CEO's Report for August 30, 2021
Board of Trustees Meeting
Post-Winter Storm Uri
Flexible Path[SM] Review

INTRODUCTION: Recognizing customer expectations and energy technologies have been changing for some time, in 2017 our President & CEO, Paula Gold-Williams, created our ***Flexible Path***[SM] strategy. Since that time our teams have worked collaboratively to bring it to life, including aligning it to our ***Guiding Pillars*** (see the image below).

The concept of continually remaining flexible and adjusting to changes in the local, state, national, and global energy landscapes is critical to our journey to find and implement new energy solutions. This will ultimately support the City of San Antonio's goal to reach carbon neutrality by 2050.

Our journey now includes incorporating what we are learning from Winter Storm Uri. That storm demonstrated that all generation technologies, as well as the natural gas distribution systems across Texas, could be affected by long-duration, extremely cold weather conditions.

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OUR ENERGY LANDSCAPE: This said, it is important to also note that over the last 18 months, we have had to address a very complex landscape of challenges while working to capitalize on new opportunities. These circumstances create complexities that we must manage through simultaneously while continuing to meet our customers' around-the-clock energy needs.

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KEY OBSERVATIONS: As we continue to navigate the landscape, our President & CEO continues to serve as our thought leader. Her goal remains to empower and support our Senior Chiefs. We are therefore using our internal ***Power of Partnership*** to address the following key observations that will help us improve service to our community.

Based on our experiences during Winter Storm Uri and as we continue our ***Flexible Path***[SM] journey, we are taking this opportunity to reassess assumptions made about:

- Generation technologies;
- Fuels;
- On-site fuel storage; and
- Energy storage technologies.

See our initial perspectives below and how they align with our ***Guiding Pillars***:

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RELIABILITY:

Description	Chief Leads	Comments
• **Currently there is no perfect power generation technology:** All generation technology types experienced problems during Winter Storm Uri. Some problems were due to extreme cold – freezing instrumentation sensing lines, and a loss of gas supply, while others were due to routine electrical and mechanical problems.	❖ F. Bonewell ❖ F. Almaraz	These evaluations align to sub-strategies that are being primarily spearheaded by the ***Power Generation Team,*** including the: FLEXPOWER BUNDLE
• **Traditional generation is generally less affected by extreme weather:** These resources provide on-demand power production, when needed.		
• **We must take a fresh view to improve our weatherization practices:** We must look at existing weatherization systems, equipment, and procedures to ensure that we can operate fully in extreme and prolonged conditions. We must require our vendors and contractors to have the same goals.		
• **Renewable generation can be helpful under more optimal weather conditions:** When sunlight and wind are available, predominantly in the summer, it can be very helpful.		

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Description	Chief Leads	Comments
• **Dual-Fuel systems can improve system *Reliability*:** Gas turbine dual-fuel conversion can provide an economical secondary fuel supply that can be stored on site for use during limited duration natural gas delivery disruptions.	❖ F. Bonewell ❖ F. Almaraz	These evaluations align to sub-strategies that are being primarily spearheaded by the ***Power Generation Team,*** including the: FLEXPOWER BUNDLE
• **Liquified Natural Gas (LNG) can be helpful:** This onsite storage system can provide a secondary source of fuel during limited duration natural gas delivery disruptions.		
• **Our *Flex*STEP[SM] program helps to reduce stress on the grid:** Energy efficiency and conservation will be a continued value driver for our community to positively change energy consumption behaviors by leveraging Distributed Energy Resources (DERs).	❖ R. Garza	These efforts are being primarily spearheaded by the ***Products & Services Team,*** including: FLEXSTEP
• **Advances in technology remain an absolute must:** Active participation in new low-carbon generation technologies such as hydrogen fuel, and energy storage technology pilot assessments will help us meet the needs of our growing community long-term.	❖ F. Bonewell F. Almaraz	These efforts are being primarily spearheaded by the ***Power Generation Team,*** including the: FLEXPOWER BUNDLE

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Description	Chief Leads	Comments
• **Technology Types**: ○ ***Steam Generation:*** Uses exceptionally mature technology that generally includes the following fuel sources to generate electricity: coal, gas, and uranium (nuclear) fuel.	❖ F. Bonewell ❖ F. Almaraz	These efforts are being led by our ***Energy Supply & Market Operations (ESMO) Resource Planning*** department and the ***Power Generation Team***, including the: FLEXPOWER BUNDLE
○ ***Combustion Turbines:*** Capable of firing natural gas or liquid fuel and operating as part of a combined-cycle, or in a simple-cycle peaking unit. These units can provide flexible generation, as needed, to support customer demand.		
○ ***Reciprocating Engines:*** This technology uses both gas and liquid fuel that have a well-established reputation for ***Reliable***, flexible operation.		

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Description	Chief Leads	Comments
• **Technology Types - Continued:** ○ ***Lithium-ion battery storage:*** This technology has proven to be both flexible and ***Reliable*** in many installations world-wide. Premature battery failures, which have been traced back to utilization profiles inconsistent with its design, are often mitigated by installing additional capacity. Since utilities generally need to maximize capacity from their power resources, this potential operating problem should be thoroughly considered during the project evaluation process.	❖ F. Bonewell ❖ F. Almaraz	Continue thoughtfully along our: FLEXPOWER BUNDLE
○ ***Compression and thermal energy storage systems:*** These technologies use both established and innovative techniques, but a ***Reliability*** assessment will require experience with active production plants.		
○ ***Mature natural gas collection, storage, and distribution networks:*** Has an established track-record for reliably delivering consistent and quality natural gas as needed to meet customer demand. Extreme cold weather events in 2011, and again in February 2021, revealed that weather-related gas distribution system ***Reliability*** problems can trigger the notable loss of electric power generation.		
○ ***Emerging low temperature geothermal:*** This generation technology holds promise, but a ***Reliability*** assessment will require experience with active production plants.		

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Description	Chief Leads	Comments
• **Technology Types - Continued**: ○ ***Coal delivery networks*:** Has an established track-record for reliably delivering quality coal as needed to meet customer demand. Infrequent, short-term disruptions have occurred during weather events that damaged relatively short segments of train track structures. On-site storage of coal has prevented power generation disruption.	❖ F. Bonewell ❖ F. Almaraz	Continue thoughtfully along our: FLEXPOWER BUNDLE
○ **Local hydrogen production and storage:** May be an alternative to natural gas for power generation. Resolution of cost, technical handling, storage and combustion challenges will support operations at the scale needed to assess reliability.		
• **Additional Considerations**: ○ Improvements to communications systems (verbal, written, visual) and processes are needed. ○ Need to further review ERCOT ***Reliability*** rules that apply when fuel is not available for power generation.	❖ R. Garza	Our efforts are being led by our ***Corporate Communications*** and ***External Relations Teams***.

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CUSTOMER AFFORDABILITY:

Description	Chief Leads	Comments
• **Baseload fuel commodity prices have typically been affordable and less volatile:** Established coal, gas, and nuclear fuel delivery systems have typically been able to deliver needed quantities at competitive prices. ○ Coal production costs have benefited from large-scale, efficient mining practices and competitive delivery options. ○ Natural gas costs have benefited from a mature, ***Reliable*** pipeline network, and advanced production techniques like hydraulic fracturing.	❖ F. Bonewell ❖ F. Almaraz	These efforts are being led by ***ESMO's Resource Planning*** department and the ***Power Generation Team***, including the: FLEXPOWER BUNDLE
• **Geothermal:** Like solar and wind energy, it has a cost for installing conversion systems to produce electricity and to operate and maintain the plants, but they do not have ongoing fuel costs.		
• **Solar and Wind:** Over the last few years, costs have declined for solar and wind, often resulting in a low levelized cost of electricity. Investment in back-up generation (or firming), when solar and wind are unable to produce, is a key consideration.		

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SECURITY:

Description	Chief Leads	Comments
• **Interconnections:** Must be protected from physical and cyber-attacks.	❖ F. Bonewell	Our efforts are being led by our ***Integrated Security Team***.
• **State and Federal Regulators:** Their support is needed to establish industry-wide standards for ***Secure*** fuel delivery systems.		
• **Extended supply and distribution lines:** Assess potential issues related to electrical transmission lines, natural gas pipelines, water lines, and railroad lines that typically extend long distances across remote areas.		
• **Redundancy of Security Assets:** Needed for physical and cyber ***Security*** system, including fail-over systems, which should be evaluated for disruption potential.		
• **Geothermal:** This generation offers the advantage of "fuel" supply that is underground, so it is not affected by above-ground disruptions.		

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SAFETY:

Description	Chief Leads	Comments
• **Mature *Safety* programs:** In place for natural gas, coal, liquid fuel, and nuclear generation.	❖ F. Bonewell	Our efforts are being led by our ***Occupational Health & Safety*** and the ***People & Culture Teams***.
• **Onsite plant housing and sequestration facilities:** Employees can avoid travel during periods when road conditions are unsafe.		
• **Existing power plant *Safety* programs:** Focused on managing electrical, thermal, pressure, and flammable gas risks associated with traditional generation technology and is readily adaptable to battery storage and other developing power generation systems.		
• **Hydrogen:** Presents challenges when used for energy storage and combustion applications; it will require further ***Safety*** program development.		
• **Public Safety Education and Communication:** We will need to enhance our focus on proactive communication about: o The importance of conservation. o How to prepare for managed outages. o How to develop temporary accommodation plans in the event of extended outages.	❖ R. Garza	Our efforts are being led by our ***Corporate Communications Team***.

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ENVIRONMENTAL RESPONSIBILITY:

Description	Chief Leads	Comments
• **Our Commitment:** We are working on a path to carbon neutrality by 2050. Earlier dates are also being considered.	❖ F. Bonewell ❖ F. Almaraz	Our efforts are being led by our ***ESMO*** and ***Sustainability Teams***.
• **Traditional electric steam generation**: Traditionally requires large amounts of water for cooling. Dry cooling technology can be used to substantially reduce water needs.		
• **Natural gas generation**: Produces fewer emissions than coal and liquid fuel.		
• **Nuclear power:** Produces no greenhouse gas emissions.		
• **Hydrogen**: If produced from emissions-free resources, it will produce minimal greenhouse gas emissions.		
• **Energy storage systems**: Supports increased use of renewable generation.		

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Description	Chief Leads	Comments
• **Large-scale energy storage systems**: Used to optimize operation of existing thermal generation to improve efficiency and reduce emissions.	❖ F. Bonewell ❖ F. Almaraz	Our efforts are being led by our ***Power Generation*** and ***ESMO Teams***.
• **Coal-powered generation in the interim**: While the general environmental profile of this technology is less favorable, Spruce 2 has the latest available emission control systems. Regulation, however, will likely remain complicated and costly. The team is also considering converting the plant to an alternate fuel source, as well as replacing the plant's production.		
• **Dual-Fuel systems can improve system *Reliability*:** Operation on backup liquid fuel is projected to be used for a small number of hours and comes with a slightly higher emissions profile. We will need to find a balance between improvements in ***Reliability*** versus the potential impacts to the environment.		
• **Social Justice:** We must continue to expand our assessments to include these considerations.		

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RESILIENCY:

Description	Chief Leads	Comments
• **We will further assess Winter Storm Uri data:** We will further incorporate detailed analyses of extreme winter and summer weather events into our generation planning efforts.	❖ V. Bouet	Our ***Data Analytics Team*** will work to help our entire organization.
• **Coal generation:** Provides large-scale power supply stability and can tolerate interruptions to fuel supply delivery through on-site storage.	❖ F. Bonewell ❖ F. Almaraz	Our efforts are being led by our ***Power Generation*** and ***ESMO Teams***.
• **Natural gas supply versus significant supply chain disruptions:** Has historically served as a ***Reliable*** generation fuel due to its abundance and mature gathering, storage, and delivery systems. Cold weather events in 2011, and again in February 2021, revealed that weather-related gas distribution system ***Reliability*** problems can trigger loss of power generation.		
• **DERs:** Like community micro-grids, more DERs can potentially be deployed as "non-wires alternatives."		
• **Liquified natural gas storage onsite:** Provides a limited duration source of natural gas for use during periods when natural gas supplies are interrupted.		

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Description	Chief Leads	Comments
• **<u>Liquid Fuel</u>:** Provides an alternative fuel source suitable for onsite storage during periods when natural gas supplies are interrupted if the generation units are permitted and equipped for dual-fuel operation. Offsite pipelines to liquid fuel suppliers should also be evaluated.	❖ F. Bonewell ❖ F. Almaraz	Our efforts are being led by our ***<u>Power Generation</u>*** and ***<u>ESMO Teams</u>***. Continue thoughtfully along our: FLEXPOWER BUNDLE
• **<u>Hydrogen</u>:** Holds promise as an energy source and as a future storage fuel, but cost and technical hurdles remain.		
• **<u>Developing geothermal energy</u>:** Uses low temperature systems, holds promise as a potential "dispatchable" or "controllable" generation source.		
• **<u>Fuel Storage</u>:** Provides protection from limited duration supply interruptions. We must consider expansion.		
• **<u>Advances in technology remain an absolute must</u>:** Active participation in new low-carbon generation technologies, hydrogen fuel, and energy storage technology pilot assessments will help us meet the needs of our growing community long-term.		

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• **Batteries cannot be recharged from the grid during extreme weather events:** Battery storage systems were able to discharge (provide power to the grid) during the winter storm event, but market rules prevented their recharge during the system emergency. That power is prioritized to go directly to customers.	❖ F. Bonewell ❖ F. Almaraz	Our ***Grid Resilience Team*** is assessing this constraint and will consider potential mitigations.
• **Customer "behind the meter" power storage:** Provides limited duration protection from interruptions in power generation delivery.	❖ F. Bonewell ❖ P. Barham ❖ F. Almaraz ❖ R. Garza	Our ***Cross Functional Team*** is evaluating these opportunities.
• **Customer "behind the meter" generation:** Provides limited duration protection from interruptions in power generation delivery.		
• **Extreme summer and winter peak weather:** Can significantly increase the amount of peak capacity needed to maintain the ***Reliability*** and ***Resiliency*** of our power supply.	❖ F. Bonewell ❖ F. Almaraz	Our efforts are being led by our ***Power Generation*** and ***ESMO Teams***.
• **Partnership:** We belong to a coalition of industry partners that are advancing low-carbon resource development and looking at how capacity needs across the nation and globe will change in the future.		

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Description	Chief Leads	Comments
• **Industry trends to focus on include:** – How and where do we see the utility industry going? – As we look at the innovation landscape, where are venture capital and startups investing in the utility eco-system? – What problems are the innovation eco-system trying to solve? – These topics need to be looked at not only from a technology perspective, but also from a business model perspective – e.g. how are startups helping customers become energy independent? – How well can our business model handle disruption? – How can we best apply and/or adjust our ***Flexible Path***[SM] strategy?	❖ F. Bonewell ❖ F. Almaraz ❖ P. Barham ❖ R. Garza ❖ V. Bouet ❖ S. Ramirez ❖ L. Lewis ❖ C. Kuchinsky	Our ***First Team*** of ***Senior Chiefs*** will work together to broadly address these topics on an ongoing basis.
• **Thought Leadership:** It is not enough to have consultants providing us with their insights. We need to continue developing internal talent to evaluate a broader understanding of how the utility industry is evolving. We need to continue to influence the industry as a thought leader by continuing to embrace innovation.		

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FINANCIAL RESPONSIBILITY:

Description	Chief Leads	Comments
• **Diversification:** Generally, relative to our fuel and technology diversification, our strategy has provided customers protection from fuel scarcity and systemic technology breakdown and defects.	❖ F. Bonewell ❖ F. Almaraz	Our efforts are being led by our ***Power Generation*** and ***ESMO Teams***.
• ***Flex*POWER Bundle[SM]:** This competitive procurement process has maintained emphasis on fuel and technology diversity.		
• **Life Cycle planning:** Power generation operating life cycle planning has focused on extracting maximum value from plant investments.		
• **Retired unit / demolition activities:** Competitively bid to maximize value of excess equipment and commodities.		
• **Customer Bills:** We continually monitor other major areas in Texas to ensure San Antonio remains an ***Affordable*** energy market for our residential, commercial, and industrial customers.	❖ C. Kuchinsky	Our efforts are being led by our ***Financial Services Team***.
• **Risk Mitigation:** Increasingly, there must be a risk lens applied to every major strategic option. This also includes considering the implications to the dimensions of Environmental, Social, and Governance (ESG).		

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• **Other Supply Chain Considerations:** Non-fuel products and services were broadly affected by events such as the pandemic and Winter Storm Uri. This included warehouse materials for us, as well as items at grocery stores. The cold weather caused treacherous road conditions and other barriers. There are also residual issues with pandemic-related high unemployment and jobs not being filled, which further disrupted supply chains across a wide range of industries.	❖ L. Lewis	Our efforts are being led by the ***Supply Chain*** department within the ***People & Culture Team***.
• **Project Prioritization:** Additionally, all major options and initiatives will need to be prioritized, using quantitative and qualitative factors.	❖ V. Bouet ❖ C. Kuchinsky	Our efforts are being led by our ***Business & Technology Excellence*** and ***Financial Services Teams***.