Hills Corporation. The panel focused primarily on wholesale markets in electric power with a limited discussion of retail markets. Wholesale markets occur within a multi-state interconnection. With the exception of ERCOT, which functions entirely in Texas, the Federal Energy Regulatory Commission (FERC) regulates wholesale markets. Public utility commissions (PUCs) frequently regulate retail markets, which exist when end-use consumers can choose a supplier from competing electricity retailers.

The panel began by exploring the distinctive challenges of establishing electric power markets. Baltadounis described the physical constraints of electricity that make it difficult to establish markets. For instance, the inability to store electricity presents a preliminary challenge. Furthermore, he noted, the nature of supply and demand for electricity requires the market instruments to function almost instantaneously. Baltadounis also noted that electric power is highly regulated, and the regulatory environment makes it difficult to set up markets.

Gifford continued the discussion by comparing electric markets to commodity markets. The balancing and need for instantaneous supply makes electric markets much more difficult to establish than commodity markets. Gifford also noted that there are specific regional challenges in the United States. For example, the economics of density in the West make it incredibly difficult to establish wholesale markets, and in some cases, Gifford suggested that markets might be prohibitively expensive. Gifford also noted that markets sometimes face challenges created by the market rule structures. For example, during the California energy crisis, Gifford posited that retail markets with bad rules could actually be worse than vertically integrated monopolies.

Hurlbut mentioned that there is a lot to be learned from the recent Texas energy crisis. He noted that challenges of real time energy markets are often political when scarcity looms. Hurlbut also noted that a lot of the electric sector's legacy involves engineers who are often unfamiliar with the concepts of antitrust and market power. Moderator William Boyd agreed that antitrust tools would need to be improved in order for markets to be more successful. Hurlbut also identified that demand response is key

and that Texas should have gone to a capacity market. Gifford responded that the tentative lesson from Texas's experience is that a capacity market is needed in order to have renewables, but that there are inadequate incentives to do this. He also identified the important reality that energy markets are highly individualized because of politics, regulations, terrain differences, and demand. For instance, a market that works in Texas won't necessarily work in Colorado, and each area of the country will require different design techniques.

Moser focused on the challenges for markets in the West. To begin, she noted that transmission issues are major challenges facing western markets. Black Hills Corporation has adjusted its plans to accommodate the realities of living in a region essentially without markets. Black Hill's peak load is very small at 400 megawatt, and it has a direct tie to its customers. Currently, Black Hill is experimenting with generational pool studies. Moser also discussed lessons to be learned from market imbalances. For instance, the flow of energy is so dynamic that if there is excess generation, it could be exported to another state. Colorado is discussing an imbalance energy market, as there are a lot of renewables in Colorado. Holburt continued to discuss the market imbalance, noting that western utilities are starting to figure out that they don't have to do it all at the same time. Utilities can put together an individualized market that works towards balancing and cooperation with other states. Gifford added that this is extremely difficult given the jurisdictional patchwork between different entities.

The second panel explored markets in water, and the panelists included Chris Goemans, Assistant Professor, Colorado State University; Charles Howe, Professor of Economics, University of Colorado at Boulder; Richard Howitt, Professor, University of California Davis; and Mark Squillace, Colorado Law Professor. Brad Udall, Executive Director of the Getches-Wilkinson Center moderated the conversation.

With freshwater being an increasingly scarce resource, water markets are becoming increasingly important to allocate the resource in an efficient manner. Chris Goemans stated that water markets are unique when compared to other types of markets such as electricity and typical goods as they lack definition. Water markets can be divided into two types of markets: water rights and water transfer. Water rights markets involve the sale of water rights and the permanent right to water. Water transfer markets involve the transfer of physical water. Literature commonly refers to both of these markets as a single common element, even though they are very different.

According to Chuck Howe, the Northern Colorado Water Conservancy District has the largest, most accurate, and closest to efficient water market. The Northern Colorado Water Conservancy District distributes water from the Bureau of Reclamation's Colorado-Big Thompson Project (C-BT) to irrigators, rural water districts, large industries and towns in northeastern Colorado. Initially, the Bureau of Reclamation defined the water coming from the western slopes as *supplemental* water. This means that it adds to water that is already present in the area that is already being served. The idea was to distribute water to the irrigators, in proportion to the irrigated acres. This idea did not work well since some irrigators had strong native water rights and some had junior rights. A decision was made to create water shares that could be subscribed to by water users of any type, so that the rights became proportional rights or identical shares in the water that was made available each year. This decision to create water shares allowed for the North District to have homogenous shares of water on the eastern slope.

Richard Howitt stated that there will always be opposition to water markets and that this opposition has given many additional institutions such as local county ordinances to prevent the export of water. In fact, the opposition is able to prevent any short-term water transfers by creating a series of legal challenges.

Chris Goemans then followed up by defining the question, “What do we mean by working?” In a water rights market, the security of the interest goes to those who value it the highest. This is what we see in many western states, including Colorado. In terms of a water market, we would think that when cities are going through a drought, we would see water shift from agriculture to cities and in normal years you would see the opposite. He finished by stating that there is a group of people that would say water markets are failing as water is being transferred out of agriculture.

Mark Squillace discussed the legal aspects of water markets. Under current law if water is placed into a reservoir, it is not subject to the first in right system and can be distributed as one chooses. However, the water reservoir may be under certain district rules, which can vary. There is potential under the law to make the shares in reservoirs relatively easily marketable.

The largest problem with water markets in the west is with direct flow rights, which is the right to divert water. If a farmer has been diverting water out of a stream for hundreds of years and decided to move the water, the farmer will face the problem of transaction costs. Water rights in the west are defined by the diversion amount; you are given the right to divert a certain amount of water for a particular kind of use. However, if you want to transfer these water rights, you are not able to transfer the amount of water that is diverted. The question is whether we can define water rights in terms of “consumptive use.”

The final topic-specific panel focused on markets in wireless spectrum and was moderated by Dean Phil Weiser. In the early twentieth century, the US government codified the ownership of wireless spectrum to the public. The primary spectrum market has existed through transactions between the US government, the exclusive owner of spectrum, and licensees, users that receive the (non-transferable) right to use specific spectrum for a specific service. In 2003, the Federal Communications Commission (“FCC”) adopted a new order, which allows for more flexible spectrum exchange rights between users in order to establish a secondary market. A license holder has since been able to transfer its right over a specific spectrum to other users through leases. That order has allowed for more flexible exchanges of spectrum to occur; however, there are still weaknesses in this emerging market.

Each panelist had the opportunity to discuss a different aspect of the existing spectrum markets. Speaker Coleman Bazelon, Principal of the Brattle Group, spoke to some of the weaknesses of the current spectrum markets. The goal of establishing a market is to find ways to reposition a “product” from a low value to a higher value. In this case, the secondary market is still failing to truly develop because there is no pull of demand for the change of ownership of wireless spectrum.

Speaker Michele Farquhar, Partner of Hogan Lovells, has done a significant amount of work with the secondary market and spectrum leasing. She has found that most typical spectrum leases are occurring as a form of transaction between commercial users in order to avoid FCC processes (for example, as a way to avoid timely FCC approval of the ownership transfer), as an economic adjustment among border areas to

help companies better align their spectrum, as a way to fill spectrum gaps, and as a way to meet build-back deadlines.

Speaker Robert Kelly, Partner of Squire Sanders, discussed that although the order for secondary markets was adopted in 2003, it was really a policy adjustment to a lot of other things already going on in the industry. There are a lot of unique business models that address different needs and wants of the commercial users. He ultimately believes the secondary market has been relatively successful.

Speaker Charla Rath, the Vice President of Wireless Policy Development at Verizon, spoke to the usage of spectrum leases by carriers. She discussed Verizon's experience with utilizing spectrum licenses and leases and ways in which Verizon reached into rural America through spectrum leases. Rath ended with a huge policy concern haunting the 2003 secondary markets rule making – how has the rules complicated nature slowed the markets? Many users struggle to conceptualize how they can lease, hold, and use spectrum under the 2003 rules. Even though the Commission rules allow for 'free transfers,' all of the rules require a thorough understanding of the laws governing spectrum usage and rights.

The panel ended with several discussions of the distinct characteristics of the markets and taking questions from the audience:

#### *Spectrum leases in Rural America*

The panel discussed how the secondary spectrum market has influenced rural wireless communications networks. The FCC has often utilized the ability to condition licenses on build out requirements on large common carriers in order to ensure rural areas have access to quality services. In rural America, there is an infrastructure problem and its very expensive to build and deploy entirely new network equipment in those areas; therefore, leases have been a great solution for those users not wanting to aggressively build out in rural areas but still want to be able to provide their services.

#### *How far is the wireless spectrum marketplace from existing as a 'spot market'?*

Within a spot market, commodities are traded and exchanged for immediate delivery rather than delivered at a future date. Because the government regulates wireless spectrum in a lot of various ways, the exchange process is inhibited by the vast amount of regulatory underbrush.

#### *Public Safety Spectrum*

The federal government allocated space within the 700 MHz band for public safety purposes. When public safety is not utilizing that spectrum, the government has stated that commercial users will have the opportunity to utilize the un-used spectrum. However, this has been criticized because interruptible spectrum raises nervousness among the commercial users. The National Telecommunications and Information Administration ("NTIA") has already arranged a model lease in order to provide oversight of how the parties are able to use and share the Public Safety spectrum. The sharing of spectrum has been praised for its recognition that the public safety community can utilize the economic value of the unused spectrum in order to fund some of its operation.

#### *Spectrum sharing more generally*

Many government spectrum users have received their spectrum licenses for free and disfavor sharing their spectrum. However, by allowing those users to receive some of

the economic gain from sharing, it may open the market to more leasing opportunities by federal spectrum users.

The conference concluded with a discussion of lessons from the three domains. Dean Phil Weiser moderated this final panel. As market structures are just beginning to take hold in the areas of electricity, water, and wireless spectrum, there is a lot to learn from these comparisons. In each area, policymakers are challenged to find approaches that best fit the relevant commodity. In all three arenas, there are many opportunities to improve efficiencies by creating more dynamic access to the markets. The final panel compared the economics of each domain, identified the specific challenges, and discussed best practices for future market development.