Testimony of Mr. Monty Humble, President & COO of Brightman Energy LLC, before the House Committee on Natural Resources

Oversight Hearing on "Increased Electricity Costs for American Families and Small Businesses: The Potential Impacts of the Chu Memorandum"

Thursday, April 26, 2012
10:00 AM
1324 Longworth House Office Building

Chairman Hastings, Mr. Markey, and members of the Committee, thank you for inviting me to testify at this hearing today. The United States transmission system needs serious attention, and this hearing will help to provide that attention.

As I begin, I want to share two anecdotes with the Committee. Unfortunately, these are neither fictional nor amusing. They are stories that I have personally experienced as an energy developer who is trying to invest private capital to produce electricity for which there is a competitive market.

This winter, my company, Brightman Energy LLC was evaluating whether to buy and complete development of a 100 megawatt wind energy project in the Pacific Northwest. The project had all of its permits in place, it was on private land, and the landowner was excited about the potential royalties from a wind farm. It was in a rural area where jobs are hard to find, and where land is cheap so the local governments struggle to finance local schools and law enforcement. The power was contracted to sell to a private utility company that had conducted an auction for power, and the project that my company was considering had been determined by the utility and its regulator to be an acceptable supplier of power. We had a project that was built on private land by a private developer and had a contract to sell power to a private utility company. All the permits and approvals were in place. As we did our due diligence on the project, we discovered that included in the project budget was a line item for a payment of nearly $50 million to purchase a transmission entitlement from the holder.

For those who do not know what a transmission entitlement is, let me explain. In the Western Electricity Coordinating Council (basically the area from the front range of the Rocky Mountains to the Pacific Ocean and from northern Canada to the border with Mexico) a good deal of transmission capacity sits idle most of the time. Ratepayers pay for this idle capacity, but it is not available for use because someone has the contractual right to use the transmission capacity. As a result, even if the capacity is not being used by the entity that is contractually entitled to use it, it sits. Since we have not perfected the ability to store electricity in large quantities, denying transmission access is the same as denying access to a resource.

In the case of the project that we were considering, the entity that had the right to use the transmission line wanted to be paid tens of millions of dollars in order to let the project use the transmission line capacity that the seller was not using. Since the transmission line was not subject to FERC jurisdiction, the seller was free to name its price, any price, without oversight. In plain English, it was charging monopoly rents because it could and because the transaction was not subject to regulatory oversight, and let me be clear—the payment did not cover the actual transmission tariff that was to be paid to the owner of the transmission line. That was a separate charge payable to the transmission owner.

One byproduct of this method of allocating transmission access is a significant underutilization of transmission assets. Studies of physical power flows consistently show that major transmission pathways in the WECC are loaded at less than 75% of their capacity a significant part of the time (see Figure 1 attached). This unused transmission capacity represents economic inefficiency. It is paid for by ratepayers. At the same time, ratepayers are also denied access to competing sources of electricity that could compete in wholesale markets and drive electricity prices down.

The second anecdote involves several projects that I have worked on in Texas. For those of you who are not deeply familiar with the United States electric system, there are three electrically isolated, separate grids that provide electric service in the United States, the Eastern Interconnect (which covers the United States from the Atlantic Ocean to the front range of the Rocky Mountains with the exception of Texas), the WECC (which I mentioned earlier), and the Texas interconnection (also frequently referred to by the name of the operator of that grid, Electric Reliability Council of Texas or ERCOT). Each of the three US electrical grids is isolated from the other two—for reasons related to the physical properties of electricity, it is not possible to have an AC connection from one grid to the other (see Figure 2 attached).

As some of you may know, Texas has been very fortunate to benefit from significant wind development, with over 10,000 megawatts of installed wind generation capacity. While this has benefited Texas consumers because we have a competitive market for electricity, and the wind generators have to compete like everyone else for customers, it has made it hard for developers like my company to make a profit for our investors. As a result, we have considered various options to export electricity generated in Texas. My company has also considered building transmission lines to provide access for other wind developers who wanted to export power. Each time I have suggested that we contact Western Area Power Administration to see if Western would be interested in participating in the development of transmission in ERCOT, I have been told that Western would not be interested because a transmission line in ERCOT would not connect up to the rest of Western's transmission system.

I do not know whether this actually represents the position of Western because I have never had a direct conversation with them, but if it does (and presumably the people I spoke to would have some basis for their statements), it seems like a very odd position for Western to take since its Congressionally mandated service territory includes a large part of Texas as you can see from the map attached as Figure 3. Taken literally, Western would never build a transmission line in ERCOT because that transmission line would never connect to the rest of the Western system because it is not physically possible to connect an AC line across the boundary from WECC to ERCOT. And yet Congress surely had something in mind when it provided that almost one half of the State of Texas would be within the Western service territory.

These two anecdotes illustrate fundamental issues facing the power marketing administrations. In preparing to testify here today, I have communicated with many people involved in the transmission business and energy markets. Most of those with whom I spoke recognize that the PMAs are taking steps to move beyond their historical roles, but there is a feeling that the PMAs can take additional steps that would benefit their customers, and more importantly, the end consumers—families and small businesses—of power that the PMAs market. The additional steps would include leadership in making changes in the way energy markets in the West operate to encourage market competition and increased efficiency in grid operations. These market oriented reforms would reduce the cost of inefficient utilization of resources and reduce costs to consumers.

Today the PMAs almost exclusively serve their preference customers, and yet they hold powers that Congress has granted to them to do so much more. Those powers were granted by both Republican majority and Democratic majority Congresses. Section 1222 of the Energy Policy Act of 2005 provided to Western the authority to enter into public/private partnerships to build new transmission lines throughout the Western service territory. Section 402 of the American Reinvestment and Recovery Act provided new borrowing authority to Western to use for development of new transmission assets. In each of these laws, Congress very carefully considered the interests of the preference customers, and directed that the new authorities be exercised only in ways that could never cause the preference customers to experience increased rates as a result of the Congressionally granted authorities.

Western has used these powers to begin construction of one transmission line, and is exploring others, but there is a desire on the part of private transmission developers to work with Western in bringing additional private capital to transmission development in the Western service territory. BPA is using its powers to integrate wind energy into its transmission system and to construct new transmission lines, but there is a feeling among many that BPA can do more to encourage efficient, market driven, resource utilization decisions to address imbalances in the market between generation and load.

Let me be clear—no one is advocating radical change. The private participants are not seeking to make the PMAs subject to FERC jurisdiction, nor are they advocating the creation of a new FERC jurisdictional RTO/ISO in the parts of the PMA service territories where one does not now exist. We do, however, feel that operational changes, such as an energy imbalance market (which can be implemented on a voluntary basis without creation of an ISO), would result in greater efficiency and better resource utilization, saving money for consumers and small businesses. These are not radical proposals. They have been implemented successfully in the East, in Texas, and in the Midwest.

Before I founded Brightman Energy, I had the great good fortune to work for Boone Pickens, and I was lucky to have the opportunity to work with him as he developed the Pickens Plan. You may remember that the original Pickens Plan when it was announced in July 2008 focused equally on renewable electricity and natural gas vehicles. What we found when we researched renewable electricity was that the United States had vast resources of wind and sunlight that could be employed for the production of electricity, but that electricity could not be delivered to customers in many cases because the transmission infrastructure did not exist in the remote areas that were most suitable for development of renewable resources. For over three years, I was a frequent visitor to Washington seeking improved transmission policies. During that time, I found myself working with other companies that also had an interest in improving transmission policy. For example, last summer I delivered a letter to the Senate leadership signed by 84 companies who supported FERC Order 1000, which directs the development of regional agreements for the planning and allocation of costs for new transmission projects. Interestingly, most of those companies were traditional utility companies, not renewable companies. Time and time, we found that the concerns related to transmission policy applied to transmission no matter what sort of electricity the transmission wires carried.

The issues with the US transmission grid are well documented. They include basic reliability issues like those that resulted in the 2003 blackout in the Upper Midwest and Mid-Atlantic regions. They include concerns that the Defense Science Board has raised about the impact of grid reliability on the ability of our military to perform its critical missions. They include concerns about vulnerability of the grid to cyberattacks and electromagnetic pulses. They include missed opportunities to invest private capital in productive transmission assets that would create jobs and economic efficiency. They include well documented inefficiencies that increase costs to consumers and small businesses due to waste of resources and impediments to competition.

The federal power marketing administrations have service territories that include all of the WECC and ERCOT footprints, with over 32,000 miles of transmission lines. The WECC and ERCOT grids are each self contained, but fully integrated within their respective geographic boundaries. Each part of the WECC and ERCOT grid is vulnerable to a malfunction elsewhere in that grid. The PMAs do not operate in a vacuum, nor are they islands unto themselves, apart from the main. Consequently, if the nation would be made better served, more competitive, and more secure through changes to the bulk electricity system, the PMAs will have to be a part of those changes.

According to a 2009 report on the transmission grid by the Congressional Research Service,

> The need for modernization is illustrated by the causes of the August 14, 2003 northeastern blackout. The blackout, which interrupted service to 50 million people in the United States and Canada for up to a week, started with transmission line trips (automatic shutdowns) and resulting overloads on the FirstEnergy utility system in Ohio. The blackout was not the result of insufficient transmission capacity or deteriorated equipment as identified by the United States - Canada investigating task force, the blackout was caused by factors such as the following:
>
> • FirstEnergy and the NERC reliability region within which it operated did not understand the strengths and weaknesses of the FE system. FirstEnergy consequently operated its system at dangerously low voltages.
>
> • FirstEnergy's system operators lacked the "situational awareness" that would have revealed the blackout risk as lines began to trip. The operators were blinded by monitoring and computer system breakdowns, combined with training and procedural deficiencies which led to those failures going undetected until it was too late.

> • FirstEnergy did not adequately trim the trees under its transmission lines. As a result, three key transmission lines tripped when they sagged (as the lines are designed to do as they heat up with use) and came in contact with trees.
>
> • The Midwest Independent System Operator (MISO), the RTO [regional transmission operator] that manages the grid in FirstEnergy's service area, did not have the real-time information necessary to assess the situation on FirstEnergy system and provide direction to the utility.
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> Once the FirstEnergy system collapsed, overloads and power swings spread out across the Northeast, causing a cascading series of transmission line and power plant trips that left tens of millions of people without electricity. One reason the outage spread over such a wide area was because many power plants were equipped with unnecessarily sensitive automatic protection mechanisms that tripped the units prematurely. The speed of the cascade allowed almost no time for manual intervention. *The elapsed time from the start of the cascade (i.e., when failures began to radiate out from the collapsed FirstEnergy grid) to its full extent was about seven minutes.*
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> In summary, as discussed in the official blackout report and other analyses, the 2003 blackout was not caused by a utility having built too few transmission lines, or because power line towers and substations were falling apart. The blackout was apparently due to such factors as malfunctioning if not obsolete computer and monitoring systems, human errors that compounded the equipment failures, mis-calibrated automatic protection systems on power plants, and FirstEnergy's failure to adequately trim trees.
>
> One part of a strategy for preventing repetitions of the 2003 blackout is to modernize the grid from a reliability standpoint. This will not always entail building more power lines. One analysis written shortly after the 2003 blackout concluded that "The common contributing factor to the recent blackout, based on investigations to date, is confusion-communication breakdowns both technical and human....[W]e maintain that much can be solved by updating technology and by changing procedures followed within the operating companies. This fix is cheaper and much more immediate than huge investment in new power lines. (emphasis added. Internal footnotes omitted)

It only required seven minutes for a problem caused by improperly trimmed trees to become a problem affecting 50 million people, and costing an estimated $6 billion. It is not realistic to believe that the PMAs can operate unconcerned about the rest of the electric grid. Improved coordination between the PMAs and other grid operators and owners is essential; given the balance of risks and costs, this is only prudent.

A 2008 report from a Defense Science Board Task Force stated that

> Military installations are almost completely dependent on a fragile and vulnerable commercial power gird, placing critical military and Homeland defense missions at unacceptable risk of extended outage.

Specifically, the report noted that "critical mission at [Department of Defense] installations have expanded significantly in recent years," rendering the current assumptions about the importance of civilian grid reliability obsolete. Mission changes for the military include both increased reliance on bases in the US for real time support of combat operations, and increased roles for the military in Homeland security, including both responses to terrorist attacks and to natural disasters such as Hurricane Katrina. At the same time,

> For various reasons, the grid has far less margin today than in earlier years between capacity and demand. The level of spare parts kept in inventory has declined, and spare parts are often co-located with the operational counterparts putting both at risk from a single act. In some cases, industrial capacity to produce critical spares is extremely limited, available only form overseas sources and very slow and difficult to transport due to physical size.

The report identified four sources of risk to the grid that could compromise national security by compromising the ability of the military to fulfill its missions—overload, vulnerability to natural disasters, sabotage or terrorist activity, including cyber attacks aimed at the SCADA systems that operate the grid, and fuel supply disruptions at generation facilities.

Each of these vulnerabilities has been seen in recent years. The 2003 blackout described above resulted in part from overloaded transmission lines overheating and sagging into trees. Hurricane Katrina wiped out much of the electrical system along the Mississippi Gulf Coast, requiring substantial and lengthy rebuilding efforts to restore power. The Stuxnet worm, although it was aimed at different SCADA systems, clearly demonstrated the vulnerability of those systems to cyber attack, and not all of the SCADA systems associated with operations of the gird have been protected from potential attacks.

> The Task Force noted that in addition to degrading national military and homeland defense capabilities, failure of the grid for any extended period could significantly affect national economic and social stability. Pumps that move natural gas and oil through pipelines rely on electricity, as do refineries, communications systems, water and sewage systems, hospitals, traffic systems, first response systems, border crossing detection systems and major transportation hubs such as airports.

Again, the PMAs are significant participants in addressing a critical issue—national security—identified by the Department of Defense.

A May 2010 study prepared by General Electric for the Department of Energy determined that the WECC could save approximately $1.7 billion per year in operating costs by improving coordination among WECC operators so that spinning reserves (generating units that are operating but not serving load in order to be available to prevent blackouts that would otherwise occur from unexpected loss of generation) could be shared over a wider area. The WECC has studied the potential benefits of an energy imbalance market, which could address this issue, and found that the potential benefits would be significant, and would outweigh the costs of creating and administering such a market. Further, implementation of an EIM would not require the creation of an RTO/ISO entity subject to FERC jurisdiction. The Western Interstate Energy Board, an adjunct to the Western Governors Association, also prepared a study regarding the potential benefits of creation of an EIM market.

> With spinning reserves determined on a zonal basis [simulating current, fragmented control areas], WECC simulated operating costs were about $2 Billion higher than with the reserves shared over larger regions for the 10% In-Area case. This is expected to increase with higher penetration levels. In this example, the total system spinning reserve was held constant. It was simply allocated over multiple zones. As the statistical analysis showed, the volatility and uncertainty are much higher for the smaller balancing areas, which mean that even more spinning reserve would be required to accommodate renewable generation. This would drive costs up even more. Because of the significant operating benefits of balancing area cooperation, this may be a fertile area for further investigation in another study.

The study also noted that the operational challenges associated with meeting state mandated renewable portfolio standards in the WECC could be "likely insurmountable" without additional coordination between balancing areas in the WECC.

The economic benefits to consumers and small business of well planned transmission system additions and operational changes have been documented. According to The Brattle Group, those benefits include not only improved reliability, but also less frequently recognized benefits—additional market benefits such as enhanced market competition and liquidity, additional reliability/operational benefits such as insurance and risk mitigation cost savings, additional investment and resource cost benefits such as capacity benefits, long-term resource cost advantages and synergies with other transmission projects, and external benefits such as favorable impacts on fuel markets, environmental and renewable access benefits and economic benefits from construction and tax collections.

The Brattle Group cites as an example the economic evaluation of the Palo Verde-Devers Line No. 2 which indicates that the total benefits of the transmission upgrade were more than double the benefits considered in determining whether to build the line as show in the attached Figure 5.

The State of Texas has made a substantial investment in new transmission assets over the last three years. The Perryman Group, a respected Texas based econometric firm that frequently advises state leadership and the Texas Public Utility Commission, performed a study of the expected economic impact of those transmission benefits and the follow on economic activity. The findings of that report included the following:

- The combined construction impact of new power transmission facilities as well as wind turbine construction following the initial implementation of the CREZ initiative [an $8

> billion privately funded Texas transmission system expansion] on business activity in Texas is projected to total $30.6 billion in output (gross product) and some 383,972 person-years of employment. This economic activity leads to notable incremental tax receipts over the development period; [The Perryman Group] estimates the gains to include about $1.6 billion for the State and $329.1 million for various local governments.

- Another perspective is on a per-customer basis. Depending on the levels of overall generation fuel prices, ***the typical residential customer at project maturity will save between $160.93 and $354.94 per year (fully adjusted for the associated transmission costs),*** resulting in a stimulus to the economy of $454.44 to $995.60 in total spending and $216.76 to $478.03 in gross product. (emphasis added)
- The CREZ transmission investment will also help solidify Texas' position at the forefront of wind power, renewables, and associated industries. Incremental gains in the cluster stemming from the CREZ transmission investment could be expected under reasonable assumptions to include $8.6 billion in total annual spending, $3.8 billion in output (gross product) per annum, and 41,181 jobs.

Another study performed by The Brattle Group to analyze the potential effect of $12 billion to $16 billion annually of privately funded transmission investments in the United States and Canada found that the likely effect of those investments in the transmission grid would be the creation of 150,000 to 200,000 full time jobs in the United States and another 20,000 to 50,000 jobs in Canada, as well as $30 billion to $40 billion in additional annual economic activity. An additional knock on impact would be the creation of another 130,000 to 250,000 full time jobs as a result of new generation development that would follow from the availability of new transmission. The Brattle Group study also found:

> In addition to these employment and economic stimulus benefits from constructing the facilities and manufacturing equipment, strengthening of the transmission grid provides important other benefits, including:
>
> ϕ Reduced transmission losses, production cost savings, enhanced wholesale power market competition and liquidity, and associated wholesale power price reductions;
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> ϕ The economic value of increased reliability, insurance against high-cost outcomes under extreme market conditions, and increased flexibility of grid operations;
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> ϕ Generation investment cost savings and access to lower-cost renewable generation;
>
> ϕ Reduced emissions and fossil fuel consumption; and
>
> ϕ Economic benefits from increased federal, state, and local tax income.
>
> These simulations show that every $1 billion of U.S. transmission investment supports approximately 13,000 full-time-equivalent ("FTE") years of employment and $2.4 billion in total economic activity. If the $1 billion is spent over the course of one year, this means the investment will support approximately 13,000 FTE jobs in that year. Furthermore, our analysis suggests that the average transmission investment from 2011 through 2030 will likely range from

$12 billion to $16 billion per year or $240 billion to $320 billion over the next 20 years (in 2011 dollars) assuming current barriers to planning, permitting, and cost recovery of regional transmission projects can be overcome. A significant portion of this range will depend on the scope of future renewable portfolio standards and the type of renewable generation projects that will be developed.

As summarized in the table below, this level of U.S.-wide transmission investment supports 150,000 to 200,000 FTE jobs and $30 billion to $40 billion in annual economic activity. The table shows that approximately one-third of this employment benefit is associated with the direct construction and manufacturing of transmission facilities. Two-thirds of the total impact is associated with indirect and induced employment by suppliers and service providers to the transmission construction and equipment manufacturing sectors.

Annual Transmission Capital Cost	**Annual FTE Jobs Supported**		**Annual Total Economic Activity Stimulated**
(2011$ Billion)	Direct	Total	(2011$ Billion)
$12	51,000	150,000	$30
$16	68,000	200,000	$40

As noted, a portion of the projected transmission investments will also enable development of the renewable generation projects needed to meet existing and potential future state or federal Renewable Portfolio Standard ("RPS") requirements. This renewable generation investment is estimated by various studies to support approximately 2.6 million to 5 million FTE-years of employment, or on average 130,000 to 250,000 FTE jobs during each year over the projected 20- year renewable generation construction effort, in addition to the direct impacts of manufacturing and constructing the transmission itself. Additional employment benefits are associated with the operations phase of these projects.

The Brattle Group report also found a wide range of additional benefits that accrued to electric system customers who were not directly benefitted by job creation or economic activity stimulated by transmission investments.

Once transmission facilities are constructed and placed in service, they support a wide range of additional benefits, from increased reliability, to decreased transmission congestion, to renewables integration, and increased competition in power markets. These benefits of major transmission investments often are wide-spread geographically across multiple utility service areas and states, are diverse in their effects on market participants, and occur and change over the course of several decades. The benefits we derive from today’s transmission grid, such as the ability to operate competitive wholesale electricity markets, could barely be imagined when the facilities were built three or four decades ago.

It is important to recognize that the scope of transmission-related benefits extends beyond the main driver of a particular investment. For example, transmission investments are often driven by the need to address reliability concerns and, thus, help increase the reliability of the power system. Reliability benefits were consequently often viewed as the primary source of benefits. However, with the emergence of transmission projects targeted to relieve transmission congestion or to integrate renewable generation projects, it is increasingly understood that transmission investments provide a wide range of benefits, such as reducing the cost of supplying electricity or allowing the integration of lower-cost renewable resources. Thus, while many transmission investments may be driven primarily by a single concern, such as reliability, congestion relief, or renewable integration, the benefits of these transmission investments generally extend well beyond the benefit associated with the primary investment driver. For example, reliability-driven projects will also reduce congestion and often support the integration of renewable generation. Similarly, a transmission project driven by congestion relief objectives will generally also increase system reliability or help to avoid or delay reliability projects that would otherwise be needed in the future. It is the interrelated but collateral nature of these benefits that often makes them difficult to quantify. There are a number of studies quantifying the economic value of benefits for individual transmission projects, which we use to indicate the potential magnitude of these benefits in the following discussion.

The post-construction assessment of the Arrowhead-Weston transmission line in Wisconsin, which was energized by American Transmission Company ("ATC") in 2008, provides a good example of the broad range of benefits associated with an expanded transmission infrastructure. The primary driver of the Arrowhead-Weston line was to increase reliability in northwestern and central Wisconsin by adding another high voltage transmission line in what the federal government designated at the time as "the second-most constrained transmission system interface in the country."... By also reducing congestion, ATC estimated that the line allowed Wisconsin utilities to decrease their power purchase costs by $5.1 million annually, saving $94 million in net present value terms over the next 40 years. Similarly, ATC estimated that $1.2 million were saved in reduced costs for scheduled maintenance since the Arrowhead-Weston line went into service. . . . The construction of the line supported 2,560 jobs, generated $9.5 million in tax revenue, created $464 million in total economic stimulus and will provide income to local communities of $62 million over the next 40 years. The increased reliability of the electric system has provided economic development benefits by improving operations of existing commercial and industrial customers and attracting new customers. Lastly, the Arrowhead-Weston line also provides insurance value against extreme market conditions as was illustrated in a NERC report which noted that if

Arrowhead-Weston had been in service earlier, it would have averted blackouts in the region which impacted an area that stretched from Wisconsin and Minnesota to western Ontario and Saskatchewan, affecting hundreds of thousands of customers.

The most commonly quantified "economic" benefits of transmission investments are reductions in simulated fuel and other variable operating costs of power generation (generally referred to as "production cost" savings) and the impact on wholesale electricity market prices (generally referred to as locational marginal prices or "LMPs") at load-serving locations of the grid. These production cost savings and "Load LMP benefits" are typically estimated with production cost simulation models that simulate generation dispatch and power flows subject to defined transmission constraints. In a recent assessment of RTO performance by the FERC, the majority of RTOs cited reduced congestion as a main benefit from expanding transmission capacity. For example, PJM noted that market simulations of recently approved high voltage upgrades indicate that the upgrades will reduce congestion costs by approximately $1.7 billion compared to congestion costs without these upgrades.

Transmission investments can enhance the competitiveness of wholesale electricity markets by broadening the set of suppliers that compete to serve load. While the magnitude of savings depends on market concentration and how much load is served at market-based rates (rather than through cost-of-service regulated generation), studies have found that the economic value of increased competition can reach 50% to 100% of a project's costs. . . . Transmission expansion can increase market liquidity by increasing the number of buyers and sellers able to transact with each other. This will lower the bid-ask spreads of electricity trades, increase pricing transparency, and provide better clarity for long-term planning and investment decisions. For example, we found that bid-ask spreads for bilateral trades at less liquid hubs are 50 cents to $1.50 per MWh higher than the bid-ask spreads at more liquid hubs. At transaction volumes ranging from less than 10 million to over 100 million MWh per quarter at each of more than 30 electricity trading hubs, even a 10 cent per MWh reduction of bid-ask spreads due to a transmission-investment-related increase in market liquidity saves $4 million to $40 million per year and trading hub, which would amount to transactions cost savings of approximately $500 million annually on a nation-wide basis.

Transmission investments, even if not driven by reliability concerns, will generally increase reliability on the power system. This increase in reliability provides economic value by reducing service curtailments and avoiding high-cost outcomes during extreme system conditions. The cost of reliability problems and their "expected unserved energy" can be measured with estimates of the "value of lost load," which can exceed $5,000 to $10,000 per curtailed MWh. The high value of lost load means that avoiding even a single reliability event that would result in blackout is worth ranging from tens of millions to billions of dollars. . . For example, the Chair of the CAISO's Market Surveillance Committee estimated

> that if significant additional transmission capacity had been available during the California energy crisis from June 2000 to June 2001, its value would have been as high as $30 billion over this 12 month period. Similarly, a detailed analysis of the insurance benefit of a 345 kV transmission project found that the project's probability-weighted savings from reducing the impacts of extreme events equated to approximately 20% of the project's costs.
>
> Transmission projects can provide "investment and resource cost benefits" by displacing or delaying otherwise needed capital investment, allowing the integration of lower-cost generation resources, and reducing the cost (or increasing the value) of subsequent transmission projects. For example, transmission investments that allow the integration of wind generation in locations with a 40% average annual capacity factor reduce the investment cost of wind generation by one quarter compared to the investment requirements of wind generation in locations with a 30% capacity factor. Transmission investments may also allow the development of generation with lower fuel costs (e.g., mine mouth coal plants or natural gas plants built in locations that offer higher operating efficiencies), better access to valuable unique resources (e.g., hydroelectric or pumped storage options), or lower environmental costs (e.g., better carbon sequestration and storage options). . . . Additional generation capacity investment savings also are provided by reducing losses during peak load and, through added transfer capabilities, the diversification of renewable generation. Recent studies show that peak-loss-related capacity benefits can add 5% to 10% to estimated production cost savings. The Eastern Wind Integration and Transmission Study ("EWITS") showed that regional transmission overlays can increase the capacity value of wind generation by roughly 5 percentage points (i.e., from an average of 23% without regional transmission upgrades to 28% with regional upgrades). Similarly, regional overlays can diversify the geographic footprint of intermittent renewable and balancing generation resources, which leads to lower renewable balancing costs. . . .
>
> Transmission investments often create benefits beyond reducing the delivered wholesale cost of power. These "external" benefits include impacts on fuel markets (reduced fuel prices), environmental benefits (reduced emissions), and reducing the cost of public policy requirements (such as the cost of renewable generation). For example, the Southwest Power Pool estimated that transmission investment that allow for the interconnection of additional wind generation would lead to a reduction of regional natural gas prices, a customer benefit that offset approximately one quarter of the transmission costs.

In summary, the federal PMAs have been given significant powers by the Congress in EPAct 2005 and ARRA, and those powers were designed by Congress to permit the PMAs to attract private investments in transmission without placing the preference customers at risk of higher rates to pay for new projects that are not planned to provide new service to the preference customers. The steps proposed by Secretary Chu in his memorandum are modest, and seek the implementation of operational changes that will provide well documented benefits to rate payers.

The new private investment in transmission that the PMAs can attract will create jobs, stimulate additional economic activity, and provide significant benefits and savings to ratepayers of all classes.

Again, thank you Mr. Chairman for holding this hearing today, and giving me the opportunity to testify before the Committee on this important subject.

I am happy to answer any questions you may have.

Figure 1

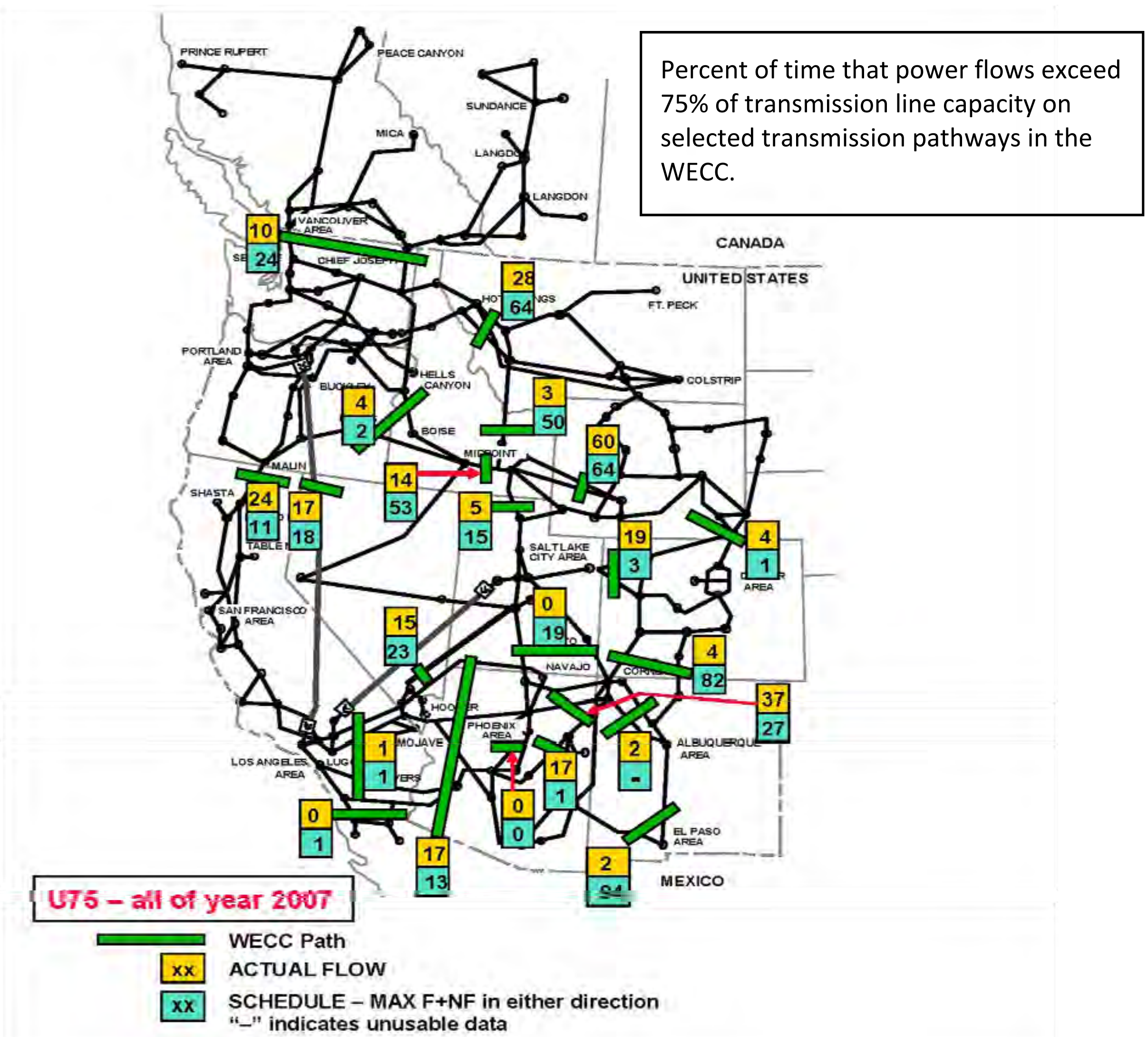
Percent of time that power flows exceed 75% of transmission line capacity on selected transmission pathways in the WECC.
PRINCE RUPERT
PEACE CANYON
SUNDANCE
MICA
LANGDON
CANADA
UNITED STATES
FT. PECK
COLSTRIP
PORTLAND AREA
HELLS CANYON
BOISE
SHASTA
SAN FRANCISCO AREA
SALT LAKE CITY AREA
NAVAJO
PHOENIX AREA
MOJAVE
LOS ANGELES AREA
ALBUQUERQUE AREA
EL PASO AREA
MEXICO
U75 – all of year 2007
WECC Path
ACTUAL FLOW
SCHEDULE – MAX F+NF in either direction
"–" indicates unusable data

Figure 2

North American Electrical System

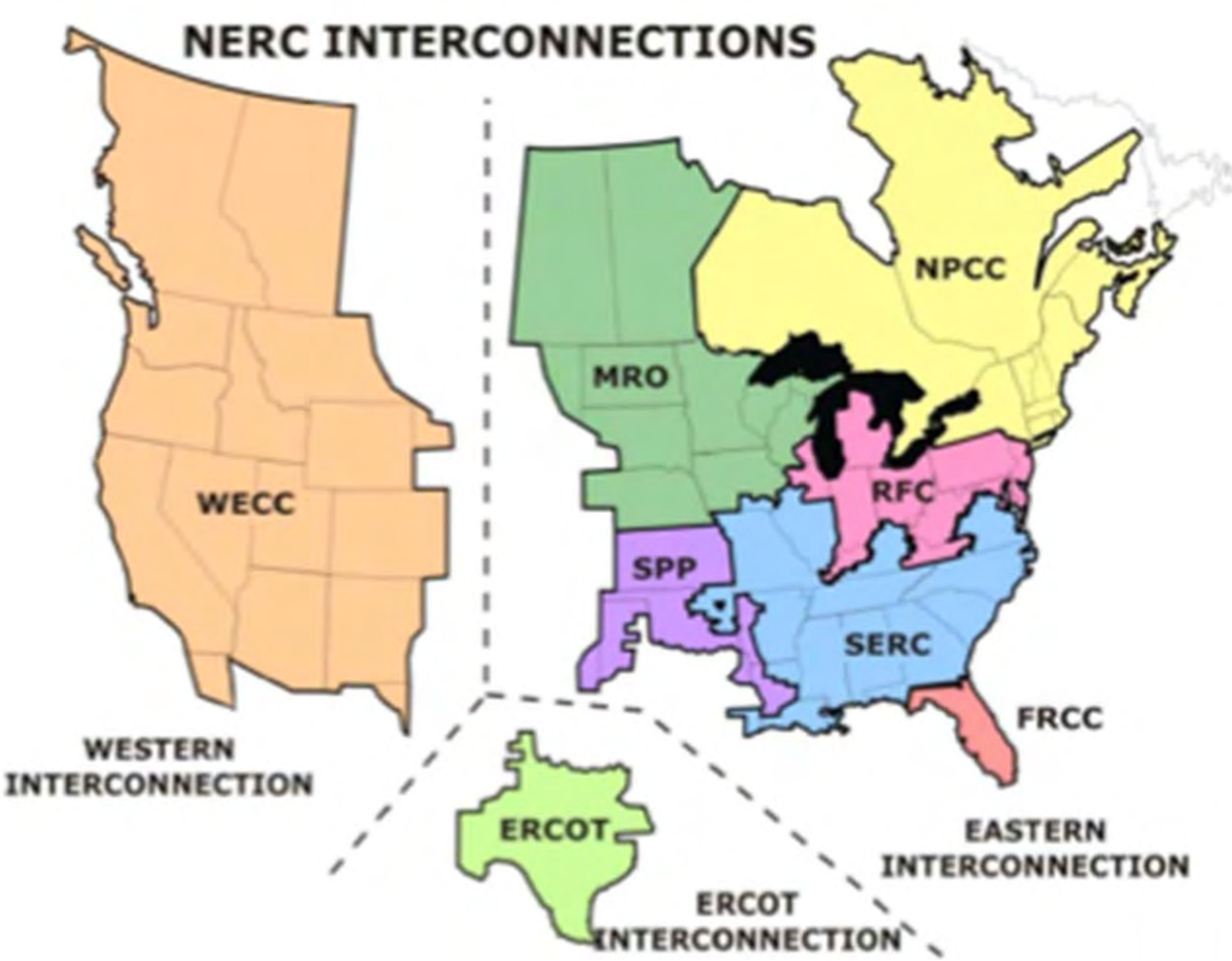

Figure 3

Western Area Power Administration Service Territory

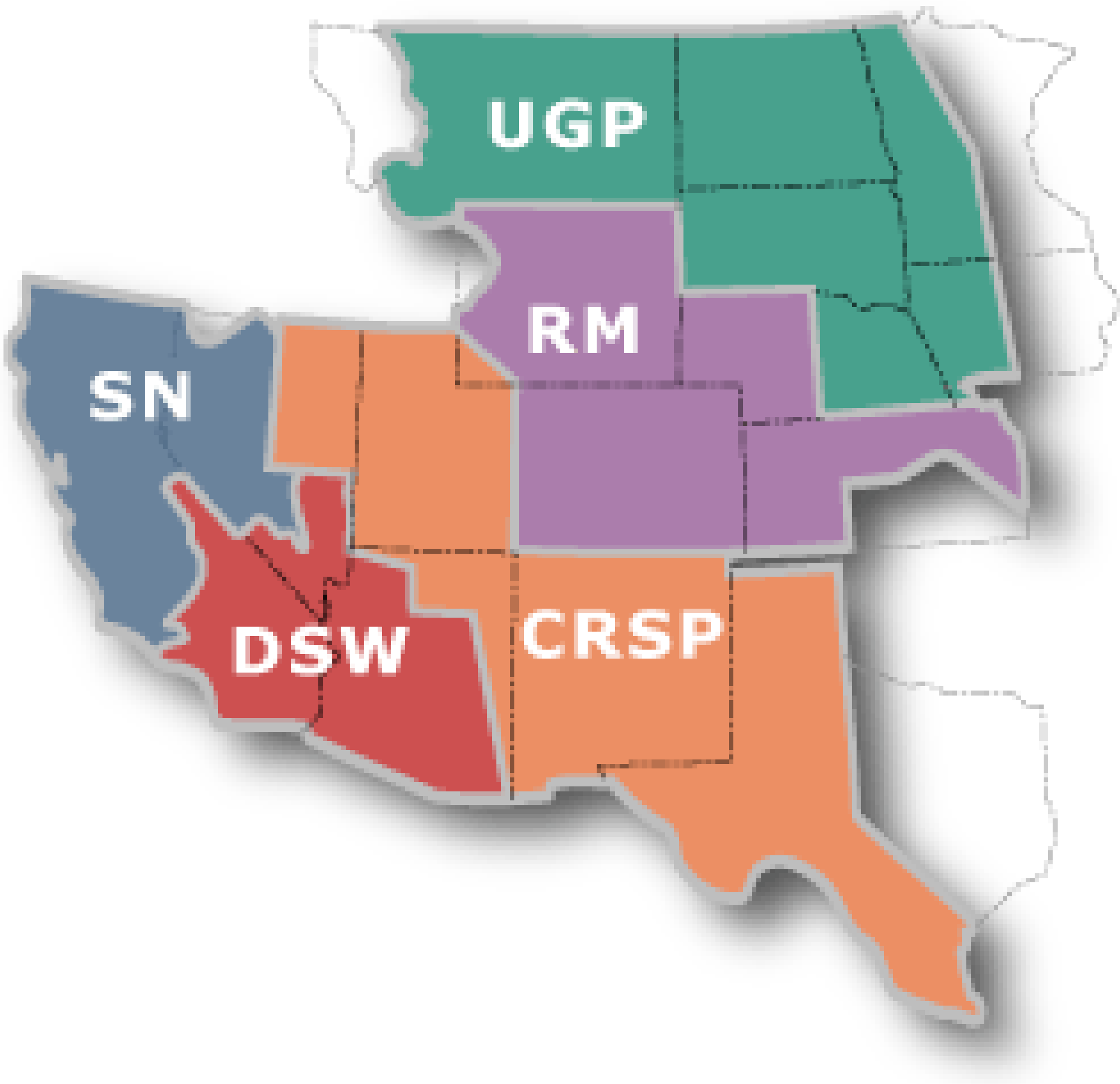

Figure 4

Impact on Spot Prices for Electricity of Balancing Area Consolidation

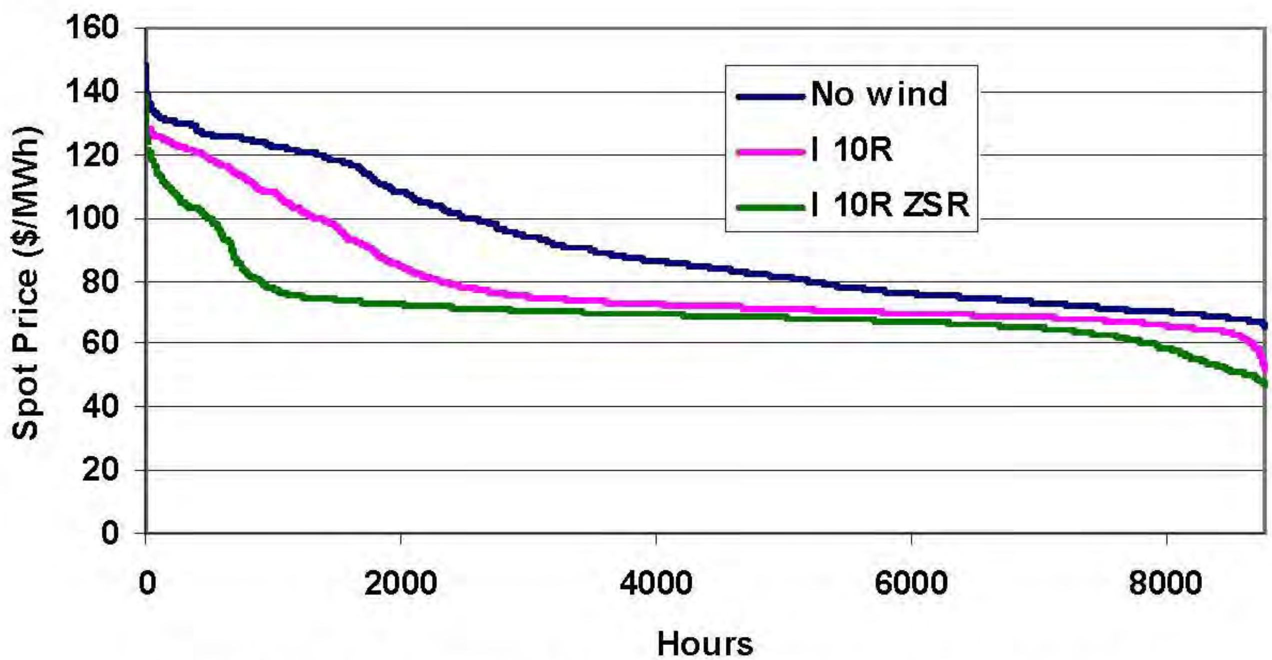

Figure 6.105 Spot Price Impact of Balancing Area Consolidation, 10% Penetration.

Figure 5

Additional Benefits of Palo Verde Devers Line 2