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>> Whittney Bell Hello everyone and welcome to the 2023 Department of energy national Transmission webinar per I have a few things to share with you before we get into the webinar. None of the information presented herein is legally binding. The content included in this presentation is intended for election informational purposes only relating to the 2023 national transmission needs study. Any content within this presentation that appears to scrap it from the needs study language is superseded by the needs study language. Housekeeping items. This meeting us being recorded and may be used by the US Department of Education. If you do not wish to be recorded if you do not want your image to be recorded turn off your video. But going for you everyone is muted. If you have technical issues you may type them in the chat box and select host. If you need life captioning these refer to the link that will appear in the chat now we will be taking questions today. You may submit your questions throughout the invent on mentee. Go to mentee.com and enter the code on the screen 9687 0310. You can then enter your questions as our center custody presentation. You have the options to upload some questions. If you like them throughout the questions will move up higher in the queue. To ensure the most effective use of the white function duplicate questions will not appear in the database. The QR code to join should be in the chat now.
On today's meeting you will hear from Maria Robinson director of the grid deployment office.
>> MARIA ROBISON Good afternoon or good morning. My name is Maria Robison and I am director of the grid deployment office. Welcome to our webinar. DOT state of the grid report. The need study provides insight into where the great and communities would benefit from

increased transmission by assessing both current and increased capacity constraints on the nations grid. Background on the grid deployment office. In addition to the need study discussed expanding access to affordable reliable electricity throughout the country through a number of initiatives. In September we outlined a series of short-term and long-term recommendations. We have also begun to announce the first round of selections from bipartisan infrastructure law. This includes commitment of up to $1.3 billion from transmission projects to the transmission facilitation program. And create 13,000 quality jobs. Also 58 projects across 44 states for our equipment program. Have given up more than $748 million start the states and territories to strengthen and modernize the electrical grid against wildfires, extreme weather and other natural disasters. For today's study we are proud of the progress we made this far but we are just getting started. The need study will serve as the backbone of our work going forward underscoring needs and identifying where new and upgrading facilities can alleviate an increase and insufficient test for capacity cross regions particularly in weather dependent areas. The need study is also a basis for the designation of interest electric transmission corridors knit sees. We will be releasing further guidance on that by the end of this year. I wanted to thank everyone who participated in the process of the study. Our team has worked closely with industry, state and local governments, tribes and policymakers across the country to understand where and how much transmission we need in the United States to ensure power comes on with a flip of a switch and the cost of electricity is affordable per your partnership has been invaluable and I look forward to our continued collaboration. I also want to

get a special thanks to our incredible team and the grid deployment office especially Dr. Adria Brooks, Jeff Dennis, and everyone else in transmission division. I will turn it back over to Whitney to introduce Jeff and Dr. Brooks.

>> WHITNEY BELL thank you so much we will now hear from Dr. Adria Brooks transmission planning engineer and Jesse Snyder. Jesse I will turn it over to you. Welcome.

>> Thank you very much Whitney and thank you Maria. I will be walking through agenda items. First background of the need study. Overview of the study structure itself before moving onto select results of the study. And Dr. Brooks will take a deeper dive and field questions in the questions and answer session. We have provided a link to the need study. Beginning with her background the need study is a report that is required over the act 216 a. Custom states. As you will note here there are sums changes in response to the Congress amended to direct the department not going to conduct assessments but also expected transmission capacity constraints and congestion every three years. With consultation with Indian tribes. As Murray mentioned refer to the need study. Serves as the department struck annual report. What we went to do here is emphasized as a department continues to develop the study is emphasized with the study is what it should not be misunderstood is doing. Objective, methods and output. Objective identify pressing transmission needs. It does not prescribe solutions. For a methods department is considered existing data nearly 100 and 80 reports. The report does not conduct new modeling cost-benefit analysis were system banning. Planning. Study department assesses the data needs organized by geographic region. These regions are not synonymous

with electric. Court orders we want to highlight the need study outreach and engagement. Notice of intent for building a better grade. Announced a number of initiatives. Including this national need study. Consultation entities the department's regard to consult with. Set a formal notification letter in July 2020 too. Department released a draft in October 2020 too. And held a consultation. Through November. We held webinars and calls to the same entities to field questions about the report and to further discuss those issues. Received 20 entity submissions with 100 unique comments. Work to incorporate feedback received. We later released a public draft in February of 2023 and held a public meeting. We received a number of written comments 58 submissions from 50 entities composing threader 30 any comments. We finally the final study on October third of 2023. I want to direct your attention to the green asterisk in the corner which indicates the content on the slide is either new or significant grade. The content, we clarify how the new study is intended to use. We clarify for things here. First clarify the study does not designate any sees. Need considers need study finding and many other statutory factors. The department clarifies them these findings are intended to inform of priorities. We also clarify that the need study is not needed to propose (Inaudible) portfolios transmission individual product evaluation scenario-based horizons alternative transmission solutions as well as weather data. We also encourage state policymakers to incorporate findings into respective regulatory processes. Overview of study structure. It is a seven-section report with two appendices roughly threader pages in length. Also published on the website. To begin with executive summary introduction, incorporate section two which is legislative

language. Section three is discussion of transmission concepts. Section four through six contain the majority of the findings. Section four is discussion of historical data which the department uses to assess current needs. Section five is review of existing studies. Chapter six is an assessment of existing expansion results. Chapter seven is an overview of the process of preparing the 2023 need study. Include appendix a is a selection of national and regional fact sheets. Section B is synthesis and resolution. So a quick snapshot of these two appendixes. They do not present any new information. It's a synthesis of existing results. We also include some graphics along these findings. Appendix B is a synthesis of all the comments received during the period organized by topic area. Moving on to some results. We want to have a couple national takeaways for today. There is a pressing need for new transmission infrastructure. Interregional transmission results in the largest benefits. Transmission needs will shift over time. Moving on here. The executive summary provides visual summary of national and regional findings of need. We organize these findings by region where transmission exists. The six transmissions which are included on this graphic here. These needs are color-coded to the circles and they need on the left side here. Under each geographic region. We have color-coded that need. And so we just want to walk through the spirit these are high-level summaries. The need to approve reliable and resilience. There are regions that can be improved by additional investment. Alleviate congestion and unscheduled flows. Alleviate transfer capacity limits between neighbors. Additional strategic to reduce this congestion. Need to eliminate limits. Prevent moving electricity across the fight between the

mountains and plains region in Texas as neighbors, Southwest, Delta region. Find some irony exists. Finally the needs to have low-cost generation of high-cost demand. Most notably areas within the plains regions and Midwest, mid-Atlantic New York and California. Additional transmission costs to meet demand in those high-risk areas. Finally the need to meet future demand with intergenic interregional transfer capacity to meet the future demands of the grid. Need for between Delta and plains region, Midwest and Plains region. We fight over time them these needs increased significantly in the regions. Before we move on we want to know a couple of things here. What a circle is not filled with a color the department concludes there is not sufficient evidence to suggest transmission needs exist or there is an absent of data. In pastors into instances the first in the Northwest Mountain region, Southwest, Southeast Florida Alaska and Hawaii. The reason is that is the limited data for these regions. The department may have other resources. The second set of actions are included under Hawaii and Alaska. Those capacity expansion models did not include Alaska or Hawaii. We move on here provide the same set of data points. Nothing has changed from the last slide just a new format. Again we have regional labeling us on the top and needs on the left-hand side. I will hand it over Dr Brooks.

>> ADRIA BROOKS Thank you Jesse. Jesse went over all the important things. I will just cover the details in the report that helps support the messages in the summary graphic. Then again that is a summary graphic. The details do help explain the reasoning we found throughout the nation. As Jesse went over there are seven parts to the study. I will still cover

the last three chapters. I am jumping into chapter four; it is broken into four sections. Historical transmission, marketplace differentials, qualified gas and interconnection cues. I will just cover a couple of things due to the limit of time. Our first finding in the study is then transmission investments decreased during the second half of the 2010's. On this chart are circuit miles of new investment every year they were installed between 2011 and 2020 across regions in the United States. The cluster on the left are all regions of the United States. You can see the uptick in new transmission between 2011 and 2015. That drops off the letter have of the decade. It's visible from all regions and us visible across several individual region. For example the mid-Atlantic, Midwest, Southwest you can see this growth and new transmission being installed. On the slightly show miles of transmission installed weighted by load. Which is why Alaska seems so high compared to other regions. In the study itself we show the amount of circuit miles and capital costs of investments in all regions. We can also look at why the transmission us being installed over the last decade. Shown here is the percentage of different transmissions over the primary project driver. We were asked to talk about the high-level national results appeared behind the biggest driver of transmission investments were these reliably reliability needs. In 2011 all caps were to address reliability needs and it is up to 75 percent. Those are really just meant to address something that is local to the community. It's not meant to address reliability throughout a region. Another thing that jumps out from this data is these high-capacity wind are really long transmission lines meant to move power. We didn't break this up by region so we can talk about it in Q&A which regions were included in these

investments. Switching now to a different type of analysis we are looking at also I'll electricity prices. What the utilities pay for utilities not the consumer. But this chart shows his historical sale price data across the entire United States. Anything in dark blue means those prices were consistently lower than the then year after year those dots are where utilities -- usually there us access from low-cost generation in those areas. On the opposite end there are areas in red have consistently high prices. This can be an energy justice concern. This is looking at the same data, just a different weighing too slices. We show the differences in electricity prices between two hubs. For example for Phoenix Arizona it is not really, I think it is Phoenix and Arizona and Mexico. How the prices compared to whatever it is linked too. That gives a sense of congestion. In general the darker the color is the higher the number of the more value there is instilled in the upgrading powerlines to between those transmissions on the power grid. What jumps out here is we see between the West as SPP that is connecting to Western to Eastern connections. Two separate grids. We see very high numbers on another part of the grid. Additional -- looking in the East we can see high value between New York in its neighbors the tickly New York and New England. If we did the same analysis start to isolate extreme events. We see there is even more transmission congestion, it is concentrated especially with events we have seen over the past several years. This is just showing winter storm all yet. A storm them hit the end of last year. You see the exact time of less links instead of showing average prices. We are looking at average prices during the course of the day. The high value transmission congestion would benefit we can see the shift. On December 22, it moves over to

December 24 and we see upper new England region. The blue as the surface temperature. The darker the blue the colder it was. There is other analysis that highlights this. It is pretty showing to see this day by day. That's all I will cover for chapter four. I will go into the chapter five review of existing studies. We had a lot of comments on this section. Did really heavily change this. This chapter is organized into these five sections. First reliability and resilience. Regional congestion and constraints. Generation and demand changes. Alternative transmission solutions. And finally we did at a section on siding and land-use considerations. I will highlight some high-level takeaways for each section. I will talk about some in detail to give you an example of what is important. First this is a snapshot of all the studies that were considered. There were over 120 studies reviewed in this section. Dating back to 2015. This gives a snapshot of who the study authors work. US government and other agencies or consultant reports. Light blue academic reports. What is the commission saying. Really dug in on transmission reports. The difference between solid studies colors. Dotted colors were added based on public comment. With that I will highlight key takeaways in each subsection. For reliability and resilience we have transmission can support I reliable grid with high penetrations of variable energy resource generation. Transmission can mitigate impacts of extreme weather events. Increase grid connectivity can support resource adequacy. Interregional transmission across the interconnection seems can improve reliability and resilience. To the next section regional congestion and constraints. Takeaways here specific to each region. While historic transmission investments in new England have resulted in low

congestion, future generation changes are expected to increase congestion in some areas. Largest transfer limitations with the New York between upstate and Long Island. Significant congestion constraints exist and eat Eastern coastal mid-Atlantic. Significant constraints in congestion exist between the Midwest and Delta regions specifically. Congestion and the space are related to limited transition transmission capacity and high wind generation output. Constraints and congestion in the West are growing as the generation reserves makes changes and demand grows. Texas entered anticipates major east-west congestion as demand grows. Alaska has limited transmission transfer capability between generation and major load centers. Friendly isolated transmission systems and Hawaii are reaching their current capacity. Next generation and demand changes. New transmission will be needed to assess many clean energy resources. Reduce curtailment of available economic generation resources can be achieved with additional transmission. Offshore wind potential is driving transmission needs but offshore transmission networks require specific planning considerations to meet those needs. Tribal lands have unique energy and transmission needs. Finally low growth will require more transmission. On the point of tribal lands have unique energy and transmission needs. Updated data about tribal needs in the public comments. We work with the office of clean energy in the department of energy. I will highlight a couple things that came out of that analysis. His survey data of tribal nations across United States. All respondents are those from the tribes themselves. Over 54,000 native peoples to live without electricity today. Their percentage is shown here by tribe affiliation. Eighty-seven percent are on the neighborhood of

nation. Five percent are on the Hopi tribe and 12 percent are from other tribes. Navajo nation and Hopi tribe geographically are in the four corners region of Arizona. This is something specific to their region. Finally of all the folks who were surveyed there is a belief that the existing grid infrastructure could be extended to electrify their communities. Sixty-five percent answered yes. About 20 percent said no and 20 percent were unsure. Just to highlight the overlap between the transmission system on tribal nations. Here are tools to help visualize the overlap. It's a snapshot from the geospatial energy meet mapper. There are many layers of the power sector. Shown here is the overlap transmission system in tribal nations. The tribal nations in orange and the transmission system in red. You can see there is some access on the lands in Arizona but there is a problem across the entire tribal nation. There were changes made to the subsection some feedback. I penetrations of distributed energy resources can shift regional transmission. Grid enhancing technologies can improve the operational efficiency of existing transmission system. Advanced conductors and cables can increase transmission transfer capacity and microgrid grids can bolster them. The last section of chapter five the psyche land-use considerations were heavily changed sending transmission it is possible in some cases transmission siting must balance lame interest. To get more detail into the transmission corridors. This was done by the national energy. This is analysis to bury HVDC transmission lines along interstate highways. Analysis considers they need a 65 meters swap from the end of the interstate to the neighboring region. Land-use whether it is community or open land in order to bury HVDC. A lot could be used at return to current use after the lines are

buried. On the on ramps and on ramps of the interstate have to be considered. Obstacles including rivers and creeks, buried pipelines and vegetation would need to be done. These are examples of the types of things to be considered in doing this analysis to understand how many of those obstacles might a transmission line cross. Highlight a few examples. In the upper right what is highlighted is the bedrock depth. When bearing the lines have to -- shallowness of bedrock it may be impossible to dig into it to install a bearing power line. This chart is an analysis of where is the shallow bedrock depth. Dark purple means it is very close to the surface. Regions like the Rocky Mountains you would expect there to be a shallow bedrock depth. Also other regions. We show another example the social vulnerability index. This is an index used to assess different environmental factors that impact communities across United States. To try to understand what communities are most vulnerable to environmental impacts. Here we have a color coding along the interstate highways themselves. Darkest color means interstates running through communities. Consideration and how to bury lines may further impact those communities. Lighter colors aware there are communities that have less social vulnerability. That is an example. There is a lot more that covers this but I wanted to give me highlight of the spirit I will move into the final chapter and open up for Q&A. Capacity expansion modeling. This is how the department is trying to get an understanding of future transmission needs. This chapter is late by showing included studies and scenarios. Treatment of alternative just mission solutions. Within region transmission deployment. Interregional transfer capacity. And finally comparisons with what these results suggest we need with feature

transmission. I will highlight a few and then we will get into questions. Data from six capacity expansion studies are in wise to future regional and interregional transmission needs. For from the national lab reports and too from academic reports. Now there are over 300 scenarios included in all six of these studies. All the scenarios describe a wide range of feature sector. We needed a way to make sense of this. We did that by looking at the outlying studies. Positive here for illustration purposes. I will show the real data. Every dot represents an individual scenario and it is color-coded. We want to understand electricity low load growth. The amount of clean energy we will have on the grid in 2040 also drives how much transmission will be needed. Clean energy is very expensive. Wind, nuclear, gas, carbon capture, landfill gases. The triangles show us where we are at in 2021. Anything to the right of that diamond means clean energy growth. We broke it into three different scenarios. Third moderate load and moderate clean energy growth. Of the scenarios in this scenario researchers ignore Allstate federal local policies. They take those out in the model and just allow markets to drive the power sector. Also scenarios include existing state and local policies. Existing at the time the research was done. On the opposite end we have scenarios that assume high load in high clean energy growth. None of those would happen under current policies. All of them assume new state and federal policies put in place. Finally we have moderate load but high clean energy growth scenarios. A whole range of different scenarios. Market driven. About to note them all six studies were done before the official action was passed. We don't know exactly where it will fall in 2040. We are considering this moderate load height energy growth to be the

new normal. Previously moderate would have been. I promise real data. Here is the data of all the alternative scenarios that came from the six studies. You can see how these national groupings pop out based on power sector characteristics. Just to recap there are 300 scenarios across the six studies considered. We were broken into three groups. Moderate moderate, moderate high, and high high. 2030, 2035 and 2040. We have transmission capacity results for all nine of these categories. Today I will focus on 2035 results. I will focus on the new normal the moderate high scenario group. Quick tutorial, ingrained we have existing transmission system across all different regions of US. In the green is the future need. We show a range of need. We want to get an understanding of how much transmission will likely be needed to meet these different scenarios. We do show a range for that reason. Important is the gap to fill. How much do we need to build tween what we have today and the estimated future knee. Here are the results for the nation continuous US not the areas of Alaska and Hawaii. But us shown here is the current install just mission across the three transmission groups. You can see the range of anticipated need to the right. And that diamond is the median of that range. Look at moderate moderate, the business as usual. You can see it will increase 20 percent. If we go to the new normal moderate growth hi you see an increase of 64 percent. We talk about the high demand where we need a doubling of the current system. This top chart is justly within region transmission. If you break out the interregional transfer system you have different numbers. Moderate moderate we have 25 percent increase, moderate hi we have 114 percent growth in the high high we have 412 percent growth. That is everything if you look at national results. We

do break this up by the regions. Of the 13 regions of the continuous US, these are shown the 2035 results for the new normal of the moderate height category. I will focus on the top floor. Where the Midwest, Atlantic, Southeast and Plains show a lot of need by 2035. For the Midwest, plains and almost for the southeast you see a doubling. For mid-Atlantic because there is so much investment it is only a 20 to percent increase in what they currently have. Where the most new transmission needed is Texas. Compared to what they have today it has more than doubled. We can do the same thing for interregional transfer capacity expansion results. We do this for all the different links that were studied. We will highlight those top four. Mid-Atlantic, Midwesterners and most need. Midwest, planes, Delta, plains and mountain, Northwest regions. Again for Mountain Northwest there is relatively load low increase to what they currently have. When we highlight the new relative needs these other regions pop out. Delta, plains, Texas, plains, Southwest and mountain plains. With these cross are where we see lot of value. The bottom two. That is very little transfer capacity in these regions today. There is a lot of value in increasing those. I will stop there just to be sure we have time for Q&A. Whitney I will go back to you.

>> WHITNEY BELL we have some time for Q&A. Please put your questions in we ask if you like the questions for today the ones with the most votes will be the ones we insert first while everyone is getting in and uploading your questions. I want to answer the most common question received today. The presentation slide and recording of today's webinar will be available on the webpage and will be in the chat shortly. We will e-mail you when these things

are available via e-mail. The slides and recording will be available within two weeks. Let's go and get started with these questions. The first question why does the data show all transfers between New England and New York and transfers with Canada.

>> ADRIA BROOKS I'm assuming the question is referring to this slide. I will note a few things before we talk about Canada. These are for the moderate scenario, the new normal. Both New York and New England have very aggressive -- when push them into the high /-slash high group in those cases we see a lot more suggested need for additional transfer capacity. Looking to the Canada piece the only transfer shown here is between New England and New York. Canada was not considered for the study. There was one study was considered. It's reasonable to assume that the transfers between New England in your as well as other regions that border Canada their domestic transfers between other US regions could decrease if they were to have additional transfer capacity with Canada that was supported by a few studies we reviewed in chapter five. It is important to note there will be a shift. I have a few slides on this. Once highlighted now all of those have Canadian provinces that would have additional transfers to. The studies reviewed in chapter five show there us value there. These numbers may come down some. It is not a one for one I would expect something to shift here.

>> WHITNEY BELL Question, would railways be another conduit?

>> ADRIA BROOKS The work on the highways was the first of its kind. We try to enlist where there is interest and extending that to others. It is possible that highways -- that would serve to

be useful in some ways the same way that highways are. It's used dependent or location dependent. The essence of expect any transmission by rail or highway is going to be ideal.

>> WHITNEY BELL What has caused investment just mission to drop off in 2015? You expect just mission growth to increase?

>> ADRIA BROOKS Unfortunately I cannot answer them. We did not get into the reason. There was a decrease. We did try to be transparent about where we are seeing decreases in different regions. It would be unique to each region as to the reasons. Nationally it might be a few trends for the most part they will be region specific.

>> WHITNEY BELL thank you. What were the drivers behind high-capacity transmission in 21122013?

>> ADRIA BROOKS I can show here this is the same chart broken out by region now. I'll regions of the US are shown in this chart. Those high-capacity lines are in, those are dominated by Texas and the upper portion of the start. We see a lot of active essay lines. This is really dominating the entire national trend. Other regions that have large high-capacity lines, California was another one that invested a lot in 2016. Dominantly is Texas.

>> WHITNEY BELL Thank you so much. Our non- buyers (Inaudible)

>> ADRIA BROOKS Yes and no. I will talk first about the way we modeled transmission expansion modeling. I didn't point those out but we are measuring new transmission in megawatt miles. That value does not mean anything in industry miles. And make a mile is meant to describe what is the amount, care and capacity on a transmission line. One reason to

use this is because it can be considered technology instead of assuming you have to install new poles of violence for the new transmission you can increase the capacity of the existing infrastructure. That would help benefit new megawatt miles. You can invest on the existing transmission system to help increase megawatt miles. We do have alternative transmission systems considered. That's the first insert of the question. Next is related to -- have transmission solutions storage. There is a lot of storage that was included in this scenario. Critically and the moderate and high high category. There are a lot of resources assumed as well. On this chart and the blue boxes those are high-level scenarios. It is to point out that while resources can reduce need in the US we are still seeing significant need even if more resources come online in the future.

>> WHITNEY BELL On slide 24 at shows transmission investment, and slide 25 and 26 looks like more need related to market efficiency instead of reliability why is that?

>> ADRIA BROOKS We didn't get into the why and regard to the historical data. I will note the reliability needs here were the low voltage lines. In 100 KB range. In many areas they are easier to install rather than the high-voltage lines. Differences in the type of transmission that is needed. Also ease or availability to install. They are more expensive and harder to get that is built. The smaller lines are easier

>> WHITNEY BELL Thank you. Related two reliability and resilience it is important to consider delays. In New England we have the interconnection delay of 28 years.

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>> ADRIA BROOKS Do include that. I will bring up a background slide. Interconnection Q. New generation wants to connect to the power they have to enter the connection Q. The planner or operator was to make sure this generator is not one to cause reliability issues on the power grid. The generator enters the queue and get in line to have this analysis done. At the end of the analysis they will say this is how many upgrades in dollars will be required to install this generator. Usually that cost is handed to the generator. Yes we are willing to make these upgrades or no we don't want too. When you talk about interconnection Q in the study. Here is a snapshot of the information in there. The middle of the bar chart, these are types of generation that are looking to connect to the power grid today. The main bar chart us across the nation as a whole lot of storage. That is a good amount of wind and gas and other is coal and nuclear. Every other resource. That is for the nation. And you can see it broken down. That is a whole lot of solar. That's the types that are connecting. If you look at the bottom left the line chart shows the length of time that everyone is waiting to connect. In 2005 going from the process to actually turning it on was two years. Now it is an average of five years. In some areas of the country even longer. There are some reasons for this. It is harder to distill a reason just by looking at the national data. One reason us because the transmission system is so congested and we are pushing the limits of the system. It is also the generator was to connect estate is going to cause reliability issues in a state or two over. They will be asked to deal with those costs to upgrade the system a few states order over in order to connect their generator. This is a reason we are having these longer wait times. The pipe chart shows the

projects of the future. Nearly 75 percent of all generators that enter the queue process will be withdrawn from one reason or another. We don't really have an exact answer to the New England question specifically. We did talk about it at the national level.

>> WHITNEY BELL Thank you for that explanation, I appreciate it. While the result study informed the process.

>> ADRIA BROOKS The group funding for two within the grid department the needs study is going to help inform program staff understanding of the power grid and it does inform area specific projects. Or funding and mechanisms like the national electric corners. There is not a direct link between funding and the needs study though. I would just leave it there although more specific wedges could be asked to the grid team.

>> WHITNEY BELL I think we can drop that e-mail to the chat if you want to reach out to them. Which would be the primary beneficiary between Eastern and Western interconnection?

>> ADRIA BROOKS There is a little bit of discussion on this in the needs study. Idea is as you connect there is additional both economic and reliability benefits. To say that is one primary benefit to either the East or the West, I'm not sure I could say that. It's kind of average across the country. In various specific events that would be a great benefit to either or so it could be both depending on which area of the country is experiencing is born. Having additional interconnection can benefit both. I don't know I could say which one would benefit more on average.

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>> WHITNEY BELL Understood. Will the data and simulation files using the study be publicly shared?

>> ADRIA BROOKS We only use publicly available data. The data that could be obtained from either academic or national. We haven't had a discussion about publishing the data analysis we have done but to the extent we try to use only public accessible data a lot of the analysis should be repeatable. That is available on the same webpage where you get the needs study. I'm also happy to follow-up conversations whoever asked if there is a specific use case they need for the data.

>> WHITNEY BELL Thank you so much. And we will be sure to include that information in the note section for everyone as well. How does the capacity model conducted under the relate to the national transmission study?

>> ADRIA BROOKS DNS some people refer to the needs study under that acronym. Related to -- national transmission planning study is a different acronym. Needs study us meant as an assessment of already published data sources or studies. It's not meant to do new modeling. National transmission ending study is the departments reporter in the four us to -- let's try to repeat the modeling efforts that transmission planners for different regions. We are trying to replicate that over the entire power grid. There is a lot of new analysis coming from that on the regional level for the entire United States. In terms of the actual data used in chapter six it does rely on some of the same models that are being used in the capacity expansion modeling for the national transmission planning study. A lot more modeling is happening past expansion

modeling. That is one piece of the different tools we are using. Drain thank you. Is there any data on the need for HV DC?

>> ADRIA BROOKS We didn't get into the different technology uses. We do talk about no transmission. That can be HV DC, AC. Any technology that could serve the need. Those who develop transmission no of those different uses. We don't get into it and the needs study itself.

>> WHITNEY BELL we have time for two more questions. On slide 25 what is the definition of electricity cost? How is high cost and low cost measured?

>> ADRIA BROOKS The cost here are just wholesale prices. The southeast is great out because the Southeast does not use location marginal prices. We don't have prices we can use here. With that said we are using LMP prices. We talk about how persistent is measured looking at what is the average price at that location. Compared to the meeting of the entire interconnect in the West and Texas those are isolated because it is the same market for the connector and the East we have all these different IPOs. We are looking at the comparison across the median wholesale price for the entire region to determine if it is person simply higher or lower. There is more information in the study itself which I just put the name of in gray under California that you can go into to understand. This information is also on the document I talked about.

>> WHITNEY BELL One last question. We studied overlapping?

>> ADRIA BROOKS I can't speak to what studies are being done across the entire apartment. We are not looking at that and the needs study. It is possible office electricity may be able to pinpoint that but I'm not sure.

>> WHITNEY BELL Thank you so much. We are about out of time for today. I just wanted to say there are several questions here. The program team will review the remaining questions and we will have an online FAQ. We will share the information on the website with the recording. We are not going to forget your questions. We know there are many more in there. We really appreciate everyone's time today. That wraps up today's webinar. If you have additional questions on the study please e-mail them at needs study.comments@hq.doe.gov. I will put that in the chat also. Thank you Adria, Jesse and Maria for joining us today. Thank you for everyone who attended and submitted questions. Take care everyone and see you next time.