

**Tennessee Valley Authority
Regional Energy Resource Council
April 20-21, 2015
Meeting Minutes**

The Tennessee Valley Authority (TVA) Regional Energy Resource Council (RERC or Council) convened for the seventh meeting of its first term at 9:03 a.m. CDT on Monday, April 20, 2015, at Loews Vanderbilt Hotel, 2100 West End Ave., Nashville, Tennessee 37203.

Council members attending:

Dus Rogers, Chair	Lance Brown	Chris Champion
Anne Davis	Wayne Davis	John Evans
Catherine Glover	Rodney Goodman	Wes Kelley
Bob Martineau	Pete Mattheis	Len Peters
Jack Simmons	Stephen Smith	Clifford Stockton
Lloyd Webb	Susan Williams	

Designated Federal Officer: Dr. Joseph Hoagland

Facilitator: Jo Anne Lavender

Appendix A identifies the TVA staff, members of the public who provided oral or written comments, and others who attended.

Appendix B is the agenda for the meeting.

Copies of the presentations given at the meeting can be found at <http://www.tva.gov/rerc>.

A portion of the meeting was devoted to presentations by TVA staff about the current status of the Integrated Resource Plan (IRP) and individual feedback from the Council on the IRP. On the afternoon of April 20, the RERC and the TVA Board of Directors held a joint public session to hear presentations from three panels on renewables, energy efficiency (EE), and the changing utility landscape and to accept comments from the general public. The RERC did not adopt consensus advice at this meeting.

1. IRP Status

Gary Brinkworth, TVA's Senior Program Manager, IRP, presented an update on the status of the IRP. He explained that TVA had published the draft IRP report and the accompanying draft Supplement Environmental Impact Statement (SEIS) and is accepting comments on both documents through April 27, 2015. (Slide 13) Mr. Brinkworth gave an overview of the contents of both draft documents and summarized the remaining public input opportunities. (Slides 14-16) He then noted the Council's advice from its February 2015 meeting regarding additional analyses and explained how TVA, in response, had engaged in sensitivity analyses to test key assumptions used in the IRP. (Slides 17-18) Mr. Brinkworth then shared the remaining steps and schedule in the IRP process. (Slide 19)

2. Feedback on IRP Draft Report

Mr. Brinkworth summarized the main takeaways from the draft IRP report, as well as the feedback provided to TVA by the IRP Working Group. (Slides 21-23) Jo Anne Lavender then led a roundtable discussion seeking individualized input from each Council member on the draft IRP. (Slide 24) Council members provided the following feedback:

- Dus Rogers commended TVA on the IRP process and output. He attended the Huntsville public meeting, which he said was good. In view of the potential volatility of

natural gas prices and supply, TVA should keep a balanced resource mix, and the IRP does that. Low rates and reliability are key factors in TVA's economic development mission. Mr. Rogers said TVA has been focused on this, but he expressed concern about residential rates and how they will impact low income residents in the Valley. He further noted TVA's retirement of seven units at Widows Creek Fossil Plant and suggested that, with the completion of Bellefonte Nuclear Plant not projected for future energy needs, TVA should look at other opportunities for the site, including a gas plant.

- Chris Champion expressed the Governor's appreciation of TVA's acquisition of the gas plant in Ackerman, MS. Based on input from his constituency, Mr. Champion expressed that Mississippi trusts that TVA will make the right decisions on its generation mix in order to keep rates low. He expressed concern about the lack of baseload capacity additions in the IRP and its heavy reliance on renewables and EE, especially in high demand events or outages. From an economic development perspective, TVA's rates are more expensive than the two other providers in Mississippi, but TVA's incentive programs help. He shared that, while his constituency supports EE and renewables, they are not willing to pay higher rates for them.
- Jack Simmons said that the presentations at the public meetings were good and that he thought the question-and-answer sessions were effective. He suggested that it may be good to clarify who the audience is for the IRP; rather than a public utility commission, the audience is the TVA Board of Directors. Mr. Simmons said TVA should tout the "cleaner" aspects of TVA's generation fleet, especially considering Section 111(d), and highlight the work it has done on renewables and EE. The additional sensitivity analyses have validated the envelope of possibilities and show that the IRP is pointing in the right direction. More maturity is needed around EE, and renewables need to be integrated carefully.
- Clifford Stockton said that he appreciated TVA's effort to make the IRP process transparent, including the public meeting in Memphis. The IRP meets its objective of providing an affordable, diverse, flexible generation mix. TVA should assure that EE programs are flexible and attractive to all sectors of consumers.
- Lance Brown said that his constituency in north Alabama expressed a consistent theme of approval that TVA's IRP is balanced, includes clean energy options, and moves to renewables in a smart, balanced way. There is, however, a concern about the resource mix during severe weather events and other high-demand situations.
- Stephen Smith said that the transparency and collaboration of TVA staff during the IRP process has been good. The IRP is directionally correct and realistic (e.g., regarding baseload assets in the future). Dr. Smith emphasized that, in order to assure that low income consumers aren't hurt, TVA should always keep in mind that bills take into account both rate and usage. He further said that TVA has modeled EE in a new and innovative way; however, it's still a work in progress and can be further refined in the final IRP. In particular, the ramp rates used in the draft IRP are overly constrained, causing the model to limit how much EE was chosen. In addition, risks are being applied as a cost factor in out-years, which is leading to incorrect EE cost estimates. Dr. Smith also said that he liked the sensitivities around HVDC wind options. With respect to renewables, he noted that the IRP doesn't provide for much over the next 3-5 years and that leaving distributed generation to be largely driven by local power companies may inhibit solar opportunities.
- Wes Kelley said that TVA should be proud of its history and accomplishments but noted that the Valley is changing from a load and energy perspective. Consequently, the IRP should focus on least-cost solutions. TVA is in a strong position to reduce its

greenhouse gas (GHG) emissions and isn't getting enough credit for reductions already made. Mr. Kelley further said that TVA has done an admirable job forecasting EE and noted that nothing influences EE as much as rates. He said that TVA historically has been "in the world but not of the world," but the IRP is a step in the right direction. Education and partnerships with local power companies will be key. Mr. Kelley further stated that the draft IRP report is well-written such that people with reasonable backgrounds can understand the direction.

- John Evans said the draft IRP report is an outstanding document. He observed that the IRP relies a great deal on EE and noted that, if TVA is counting on it that much, we need to make sure we've done our homework on it. Determining costs associated with EE is difficult, and he would like to see more information. He does not believe the marginal cost of EE has been captured. Mr. Evans questioned whether the new coal combustion residuals rule would result in plants closing sooner than anticipated. With respect to the SEIS, he noted that climate sensitivity is not as great as predicted. Given this, he questioned the role of climate change in planning.
- Pete Mattheis commended TVA's effort in developing the IRP, which he described as thorough and transparent. TVA has a statutory mandate and must keep this at the forefront of all its activities. It is evident that TVA's mission has been central to the IRP. Mr. Mattheis noted that, in an unregulated public power monopoly, everything comes down to the ratepayers, and TVA has done a good job of encouraging and accepting ratepayer comments on the IRP. He further noted that risk mitigation is critical; TVA must be flexible and act to reduce risk.
- Wayne Davis said that he was impressed with the quality of the draft IRP and its ability to handle a complex subject. He also noted its transparency and the rigorous process TVA used. Dr. Davis encouraged TVA to improve its discussion of the modeling and assumptions used. He said that he was pleasantly surprised by the growth scenario and the small amount of growth used. He further expressed surprise that solar did not play a larger role in the IRP and was being fulfilled by power purchase agreements rather than construction of solar installations or distributed generation. Dr. Davis also noted that the scale of the graph in Figure 8-4 gave the impression of a lot more risk variation than actually exists; in reality, the range of risk is only 1.5%.
- Anne Davis said the IRP process has been thorough, inclusive, and largely transparent. She appreciates the inclusion of EE and TVA's effort to model it as a resource. Ms. Davis said, however, that EE and renewables are more competitive than shown in the report, in part because TVA has overestimated the cost of these resources, especially in the long term. Investments in these resources will have little impact on net system costs in the near term and would support Clean Power Plan compliance and TVA's environmental stewardship mission. With respect to EE, Ms. Davis said that TVA has placed unjustified artificial constraints on EE, and she criticized TVA's treatment of distributed generation only as a load modifier.
- Rodney Goodman said he was pleased that EE appeared in every scenario, but he questioned how its use plays out at the level of the local power companies. Partnerships with local power companies will be key to assure that EE is implemented and to assure access to those who need it the most.
- Catherine Glover said that TVA has been responsive to questions and concerns in the IRP process. Given the large energy-intensive industries that are located in the Valley, TVA needs to continue to focus on understanding industrial customers and their needs and make sure it has a good plan that supports reliable and low-cost power.
- Len Peters noted that the very small projected growth rate gives TVA an opportunity to get cleaner and greener. He further said that natural gas prices are a prime driver that

will have a big impact on implementation. Higher gas prices would have resulted in a more aggressive look at EE and renewables. Dr. Peters encouraged TVA to continue to study all three consumer bases—residential, commercial, and industrial—and to look at the impact of its decisions on jobs. Industrial rates can be a proxy for job creation/ retention/loss.

- Bob Martineau said that EE, renewables, and natural gas will play key roles in meeting future energy needs, and each can present unique challenges. TVA and local power companies have time to grow these resources properly while maintaining reliability. Since these resources are paid for by all ratepayers, TVA must assure that all ratepayers get the associated benefits (e.g., apartment dwellers). Mr. Martineau further said that the general direction of the IRP supports carbon reduction; while it's not intended as a Clean Power Plan compliance strategy, it fits nicely and should position TVA well for compliance.
- Lloyd Webb said that low cost and reliability are the keys to TVA's ability to keep industry in the Valley. He supported TVA's inclusion of EE and renewables as selectable resources. However, he noted that EE is fundamentally different than other resources. The adoption rate of EE is critical, and the IRP may not fully capture adoption rate risk. With respect to renewables, Mr. Webb said there needed to be further explanation of how those resources were selected, how incentives were treated, and how the results were affected. In addition, he said the IRP should explain how the EPA consent decree impacted this IRP.
- Susan Williams noted that the Council previously recommended that TVA Board open its committee meetings to the public, but that has not happened yet. She said she was pleased that the IRP does not contain any new nuclear or coal plant construction. Ms. Williams questioned why small modular reactors are still included in the IRP given that private development has backed off the technology. She said the plan should call for more solar sooner. Further, if TVA waits until the 2030s for Clean Line, it may no longer be an option. Ms. Williams said she was glad to see EE included as a selectable resource and that it is important to low income consumers. She also noted the need for alignment of the IRP with the Clean Power Plan.

The Council adjourned for lunch at 10:54 a.m. CDT. The Council reconvened in joint session with the TVA Board of Directors at 12:04 p.m. CDT.

3. **Joint Session with RERC and TVA Board of Directors**

TVA Board Chair Joe Ritch and RERC Chair Dus Rogers welcomed the audience and participants. Dr. Joe Hoagland, TVA's Vice President, Stakeholder Relations, and Designated Federal Officer for the RERC, provided an opening statement regarding the development of the IRP and the joint session. He explained that the IRP is TVA's attempt to answer the question "What will you be doing 20 years from now?" from a least-cost perspective. The way TVA may meet demand is evolving at the same time customer desires are evolving. Customers want efficiency and flexibility in choosing the energy with which their load is met, but high reliability and affordability remain critical. Dr. Hoagland explained that today's session focuses on changes highlighted in the IRP. Historically, the energy supply puzzle has been entirely focused on TVA—what types of plants to build, where to build them, when to build them. Now, with options like EE and distributed generation, the model is less about TVA and more about customers, consumers, and stakeholders. This shift requires an understanding of changing customer wants in a rapidly changing regulatory framework and requires an even closer working relationship between TVA and its customers and consumers.

Scott Self, TVA's Vice President, Enterprise Planning, presented the preliminary IRP results. (See slide deck) He summarized TVA's current energy portfolio, the scenarios and strategies used in the IRP, the key evaluation criteria, and a high-level view of the future energy portfolio.

Panel 1

Neil Placer (TVA) moderated a panel discussion on renewables. Panel participants were Mary Shaffer-Gill (TenneSEIA and Aries Energy), Len Peters (Commonwealth of Kentucky), Greg Williams (Appalachian Electric Cooperative), and Jack Simmons (Tennessee Valley Public Power Association (TVPPA)). Mr. Placer introduced the panel topic by highlighting TVA's rich history of employing renewables in the form of hydroelectric generation. Since 2010, TVA has added 1,500 megawatts of wind and some biomass generation. In the last three years, TVA has experienced nearly 100% growth in its solar programs. The draft IRP focuses on least-cost planning and leads TVA toward meeting future energy needs through EE, renewable, and natural gas. The increased reliance on renewables creates opportunities and challenges, and Mr. Placer posed several questions to panel members.

First, Mr. Placer asked the panel to discuss opportunities: what types of business models are most important to leverage to pursue renewable energy in a prudent manner and what types of new partnership opportunities are important to capitalize on? Mr. Simmons pointed out that TVA's business model is unique in the first instance, given the lack of regulation by a public utility commission and TVA's isolation as a result of the "fence." Fairness, affordability, and reliability must be the cornerstones of the models going forward. Mr. Williams said that his organization is trying to implement a unique community solar program in the Valley that could be a model. He's finding that his members are willing to entertain the community solar option because they do not want the maintenance responsibility of solar panels on their own homes. Dr. Peters noted that TVA does not provide all of the electricity in Kentucky and that the use of renewables is a location-specific issue. He explained that investor-owned utilities must operate under a fair, just, reasonable, cost-effective rate, and TVA should be consistent with that. Ms. Shaffer-Gill noted that community solar projects are not intended to replace distributed generation and rooftop solar options. She said that public-private partnerships could help generate new models and support economic development in the Valley. Mr. Simmons said local power companies should approach distributed generation carefully, avoiding unfairly incentivizing it at the expense of other ratepayers. He also noted that aggregated solar projects, such as community projects, can be chosen and sited more strategically, thereby making them potentially more efficient and economical. Dr. Peters noted that many ratepayers cannot afford to put solar panels on their homes. In terms of partnerships, all panel participants agreed that the most important partnership is between local power companies and end-use consumers. Mr. Simmons said that another key partnership must be between TVA and its customers (local power companies and direct-served customers) in order to integrate renewable resources.

Second, Mr. Placer asked the panel to discuss challenges: how do we deploy renewables in a manner that delivers low-cost energy that is also reliable and on the scale used by our customers? Dr. Peters said that the biggest challenge is trying to integrate renewable opportunities at the utility scale in order to provide electricity for large industrial users around the clock. Ms. Shaffer-Gill commented that distributed generation can provide value in that situation. Mr. Williams said that, while renewables are part of the solution, they are not an end-all solution. By example, he pointed to the winter peaks in January and February 2015, which occurred between 7:00 and 8:00 a.m., a time during which renewables would not have played a role in meeting demand. Mr. Simmons said that what we should be working

toward is integration of the entire system on both the load and supply sides. He said storage also plays a role, while noting that local power companies are looking at ways to aggregate the demand response capabilities of electric water heaters across the Valley to leverage them in a way that's similar to TVA's pumped storage technology. In response to a question from TVA Director Mike McWherter, Mr. Simmons further explained the idea of using water heaters for demand response. TVA Director Pete Mahurin commented that the conversation about renewables should not ignore water power, which is our most important and cheapest renewable resource, and that TVA should be looking for ways to expand our power production using this resource. Dr. Peters noted that there have been a few recent hydro installments and run-of-the-river projects in Kentucky. Mr. Simmons mentioned the possibility of pumping water back upstream and reusing it as an alternative to traditional pumped storage technology. TVA Director Ron Walter questioned how we can get low-income communities involved in this process. Mr. Simmons pointed out that, if the IRP says that EE is a true player and will replace the need for new generating sources, TVA should be willing to invest its avoided construction costs in EE development. Mr. Williams also noted that TVA and TVPPA have been developing an education program for lower income consumers and mentioned a possible partnership with Appalachian Outreach with respect to renewables.

Lloyd Webb asked the panel to comment on the cost issue with intermittent resources like renewables and the two competing theories about paying for system capacity that provides back-up power. Mr. Williams acknowledged the issue and said that his organization is considering it in its strategic pricing plan. He also said that education on the issue is key. Mr. Simmons agreed, noting that some kind of cost-of-service-based pricing may be necessary to make sure that fixed costs are recovered through fixed charges. Ms. Shaffer-Gill noted that the distributed generation-integrated value (DV-IV) stakeholder process last year considered these issues. These assets add value to the grid, but the key is to fairly assess the value so that costs aren't shifted to other ratepayers.

Panel 2

Cindy Herron (TVA) moderated a panel discussion on EE. Panel participants were Clifford Stockton (Greater Memphis Chamber), Curt Puckett (DNV GL), Michelle Walker (State of Tennessee), and Becky Williamson (Memphis Light, Gas & Water (MLGW)). Ms. Herron said that TVA has been partnering with local power companies, directly-served customers, and other Valley stakeholders to deliver EE and demand response solutions. While TVA has a fairly robust product portfolio, we recognize that we're missing products for tenants and renters. Including EE as a power resource in the IRP will require even more rigorous measurements and evaluations of EE results.

Mr. Stockton explained that one of the major weaknesses in TVA's current programs is the lack of attention on apartment complexes and the lack of incentives to apartment developers to build more efficient buildings and lower utility costs for tenants. Mr. Puckett is a third-party evaluation contractor for EE resources whose responsibility it is to develop reliable estimates of in-Valley EE resources on which TVA system planners can rely. The first step in that process is looking at customer participation and billing information to understand how customers are consuming energy. In response to a question from Joe Ritch, Mr. Puckett responded that his responsibility is to identify the energy saved on a seasonal and annual basis, as well as the demand reduced during key critical times so that TVA can fold that information back into the planning process. TVA Director Marilyn Brown commented that TVA's approach to EE in the IRP is innovative. Ms. Walker explained that Tennessee's Governor put \$32.5 million in his budget for EE projects in state facilities. She agreed with

Mr. Puckett that there's a lack of data on EE, so Tennessee is going to start investing in the data infrastructure. In terms of challenges, she noted that there would need to be a large educational component to EE programs in order to get consumers comfortable with third parties accessing their energy usage data. Moreover, we need to fill the gaps in programs to assure that all customers can take part and fairly distribute the cost burden. Ms. Williamson pointed out that the bill customers receive reflects both rate and consumption, and that high bills in this area are mostly driven by high consumption. Reducing consumption will be critical to the EE program effort. She also recognized the need for diverse programs to meet diverse needs which may differ across the Valley. For example, a heat pump program won't be unilaterally possible if 80% of homes have gas heating. Filling the gaps in programs also will be an essential component.

Ms. Herron posed the following questions to the panel: How best do you think we can work together to help the people who have limited ability to pay for EE programs, and whose role is it to take the lead and address the issue? Mr. Stockton said that local power companies and TVA must take the lead jointly, and they must incentivize apartment owners and developers to make improvements to their buildings. TVA Director Virginia Lodge added that the federal government, which has weatherization programs, should also be included as a potential partner. Mr. Stockton agreed that pulling together all agencies to come up with solutions is important and said that TVA could be a leader. In response to a question by TVA Director Richard Howorth about the role of building codes, Dr. Hoagland responded that lack of adequate building codes is one problem, but code enforcement is also a problem; Mr. Puckett agreed. Ms. Williamson also acknowledged the code enforcement issue and summarized a program created by MLGW under which they trained inspectors to certify new home construction, which led to an average 35-40% savings. MLGW also created a set of specifications for apartments and worked with a developer to make improvements to his plans aimed toward EE. Dr. Brown noted that Tennessee and Mississippi are two of about ten states that haven't adopted modern codes. She further noted that in California the public service commission provides incentives to its utilities to work with states and municipalities to upgrade building codes; the analog here would be TVA rewarding local power companies for working toward better codes in Valley states. Mr. Goodman pointed out that better codes are useful for new construction, but many low income residents must live in older housing. In relation to this issue, Ms. Walker noted that Tennessee's energy office has been working with the Tennessee Electric Cooperative Association to look at a potential model that would access some of the \$250 million in USDA's EE and loan conservation program.

Stephen Smith questioned how we make sure we're not being overly cautious in implementing EE programs and how we let those who want to run faster to capture opportunities do so. Ms. Williamson suggested that TVA could recruit large and small local power companies to do pilot tests of programs and then offer turn-key programs for implementation. Mr. Puckett said that the key will be for TVA to provide EE programs that local power companies actually want to take advantage of. Mr. Walter asked whether the homeowners and apartment renters in the programs Ms. Williamson mentioned actually saw reductions in bills as a result of the EE measures. Mr. Stockton responded that they were seeing rates 30% lower than those not in the program.

Panel 3

Dr. Hoagland (TVA) moderated a panel discussion on the changing utility landscape. Panel participants were Van Wardlaw (TVA), Jay Stowe (Huntsville Utilities and Seven States Power Corporation), Pete Mattheis (Tennessee Valley Industrial Committee), and Wayne

Henson (East Mississippi Electric Power Association and TVPPA). Mr. Wardlaw explained that TVA has made some hard decisions over the last few years in order to position itself with a diverse portfolio. The public power model is based on community involvement and decision-making at a local level, and this model is the best model if done right. Further, TVA and its partners are all working toward a common goal of serving the people.

Mr. Stowe explained that, although it's a nice story to say that the industry hasn't changed in 70 years, it's not completely accurate; for example, he can turn the lights at his house on and off with his cell phone. Nevertheless, cost and reliability are still at the forefront of consumers' minds. TVA has largely taken care of the reliability piece, so local power companies spend most of their time talking about cost. He noted, however, that when the power is out, he doesn't get many calls complaining about cost. Mr. Stowe also noted that EE works well except in extreme peak situations. Mr. Mattheis explained that large energy-intensive customers look at the world through a lens of competitiveness. While customers want the flexibility to participate in new technologies, they want the supplier to maintain reliability and they want clarity and predictability. Mr. Henson described the current electric system and the reliable, affordable power it supplies, which supports industry. He pointed out the difficulty of using solar to replace capacity, given its low annual availability factor. However, he supports customers having the option of using solar and other renewables as long as there is no cost-shifting. The most economically promising model is utility-grade or community installations. Mr. Henson also encouraged the use of water heaters as a source of energy storage. He closed his remarks by noting that he does not like the term "smart grid" because it insinuates that the current grid is "dumb," when in fact the current grid is resilient, high-quality, reliable, and economical.

Dr. Hoagland asked the panel how TVA can manage its relationships with third parties to provide innovative technologies and business models while continuing to maintain the grid and public trust. Mr. Stowe noted that there are third parties that are also trusted by customers (e.g., Google) and said that one challenge will be the transition from a one-way system. Mr. Mattheis said that part of the challenge will be collecting, modeling, and reacting to data regarding how the marketplace is changing. Transparency of data and of decision-making is critical. Mr. Henson noted that his company is working on a utility-scale solar project involving third parties. One of the challenges is protecting the resource if the third party walks away after the tax credits are used. Mr. Wardlaw noted that, during the last conversations about these topics, TVA talked about needing to be directionally positioned to address changes; now, we're taking the next logical progressive step down this path, and we'll learn more over the next few years as third parties stimulate thinking. He also said that TVA's job in the Valley isn't merely to provide energy, but to provide economic prosperity and a good environment in which to live. Embracing these new technologies and changes is a natural fit with TVA's mission.

Dr. Hoagland asked the panel about rate impacts associated with distributed generation. Mr. Henson said that recovery of fixed costs is critical. Local power companies have been doing their homework to build the right model to be able to take advantage of technology opportunities that arise. Mr. Mattheis agreed that rate structure and cost allocation are important issues. Mr. Stowe noted that the 18-month window for decisions on renewables, rather than a years-long lead time for traditional capital expenditures, provides flexibility. Mr. Wardlaw noted that the participants in conversations about energy supply are changing, with consumers and third-party vendors now having a seat at the table.

Stephen Smith cautioned against assuming that rooftop solar creates cross-subsidization; it

can depend on penetration rates, individual circuits, and other factors. Moreover, Dr. Smith said there are many cross-subsidizations occurring within the existing rate structure that dwarf whatever might occur with distributed generation. Market signals, including time-of-use rates, also need to be part of the conversation to address those other cross-subsidizations. Mr. Henson responded that his company has been working toward time-of-use pricing, but customers have been hesitant to adopt the technology needed. Mr. Stowe agreed that other potential cost-shifting needs to be addressed as a part of the overall solution.

Lloyd Webb asked what the driver is for the significant change in load growth projections. Mr. Mattheis said a key factor is customer awareness of cost and efforts to reduce energy consumption. Marilyn Brown said that electric vehicles are a wild card and may become a large factor in selling base load. In addition, we're in a time period where people want to use energy more wisely but they are also using energy in different ways. The business model going forward will be critical to handling this opportunity for growth. Mr. Henson noted that the small load growth has spurred local power companies to produce better financial models.

4. **Public Comment Session**

Wilson Taylor facilitated a public comment session. The following people offered comments in the joint RERC-TVA Board session:

- Jack Suggs, Electric Director, City of Oak Ridge: Oak Ridge is heavily involved in EE and renewables, is a platinum-level sustainable community, and is a U.S. EPA Green Power community. Oak Ridge is excited about the IRP process and appreciate that it was an input-driven document. The city especially applauds TVA for its approach to renewable resources. Given the two percent annual loss in energy sales the city has been experiencing, the city encourages TVA to consider a one-ownership study of EE. Oak Ridge also appreciates TVA's support of small modular nuclear reactors and hopes they remain part of the region's energy future.
- Chris Ann Lunghino, Coordinator, Beyond Coal Campaign, Sierra Club: This IRP is an opportunity for TVA to lead the way in the transition to an economy powered by clean, renewable energy sources and improved EE. The draft IRP reflects important steps in the right direction, including a considerable commitment to resource planning and public engagement that should serve as a model for other utilities, and confirms that TVA can reduce carbon emissions to facilitate compliance with the Clean Power Plan. However, TVA is ultimately out of touch regarding performance and costs for EE and wind energy. The draft IRP obscures the true potential of those resources in the Valley. With respect to EE, by placing a cap on the growth of EE programs and predicting too-high costs, TVA fails to maximize its lowest cost energy resource and deprives its customers of a choice to use energy smarter and save money. With respect to wind energy, staff relied on out-of-date technology and performance assumptions, causing the plan not to choose wind energy development over the next decade.
- Don Safer, Board Member, Tennessee Environmental Council: The 2015 IRP has improved on the 2011 IRP, but it still suffers from an "echo chamber" effect and, as a result, fails to take into account the revolutionary transformation of renewables and the future development of cheaper storage. TVA needs to prepare now for grid defection and load defection. The IRP is correct in not taking into account Bellefonte, and TVA should abandon the license. Small modular reactors are not economical. The uprate on Browns Ferry is a mistake and could damage the reactors; those 134 megawatts can be obtained from wind, solar, and EE.

- Lauren Bush, Statewide Organizing for Community Empowerment: There's room for both community solar and rooftop solar. The IRP needs a higher EE target to keep levels above the past. We also need EE programs for low income areas. Codes enforcement may be a viable mechanism, as many high energy usage establishments may also have other health code violations. People should be able to report poor heating and air conditions as they do radon and mold violations.
- Amanda Garcia, Southern Environmental Law Center: Serving on the IRP working group, it's evident that the draft IRP reflects contributions of stakeholders and robust dialogue. SELC supports a planning direction that includes a significant investment in EE and renewables. Such a strategy is least cost and least risk. It also diversifies TVA's fossil-heavy portfolio, providing a hedge against key uncertainties, and it best aligns with TVA's stewardship mission by translating to less carbon and less coal ash pollution. Though it has challenges, the shift toward EE and renewables should be viewed as an opportunity to lead the southeast and the nation in the transition to the utility marketplace of the future. Today's panels represent the beginning of a conversation about this transition, but several key voices were missing: environmental interests and end-use customers. These voices should be included in future discussions, and the multi-stakeholder model used for the IRP provides a strong foundation for inclusion.
- Max Shilstone, Clean Line Energy: Clean Line previously requested that the RERC ensure that the IRP staff explained the pricing used in modeling HVDC wind in the forecast. Does a levelized price represent the offers TVA receives from wind developers, or are historical prices being used? New pricing should be built into the model. In addition, the draft IRP assigned all wind resources the same net dependable capacity factor. That is not appropriate for the wide range of wind options. TVA should evaluate each wind resource using a location-specific generation profile for that area and inputs that represent current wind turbine technology.
- Deanna Bowden: TVA should be the technology leader it has been in the past. TVA must assure that the models being used reflect the changes that are coming. Renewables and EE are more accessible, and people will choose them. Make sure the IRP fully considers the sources that are already here.
- Dave Hrabosky, Exigent Energy: The Valley became a great place to live and do business because of low-cost, reliable power. Over the past 15 years, the prosperity in the Valley has ebbed as power rates have escalated and businesses have closed or relocated outside the Valley. This trend can't continue. In developing a long-term plan to provide low-cost, reliable power, TVA and consumers must innovate—TVA in how it manages its generation fleet and consumers in how they consume energy. TVA must also diligently manage its risk and provide reasonable assurance to Valley residents and businesses that they will have access to low-cost, reliable power in the future.

The joint RERC-TVA Board session adjourned at 3:52 p.m. CDT, and the RERC reconvened on Tuesday, April 21, 2015, at 8:34 a.m. CDT.

5. **RERC Observations about Day 1**

Ms. Lavender sought observations and reflections from the Council about the previous day's discussions.

- Clifford Stockton said that TVA received feedback that low income areas need to be studied. Staff needs to look at that population to see what can be done to resolve issues and serve the underserved.
- Wayne Davis said that he heard many comments about the social justice aspects of EE. Although TVA has treated EE like a power plant in the IRP, not enough work has been

done on how TVA makes a capital investment in EE like we would for traditional sources.

- Lloyd Webb said that his main takeaway was that he hadn't appreciated how complex EE is. TVA needs a stand-alone strategy to address EE opportunities. However, the issue goes well beyond just TVA. There are many organizations and governmental entities who feel they have a stake in implementation, and TVA might appear to be crossing into other people's territory.
- Len Peters said that it was evident yesterday that it will be a heavy lift to get the Board to fully understand the IRP given the complexities surrounding EE, renewables, and the changing utility marketplace.
- Stephen Smith said that the discussion on EE was good. It's a complex issue but one for which there's tremendous support. TVA's work to reflect EE as a resource in the IRP shows even more that TVA needs to get it right, send the right signals, and set the right precedent. Yesterday's solar discussion may not have included all the perspectives, and some information was convoluted, with multiple levels of conversation going on (e.g., rooftop vs. community, the recurrent theme of cost subsidization). It was confusing and perpetuated mythologies. TVA needs to distribute the information that its DG-IV process has found and then have a more representative conversation that separates fact from fiction. Overall, the renewables conversation was not as productive as the EE conversation.
- John Evans said that the only effort in North Carolina where he's seen non-traditional energy assets be successful is in terms of penetration of solar. That was accomplished through tax equity. Mr. Evans said he wasn't sure whether that was the answer for EE, but maybe incentivizing third parties to provide EE via tax credit could work. If TVA wants to do the most for low income residents, it should keep cost low and create jobs. He found it odd that the panels focused so much on EE and renewables, given that most generation is not in those areas.
- Jack Simmons said that EE is a complex topic, and that while he thinks everyone is interested in the same thing, there are differences of opinion on how to get there. The first step is to acknowledge that TVA's programmatic offerings for years have been on the token level rather than larger scale. If the IRP is treating EE as an alternative to steel on the ground, then it has value that we should be able to equate to monetization of behavioral changes. However, we have to be able to measure the savings to make sure the value is actually being provided.
- Wes Kelley said that the drive toward more EE and renewables will require program development and raises the need to determine the roles TVA and various stakeholders will serve in terms of developing those programs.
- Rodney Goodman noted that these issues are difficult to talk about, but TVA taking up these issues in the IRP gives TVA a chance to be a leader in the conversation. There are already some tax credits available for building low income housing, and we may be able to add to that.
- Mr. Kelley asked about the demand response program, and Dr. Hoagland responded that we have 2,000MW of demand response capability and plan to add 200-500MW over the IRP planning period. However, the demand response need is different than it was several years ago and is not as urgent a question. Mr. Simmons noted that demand response is load-shaping rather than load-lowering like EE. As TVA implements other programs, it may find opportunities for demand response. Scott Self said TVA is open to that and pricing signals are an available tool.
- Dr. Peters noted that all stakeholders recognize what can be gained from EE, and it's the right thing to do. He questioned the goals of the focus on renewables. If we're trying

to build an industry, he expressed skepticism about its inclusion in the IRP. If we're trying to solve a problem, he said we're having an incomplete conversation. For example, in Kentucky, renewables couldn't be implemented on a scale necessary to achieve carbon dioxide reductions. Mr. Simmons also raised the issue of defining the objective of renewables. If air quality is a driver, small modular nuclear reactors could be part of the solution. He noted that intermittent renewables, without storage capability, create the need for back-up generation. Dr. Smith said that he supports incentivizing storage, which is a very important component of growing the renewable industry. Lower demand creates an opportunity to bring projects on in a smaller, more discrete way and to take advantage of technological advancements. Nuclear generation is not the answer, given the state of that industry and its projects. Dr. Peters said that he recognizes the problems with nuclear projects, but sees few options that enable the required level of CO₂ reduction.

- Susan Williams said that she views renewables as part of TVA's mission. In a relatively short time, the conversation within TVA has evolved considerably, from focus only on nuclear and coal to spending considerable time talking about EE and renewables.

6. TVA Update

Dr. Hoagland provided an update on the completion of Watts Bar Unit 2. (Slide 34) He also noted the recent announcement of TVA's acquisition of a gas plant in Ackerman, MS, and said that it was reflected in the IRP as a long-term power purchase agreement. Because it is not an addition, it doesn't change the analysis; it's essentially just a change in ownership. Dr. Hoagland also mentioned that Raccoon Mountain is expected to return to service in June following the refurbishment of cracked rotors and cables. Lloyd Webb asked whether TVA has noted any lessons learned. Dr. Hoagland responded that the rotor design is different than the one that cracked, and TVA has implemented a new set of predictive maintenance procedures.

Wes Kelley asked about the timeline for the retirement of Allen, and Scott Self and Tom Rice responded the plant must retire by the end of 2018.

Stephen Smith asked for an update on DG-IV. Dr. Hoagland responded that it is time to pull that group of people back together to talk about next steps and to develop a bridge/transition plan.

7. Summary of IRP Public Comments

Gary Brinkworth provided a summary of the public comments received to date on the draft IRP. He described the various methods by which TVA has been seeking comments. (Slide36) The plan is to list the comments and TVA's responses in a separate volume. As of April 20, TVA had received approximately 90 comments. Two-thirds of those are form comments (e.g., standardized postcards). Lloyd Webb asked how IRP working group comments would be reflected. Mr. Brinkworth said TVA hasn't yet decided how to treat those comments.

Mr. Brinkworth provided a topical summary of the public comments received to date. (Slides 37-38) Wes Kelley asked whether any comments had been received about nuclear power. Mr. Brinkworth responded that the only comments in this regard were around how spent fuel was considered in the waste metric. Anne Davis asked whether TVA anticipates making changes to the final IRP in response to comments. Mr. Brinkworth said that TVA will refine its message and try to be clearer about its findings and where the risks are. Susan Williams asked whether TVA had received comments from the coal industry, and Mr. Brinkworth said

none had yet been received.

8. Sensitivity Case Runs and Preliminary IRP Results

Tom Rice, TVA's Senior Manager, Capacity Planning and Fleet Strategy, summarized the additional sensitivity case runs that TVA has completed in recent months in response to suggestions from the Council and the IRP working group. (Slides 40-54) The sensitivities are grouped into several categories: nuclear, EE/DR, renewables, resources, and key drivers. Anne Davis asked for clarification of what TVA considers short-term and long-term as referenced in the slides. Mr. Rice responded that short-term is the first 10 years of the planning term and long-term is the second 10 years of the planning term.

The Council asked a number of clarifying questions about the EE sensitivity case assumptions (slides 44-45). In response to a question from Stephen Smith, Mr. Rice explained that the overall percentage of EE taken in the model hadn't changed, but the sensitivities did result in more EE used sooner in the planning period. Lloyd Webb asked if any artificial constraints had been added to prevent the model from taking too much EE. Mr. Rice said no, but noted that we do have ramp rates. Dr. Hoagland noted these are similar to construction schedules for gas plants. In response to a question from Wes Kelley, Mr. Rice said that a 25% ramp rate was used in the base case. Mr. Webb said that additional study was needed to validate the ramp rates. Stephen Smith noted there are real issues in ramping up, but noted that it's instructive if the model selects more EE in the near-term if ramp rates are relaxed. He said other jurisdictions have different ramp rates and suggested that a policy decision may be necessary about how and when to deploy EE. Dr. Hoagland noted that better infrastructure is needed to support enhanced EE and that TVA would be wasting money if we forced more EE into the portfolio without good alignment ahead of time. Dr. Smith said TVA should capture these tensions in the narrative of the IRP.

Len Peters asked about TVA's reflection of the cost and value associated with greater penetration of EE. Mr. Rice explained that EE is reflected in blocks, and the supply stack for EE selects lower cost blocks first. He further said that, as we have greater EE penetration, the model shows a trade-off in bill vs. rate; we can have lower total system cost but higher average system cost.

With respect to renewable sensitivities (slides 47-49), Dr. Smith noted that Clean Line has a timeframe in the 2018-2020 range, but it didn't originally get picked up in the model until the late 2020s/early 2030s. These sensitivity case runs explored what it takes to pull that wind contribution back to the project's timeline and provides good information for TVA decision makers. John Evans said it would be good to understand how the block size assumptions affect the modeling.

With respect to the resource sensitivities (slides 50-51), Stephen Smith noted it was counterintuitive that additional pumped storage would offset renewables. Mr. Rice responded that the impact was minimal. Lloyd Webb noted that the sensitivities must be affected by the discount rate used for the out-years. Mr. Rice confirmed that the results would look different in the early years and noted that 2028 is when we see the first need.

Mr. Rice then summarized the results of the sensitivity analyses on total system costs and short-term and long-term system average costs, as well as the preliminary sensitivity conclusions. (Slides 55-59)

Dr. Peters asked about TVA's consideration of CO₂ reductions and whether the model

recognizes that the timeframe of the Clean Power Plan overlaps with the IRP planning period. Mr. Rice clarified that, while the IRP did not attempt to capture timing around the Clean Power Plan, the model reflects the dramatic impact on average CO₂ emissions resulting from adding additional nuclear plants in the nuclear sensitivity cases. Renewables and gas plants did not move the CO₂ needle as much.

Lloyd Webb said that he was among those who pushed for the gas price sensitivities. Although he still disagrees with the reference case's treatment of gas prices, the sensitivities have picked up the information that he wanted to see. Dr. Peters noted that volatility is also a key issue with gas prices that creates uncertainty. Mr. Webb said that TVA is taking on risk if it relies too much on gas. Mr. Rice noted that many decisions are close calls with respect to which resource to choose, and TVA will have to see what the current market is when those decisions must be made. Dr. Smith asked Mr. Webb if he thought the export of gas would have an impact. Mr. Webb responded that he thought oil will have the bigger impact. Dr. Peters also noted the geopolitical issues associated with natural gas, pointing to the destabilization of Russia.

Mr. Brinkworth summarized the direction of the IRP. (Slide 61) He described the IRP as a compass that provides a directional indication. The IRP doesn't make generation commitments but instead identifies a power supply mix. Implementation will be a challenge, with TVA trying to achieve the value the IRP says exists. Wayne Davis asked why nuclear isn't mentioned. Mr. Brinkworth said it simply didn't make it to this slide, but it is reflected in the plan and in the public discussions.

9. Council Discussion

Jo Anne Lavender opened the floor for Council discussion, including on the proposed discussion questions (slide 64).

Stephen Smith asked what the role is for the Council post-IRP approval. Dr. Hoagland responded that he expects the Council to provide advice on TVA's policy decisions as it implements the IRP. In addition, the Council can help set direction, review results, and provide feedback to the Board concerning the work of other technical groups (e.g., RIX). Wes Kelley suggested a continued focus on EE at a policy level as efforts are made to capture that value. Dr. Smith noted that the RIX group (renewables) functioned at a higher level than the EEIX group (EE), so TVA may need to figure out how to improve the EE process. He also suggested that TVA could play a larger role in facilitating conversations among the many players in the EE world.

Lloyd Webb asked whether the Council would have another opportunity to offer comments on the IRP. Dr. Hoagland responded that there will be one more Council meeting in June to get feedback on the recommended planning strategy.

10. The next meeting of the Council will be held June 16-17, 2015, in Knoxville, Tennessee.

The meeting adjourned at 11:38 a.m. CDT.

Minutes Approved:


Dus Rogers, RERC Chair

Date:


7/5/15

**Appendix A
Non-Council Meeting Attendees**

RERC Meeting

TVA Staff			
Brenda Brickhouse	Gary Brinkworth	Cathy Coffey	Hunter Hydas
Beth Keel	Kelly Love	John Myers	Tom Rice
Scott Self	Greg Signer	Liz Upchurch	

Other
Jessica Monroe – TVA Office of the Inspector General

Joint Session with RERC and TVA Board of Directors

TVA Board of Directors			
Joe Ritch, Chair	Marilyn Brown	Lynn Evans	Richard Howorth
Virginia Lodge	Pete Mahurin	Mike McWherter	Ron Walter

TVA Executives
Bill Johnson, Chief Executive Officer
Kathy Black, Senior Vice President, Human Resources & Communications
Charles Pardee, Executive Vice President, Operations
Sherry Quirk, Executive Vice President & General Counsel
Ricardo Perez, Senior Vice President, Shared Services
John Thomas, Executive Vice President, Financial Services
Van Wardlaw, Executive Vice President, External Relations
Janet Brewer, Vice President, Communications
Brenda Brickhouse, Vice President, Environment & Energy Policy
Joe Grimes, Chief Nuclear Officer
Cindy Herron, Vice President, EnergyRight and Renewable Solutions
Joe Hoagland, Vice President, Stakeholder Relations
Justin Maierhofer, Vice President, Government Relations
Scott Self, Vice President, Enterprise Planning
Rebecca Tolene, Vice President, Natural Resources & Real Property Services

TVA Staff			
Gary Brinkworth	Cathy Coffey	Sherri Collins	Teresa Dillard
Hunter Hydas	Beth Keel	Jo Anne Lavender	Kelly Love
Jeff McKenzie	John Myers	Mary Margaret Painter	Neil Placer
Tom Rice	Greg Signer	Wilson Taylor	Liz Upchurch
Mike Walker			

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Panelists	
<u>Panel 1: Renewables</u>	
Moderator: Neil Placer, TVA	
Mary Shaffer-Gill, TenneSEIA and Aries Energy	
Len Peters, Commonwealth of Kentucky	
Greg Williams, Appalachian Electric Cooperative	
Jack Simmons, Tennessee Valley Public Power Association (TVPPA)	
<u>Panel 2: Energy Efficiency</u>	
Moderator: Cindy Herron, TVA	
Clifford Stockton, Greater Memphis Chamber	
Curt Puckett, DNV GL	
Michelle Walker, State of Tennessee	
Becky Williamson, Memphis Light, Gas & Water	
<u>Panel 3: Utility Landscape</u>	
Moderator: Joe Hoagland, TVA	
Van Wardlaw, TVA	
Jay Stowe, Huntsville Utilities and Seven States Power Corporation	
Pete Mattheis, Tennessee Valley Industrial Committee	
Wayne Henson, East Mississippi Electric Power Association and TVPPA	

Members of the Public Who Presented Oral Statements			
Jack Suggs	Chris Ann Lunghino	Don Safer	Lauren Bush
Amanda Garcia	Max Shilstone	Deanna Bowden	Dave Hrabosky

Other	
Jessica Monroe – TVA Office of the Inspector General	
Todd Peney, Phillip Rickett, Adam Smith, Steven Vinsant – TVA Police	
Amber Thompson – Court Reporter	

**Appendix B
Meeting Agenda**

Day 1: Monday April 20

9:00	Welcome, Introduce New Members	Joe Hoagland, Designated Federal Officer Dus Rogers, Council Chair
9:15	Meeting Purpose	Hoagland
9:25	Agenda and Protocols Review	Jo Anne Lavender, Facilitator
9:30	IRP Status	Brinkworth
9:40	Break	
9:50	IRP Draft Report Feedback	Brinkworth / Lavender / Council
10:45	Preview TVA Board Public Session on IRP with RERC	Hoagland
11:00	Lunch	
12:00- 4:45	Joint Session with TVA Board (Symphony I Ballroom)	Council
4:45	Adjourn	

Day 2: Tuesday, April 21

8:30	Welcome, Review of Day 1	Lavender
9:00	Recap February 2015 Meeting	Lavender
9:05	TVA Update	Hoagland
9:15	IRP Public Comments	Brinkworth
9:30	Break	
9:45	IRP Sensitivity Case Runs and Preliminary	Tom Rice
10:45	IRP Direction	Brinkworth
11:00	Council Discussion	Lavender
11:45	IRP Next Steps	
11:55	Summary, Adjourn	Hoagland / Rogers
12:00	Lunch	