LA100

ACHIEVING 100% RENEWABLE ENERGY IN LOS ANGELES

LA DWP

LA100 & Green Hydrogen

April 7, 2023

LA DWP Los Angeles Department of Water & Power

LADWP Overview

Balancing Authority

Largest Publicly Owned Utility

- 465 square miles served

Vertically Integrated

1.5 Million Customers

$4.2 Billion Annual Budget

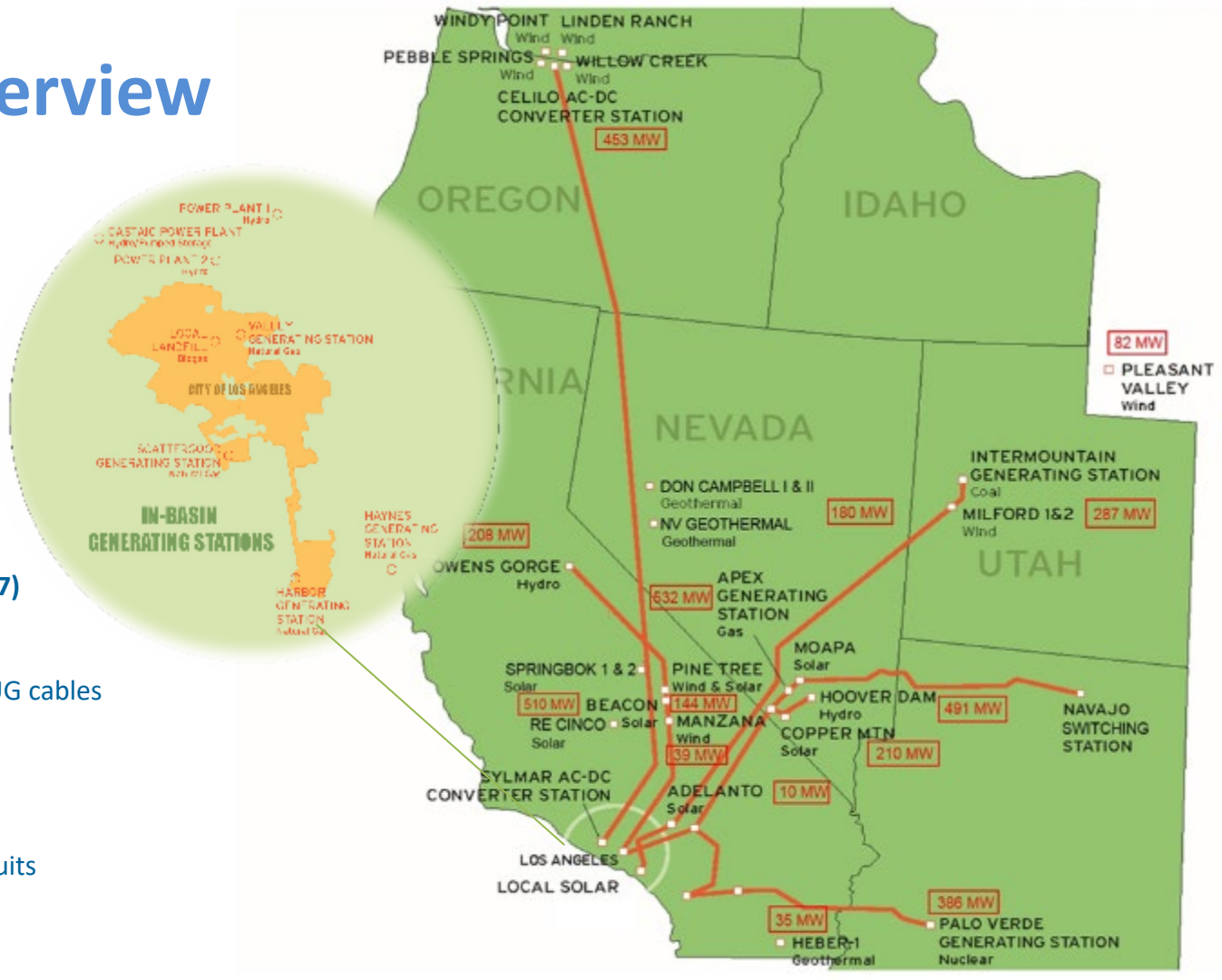
Peak Demand of 6,502 MW (8/31/17)

Distribution System

- 10,495 miles of OH lines & UG cables
- 181 stations
- 128,693 transformers

Transmission System

- 3,760 miles of OH & UG circuits
- 15,452 towers



LADWP's Resource Stack (2023)

3,800 MW Natural Gas

2,000 MW Hydro

1,200 MW Coal

380 MW Nuclear

Total Capacity: 10,814 MW

(All Time Peak: 6,502 MW)

1,330 MW Wind

1,730 MW Solar

20 MW Battery Storage

340 MW Geo, 14 MW Biomass



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LA City Council motions directed LADWP to evaluate:

- What are the **pathways and costs to achieve a 100% renewable electricity supply** while electrifying key end uses and maintaining the current high degree of reliability?
- What are the potential benefits to **the environment** and **health**?
- How might **local jobs** and the **economy** change?
- How can communities shape these changes to prioritize environmental justice?

LA100: How can LADWP reach 100 carbon free?

Each Scenario Evaluated Under Different Customer Demand Projections (different levels of energy efficiency, electrification, and demand response)

Moderate

High

Stress

SB100

Evaluated under Moderate, High, and Stress Load Electrification

- 100% clean energy by **2045**
- Only scenario with a target based on retail sales, not generation
- Only scenario that allows up to 10% of the target to be natural gas offset by renewable electricity credits
- Allows existing nuclear and upgrades to transmission

Early & No Biofuels

Evaluated under Moderate and High Load Electrification

- 100% clean energy by **2035**, 10 years sooner than other scenarios
- No natural gas generation or biofuels
- Allows existing nuclear and upgrades to transmission

Limited New Transmission

Evaluated under Moderate and High Load Electrification

- 100% clean energy by **2045**
- Only scenario that does not allow upgrades to transmission beyond currently planned projects
- No natural gas or nuclear generation

Transmission Focus

Evaluated under Moderate and High Load Electrification

- 100% clean energy by **2045**
- Only scenario that builds new transmission corridors
- No natural gas or nuclear generation

Common Investments Across All LA100 Scenarios

Electrification
Efficiency
Flexible Load

Customer
Rooftop Solar

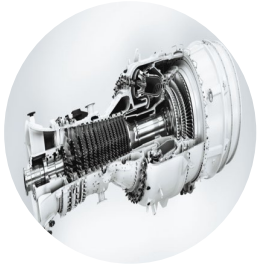
Renewable
Energy

Solar: + >5,700 MW
Wind: + >4,300 MW

Storage

+ >2,600 MW

Transmission,
Distribution



Renewably Fueled
Dispatchable
Turbines

+>2,600 MW
(in basin)

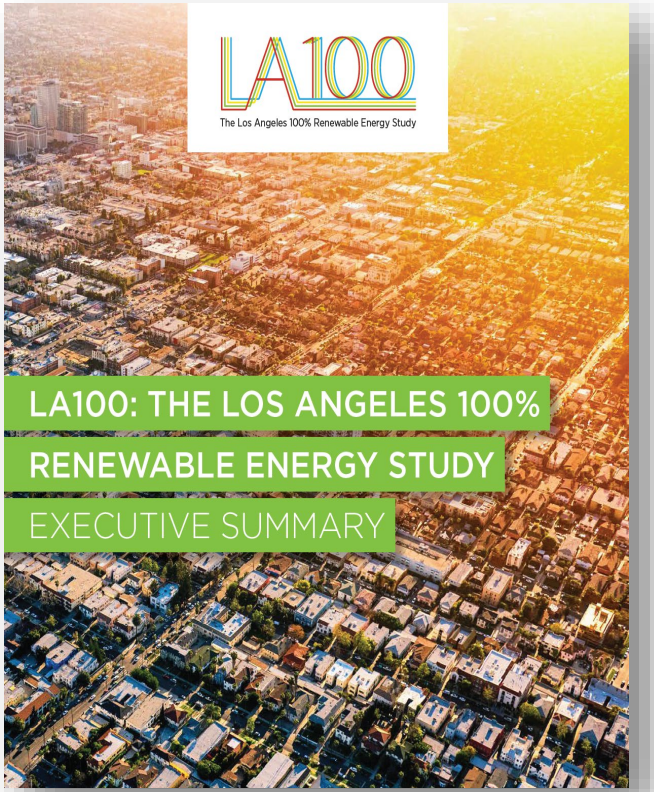
Much More

Natural Gas → Hydrogen	
Today: Daily	**Future:** Infrequently

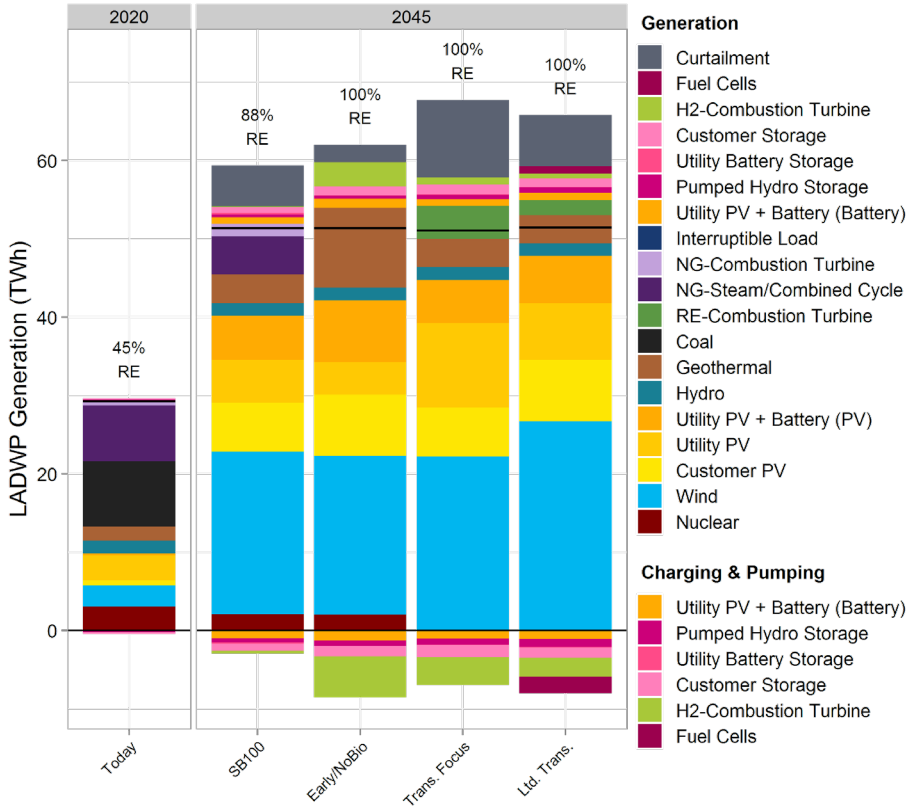
Hydrogen's Role in 100% Carbon Free

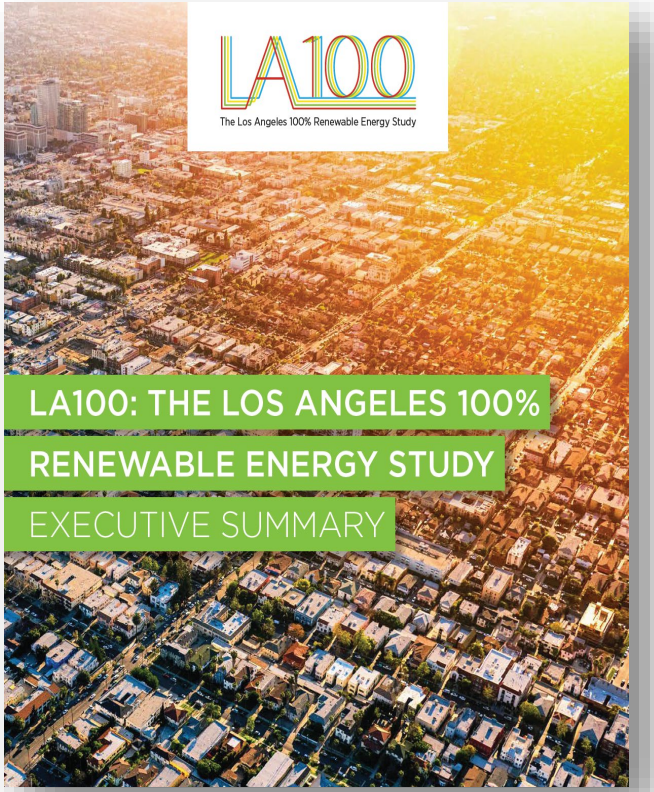
Why Invest in Renewably Fueled Turbines if Infrequently Used in the Future?

- **"The challenge of addressing the seasonal mismatch of supply and demand.** Demand peaks in August and September, but wind and solar generation peaks earlier in the year."
- "The risks associated with relying on transmission lines to bring wind and solar energy to the city. **Fires and earthquakes could affect these transmission lines, so LA needs to have energy that can be stored locally that can produce electricity for extended periods of time when needed**."
- "The limitation of the city's local transmission network— it is difficult and expensive to upgrade transmission infrastructure that could help import renewable energy through the north side of the LA system to other locations in the city."
- LA100 Study report, Executive Summary, pg. 29



Hydrogen's Role in 100% Carbon Free





Project Alternatives: LA100 on No Combustion

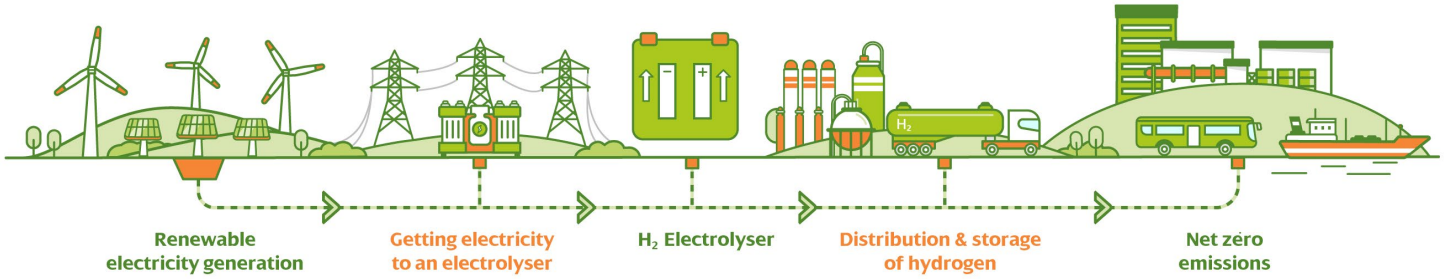
- Through the LA100 process, NREL attempted to model a scenario without in-basin combustion
- This scenario resulted in the following outcomes
  - Increased out-of-basin combustion by approximately 1,600 MW (i.e. new power plants)
  - Required 14 square miles of ground mounted solar (in addition to needed rooftop solar)
  - New in-basin transmission; 5 new in-basin transmission lines
- This no-in basin combustion scenario resulted in the inability to serve load (i.e. maintain reliability) during low frequency, high impact events such as wildfires, earthquakes, and heat storms
- These findings were communicated through the LA100 Advisory Group process as well as through LADWP's most recent Strategic Long-Term Resource Plan (SLTRP) Advisory Group process

LA100 Next Steps – Investments Began in 2021

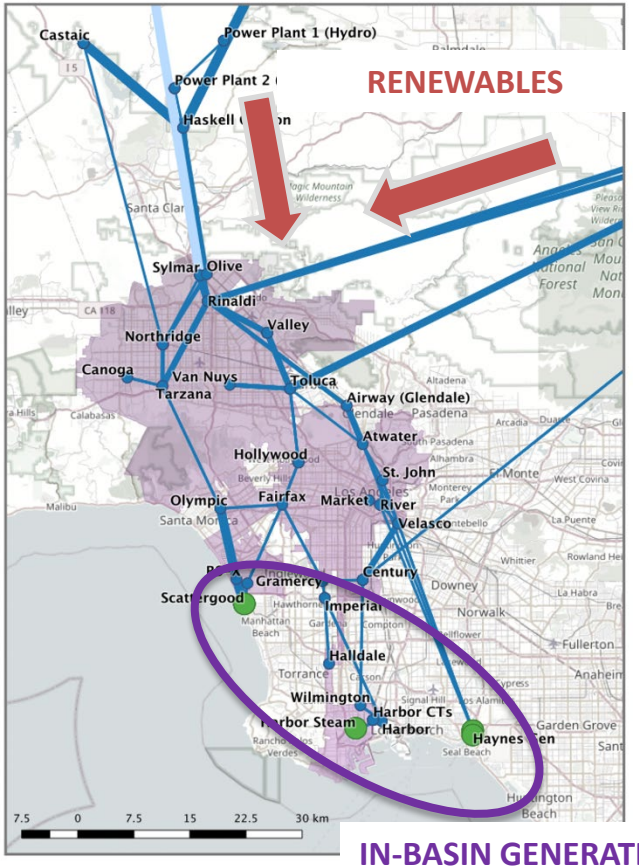
Accelerate to **80% Renewable 97% GHG-Free by 2030**	**Increase to 80% renewable energy by 2030** to achieve 97% GHG free by adding **3,000 MW of new renewables**.
Accelerate **Transmission**	Complete **10 critical transmission projects over 10 years** to maintain grid reliability and meet growing EV, building electrification, LAX, and Port of LA electricity demand
Transform **Local Generation**	**Green hydrogen Request for Information** (RFI) for all in-basin generating stations. Construct **hydrogen capacity at Scattergood**. Retrofit **Haynes to recycled water cooling**.
Accelerate **Energy Storage**	Build over **1,000 MW of energy storage by 2030** to support capacity needs.
Accelerate **Distributed Energy Resources Equitably**	Deploy **1,000 MW of local solar, 500 MW of demand response**, doubling energy efficiency, and support 580,000 electric vehicles by 2030. Adopt goal of **50% of DER investment reaching disadvantaged communities**.

WHY GREEN HYDROGEN?

- Most viable technology today for clean generation that can be dispatched when needed
- Uses renewable energy to create hydrogen power
- **Not a greenhouse gas** and does **not produce carbon emissions** when used for power generation
- Can provide clean power for hard-to-electrify industries, like transportation
- LA100 assumes **hydrogen in all scenarios** to:
  - Use as a **clean fuel** to back up renewable energy when sun isn't shining or wind isn't blowing
  - Needed to achieve **last 10%** toward a 100% carbon-free ***and*** reliable power grid



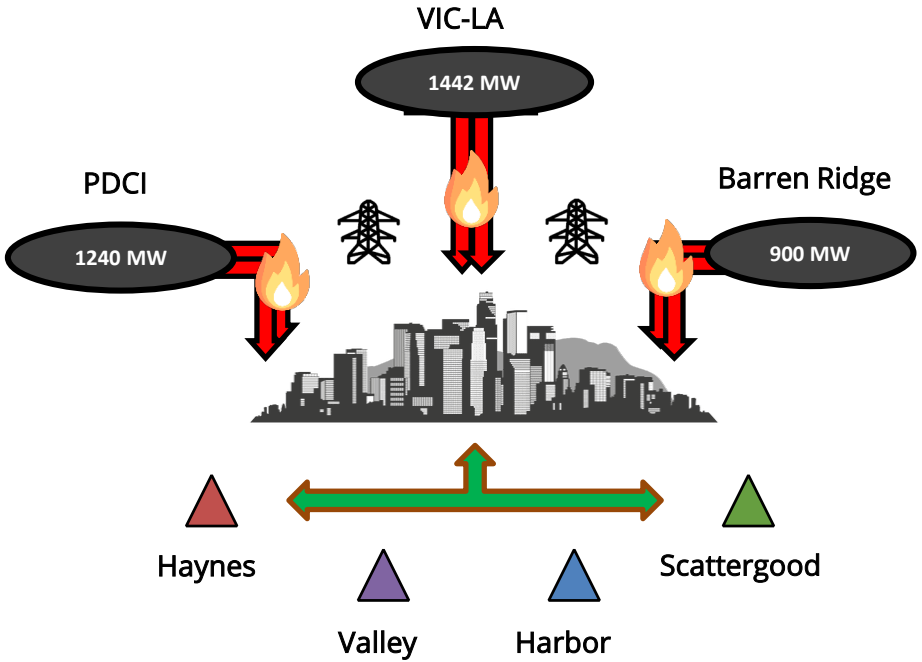
NEED FOR IN-BASIN GENERATION



- LADWP transmission network was designed in part around **in-basin generation**, located mostly in the south
- **Renewables** are primarily imported from the north
- **Transmission limits/outages** are currently addressed by running locally sited generators

IN-BASIN RESILIENCY

WHEN THERE IS A TRANSMISSION OUTAGE, WE WOULD RELY ON GREEN HYDROGEN TO KEEP CRITICAL POWER FLOWING



LA100 Study – Key Takeaway

In-basin capacity must be maintained for **reliability** and **resiliency**, even in a decarbonized future Power System.

All 2022 SLTRP cases have been developed to maintain reliability and resiliency

Example:

The 2019 Saddle Ridge Fire impacted the Pacific DC Intertie for 22 hours, Barren Ridge corridor for **10 hours**, and VIC-LA path for **5 hours.**

Limitations:

Existing storage technologies are incapable of supporting long duration outages in a cost-effective manner.

For example, a standard energy storage system can only discharge for several hours.

LA100: Ensuring Reliability with In-Basin Capacity: Scattergood Modernization

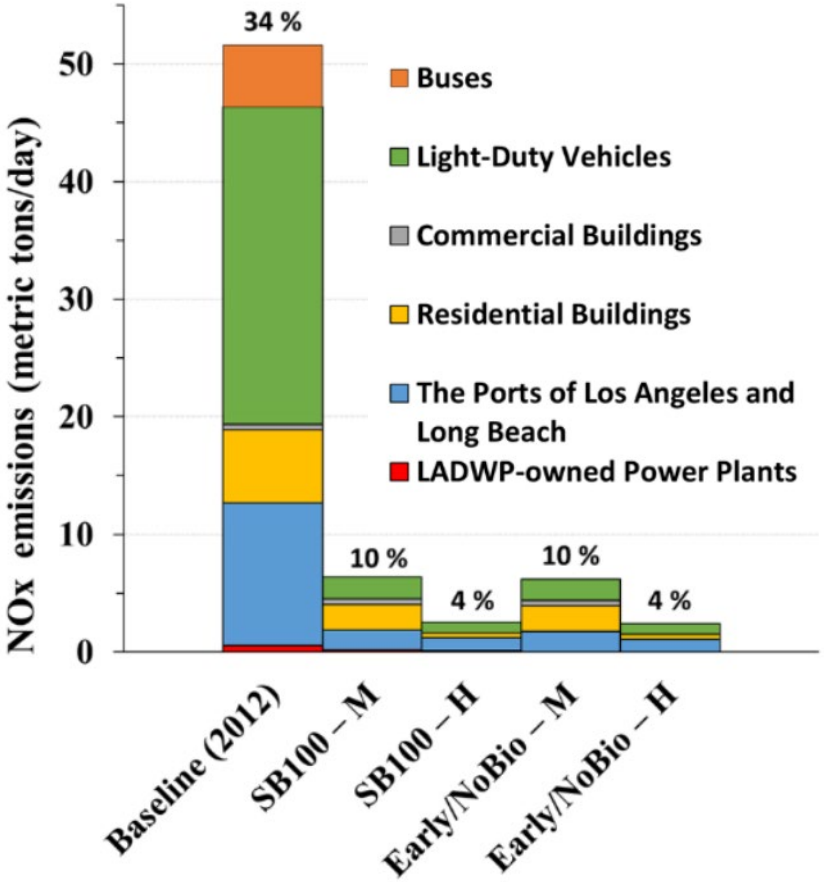
- **Transforming local generation.** LA100 study shows need for renewable in-basin capacity at all generating stations, in all scenarios.
- **System reliability.** Capacity at Scattergood is our most immediate need.
- **Load growth.** Port & LAX electrification, Operation NEXT at Hyperion.
- **Challenges**. Limited footprint and in-service prior to retirement of Units 1 & 2 to support transmission buildout.
- **OTC extension critical.** Scheduled for 2024, seek extension to 2029. Net reduction in water use with early elimination of water usage at Haynes.

Scattergood Modernization

Scattergood Modernization Project Overview

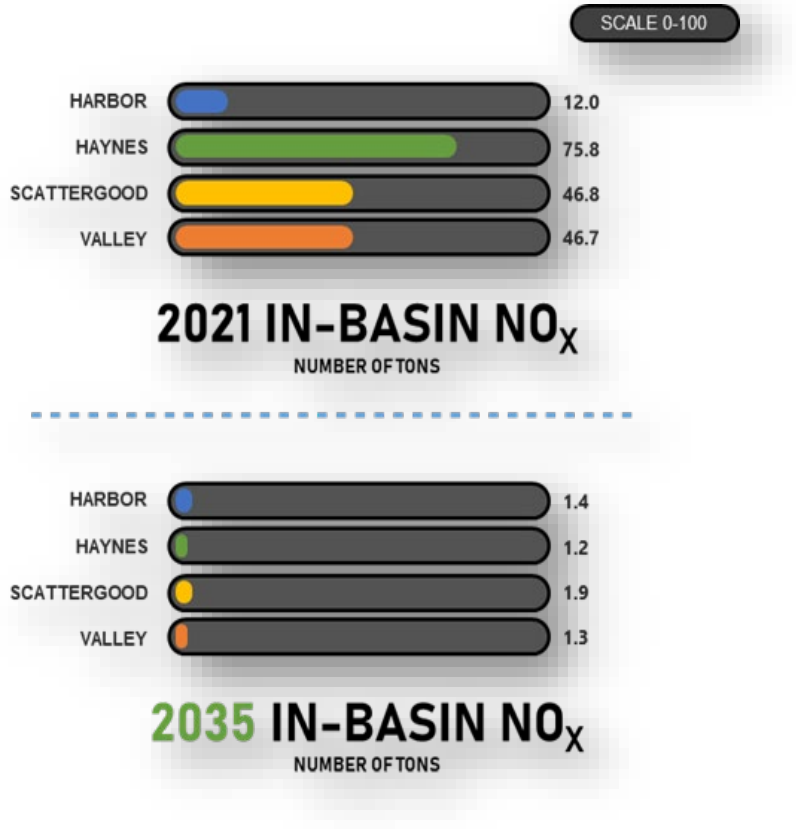
- Combined Cycle and Balance-of-Plant Equipment
- 346 megawatts (MW) capacity
- Hydrogen Ready
- Estimated Cost: $800M
- In-Service Date: 12/30/2029

LA100 Scenario NOx Emissions Reductions



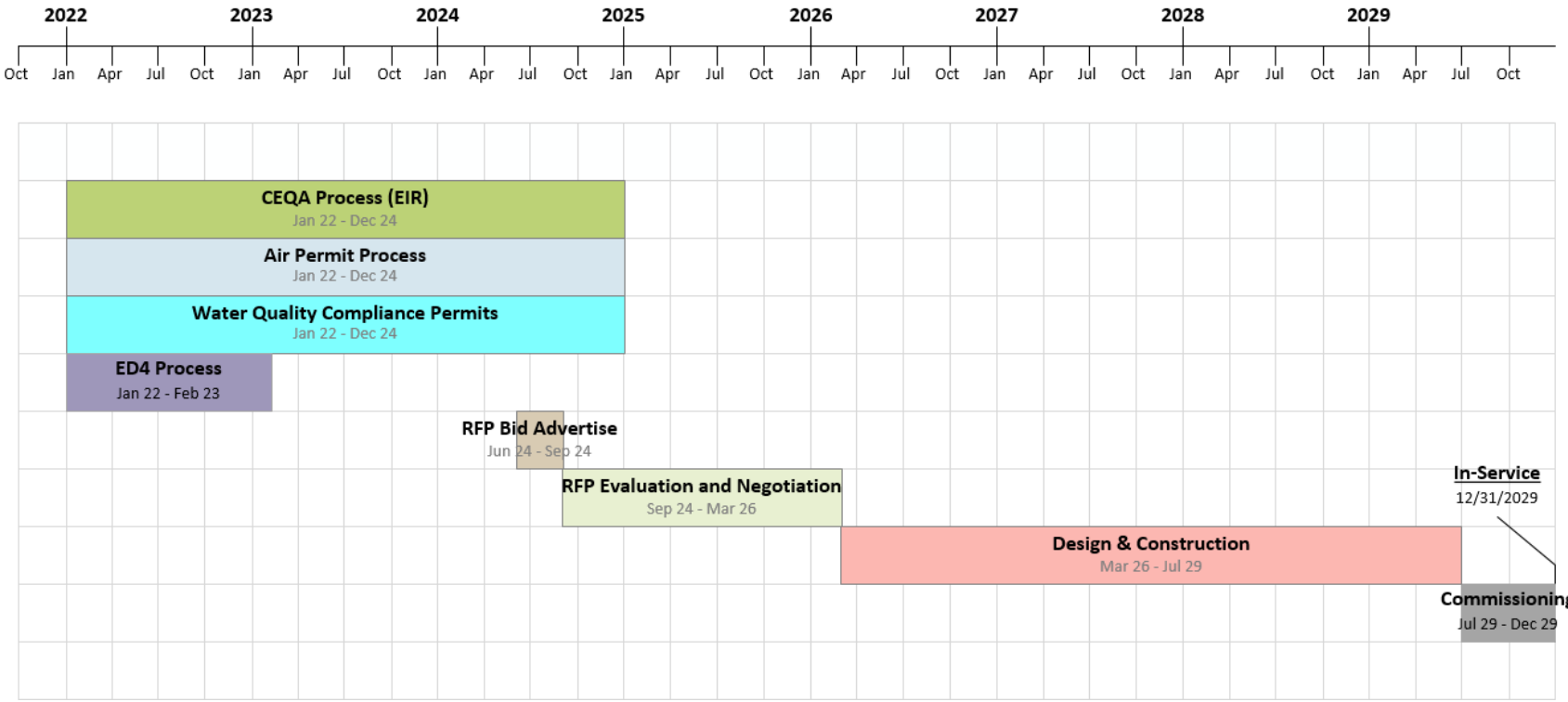
- In 2012, LADWP's in-basin plants contributed 0.4% of NOx emissions citywide
- Contribution of LA100-influenced sectors to **annual average emissions** in Los Angeles based on 2012 Baseline
- LA100 scenarios could lead to **citywide reductions** in major air pollutant emissions including oxides of nitrogen (NOx)
- Significant NOx reductions modeled by LA100 and by Strategic Long-Term Resource Plan

In-Basin Power Plant NOx Emissions Reductions



- Contribution of LA100-influenced sectors to **annual average emissions** in Los Angeles based on 2012 Baseline
- LA100 scenarios could lead to **citywide reductions** in major air pollutant emissions including oxides of nitrogen (NOx) and fine particulate matter (PM2.5)
- Emission reductions in SB100 scenarios are due to increased **electrification**.

Project Timeline



CEQA & Public Involvement

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Thank you