

Exhibit to Agenda Item #1

Present draft **2030 Zero Carbon Plan** for review and feedback by Board members and public comment.

Board Strategic Development Committee and Special SMUD Board of Directors Meeting

Tuesday, March 9, 2021, scheduled to begin at 5:30 p.m.

Virtual Meeting (online)

2030 Zero Carbon Plan

Draft | March 9, 2021



Charting a course to a carbon free future

Our 2030 Clean Energy Vision and 2030 Zero Carbon Plan is a historic milestone for SMUD, leading the way to the future.

RELIABLE | AFFORDABLE | INCLUSIVE | ZERO CARBON



Built our utility's hydroelectric backbone of low-cost carbon free power.



1st California utility to meet 20% of load with eligible renewable energy.



Transforming our utility to zero carbon.

1957
(Started)

2010
3MMT

2020
2MMT



2030
Zero



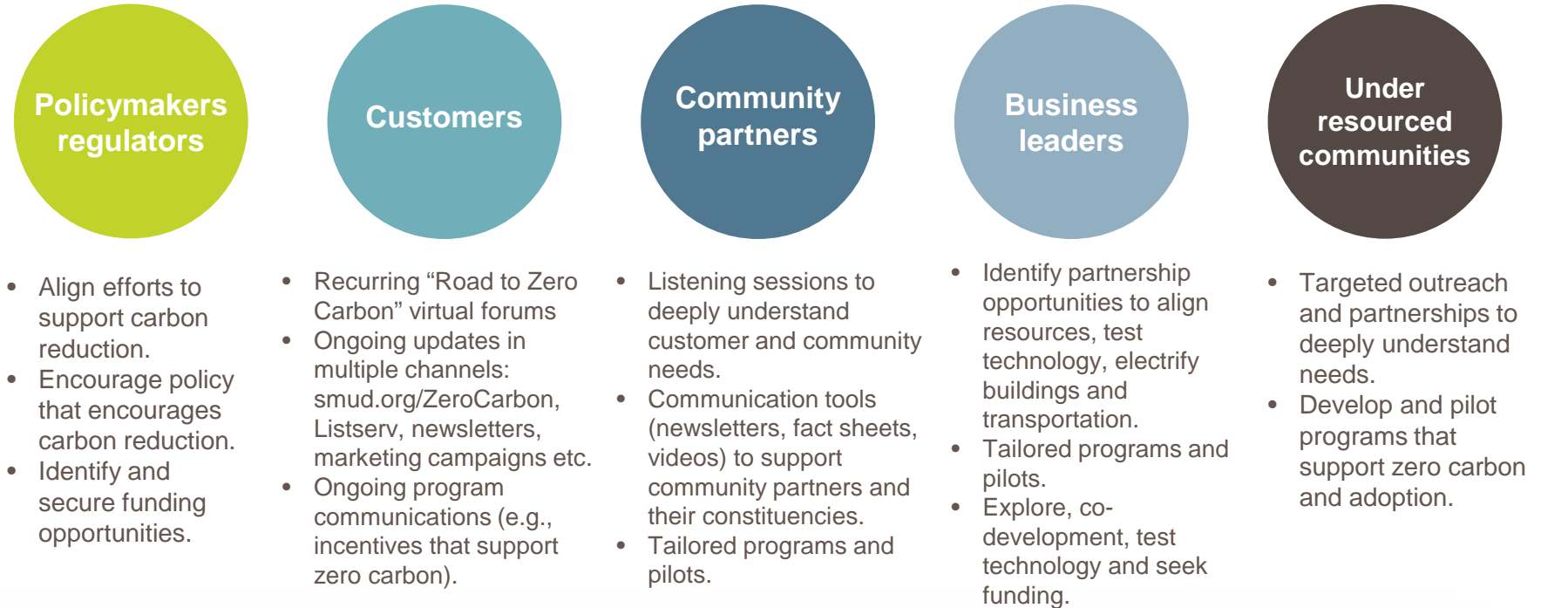
Partnerships & community

Outreach priorities: 2021 & 2022.

Plan

- Focus on customers to deliver win-win solutions and partnerships for reaching regional zero carbon.
- Develop programs and services based on specific customer segment needs.
- Create a vibrant ecosystem to attract business investment.
- Advance inclusive economic development
- Catalyze regional innovation.
- Create an international hub for new investment in the Sacramento region.
- Secure new funding to drive absolute zero carbon future.

SMUD can be a powerful convenor to bring our partners to the table to develop shared goals and align our resources for maximum impact.



Ongoing customer and community input to inform program development, encourage participation and refine implementation plan.



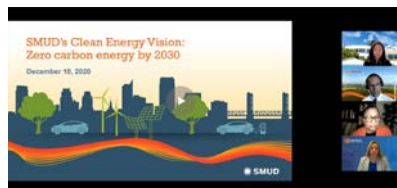


Extensive outreach & engagement



7 stakeholder workshops

- 270 attendees (Dec. 2020 & Feb. 2021)



3 Customer & Community meetings

- 400 customers
- 336 surveys completed (Dec. 2020)



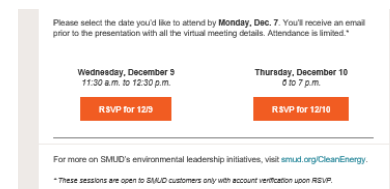
3 expert panel discussions @ Board Committee meetings

- 11 experts



smud.org/ZeroCarbon & ZeroCarbon@smud.org

- FAQs
- Meeting recordings
- Opt-in for updates
- Video
- Email for feedback



Listserv notification emails

- Proactively customer notification of upcoming zero carbon meetings



Presentations

- External presentations by Board members, CEO & other key staff



CEO communications

- Video blogs
- All hands employee meeting
- Workgroup meetings



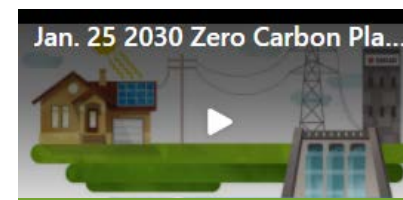
Employee resources

- SharePoint site
- Talking points
- 2 Brown bag learning sessions
- 15+ Intranet news stories & updates



Innovation leadership

- Innovation Leadership Team
- Call for employees' innovative ideas
- Centralized hub for idea vetting



Tailored workgroup presentations

- Project team leads @ staff roundtables
- Q&A session



7 Board & Committee meetings

(Dec. 2020 – March 2021)

External
Internal



Stakeholder feedback: Major themes

Strong support for zero carbon goal and draft Plan

Importance of education and outreach about climate change and SMUD's Plan

Support for re-tooling gas plants to cut emissions

Emphasized community input & engagement

Concerns over rising costs and need for equity & accessibility

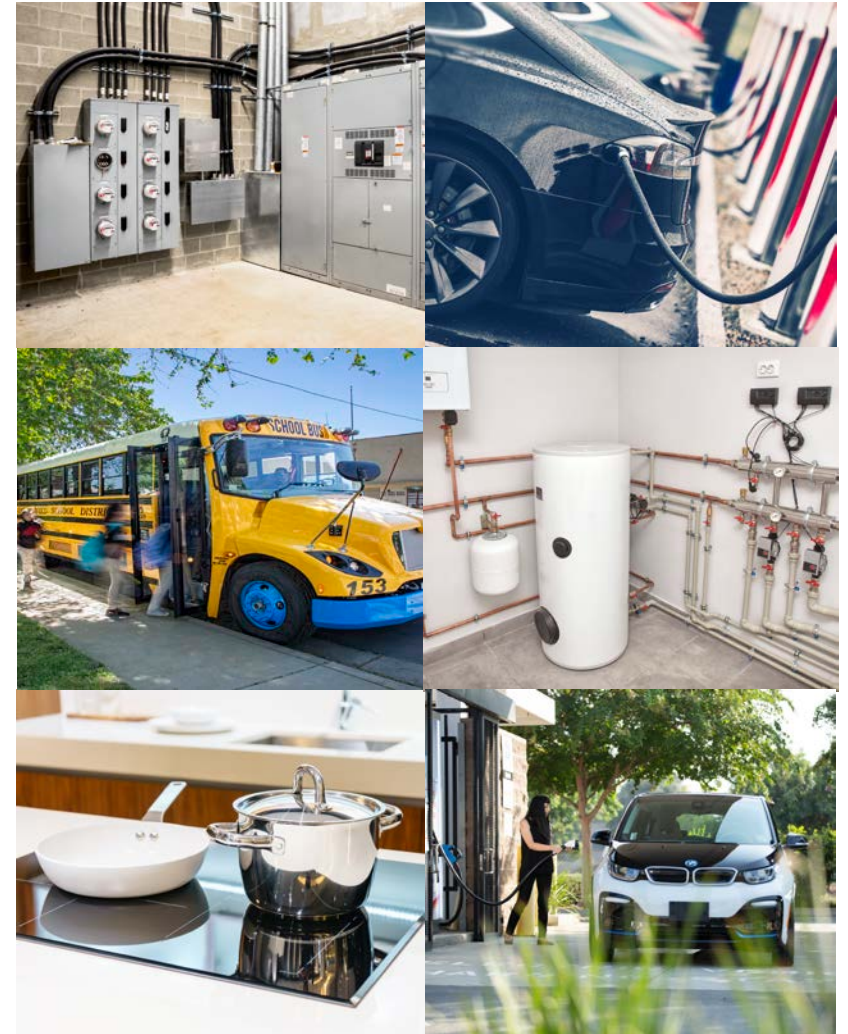
Interest in partnering with SMUD but details needed

Supporting technology choices - emphasizing electrification & transportation



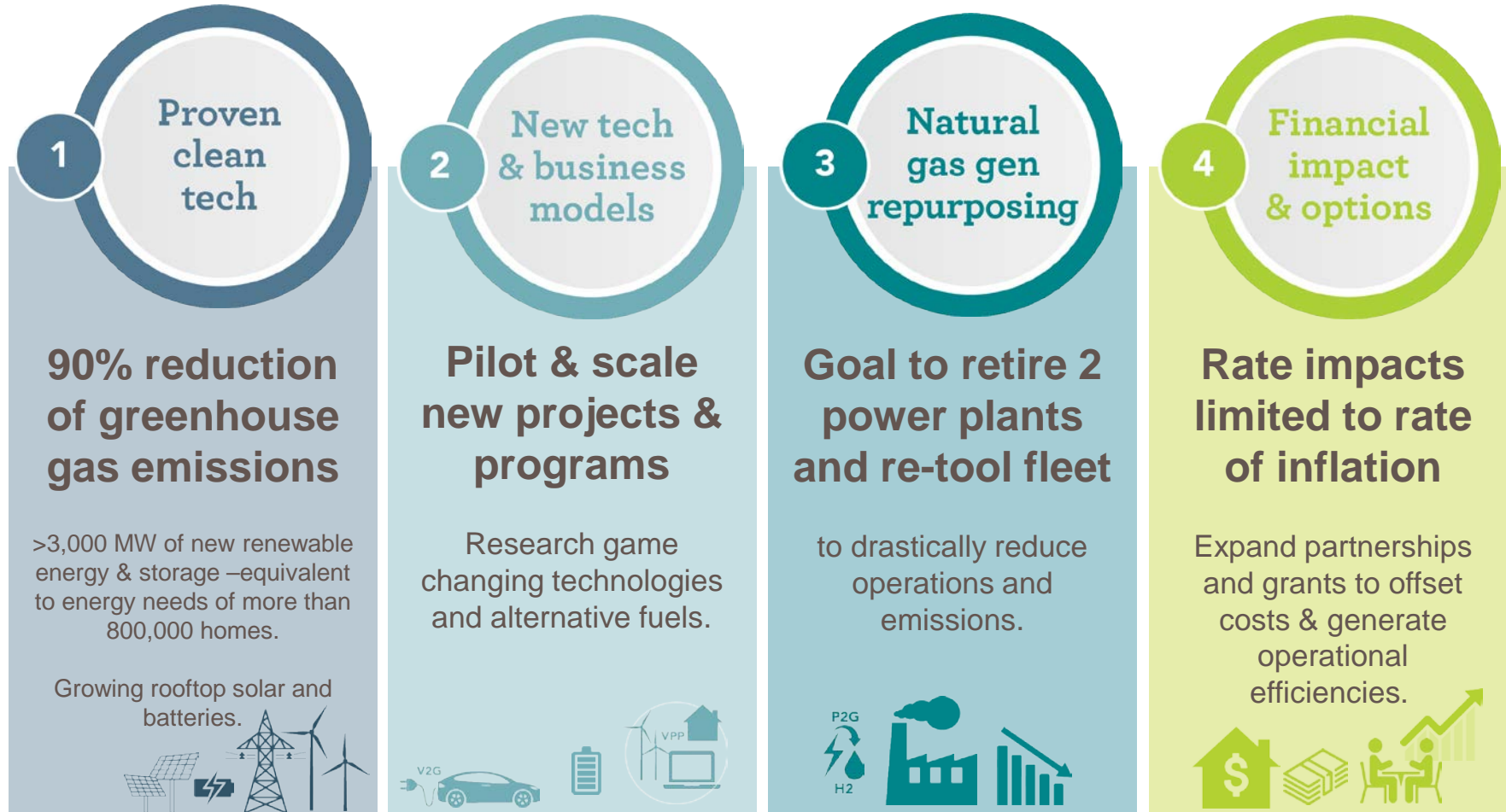
Continued focus on electrification

- Continued focus on electrification for greater community-wide GHG reduction
- We propose to accelerate our goals:
 - 100% electrification of transportation and buildings by 2045
 - Achieve this goal for low-income customers by 2040
- Electrification is a win-win:
 - Improves air quality and community health with greatest impacts felt in communities disproportionately impacted by poor air quality (near industry and freeway corridors)
 - Supports clean technology choices in under-resourced communities and SMUD will ensure engagement.
 - Helps maintain affordable rates and lowers overall household energy bills





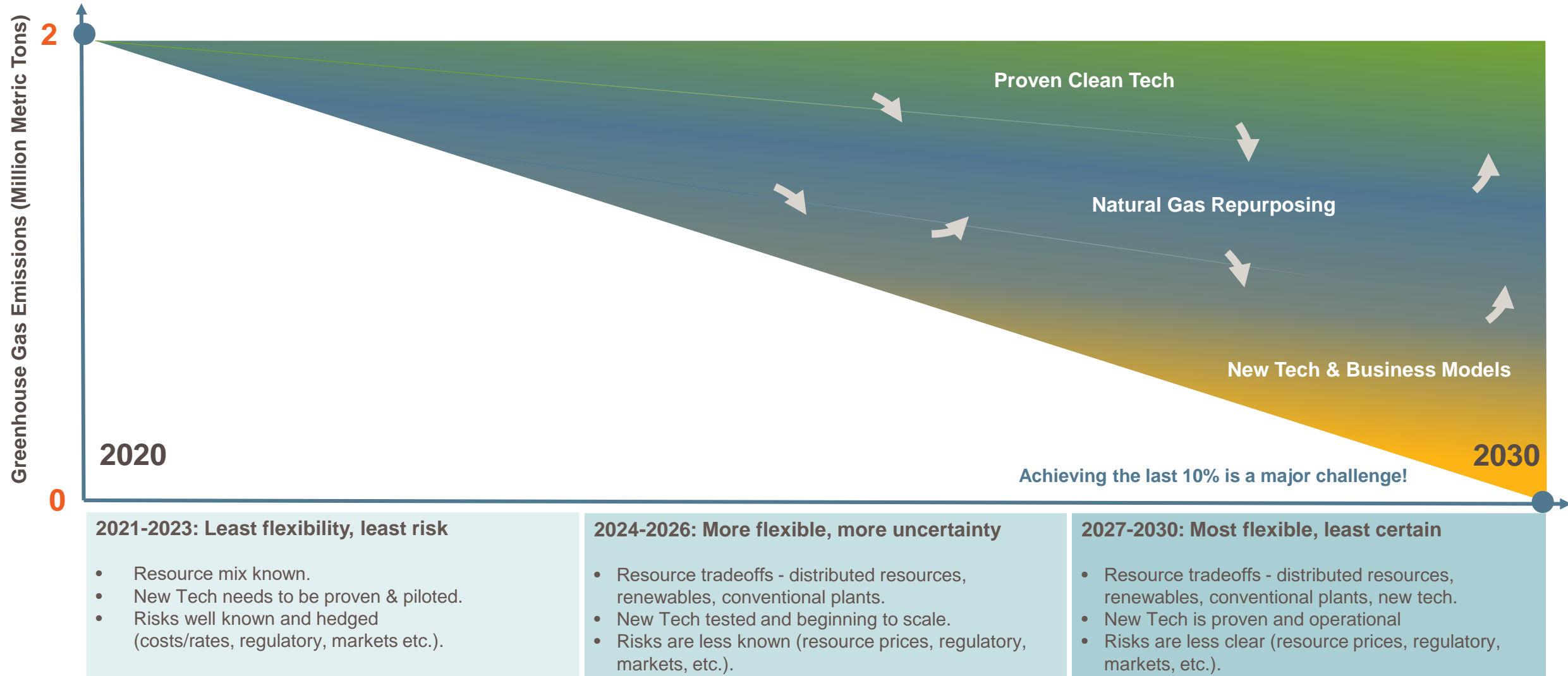
Flexible pathway to zero carbon



Work with all our communities to reduce greenhouse gas emissions together.
Partner and collaborate with community organizations, attract business, innovation and jobs to Sacramento.
Alignment with SMUD's Sustainable Communities Initiative.



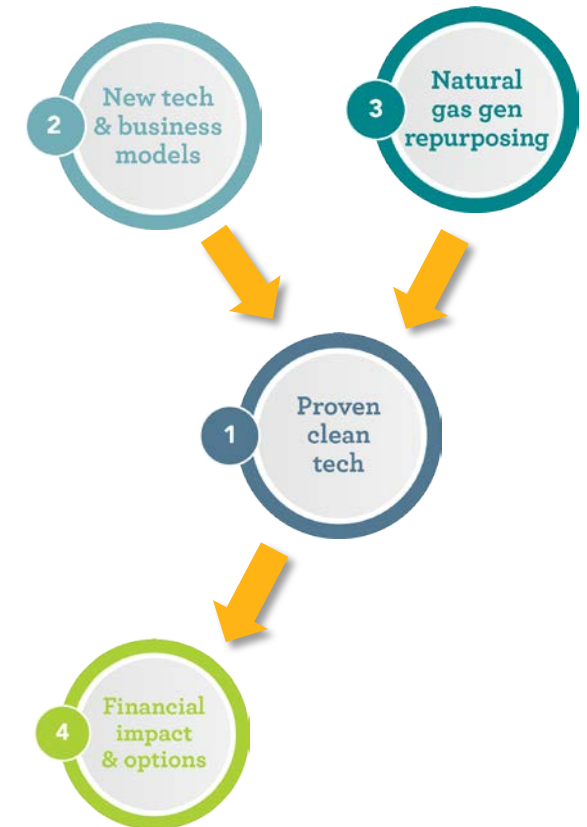
A flexible pathway with a firm commitment





Study methodology & context

- Supported by internal subject matter experts, expert consultants, industry panel discussions, and SMUD R&D studies; incorporating a wealth of knowledge and input into the Plan.
- Results are based on today's forecasts of customer demand, customer adoption of technologies, costs and availability of new tech and business models, markets, and regulatory climate.
- The plan provides a broad strategy for achieving our 2030 Zero Carbon goals; more detailed research and reliability studies are needed to refine and adjust the Plan as we learn more.
- Analysis has been carefully coordinated and synched across all elements of the plan to assess impact on reliability, resource needs, and costs.
- The 2030 Zero Carbon plan is flexible and a continuous refinement is required as we chart our way to 2030.





Proven clean technologies



1

Proven
clean
tech

Expand existing technology to:

Increase the amount of our electricity supply served by carbon free resources.

Resource diversity is critical

Plan



Target 90% of SMUD's electricity needs from renewable sources (excluding large hydro).

Research



More reliability & system impact studies.

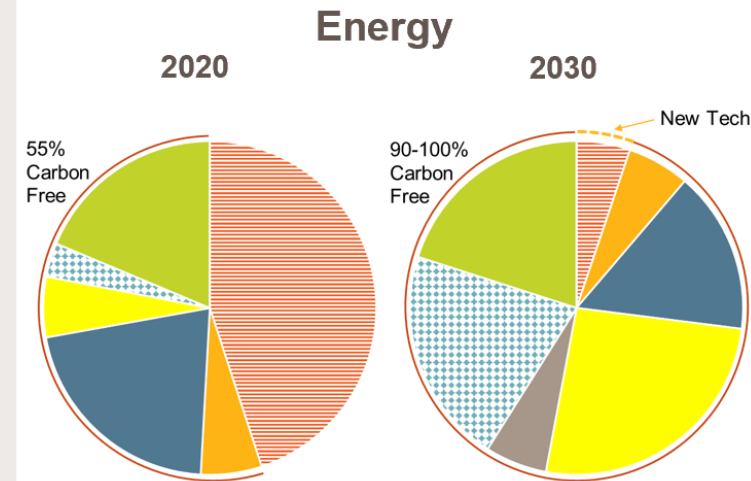
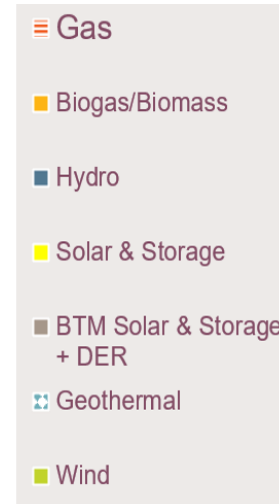
By 2030, build up to **3.5x** the amount of **renewables & battery** we have today.

- ~ 1,100 to 1,500 MW new local utility PV
- ~ 700 to 1,100 MW local batteries
- ~ 300 to 500 MW wind
- ~ 100 to 220 MW geothermal
- ~ 100 MW regional solar



Behind the meter resources

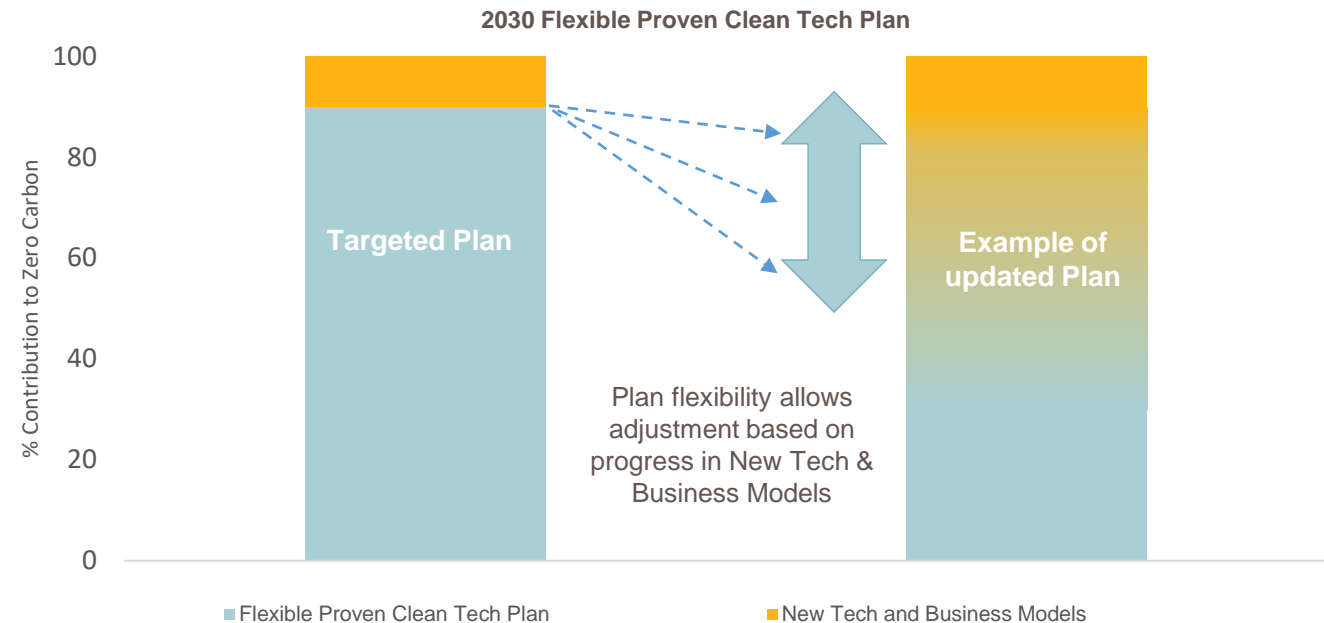
- ~ 500-750 MW solar
- ~ 50-250 MW battery storage



Risks & trade-offs

Why do we need a flexible Plan:

- Need to complete a detailed reliability study to validate the resource plan.
- Customer investments in electric vehicles, rooftop solar, battery storage and other technologies may change.
- Costs and availability of grid-scale renewable energy and storage.
- Technology break-throughs in green hydrogen, long duration storage or offshore wind may warrant adjustment of portfolio.
- Plan needs to address events such as droughts and heatwaves.





New DER technologies, business models



Electrification & decarbonization to:

Help our region and customers partner with SMUD to reduce greenhouse gas emissions.

Plan



- Pilot new programs to electrify Sacramento.
- Engage under-served and low-income communities to achieve bill savings.
- Partnering to reduce GHG and improve air quality.

Research



- Customer & market research.
- Community listening sessions.

- **Pilot** innovative programs to strengthen customer investments in **zero carbon solutions**, including:
 - Electrifying Multifamily Retrofit, Schools, Commercial, and Underserved Communities
 - New Construction Smart Homes
 - Financing Options
 - Turnkey EV Charging Solutions for Residential & Commercial
 - Incentives for Used EVs
- Select and **scale** successful programs.
- **Engage with customers and community organizations** to further develop zero carbon solutions.
- **Seek external funding through grants and focus regional efforts through partnerships** to accelerate market transformation for the region.



Continuous refinement of targeted plan to 2030.

Education & demand flexibility to:

Help our region and customers partner with SMUD to reduce greenhouse gas emissions.

Plan



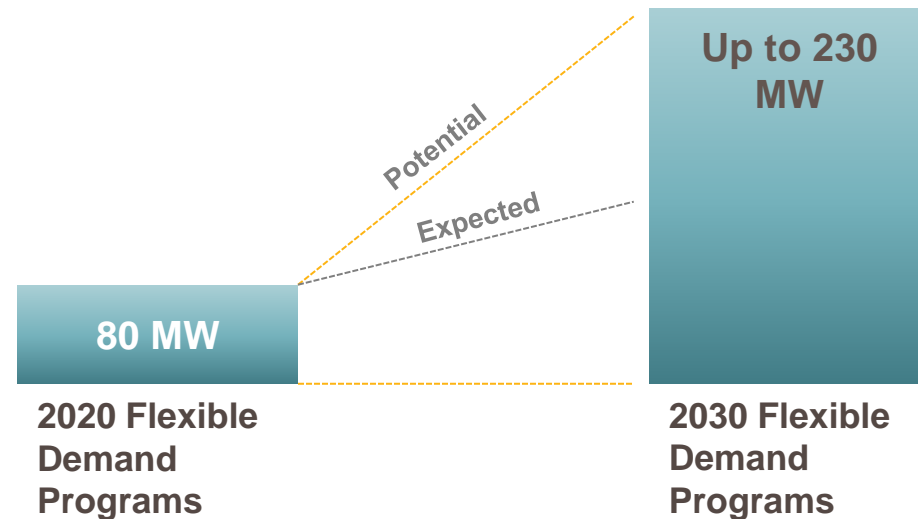
- Pilot Flex Alert programs to offset capacity needs without technology requirements.
- Pursue education and behavior-based opportunities.

Research



- Customer & market research to develop solutions.

- **Educate customers and community organizations** on how they can play a role toward zero carbon.
- **Pilot** behavioral-based **demand response and flexibility** such as “**Flex-Alert**” to help reduce customer bills and system peak demand **without requiring investment in technology**.
- **Assess pilots and programs** to ensure alignment with zero carbon goals.



Virtual Power Plants (VPPs) & Vehicle-to-Grid (V2G)

Support the elimination of fossil fuels in SMUD's electricity supply.

Plan



Partner directly with customers or third-party providers to pilot and then scale up solutions where customer-owned devices help manage the grid.

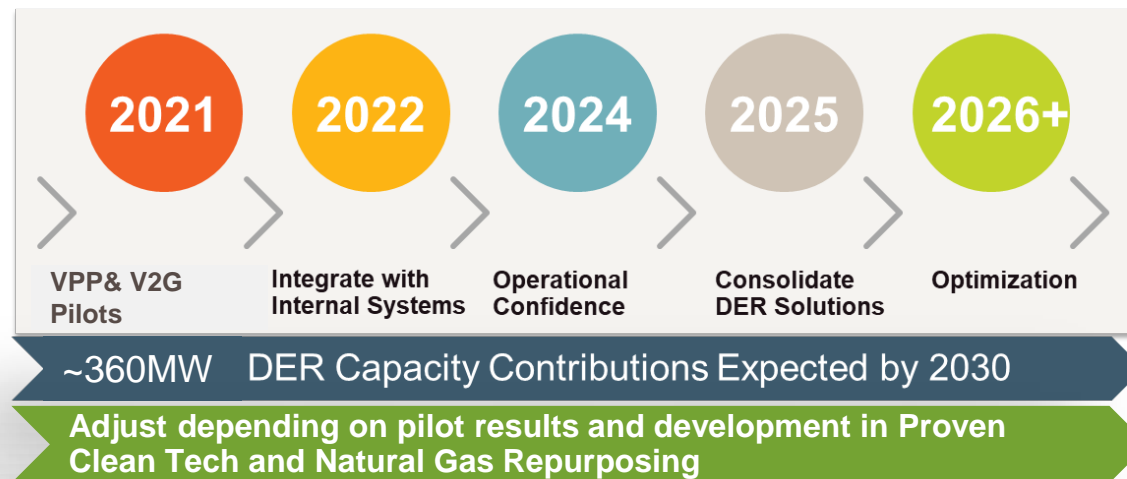
Research



Identify VPP partners to develop & test customer offerings.

Assess VPPs relative to alternatives to determine operational scale.

- Assess ability of **customer-installed devices** such as thermostats, pool pumps, water heaters to be aggregated into VPPs.
- Pilot Bring Your Own Device (BYOD)** using multi-DER approach that aggregate a variety of customer-owned devices including thermostats, EV Charging to manage load.
- Pilot Solar & Storage VPP** to test ability to deliver grid-type scale and services such as capacity and short-term energy.
- Pilot and scale **Vehicle-to-Grid (V2G)**.

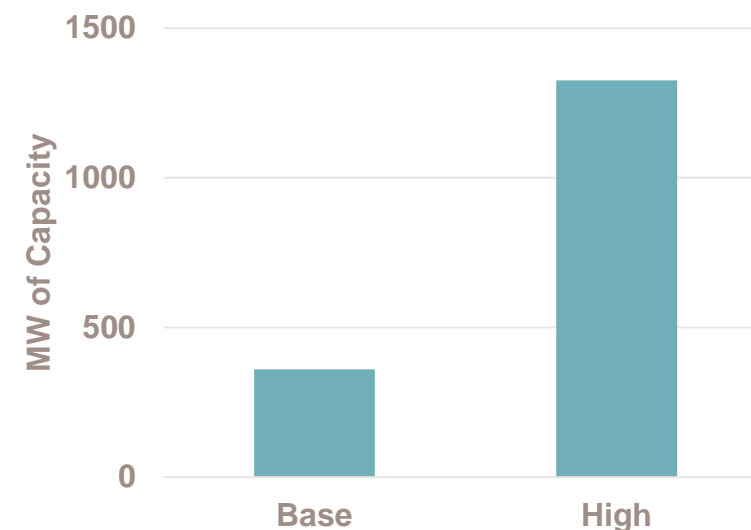


- Develop **scaling** models and prioritize.

Risks & trade-offs

- High adoption of VPP-capable smart devices could reduce our needs for utility scale battery technologies.
- If costs for new technologies remain expensive, customer uptake may be slow.
- Local, state and federal regulations can impact speed of adoption.
- Customer engagement needs to be demonstrated in conjunction with value to all customers.
- Predictability of customer behavior will impact the capacity that can be relied on as alternative to grid-scale resources.
- High reliance on customer and 3rd parties for success of programs – proving in pilots is essential. Maintaining high customer engagement important for reliability of capacity.
- Ensure equitable access to technology and benefits across customer groups.

Range of potential Distributed Energy
Resource capacity





Natural gas generation repurposing



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Natural gas gen repurposing

Repurpose natural gas generation to:

Eliminate the use of fossil fuels in SMUD's power plants.

Plan

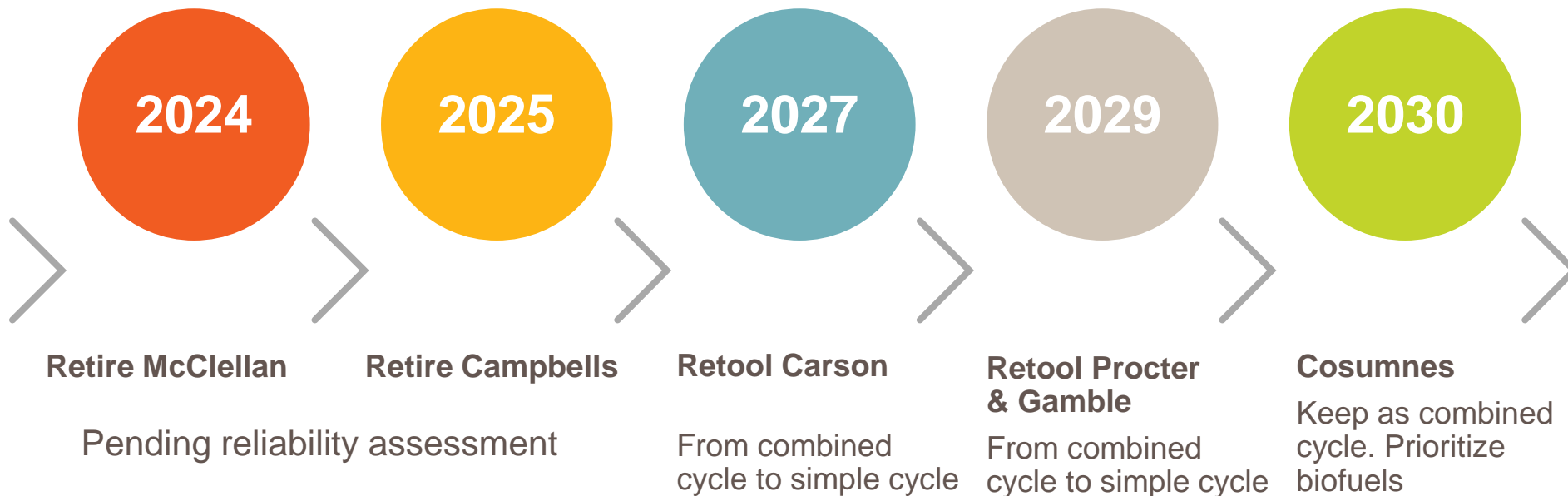


- Target retirement of 2 plants & re-purpose 2 plants for operation as peaking plants and seek to eliminate use of natural gas.

Research



- Reliability impact studies.
- New technologies to phase out the last 10% of GHG.



Pursue biofuels and explore battery hybrid configurations

Dependent on Clean Tech, New Tech / Distributed Resources

Research plan: New large-scale technologies

- **Thermal/battery hybrid.** Enables plants to be online without burning fuel. Relatively mature today.
- **Biofuels.** Renewable natural gas and biodiesel to be researched as alternative fuel. Partnerships and grants will be critical.
- **SMUD pumped storage.** Research, design and potentially develop new pumped storage hydro with existing SMUD hydroelectric assets.
- **Long duration storage.** Research and pursue partnerships and grants (electro-thermal energy storage, liquid air energy storage, etc.).
- **Pre-combustion carbon capture.** Investigate Allam-Fetvedt cycle for CCS and explore venture partners and grants.
- **Green hydrogen.** Feasible in some of our plants but expensive and supply chain is unknown. Plan to follow development and be ready to invest if costs come down – major grant support or technology breakthrough needed.
- **Post-combustion carbon capture & storage.** Feasible and relatively proven technology but requires major capital investments on top of our aging plants.



Net Power's "Allam Fetvedt" Cycle Power Plant in La Porte, Texas

Success with these new technologies will alter the need & timing for other resources.

Risks & trade-offs

- **Commodity risks**

- Limited renewable natural gas & biodiesel availability.
- Building coalitions for dramatically increasing biofuels production and driving economies of scale.
- Hydrogen technology maturity projected past 2030.
- Storage of fuel supply.

- **Technology break-throughs** could accelerate retirements (e.g., hydrogen, long-duration storage, offshore wind, turbine technologies).

- **Cosumes retooling or replacement** solution post 2030 with potentially large capital and O&M costs.

- **Permitting & community issues** - "First to the table."





Financial



Financial considerations to:

Help facilitate an affordable and inclusive zero carbon future.

Plan



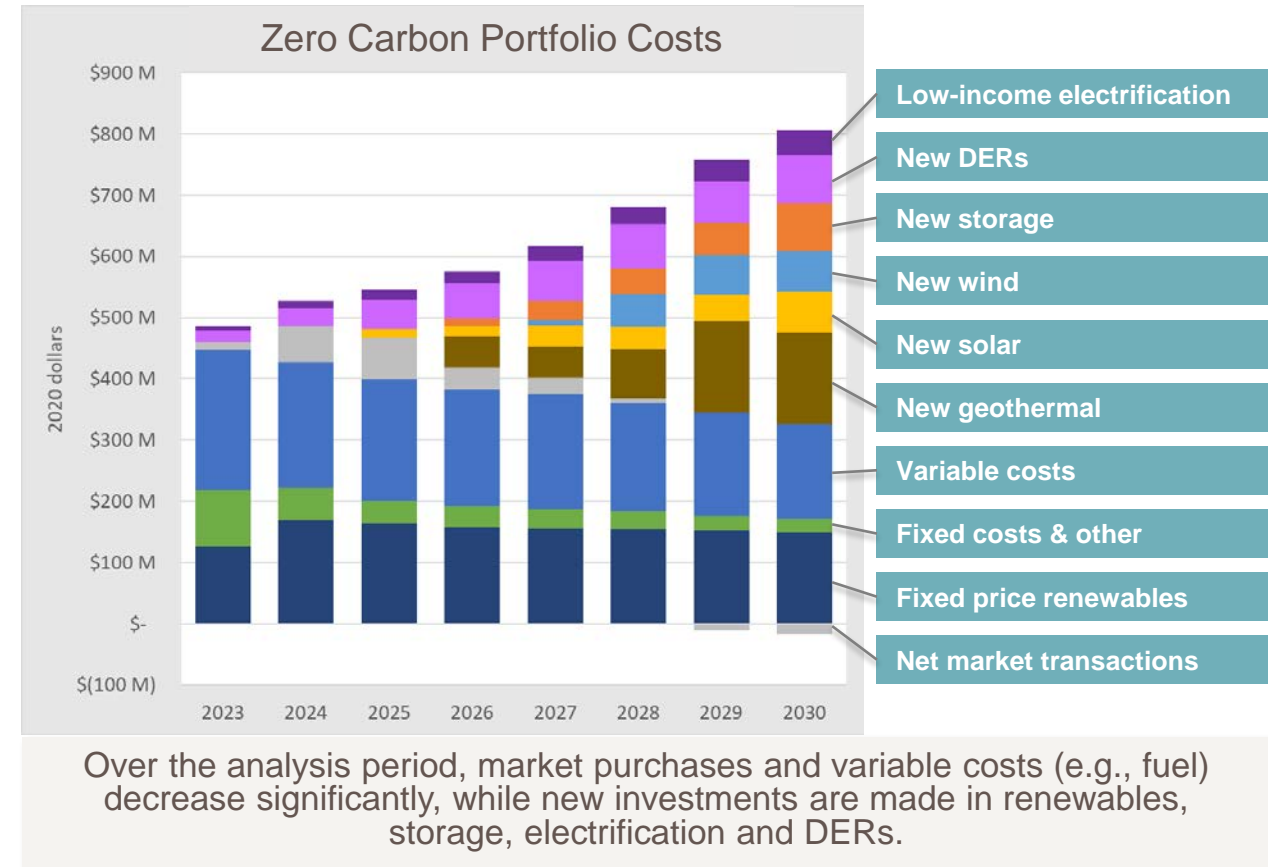
- Keep annual rate increases to the rate of inflation by finding operational efficiencies, seeking grants opportunities and partnering.

Research



- Partnering & financing options.

- Identify **cost reduction opportunities** and seek grants and other external funding sources for new technologies to offset expected costs for Zero Carbon solutions to keep rate increases manageable.
- Partner with local, state and federal governments to showcase new technologies and solutions under **shared cost arrangements**.
- Seek **innovative financing solutions**.
- Attract **clean technology investors** to our region for developing and scaling solutions in clean energy and electrification.



Financial outlook will be refined as plan develops.



Communications & outreach

March 9, 2021

25

Board Strategic Development Committee and Special SMUD Board of Directors Meeting



Immediate outreach efforts

Internal & external

PR/social media launch strategy (national, local and industry/trade press)

- Media strategy, Op-Eds, news release
- Thought leadership and social posts for Board, CEO and leadership team
- Social media content for all SMUD channels
- Co-authoring/endorsement strategy
- Zero Carbon Plan executive summary report for distribution in multiple channels
- Plug-and-play content for partners' publications
- smud.org/ZeroCarbon

Comprehensive and inclusive community engagement strategy

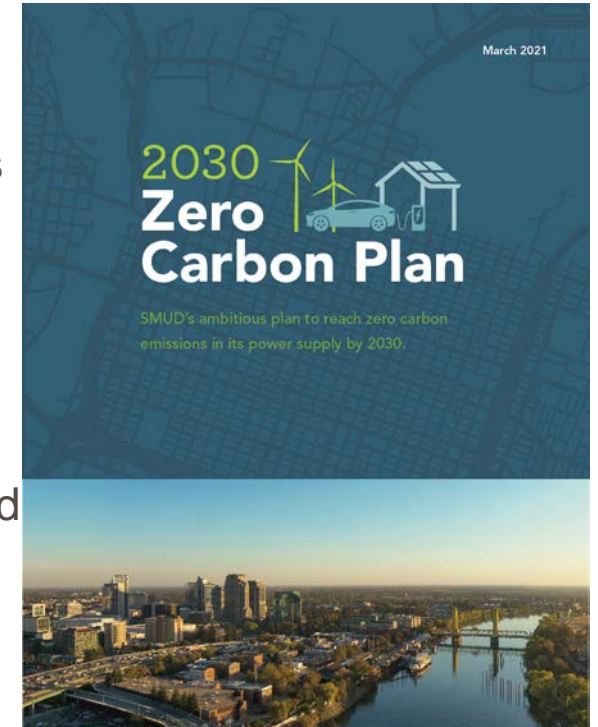
- Listening sessions, virtual forums and partnering strategies
- Input to inform program development
- Ongoing meetings and two-way conversations
- Support for partners' publications to share information about how to get involved

Company-wide employee communications effort

- CEO and Executive video blogs, employee meetings and leader updates
- Intranet updates with additional resources (progress, FAQs, talking points)

Upcoming multi-channel and multi-language marketing campaign

Staff can present a full marketing and community briefing at a future meeting if the Board would like.



Top things you can do now

Engaging all of SMUD's customers.



Residential

- Visit the SMUD Energy Store and get instant rebates on load flexibility technologies like a smart thermostat, controllable heat pump water heater and others.
- As you consider replacing equipment or renovating, go electric for your space and water heating and cooking needs. We have rebates and incentives to help.
- Replace your transportation with an emissions-free new or used electric vehicle.
- Consider pairing your solar with battery storage.
- Go green and green others through our Shade Tree Program and Greenergy.
- For income-qualified customers, look to our weatherization, energy efficiency and electrification offerings.

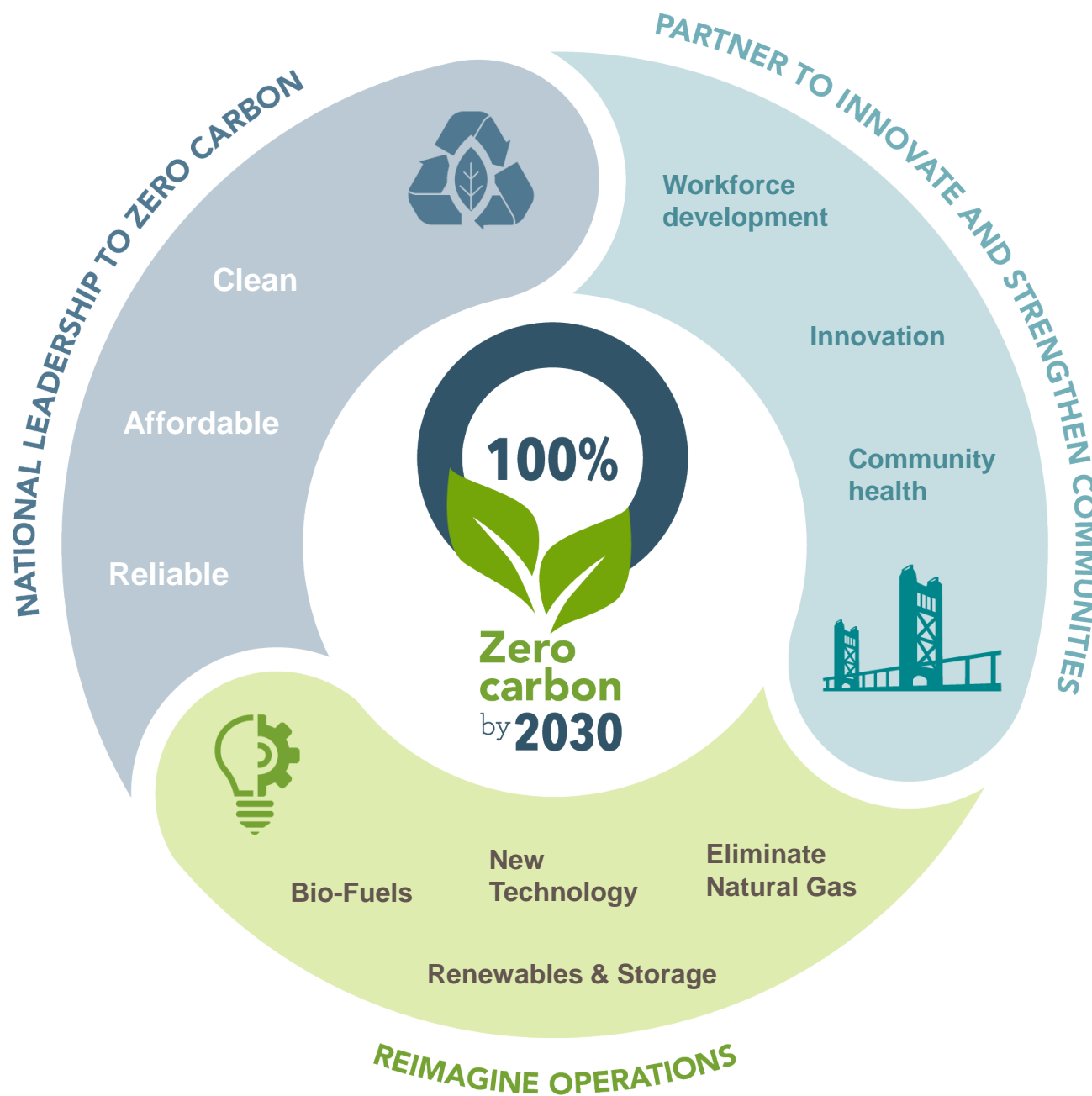


Commercial

- Reach out to your Strategic Account Advisor for advice and information.
- Look into our programs that help commercial customers manage energy and find clean solutions for businesses.
- Get advisory services and install EV charging for your employees and fleet needs.
- For small businesses, look into our microloans and qualifying as a SEED supplier.



2030 Zero Carbon Plan Summary





Next steps

March 10-30. Take onboard feedback and finalize report and Plan.

March 31. Board Meeting. Presentation of final Zero Carbon Plan for approval.

April. Implementation starts.

April. Revision of Strategic Directions to reflect Zero Carbon Goals.

Questions?

