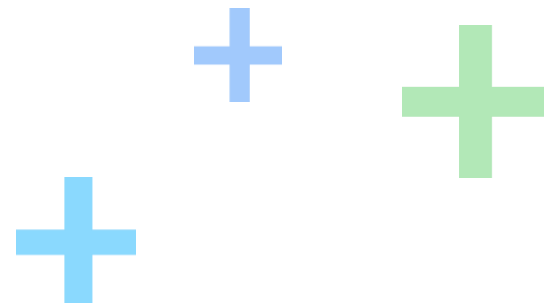


GWP 2024 Integrated Resource Plan

Townhall 3

August 12, 2023



Welcome!

- + Who here attended the last townhall?
- + Who here attended the last 2 townhalls?



Townhall objectives

- + Provide transparency on some inputs/assumptions feeding into the IRP modeling process.
- + Update the community on the scenario development process and proposed scenarios.
- + Receive community feedback to inform scenarios and IRP modeling.



Townhall reminders!

- + We have translators available in Armenian and Spanish. Please ask if you know someone who may need translation help.
 - + Look out for the nametags!
- + Please hold any questions on presentations until the Q&A portions.
- + We'll try to create opportunities for as many folks to contribute as possible, so please allow space for other perspectives.
- + Please use a microphone when speaking so the recording equipment can hear you.



Overview of Integrated Resource Plans (IRPs)

- + IRPs are planning documents required to be developed by California law every 5 years.
- + They study how much energy GWP will need in the future and develop potential strategies to supply that energy over the next 20 years.
- + These strategies are called “scenarios” and can test:
 - + Different mixes of energy resources (rooftop solar, wind, energy efficiency, etc.)
 - + Different timelines for achieving clean energy goals
- + The scenarios will be studied in a model, and results will inform how GWP plans its energy system into the future.
- + GWP has formed a Stakeholder Technical Advisory Group (STAG), made up of community members, that will create 2 community scenarios to test in this IRP.

How will the IRP be developed?

1. GWP and the STAG, informed by the Glendale community, will develop multiple future energy scenarios to test in the IRP modeling process.
2. Ascend Analytics will test these strategies in their model to see how they compare on reliability, sustainability, and affordability.
3. GWP will present and discuss results with the STAG and the community to provide an opportunity for feedback.
4. Based on the results, GWP will choose a “preferred portfolio” of resources it will develop to meet Glendale’s energy needs over the next 20 years.

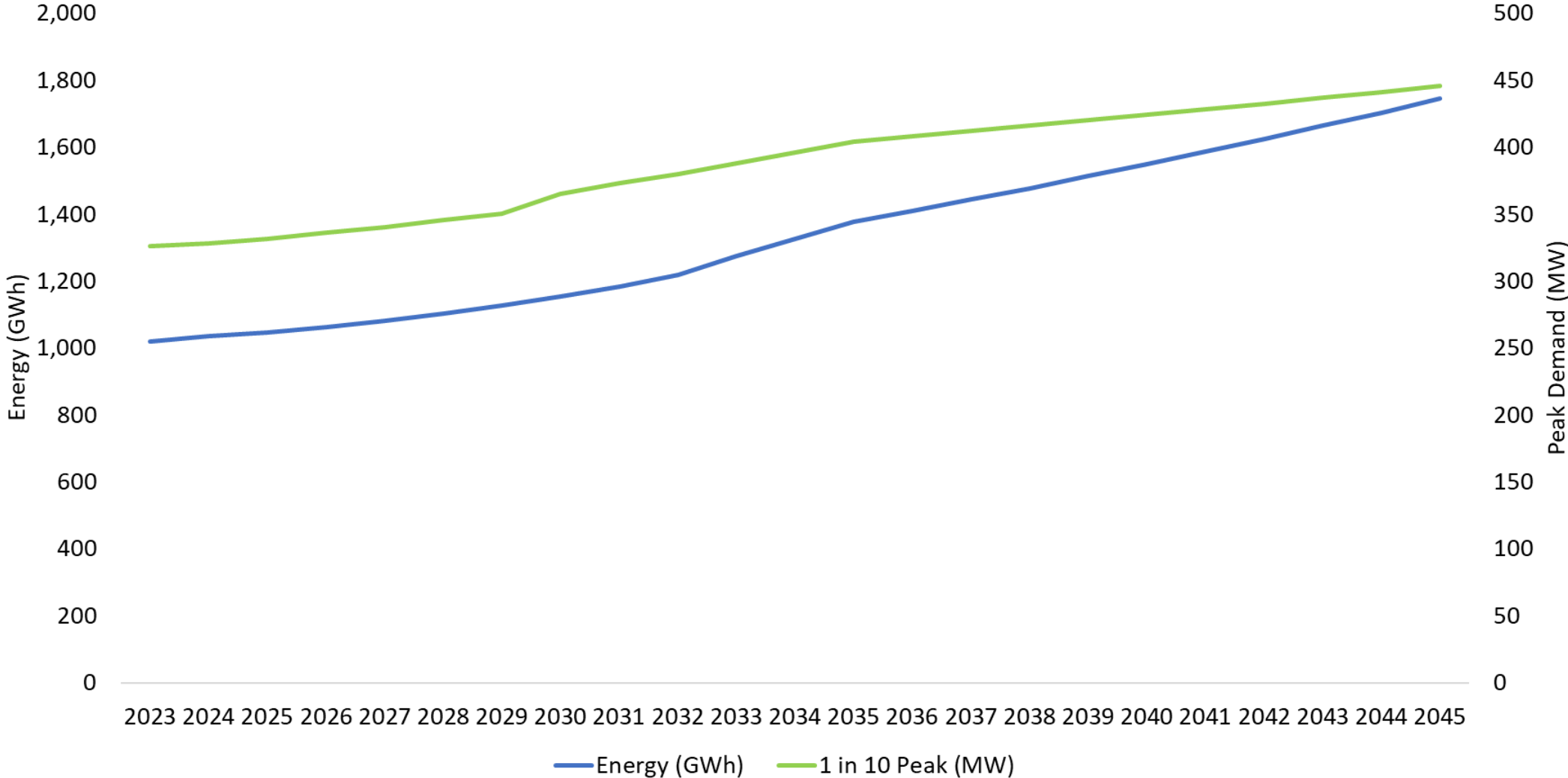
Inputs and assumptions informing this IRP

- + There are numerous variables related to the future that we input in the IRP model:
 - + How much will GWP's **electricity demand** be in the future?
 - + How much will various energy resources **cost** in the future?
 - + How much will **energy efficiency and demand response** reduce energy demand in Glendale?
 - + How much will **customer solar** grow in Glendale?
 - + How much can GWP develop **inside Glendale**?
- + The way we define these variables has implications for the results of the IRP.
 - + For instance, assuming higher electricity demand in Glendale means GWP will need more resources to fill in gaps.
- + Ascend Analytics and GWP have been working to line up the inputs and assumptions to use in the modeling process.

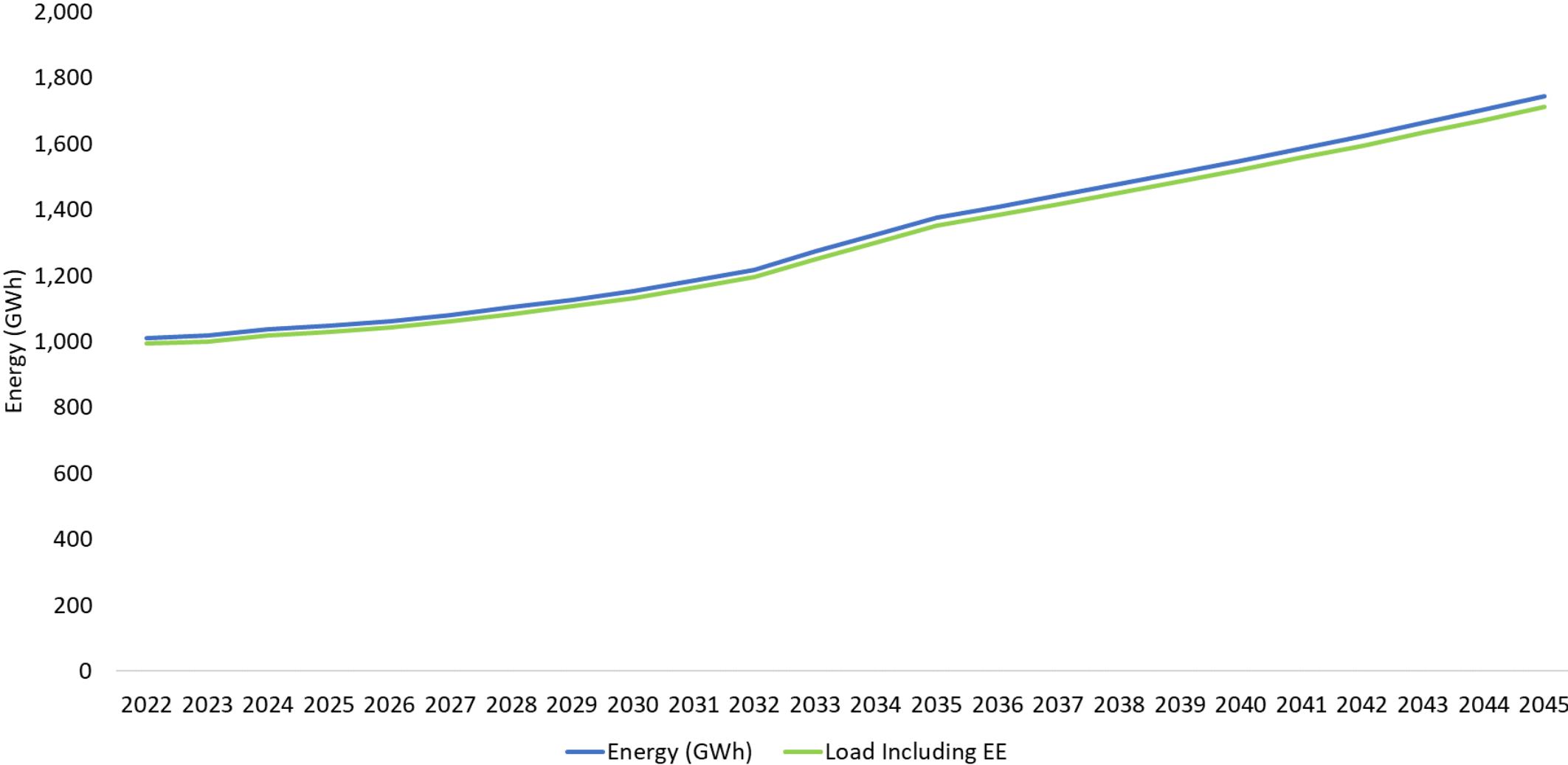
How much will GWP's **electricity demand** be in the future?

- + Ascend Analytics uses publicly available forecasts from the California Energy Commission (CEC) as the basis for this projection.
- + The CEC anticipates Glendale's demand increasing by **~2.4%/year through 2035**.
 - + This is higher than average, which is usually 1-1.5%.
- + Factors driving this growth can include electric vehicle purchases, electrification, and new customer growth.
- + Ascend then couples the CEC forecast with Glendale-specific information, like Glendale's energy efficiency performance, to arrive at a final forecast for the city.
- + It's important to look at Glendale's energy demand in two ways to plan for both average and extreme conditions:
 - + Total energy demand
 - + Peak demand (1-in-10-year events)

Forecast of Glendale's Future Energy Demand (CEC Projection)



Glendale Future Energy Demand (CEC Projection + Energy Efficiency)



How much will various energy resources **cost** in the future?

- + Ascend Analytics forecasts the cost of new resources (solar, wind, batteries, etc.) into the future.
- + These forecasts consider public sources such as the National Renewable Energy Laboratory Annual Technology Baseline (ATB).
 - + The ATB only considers the cost to *build* new resources, not how much it would cost for GWP to actually *procure* the resource.
- + Ascend then adds to this baseline information with its understanding of current project costs, informed by their work with utilities across California.
- + These resource costs consider both federal incentives (e.g., tax credits in the Inflation Reduction Act) and likely future inflation.

How much will **energy efficiency and demand response** reduce energy demand in Glendale?

+ Energy efficiency:

- + GWP will assume it will achieve its historical performance on energy efficiency (1.8% of retail sales). This is higher performance than most publicly-owned utilities in California.

+ Demand response:

- + Demand response refers to programs in which customers shift or reduce their energy use to reduce GWP's peak energy demand.
- + GWP will assume slightly better than historical performance on demand response, based on what existing programs have achieved (~3.5 MW over 4 years).

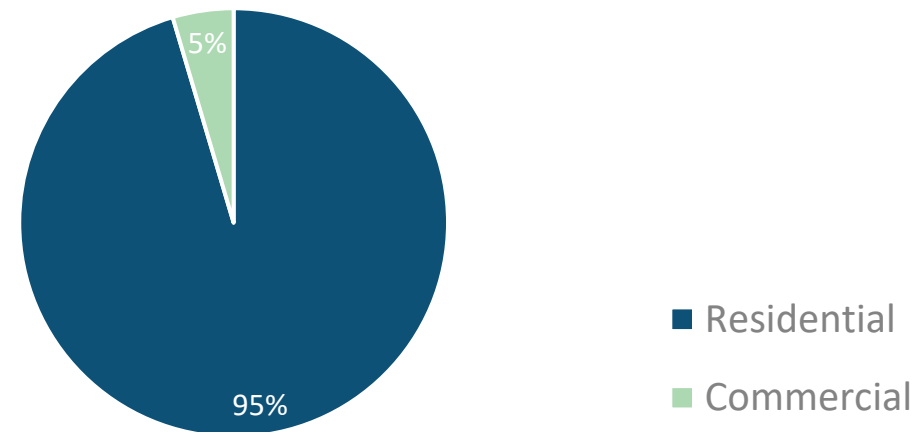
How much will **customer solar** grow in Glendale?

- + Customer solar in Glendale has grown to provide **26.3 MW** of capacity in the past 20 years.
 - + Roughly **2.6%** of customers have rooftop solar, representing up to **7%** of GWP's peak demand.
 - + **Over 10% of single-family homes** in Glendale have rooftop solar (2,500 of 24,000).
- + There are roughly **54,000 households** in Glendale that aren't fully capable of installing solar (45,000 multifamily homes and 9,000 condos). These make up **69%** of GWP's residential customers.
- + Significantly expanding rooftop solar will require launching new programs that can open access for those who haven't traditionally been able to opt in.
- + GWP assumes it can double rooftop solar adoption in half the time it took to reach current adoption. This would be **~52 MW total** over 10 years.

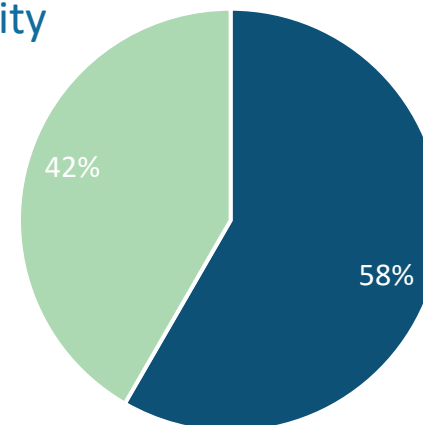
Customer solar in Glendale – what’s the current state of play?

- + **2,639** installations as of July 2023
 - + **2,520** of these are residential.
 - + **119** are commercial.
- + **26.3 MW** peak capacity total
 - + **15.3 MW** comes from residential projects.
 - + **11 MW** comes from commercial projects.
- + Glendale’s customer solar adoption (**2.6%**) is slightly below the state average for publicly owned utilities of **4.7%**.
 - + Publicly owned utilities have significantly lower solar adoption compared to private, investor-owned utilities (**18%**).

By # of customers



By capacity



How much can GWP develop **inside Glendale**?

- + Glendale has limited available land for resource development.
 - + For example, local nuclear and geothermal are not options.
- + Glendale does not have space to develop true utility-scale solar in the city but can still develop smaller-scale solar projects.
- + GWP plans to develop 4 MW of utility-owned solar by 2025 and 10 MW by 2030 (City Solar program).
 - + Sites that are solar-ready now under Phase 1 of City Solar are: Brand Landfill, Sports Complex, GCC lot 34, Central Library, UOC Parking Lot, and the Perkins building.
 - + Scholl Canyon Landfill is not included for Phase 1 because a decision is pending on time required for the land to settle prior to new development. It has the potential to provide ~5 MW, pending land availability.
- + Some land being retired (Grayson units 1-8) will already be used for other purposes.
 - + Grayson will host the Wartsila natural gas-powered internal combustion engines and new utility-scale batteries.

How is GWP considering the **social cost of carbon** in this IRP?

- + The social cost of carbon (SCC) is a dollar value that attempts to quantify the often unaccounted environmental and health impacts of greenhouse gas emissions.
- + GWP will be considering two separate carbon prices in this IRP:
 - + California Air Resources Board carbon price – will automatically apply to all scenarios.
 - + Social cost of carbon “sensitivity” analysis – will be run as additional analysis on all scenarios.
- + Including an SCC analysis will help us understand how a portfolio of resources would behave if a higher price on carbon were placed on the resources in that portfolio.
 - + Ex. Natural gas-fired units would run significantly less when considering the SCC because the high cost on their emissions would make it uneconomical to do so.
- + A source for the SCC hasn’t yet been decided.
 - + EPA recently proposed updating its SCC to \$190/ton. This value hasn’t been finalized but could be a potential source for the IRP.

Q&A (30 min)



Resource summaries considered in scenarios – what’s technically possible?

Local resource options (inside Glendale)	Excluded local resources	Remote resource options (outside Glendale)	Excluded remote resources
<ul style="list-style-type: none"> + Utility-owned energy storage (under 8 hours) + Utility-owned long-duration energy storage (8+ hours) + Customer-sited batteries + Customer-sited solar + Utility-owned solar + Hydrogen combustion + Hydrogen fuel cells + Natural gas + Customer energy efficiency + Customer demand response + Existing biogas 	<ul style="list-style-type: none"> + New biogas + Nuclear (incl. small modular reactors) + Utility-scale wind + Geothermal + Carbon capture for Grayson, Magnolia 	<ul style="list-style-type: none"> + Utility-scale solar + Utility-scale wind + Utility-scale energy storage (under 8 hours) + Utility-scale long-duration energy storage (8+ hours) + Offshore wind + Hydrogen combustion + Hydrogen fuel cells + Natural gas + Nuclear (incl. small modular reactors) + Geothermal + Existing hydropower 	<ul style="list-style-type: none"> + Coal + New hydropower

GWP's modeling scenarios – what's being planned?

California 2045 mandate	Glendale 2035 goal	Least-cost pathway to 2045
<ul style="list-style-type: none">+ Will follow requirements of California's SB 100 and SB 1020:<ul style="list-style-type: none">+ 60% renewable by 2030+ 90% zero carbon by 2035+ 95% zero carbon by 2040+ 100% zero carbon by 2045+ Will result in all energy brought to Glendale being 100% zero carbon by 2045.	<ul style="list-style-type: none">+ Will meet Glendale's 100% clean energy by 2035 goal.+ Will result in all energy brought into Glendale being 100% clean by 2035.	<ul style="list-style-type: none">+ Will meet mandates of SB 100 and SB 1020 at the lowest possible cost, without necessarily meaning all energy brought into Glendale is 100% zero carbon.<ul style="list-style-type: none">+ Could mean greater use of renewable energy credits (RECs).+ Meant as reference to scenario 1 for lowest possible cost of compliance.

Community scenarios: How were they developed?

+ Community input to scenarios:

- + Strategen conducted 2 polls of the community at townhalls that identified: 1) energy resources of interest, and 2) preferred clean energy timelines.
- + Most community members preferred a 2035 clean energy date, with some interested in a late 2030s or early 2040s date.
- + Distributed energy resources (customer solar, energy efficiency, etc.), utility-scale solar, utility-scale batteries, and long-duration energy storage (8+ hours) were popular at townhalls.

+ STAG brainstorming:

- + STAG members were presented the community input received at townhalls.
- + Strategen conducted polls and surveys to gather STAG's ideas on scenarios. These indicated that STAG members were interested in many of the same things the larger community was.
- + The group discussed scenario options until arriving at two scenario ideas that met most members' needs.

Community scenarios: What's being proposed?

Local resources + accelerated electrification

- + 100% clean energy by 2035.
- + Assumes achievement of City Council clean energy goals:
 - + 10% of customers adopting solar by 2027
 - + 100 MW of distributed energy resources
 - + Reach code requiring new building electrification, solar installations, and EV charging
- + Assumes accelerated electrification compared to GWP scenarios.
- + Assumes maximum development of utility-owned solar and storage in Glendale.

Community scenarios: What's being proposed?

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- + Assumes accelerated electrification compared to GWP scenarios.
- + Assumes maximum development of utility-owned solar and storage in Glendale.

Middle path + long-duration energy storage

- + 90% clean energy by 2035, 100% by 2042.
- + Takes moderate assumptions on customer-sited resource adoption and utility-owned solar and storage in Glendale (between GWP's scenarios and STAG scenario 1).
- + Takes ambitious assumptions on long-duration energy storage.
 - + Assumes accelerated cost declines and commercial availability
 - + Will model an LDES project in Glendale to examine impact on cost and reliability

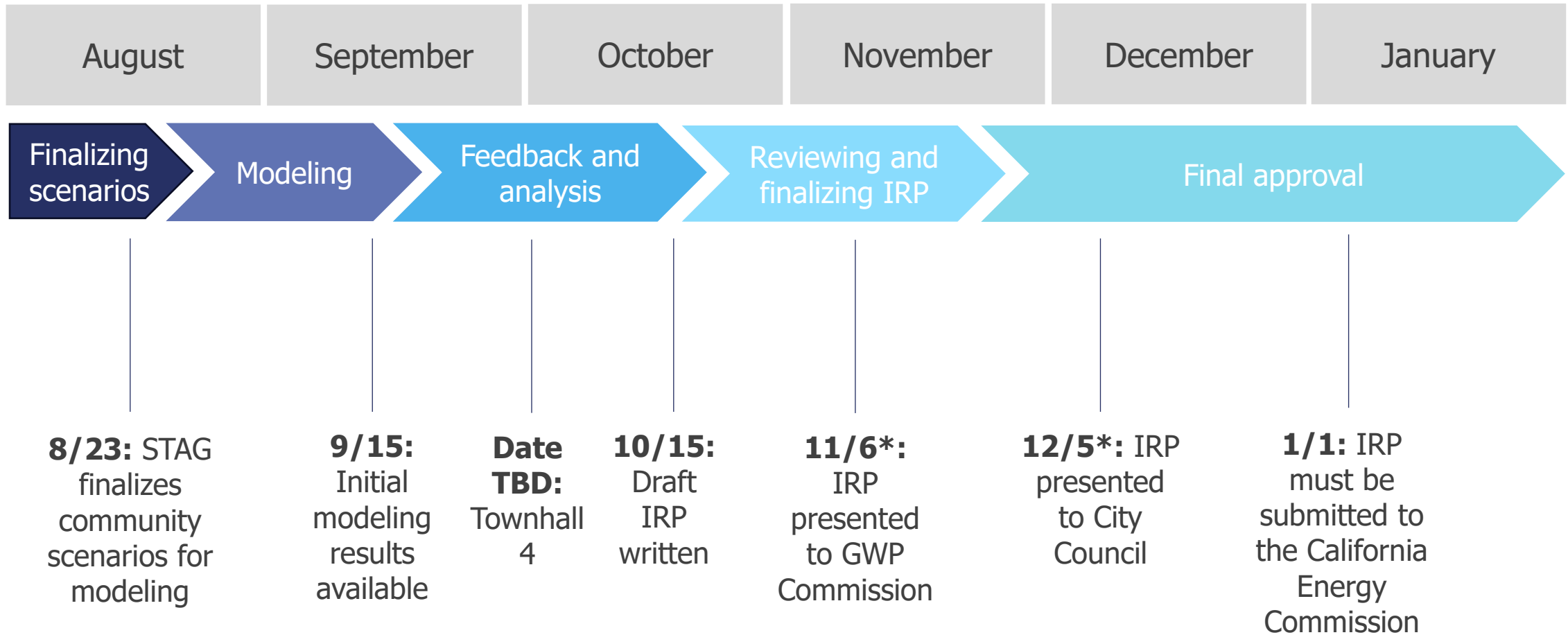
Summary of scenarios

Scenario	100% clean energy date	Meets CA mandate	Meets Glendale goal	Baseline assumption changes
<i>CA mandate</i>	2045	X		--
<i>Glendale 2035 goal</i>	2035	X	X	--
<i>CA mandate – least cost</i>	2045	X		<ul style="list-style-type: none"> • Not all power supplied to Glendale has to be 100% clean.
<i>Local resources + accelerated electrification</i>	2035	X	X	<ul style="list-style-type: none"> • Integrates all City Council clean energy goals. • Assumes maximum customer DER participation. • Assumes maximum utility-owned solar + storage in Glendale. • Assumes accelerated electrification.
<i>Middle path + long duration energy storage</i>	2042	X		<ul style="list-style-type: none"> • Assumes higher customer DER participation than baseline (lower than above). • Assumes higher utility-owned solar + storage in Glendale than baseline (lower than above). • Assumes LDES cost declines and earlier availability, with project in Glendale.

Next steps on community scenarios

- + We'll gather your questions and feedback at today's townhall and present it to STAG for discussion.
- + STAG may tweak the community scenarios to reflect community input depending on what we hear today.
- + Final scenarios will be agreed upon by STAG in the next two weeks and sent to the Ascend modeling team.

Modeling process and community engagement timeline



*Dates pending.

Questions and discussion (30 min)

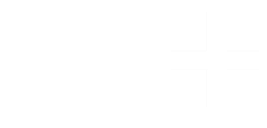
Scenario	100% clean energy date	Meets CA mandate	Meets Glendale goal	Baseline assumption changes
<i>CA mandate</i>	2045	X		--
<i>Glendale 2035 goal</i>	2035	X	X	--
<i>CA mandate – least cost</i>	2045	X		<ul style="list-style-type: none"> • Not all power supplied to Glendale has to be 100% clean.
<i>Local resources + accelerated electrification</i>	2035	X	X	<ul style="list-style-type: none"> • Integrates all City Council clean energy goals. • Assumes maximum customer DER participation. • Assumes maximum utility-owned solar + storage in Glendale. • Assumes accelerated electrification.
<i>Middle path + long duration energy storage</i>	2042	X		<ul style="list-style-type: none"> • Assumes higher customer DER participation than baseline (lower than above). • Assumes higher utility-owned solar + storage in Glendale than baseline (lower than above). • Assumes LDES cost declines and earlier availability, with project in Glendale.

What could make this IRP process a success for the Glendale community?

- + What programs would you be interested in seeing from GWP to move toward clean energy goals?
- + What strategies are needed to increase customer access to and involvement in clean energy programs (e.g., demand response or rooftop solar)?



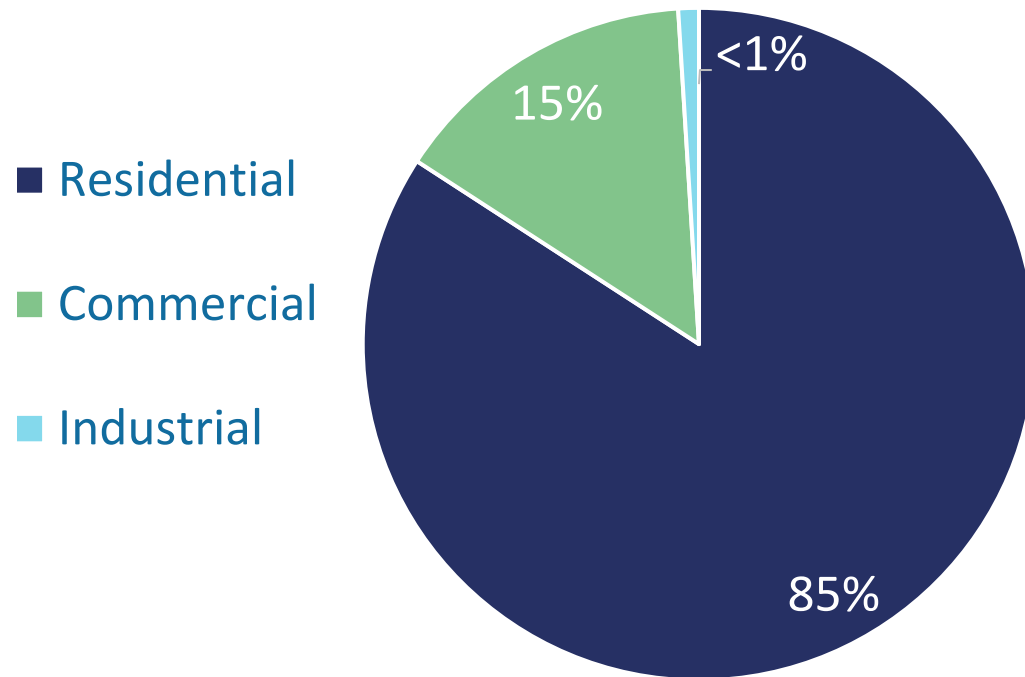
Appendix slides



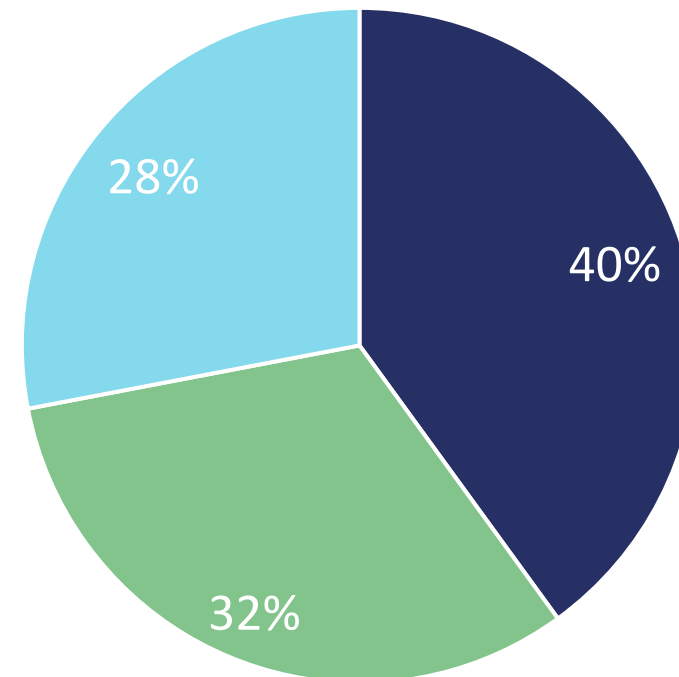
Background on Glendale Water & Power

+ GWP is a not-for-profit municipally owned utility serving approximately 90,000 customers.

GWP customers (by number of customers)

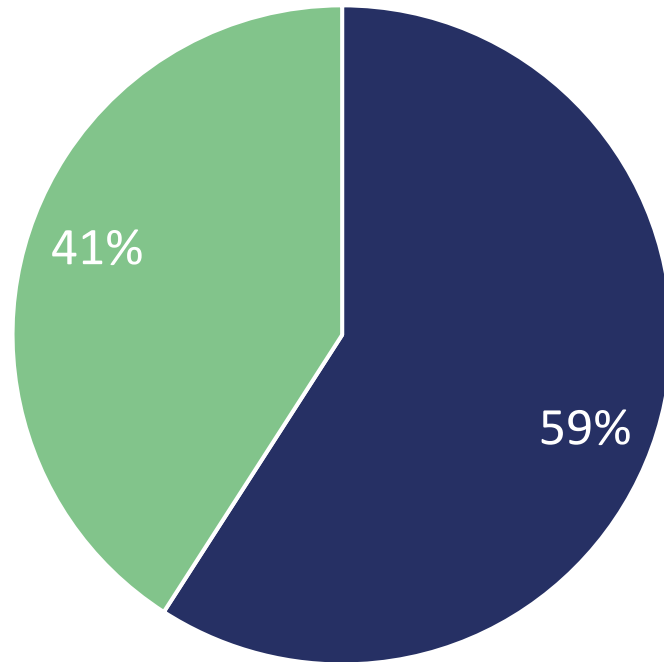


GWP customers (by energy usage)



By 2026, Glendale will get nearly 60% of its energy supply from resources inside the city but will count on remote generation for a large portion.

Glendale Power Supply as of 2026 (Projected)

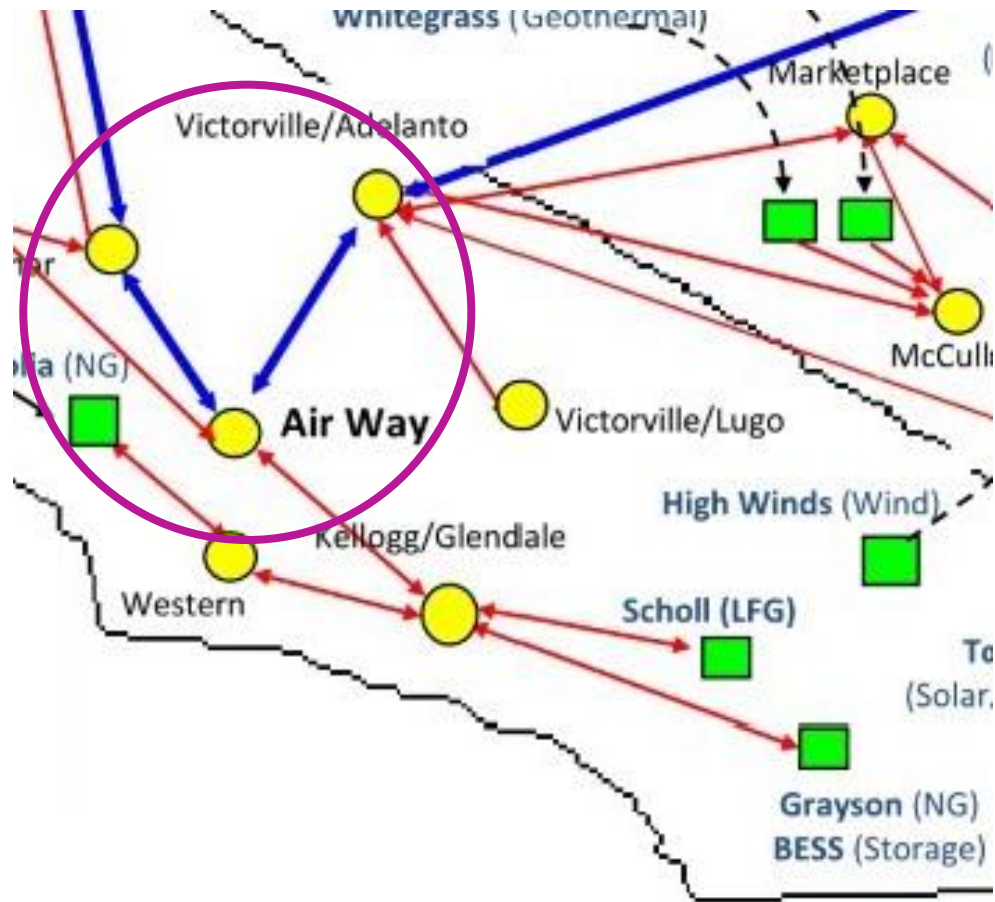


■ Local ■ Remote

+ By 2026, 59% of Glendale’s power supply will be local [236 MW]:

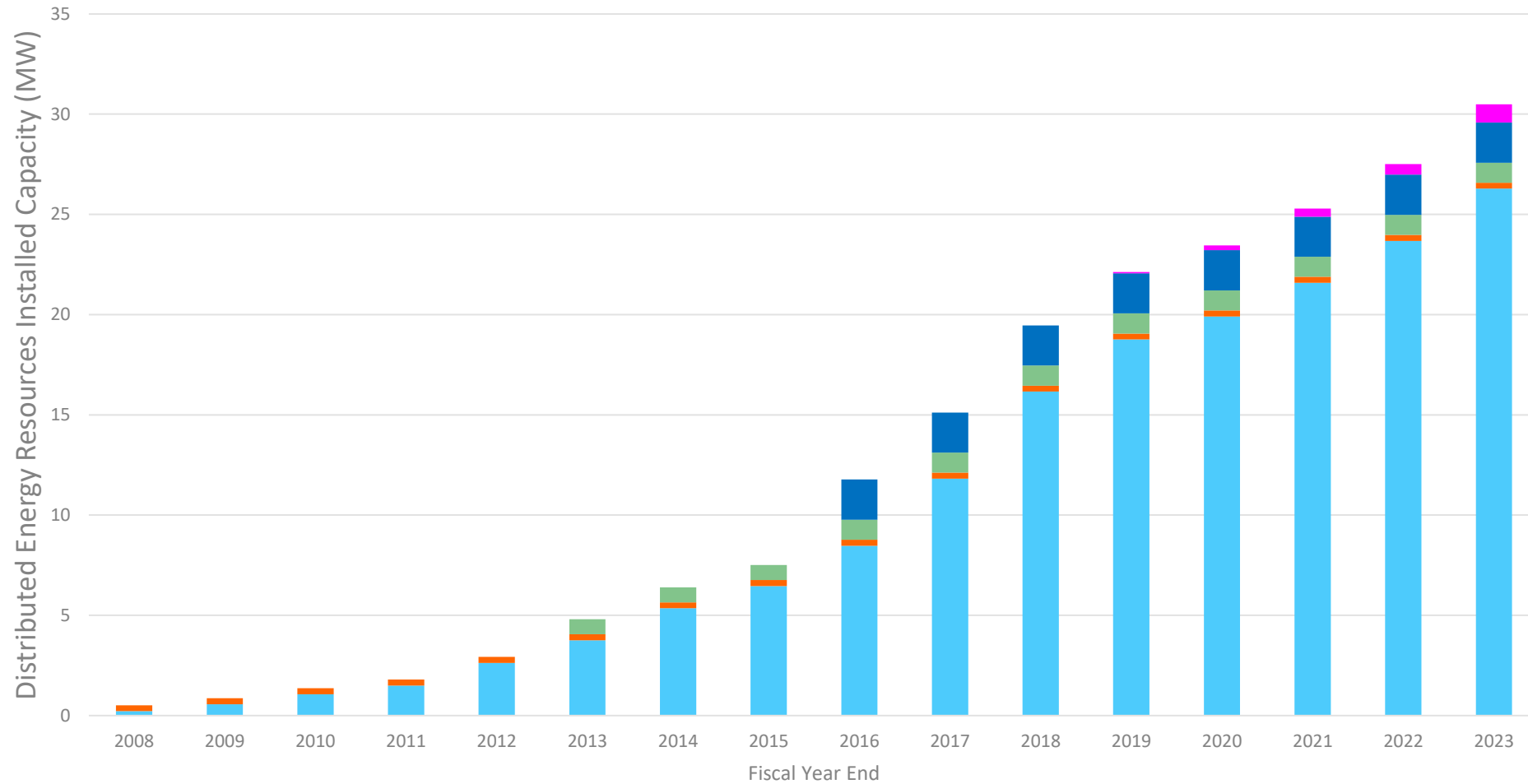
- + Grayson natural gas [48 MW]
- + Magnolia natural gas [47 MW]
- + Grid-scale battery storage [75 MW]
- + Scholl Canyon landfill gas [11 MW]
- + Natural gas internal combustion engines [55 MW]

Power entering Glendale from outside the city is constrained to just two transmission lines.



- + These transmission constraints mean:
 - + Glendale is particularly vulnerable to any transmission outages
 - + Glendale is dependent on other utilities (LADWP) for access to transmission resources
 - + Glendale cannot meet 100% of its energy needs through importing resources

As a result, GWP is using a variety of local resources to meet energy needs, such as distributed energy resources.

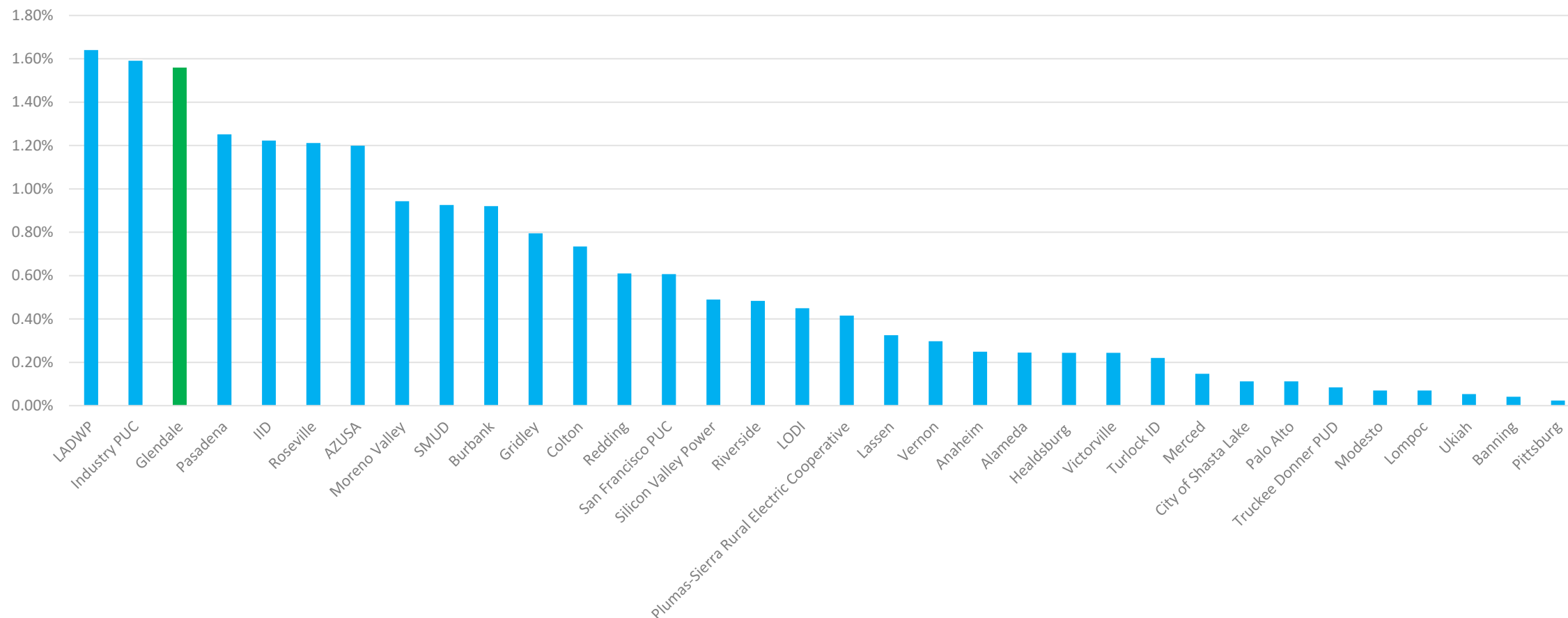


2023:
 Solar PV: 26 MW
 Grid scale storage: 2 MW
 Small scale storage: 1 MW

■ Solar PV
 ■ Pumped Hydro
 ■ Fuel Cells
 ■ Grid Scale Storage
 ■ Small Scale Storage

GWP also invests heavily in energy efficiency and is among the best performing publicly owned utilities in energy efficiency savings.

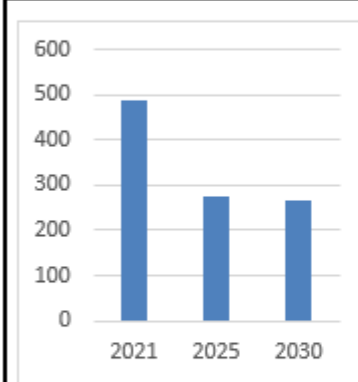
Net savings percentage (% of retail sales), as of 2022



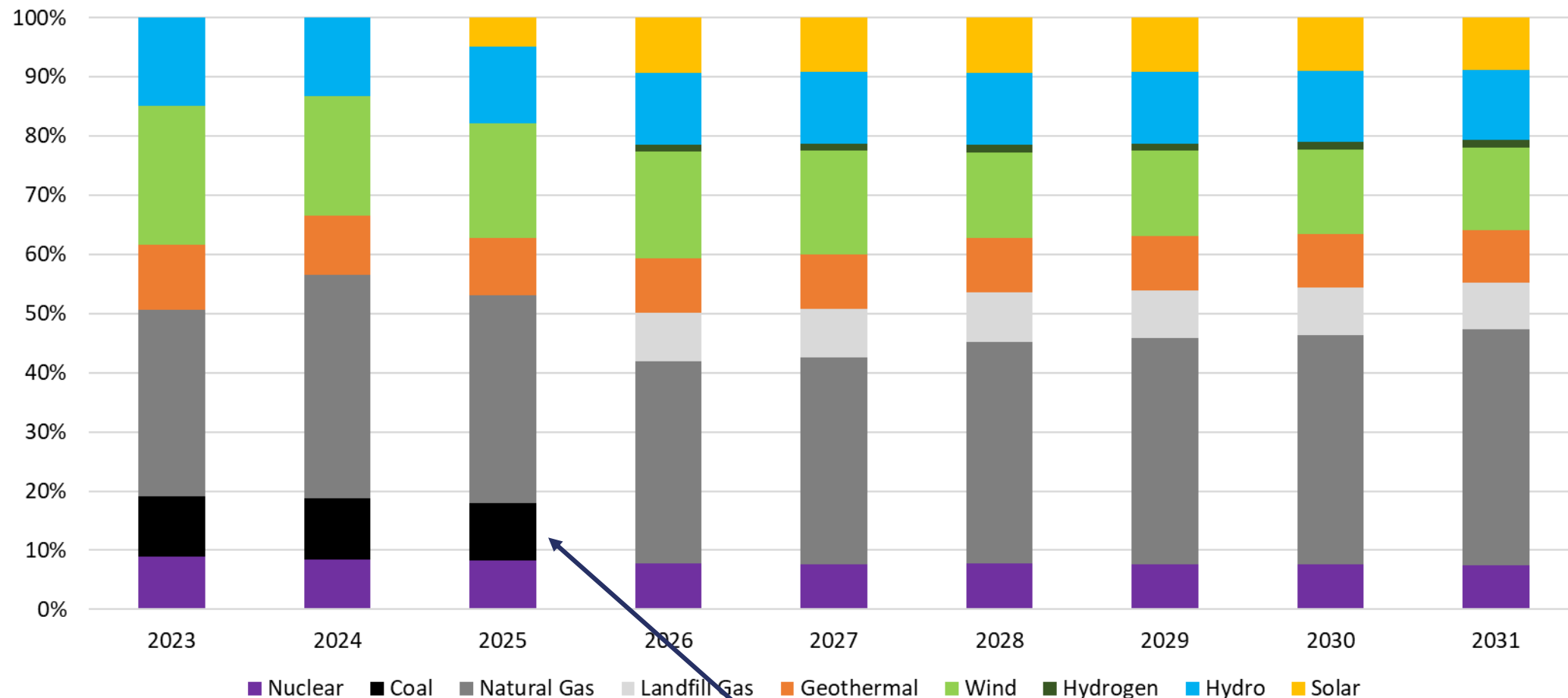
How is Glendale's energy mix evolving into the future?

- + GWP is making changes to its portfolio to increase clean energy and reduce greenhouse gas emissions.
- + Expected changes in the next decade include:
 - + Intermountain Power Plant converting fully to hydrogen
 - + Addition of Eland solar and storage project
 - + Addition of Scholl biogas (landfill gas)
 - + Grayson repowering and battery storage
- + This IRP will focus on how to close the gaps to meet CA and Glendale clean energy goals.

POWER CONTENT LABEL						
City of Glendale						
Greenhouse Gas Emissions Intensity (lbs CO ₂ e/MWh)			Energy Resources	2021	2025	2030
2021	2025	2030	Eligible Renewable ²	35.3%	47.8%	47.0%
			Biomass & Biowaste	14.1%	4.6%	9.0%
			Geothermal	3.6%	10.2%	9.9%
			Eligible Hydroelectric	8.3%	2.3%	2.2%
			Solar	0.0%	26.8%	25.9%
			Wind	9.2%	4.0%	0.0%
			Coal	3.5%	3.0%	0.0%
			Large Hydroelectric	21.4%	11.3%	11.0%
			Natural Gas	31.3%	15.0%	11.0%
			Nuclear	8.4%	8.4%	6.8%
			Other	0.0%	7.0%	7.0%
			Unspecified Power	0.0%	7.5%	17.2%
			TOTAL	100.0%	100.0%	100.0%
Percentage of Total Clean Energy (RPS + ZeroCarb) Supplied to Load¹				65%	75%	72%
¹ Percentages are calculated as the ratio of resource generation to mean system load. ² The eligible renewable percentage above does not reflect RPS compliance, which is determined using a different methodology.						
For specific information about this electricity portfolio forecast and any additional questions, contact: GWP-IRP@glendaleca.gov						



How is Glendale's energy mix evolving into the future?



IPP Coal Generation Retires