MEETING of the Legislative & Regulatory Committee of the Clean Power Alliance of Southern California

Wednesday, September 28, 2022

10:00 a.m.

SPECIAL NOTICE: Pursuant to the Proclamation of the State of Emergency by Governor Newsom on March 4, 2020, AB 361, and enacting Resolutions, and as a response to mitigating the spread of COVID19, the Legislative & Regulatory Committee will conduct this meeting remotely.

Click here to view a Live Stream of the Meeting on YouTube
If the YouTube stream is not working, please use the zoom link.
*There may be a streaming delay of up to 60 seconds. This is a view-only live stream.

To Access the Meeting:
https://us06web.zoom.us/j/88054055308
or
Dial: (720) 707-2699 Meeting ID: 880 5405 5308

PUBLIC COMMENT: Members of the public may submit their comments by one of the following options:

- Email Public Comment: Members of the public are encouraged to submit written comments on any agenda item to clerk@cleanpoweralliance.org up to four hours before the meeting. Written public comments will be announced at the meeting and become part of the meeting record. Public comments received in writing will not be read aloud at the meeting.
- Provide Public Comment During the Meeting: Please notify staff via email at clerk@cleanpoweralliance.org at the beginning of the meeting but no later than immediately before the agenda item is called.
    - You will be asked for your name and phone number (or other identifying information) and agenda item similar to filling out a speaker card so that you can be called on when it is your turn to speak.
    - You will be called upon during the comment section for the agenda item on which you wish to speak on. When it is your turn to speak, a staff member will unmute your phone or computer audio.
    - You will be able to speak to the Committee for the allotted amount of time. Please be advised that all public comments must otherwise comply with our Public Comment Policy.
    - Once you have spoken, or the allotted time has run out, you will be muted during the meeting.

If preferred, you may also submit written comments during the meeting via email to: clerk@cleanpoweralliance.org. The written comments will be shared with the Committee.

*While downloading the Zoom application may provide a better meeting experience, Zoom does not need to be installed on your computer to participate. After clicking the webinar link above, click “start from your browser.”

Meetings are accessible to persons with disabilities. Individuals who need special assistance or a disability-related modification or accommodation to participate in this meeting, or who have a disability and wish to request an alternative format for the meeting materials, should contact the Clerk of the Board at least two (2) working days before the meeting at clerk@cleanpoweralliance.org or (323) 640-7664. Notification in advance of the meeting will enable us to make reasonable arrangements to ensure accessibility to this meeting and the materials related to it.

PUBLIC COMMENT POLICY: *The General Public Comment item is reserved for persons wishing to address the Board on any Clean Power Alliance-related matters not on today's agenda. Public comments on matters on today's Consent Agenda and Regular Agenda shall be heard at the time the matter is called. Comments on items on the Consent Agenda are consolidated into one public comment period. Members of the public who wish to address the Board are requested to contact the Board Clerk, as specified above, at the beginning of the meeting but no later than immediately prior to the time an agenda item is called. Each speaker is limited to two (2) minutes (in whole minute increments) per agenda item with a cumulative total of five 5 minutes to be allocated between the General Public Comment, the entire Consent Agenda, or individual items in the Regular Agenda. Please refer to Policy No. 8 – Public Comment for additional information.*

CALL TO ORDER & ROLL CALL

GENERAL PUBLIC COMMENT

CONSENT AGENDA

1. Approve Minutes from July 27, 2022, Legislative & Regulatory Committee Meeting

REGULAR AGENDA

2. Discussion and Q&A on Memo Distributed to the Board of Directors Regarding the 2022 California Legislative Session

3. Green Hydrogen Overview

COMMITTEE MEMBER COMMENTS

ADJOURN – NEXT MEETING OCTOBER 26, 2022

Public Records: *Public records that relate to any item on the open session agenda for a Committee Meeting are available for public inspection. Those records that are distributed less than 72 hours prior to the meeting are available for public inspection at the same time they are distributed to all, or a majority of, the members of the Committee. Those documents are available for inspection online at www.cleanpoweralliance.org/agendas.*

MINUTES

MEETING of the Legislative & Regulatory Committee of the

Clean Power Alliance of Southern California

Wednesday, July 27, 2022, 10:00 a.m.

The Legislative & Regulatory Committee conducted this meeting in accordance with California Governor Newsom's Executive Order N-29-20 and COVID-19 pandemic protocols.

CALL TO ORDER & ROLL CALL

Committee Chair Lindsey Horvath called the meeting to order at 10:00 a.m. and Gabby Monzon, Board Clerk, conducted roll call.

Roll Call			
Agoura Hills	Deborah Klein Lopez	Committee Member	Remote
Carson	Cedric L. Hicks, Sr.	Committee Member	Remote
West Hollywood	Lindsey Horvath	Chair	Remote

All votes are unanimous unless otherwise stated.

GENERAL PUBLIC COMMENT

There was no public comment.

CONSENT AGENDA

1. Approve Minutes from May 25, 2022, Legislative & Regulatory Committee Meeting

Motion: Committee Member Hicks, Carson
Second: Committee Member Lopez, Agoura Hills
Vote: The consent agenda was approved by a roll call vote.

REGULAR AGENDA

2. Assembly Bill 205 Summary and Impacts

Gina Goodhill, Director of Government Affairs, provided an update on AB 205, which implements energy items from the 2022 budget act with a specific focus on grid reliability. Ms. Goodhill explained that the bill establishes a second year of the California Arrearages Payment Program (CAPP), which will provide a billion dollars specifically for customers of Community Choice Aggregations (CCAs) and Investor Owned Utilities (IOUs). CPA is expecting approximately $15 million of this funding to credit customer accounts. It also makes changes to how CARE rates and fixed charges will be calculated, with the goal of reducing monthly bills for low-income customers. The bill establishes the long-duration storage program at the California Energy Commission (CEC) and will provide incentives to projects with at least eight

hours of continuous discharge. Additionally, there is new funding for demand response and distributed energy programs at the CEC. The bill also creates the Strategic Reliability Reserve and allows the Department of Water Resources (DWR) to contract for new or existing energy resources to be used during grid emergencies (including fossil fuel resources). It also allows the DWR to skip the usual project approval process to speedily get resources on the grid. Lastly, the bill creates an expedited permitting authority that allows the CEC to issue permits for new clean energy projects. CPA staff is working closely with California Community Choice Association (CalCCA) to understand the full impacts of the bill, and one potential action could be a clean-up bill to clarify the language. In response to Committee Member Hicks' question regarding cost impacts from the creation of the Strategic Reliability Reserve, Ms. Goodhill noted that the bill's goal is to increase reliability and is funded from taxpayer dollars and not from ratepayers, therefore, it will not affect ratepayer costs.

3. Update on Resource Adequacy Proceeding

CC Song, Director, Regulatory Affairs, provided an update on the California Public Utilities Commission (CPUC) decision on Resource Adequacy (RA) Reform. Ms. Song reviewed the background, goal, and key factors driving RA Reform. Ms. Song noted CPA's guiding principles in participating in the RA Reform proceeding track and the two Reform proposals considered by the CPUC. CPA supported the Southern California Edison (SCE) 24-hour slice proposal with proposed modifications. The CPUC adopted SCE's 24-hour slice framework where each month an entity would have to demonstrate that it has enough capacity to meet its load profile in all 24 hours on the CAISO's worst day. However, the CPUC declined to further examine hourly load and resource trading due to its complexity; obligation trading may be revisited in the future. Three workstreams will be conducted to develop further implementation details for 2024 test year. The three workstreams will focus on compliance, resource counting riles, and CAISO/CPUC validation tools. Ms. Song noted that CPA staff is disappointed that the CPUC did not adopt a workstream to explore granular hour resource trading. CPA staff will continue to participate in workshops and discussion groups organized by CalCCA.

Responding to Committee Member Hicks' question, Ms. Song specified that the 24-hour slice proposal framework aims to meet energy needs during all hours of the day, including the gross and net peaks. Committee Member Hicks commented on the issue arising among customers with residential solar panels without battery storage, noting that the grid has been flooded with additional unabsorbed energy without a way to collect it, resulting in reduced rates for customers with residential solar panels and higher rates for customers without residential solar panels. Ms. Song noted that CPA staff is aware of the issue and has discussed it with CPUC in the Net Energy Metering (NEM) proceeding. The CPUC has suspended the proceeding to gather more information from stakeholders. Staff is conducting internal analysis to gauge the impact of those customers on CPA's overall financial health. Committee Members Lopez and Hicks inquired about the impact of lack of storage on customer costs and how storage may alleviate costs in the future. Matt Langer, Chief Operating Officer, clarified that there are times during the day when the grid has too much energy and the generator can power down and power off power plants connected to California Independent System Operator (CAISO) or

store the energy to be used at a time of day more valuable to the grid; as CPA acquires more energy storage, CPA can absorb more excess energy to use at other times of the day. Mr. Langer added that the RA program is different in that each resource that produces energy also has the ability to produce RA credits which can be purchased separately. There is no provision to purchase RA credits by the hour so if CPA has more credits than needed in certain hours, or vice versa, it can't sell them, making it economically inefficient.

COMMITTEE MEMBER COMMENTS

Committee Member Hicks advised the Committee about the Alliance of Renewable Clean Hydrogen Energy Systems (ARCHES) and their initiative to address the clean decarbonization of energy in the form of hydrogen.

ADJOURN

Chair Horvath adjourned the meeting at 10:33 a.m.

Staff Report – Agenda Item 2

To:	Clean Power Alliance (CPA) Legislative & Regulatory Committee
From:	Gina Goodhill, Director of Government Affairs
Subject:	Discussion and Q&A on Memo Distributed to the Board of Directors Regarding the 2022 California Legislative Session
Date:	September 28, 2022

RECOMMENDATION

The Committee will have the opportunity to discuss the memorandum distributed to the Board of Directors regarding the 2022 California Legislative Session.

ATTACHMENT

1. Board Memo on 2022 California Legislative Session Summary

Memorandum

To:	Clean Power Alliance (CPA) Board of Directors
From:	Gina Goodhill, Director, Government Affairs
Subject:	2022 California Legislative Session Summary
Date:	September 19, 2022

BACKGROUND

On early September 1, 2022, the California Legislature finished the 2022 Legislative session, voting on a slew of energy and climate related bills that were introduced just weeks before the end of session. This report gives a summary of the major bills and their impacts for CPA, our customers, and the state.

DIABLO CANYON EXTENSION

SB 846 (Dodd): The highest profile of all energy related bills, SB 846 authorizes the extension of operating the 2,200 MW Diablo Canyon Power Plan (DCPP) beyond the current expiration dates of 2024 for Unit 1 and 2025 for Unit 2. An earlier version of the bill proposed extending DCPP for up to 10 years, however the version that passed authorizes a five-year extension assuming a successful licensing amendment process with the federal Nuclear Regulatory Commission. This bill also authorizes a loan of $1.4 billion from the state to Pacific Gas & Electric (PG&E), the operator of DCPP, to facilitate the operating extension of the plant. This bill immediately appropriates $600 million and requires future Legislative action for the remaining. This bill also provides expedited state permitting to facilitate relicensing of DCPP, exemption from most environmental reviews, and authorized collection of ongoing costs from electric ratepayers (more details below). In addition, it includes a $100 million annual payment to PG&E that can be used as direct compensation for shareholders. This bill also prohibits the use of DCPP's capacity to be included in long-term electricity supply forecasts used by the state. The bill passed the Assembly 69-3 and the Senate 31-1, and Governor has signed this bill into law.

Impact on CPA: The extension of DCPP will increase both costs and reliability for all customers. The bill includes a $6.50/MWh volumetric charge for all non-PG&E load serving entity (LSE) ratepayers, including CCA customers, and a $13/MWh charge for all PG&E ratepayers for each MW generated by DCPP during the extension. According to analysis from the Assembly Floor, the Newsom administration estimates that these charges, paired with other charges that will be collected from ratepayers, should equate to roughly 10 cents per month for average residential customers; however, because

volumetric rate is based off energy usage, the cost for large energy users will be much higher. CPA does not believe nuclear energy from DCPP will end up on CPA's Power Content Label. While the extension should provide some relief to the tight RA market, its impact on RA pricing, a main driver of CPA's energy costs, is uncertain.

NEW CLIMATE GOALS

On August 12, 2022, Governor Gavin Newsom presented new climate goals to the Legislature, which CPA staff shared with the Legislative committee in an August 19th memorandum. These goals were officially introduced as bills in the final days of the legislative session.

1. **SB 1020 (Laird)**: Originally authored by the Senate Committee on Climate, this CPA supported bill ultimately become part of the Governor's climate package. The bill set new interim targets to meet the goals of SB 100 (the 2006 California Global Warming Solutions Act), which requires that renewable energy and zero-carbon resources must supply 100% of all retail sales of electricity to California by 2045. Under this bill, renewable energy and zero-carbon resources must supply 90% of all retails sales of electricity by 2035, and 95% by 2040. The final version of the bill removed the creation of a climate and equity trust fund that could be used to fund various clean energy initiatives. It also extended the deadline by which state agencies would be required to purchase 100% zero carbon electricity, from 2030 in the initial bill to 2035 in the final bill (and instead of by 2045 under SB 100). This bill passed with solid majorities on a party line vote, and the Governor has signed it into law.

   Impact on CPA: CPA has already incorporated these new interim goals into its long-term planning under the Integrated Resource Plan (IRP) and took a Support position early in the legislative session.

2. **AB 1279 (Muratsuchi) The California Climate Crises Act:** This bill establishes a legally binding goal for California to achieve statewide carbon neutrality no later than 2045, and to ensure that greenhouse gas (GHG) emissions are reduced to at least 85% below 1990 levels by that same time, with the remainder allowed to come from various carbon capture technologies. In 2018, Governor Brown established carbon neutrality by 2045 as a statewide goal and directed the California Air Resources Board (CARB) to work with relevant state agencies to develop a framework for implementation. This bill turns this gubernatorial direction into law. Importantly, the bill was contingent on the passage of AB 905 (see next bill), which did pass and sets goals around carbon capture. This bill passed both floors on the final night with solid majorities on a party line vote, and the Governor has signed it into law.

Impact on CPA: CARB releases Climate Change Scoping Plans every five years, in which they model various scenarios to guide the state in achieving GHG reduction goals. These scenarios include GHG emission targets for the electricity sector, which are then used by load serving entities (LSEs) as they develop their IRPs. CARBs 2022 Scoping Plan included modeling to achieve a 2045 zero-carbon goal. Similarly, with the passage of this bill, CARB's 2027 Scoping Plan will include GHG emissions targets for the electricity sector that help to achieve this 2045 goal, and LSEs like CPA will then incorporate these targets into their long-term planning. With GHG levels being driven down in the electricity sector due to SB 100 and now SB 1020, future CARB actions are likely to continue focusing on other sectors, such as transportation, building electrification, industrial use, and short-lived climate pollutants – often with regulations and program funding that will impact and be available to CPA customers.

3. **SB 905 (Caballero and Skinner):** This bill requires CARB to establish a Carbon Capture, Utilization, and Storage (CCUS) program. The CCUS program *may* account for the remaining 15% of emissions reductions not covered under the goals in AB 1279 to achieve a GHG emission reduction of 85% below 1990 levels by 2045. However, whether this can be used for the final 15% will ultimately be up to CARB. This bill also includes specific requirements around workforce benefits and protection of frontline communities. Key stakeholders were split on this bill, with electrical workers largely supported the bill, and environmental groups split between supporting and opposing this bill. The bill passed the Senate 29-9 and the Assembly 48-15 and Governor has signed this bill into law

   Impact on CPA: While this bill does not have a direct impact on CPA, its passage was necessary for AB 1279 to pass. If economically and technically viable, which has so far not be proven, CCUS could be used to keep fossil fuel powered electricity generators on-line.

4. **SB 1137 (Gonzalez):** This bill establishes a setback distance of 3,200 feet between any new oil well and homes, schools, or parks and ensures comprehensive pollution controls for existing oil wells within 3,200 feet of these facilities. The bill passed both the Assembly and Senate, 46-24 and 25-10, respectively, and the Governor has signed it into law.

   Impact on CPA: While this bill does not have any direct impacts on CPA, it may affect CPA customers. Environmental justice and environmental groups have praised the bill for protecting low-income communities who often live near oil extraction and bear the brunt of the impacts of oil drilling, such as poor air quality. Conversely, the State Building and Construction Trades Council opposed the bill and argued that it would eliminate union jobs in underserved and disadvantaged communities while doing nothing to reduce carbon emissions globally.

5. **AB 2133 (Quirk)**: This bill would have required the California Air Resources Board (CARB) to adopt a more aggressive 2030 greenhouse gas emissions reduction target - going from 40% to 55% below the 1990 level. While the bill passed the Senate, it failed to pass the Assembly by four votes. This was the only one of the Governor's climate policy priority bills that failed.

BUDGET BILLS

The Governor and the Legislature released three budget bills in the final week of session, each containing additional funding and details for elements of the state's energy and climate plans. Collectively, these bills included hundreds of millions of dollars for investments in clean energy including green hydrogen, offshore wind, zero emissions vehicles and infrastructure, and energy transmission projects. Most immediately relevant to CPA was funding that complements CPA's existing and planned customer programs and that may present additional opportunities for CPA to expand or partially fund current customer programs. These include:

- Extreme Heat: At least $160 million is designated for Extreme Heat, including $110 million for Community Resilience Centers through the Strategic Growth Council (SGC), and $50 million for state operations or local assistance for the Extreme Heat and Community Resilience Grant Program at the Office of Planning and Research (OPR). While the programs through OPR and SGC are both still under development, there is a potential for CPA's Power Ready program to qualify for some of this funding.
- Building Decarbonization: $162 million is designated to support the newly created Equitable Building Decarbonization program to be managed by the California Energy Commission (CEC). Part of this program will include a statewide incentive program for low-carbon building technologies, such as electric heat pumps, and electric space and water heaters. This new incentive could complement CPA's building electrification reach code program that is currently under development.
- Demand Response: Earlier in the legislative session, a bill allocated $200 million to the existing CEC Demand Response program, known as the Demand Side Grid Support Program. While the earlier bill designated this money for only customers of publicly owned utilities, the final budget bills clarified that all customers, including CCA customers, could be eligible for this program. CPA will evaluate if changes should be made to CPA's Power Response program to take advantage of this additional funding.

Additional CPA Supported Legislation

In addition to SB 1020, two other CPA supported bills were approved by the Legislature:

1. **SB 887 (Becker):** This bill will accelerate the state's planning and approvals for transmission projects to get new clean energy connected to the grid and delivered to communities more quickly. This bill requires the CPUC, CAISO, and CEC to identify the highest priority transmission needs and approve at least 2 projects during the 2022-2023 transmission planning process. This bill also makes changes to how the CPUC and CEC create their projections for transmission planning by incorporating longer lead times and increased renewable energy into their planning. The bill has been signed into law by the Governor.

2. **AB 2238 (Luz Rivas):** This bill will create the nation's first extreme heat warning and ranking system and will develop a public communication plan for the statewide extreme heat ranking system. This bill has been signed into law by the Governor.

Staff Report – Agenda Item 3

To:	Clean Power Alliance (CPA) Legislative & Regulatory Committee
From:	Rich Viebrock, Project Manager, Power Supply Natasha Keefer, Vice President, Power Supply
Subject:	Presentation on Green Hydrogen
Date:	September 28, 2022

Staff will provide a presentation on the item.

ATTACHMENT

1. Green Hydrogen Overview Presentation

Item 3: Green Hydrogen Overview

September 28, 2022

Executive Summary

- Hydrogen is the most abundant element on earth and has the potential to provide carbon free and clean energy across multiple sectors, including electricity generation
- Hydrogen's carbon intensity differs based on how it is produced; green hydrogen is produced with renewable electricity and has the lowest carbon intensity of all production methods
- Many proposed uses of green hydrogen require technological innovations to determine feasibility, reduce costs, and leverage hydrogen's potential in electricity generation
- An economy that depended on significant amounts of hydrogen could increase water stress in drought-stricken areas and require significant land use for additional renewable energy capacity
- Current state and federal funding is intended to drive down costs and address feasibility challenges of green hydrogen deployment in CA
- While hydrogen's end use in the electricity sector is still not a near-term solution, CPA's eventual deployment of hydrogen-based projects would depend on those projects competing in RFO solicitations against other technologies that deliver similar attributes

Agenda

- Green Hydrogen Overview
- Potential of Green Hydrogen for Electricity Production
- Challenges for Deployment
- ARCHES Project Review
- Key Takeaways, Questions, and Conversation

Green Hydrogen Overview

CPA CLEAN POWER ALLIANCE

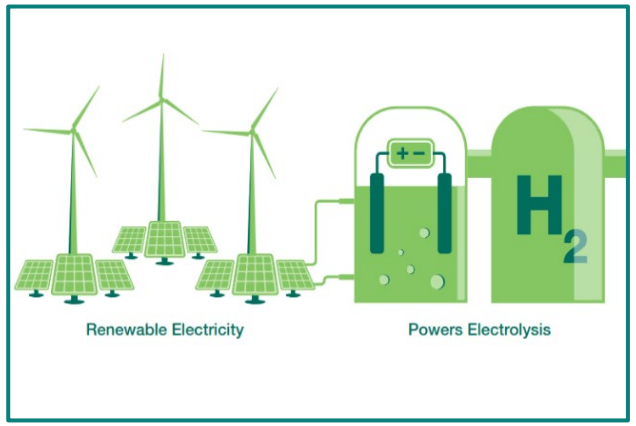
Hydrogen Overview

- Hydrogen is the most abundant element on earth (the "H" in H_2O)
- Like natural gas, hydrogen gas can theoretically be used to fuel trucks, power plants, industrial manufacturing, aviation, and much more
- Unlike natural gas, hydrogen is harvested by splitting chemical compounds that contain hydrogen; different methods of production determine how "clean" hydrogen is

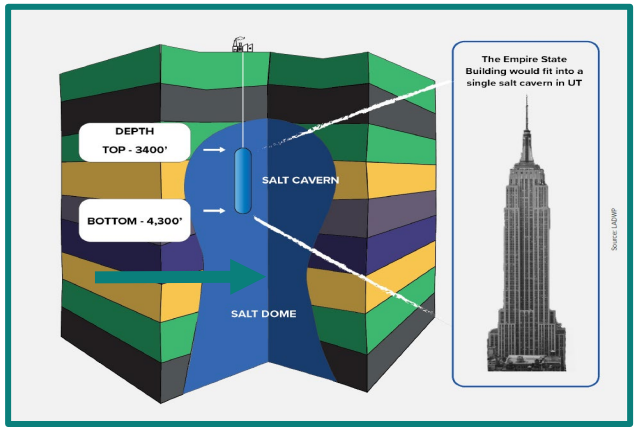
Colors of Hydrogen			
Variable	Grey Hydrogen	Blue Hydrogen	Green Hydrogen
Description	Hydrogen harvested from fossil gas through steam methane reformation	Grey hydrogen that has been paired with carbon capture to reduce CO2 emissions	Hydrogen harvested from water through electrolysis powered by renewable electricity
GHG Emissions	High	Medium	Low / None

Green Hydrogen Supply Chain

Production



Storage



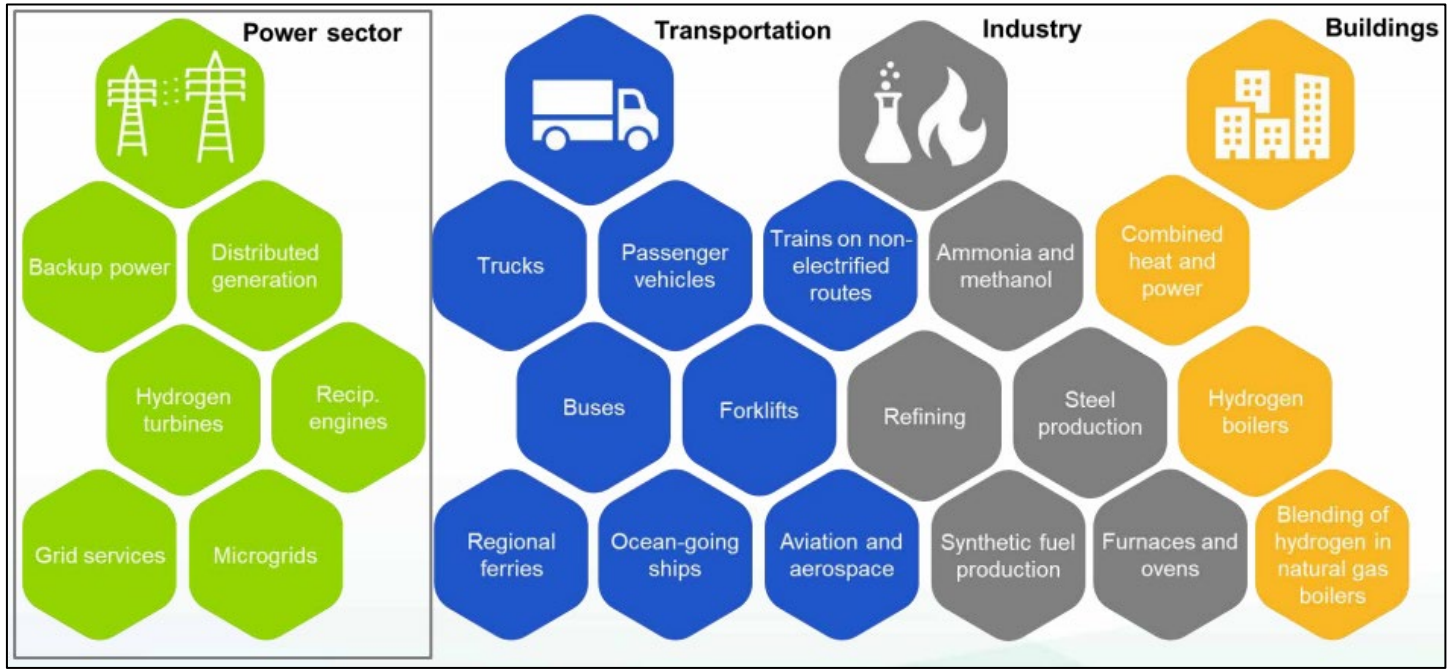
Distribution

Energy from renewable resources (i.e. wind & solar) is used to power an electrolyzer, which separates water into oxygen and **hydrogen.**

Once produced, hydrogen can be stored as a gas or liquid in either man-made tanks or underground geologic features (empty salt caverns). Storage as liquid requires a gas-to-liquid conversion.

Hydrogen can be distributed via gas pipelines or by road, train, or ship. Significant upgrades needed to piggy-back off existing pipelines.

Potential Uses of Green Hydrogen



- The most promising near-term use for green hydrogen is to replace use of grey hydrogen in industrial feedstock, where there is already a mature downstream supply chain for hydrogen & developed end-use technologies
- Many other use cases, including hydrogen for power generation, still need significant supply chain & technological development to be realistically considered as a major fuel source
- Each potential use-case should be explored with caution, as they may have unintended negative consequences

Potential of Green Hydrogen for Electricity

CPA CLEAN POWER ALLIANCE

Green Hydrogen for Electricity

Electricity Production

Energy Storage

Electricity Production

- Hydrogen is an energy carrier that can efficiently store energy over long periods of time and provide on-demand power. This differs from lithium-ion batteries, which are better suited for shorter duration energy storage.
- Long duration energy storage will be required to fully decarbonize the electricity grid; there are few mature long duration energy storage technologies at commercial scale today
- Environmental Benefit - Unlike many other energy storage technologies, green hydrogen does not require upstream mining of precious metals*, produces no GHG emissions, and no recycling of hazardous waste at end-of-life required

**Additional PV installations required could increase precious metal mining*

Green Hydrogen for Electricity

Combustion Turbines

- Can theoretically burn hydrogen in turbines but tech needs development
- No CO2 emissions but NOx emissions if flue gas not treated
- Less efficient but less expensive than hydrogen fuel cells
- IPP: Coal-fired power plant plan to be converted to 30% H2 in 2025

Hydrogen Fuel Cells

- Mature technology
- Quiet, emissions-free electricity generation
- Suitable for backup power & long duration energy storage
- More efficient but more expensive than hydrogen combustion
- Hanwha: 50 MW hydrogen fuel cell power plant in South Korea

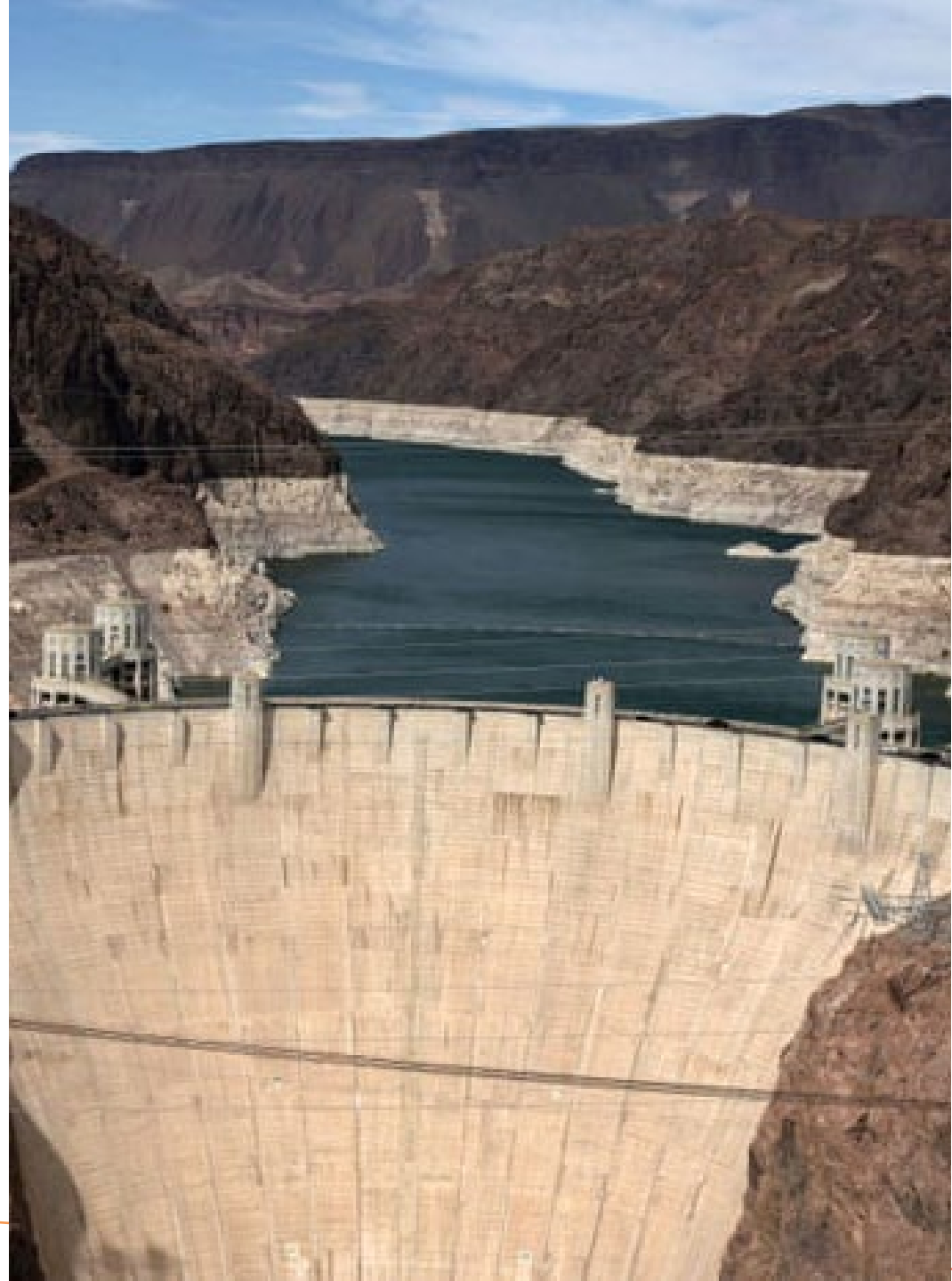
Deployment Challenges

CPA CLEAN POWER ALLIANCE

Production and Cost

- Green hydrogen production cost estimated at $3.00 - $8.00/kg*. Production costs need to drop to $1.00/kg or lower to be cost-competitive with grey hydrogen
  - IRA offers $3/kg tax credit for green hydrogen, which could bring costs down to $0.39 - $1.92/kg by 2030**
- Producing green hydrogen with electricity is less efficient than storing energy in lithium-ion batteries
  - Using green hydrogen for energy storage is less cost effective than alternative technologies for durations of less than 24 hours
  - Scaling requires additional renewable energy capacity relative to more efficient energy storage technologies
- Green hydrogen production requires large quantities of water. This can be an issue in water-stressed areas, which are often the same areas where it is favorable to generate the electricity necessary for green hydrogen production

*Source: IEA 2021 Global Hydrogen Review
**Source: Rhodium Group 2022



CPA

Storage, Distribution, and Use

Storage & Distribution

- Cheap geologic storage is not widely available and tank storage is expensive
- Expensive pipeline upgrades and new networks required to transport hydrogen via pipeline
- Un-combusted hydrogen is a potent GHG; storage and transportation leaks must be minimized

Use in Electricity Sector

- Technologies that burn high percentage of hydrogen need further technological development
- Hydrogen-based energy storage is more expensive than alternative technologies for storage durations less than 24 hours
- Environmental concerns that “hydrogen conversion” of natural gas facilities will prolong use of natural gas and encourage investment in natural gas infrastructure

ARCHES

Alliance for **R**enewable **C**lean **H**ydrogen **E**nergy **S**ystems

CPA CLEAN POWER ALLIANCE

ARCHES - Overview

ARCHES is a public-private hydrogen hub consortium intended to leverage federal funding to accelerate the deployment of hydrogen projects and infrastructure in CA

- Consortium led by State's GoBiz & private partners predominately hydrogen-focused organizations
- ARCHES to submit state-backed application for green hydrogen hub in CA
  - Infrastructure Investment and Jobs Act appropriates $8 billion to establish at least 4 regional hydrogen hubs; one hub to be focused on green hydrogen production and use
  - DOE will require 1:1 cost share for hub construction & deployment

ARCHES - Priorities

ARCHES Priorities for Hydrogen Hub Application		
Transportation	**Electrical Power**	**Industrial**
• Light-duty vehicle • Long-haul trucks • Aviation • Freight & passenger rail • Ships	• Hydrogen fuel cells for firm power	• Heat for chemical manufacturing* • Fuels for building • “H2 blended in NG pipeline” • “Dedicated H2 pipelines…”

- Stated focus on developing hydrogen fuel cells for the electricity sector
- Stated focus on green hydrogen, although not limited to green hydrogen
- Uncertain how much funding would be leveraged for pipeline development
- Uncertain if funding would benefit specific organizations (pipeline development)

Key Takeaways

- Green hydrogen has the potential to help decarbonize many sectors, although near-term efforts should focus on displacement of grey hydrogen in existing economies
- Hydrogen's potential in the electricity sector is met with significant uphill challenges to develop a cost-effective supply chain with cost-effective end-use technologies
- A hydrogen economy could also increase water stress in drought-stricken areas and require significant land use for additional renewable energy capacity
- CA's ARCHES program intends to leverage federal funding to combat cost and feasibility challenges for hydrogen deployment and create a hydrogen economy in CA

Questions?

CPA CLEAN POWER ALLIANCE

Example: Intermountain Power Project

- Intermountain Power Project in Delta, Utah is a coal-fired power plant that is being converted to run on green hydrogen for LADWP (840 MW)
- 2025 Goal: Conversion to 30% hydrogen / 70% natural gas
- 2045 Goal*: Expected conversion to 100% hydrogen
- Hydrogen produced using ample wind and solar resources in area
- Hydrogen will be stored in nearby underground salt caverns

Note: IPP is located in a unique location with ample solar and wind resources and proximity to salt caverns. This is not the case for most natural gas power plants.

LCOH vs. Energy Storage

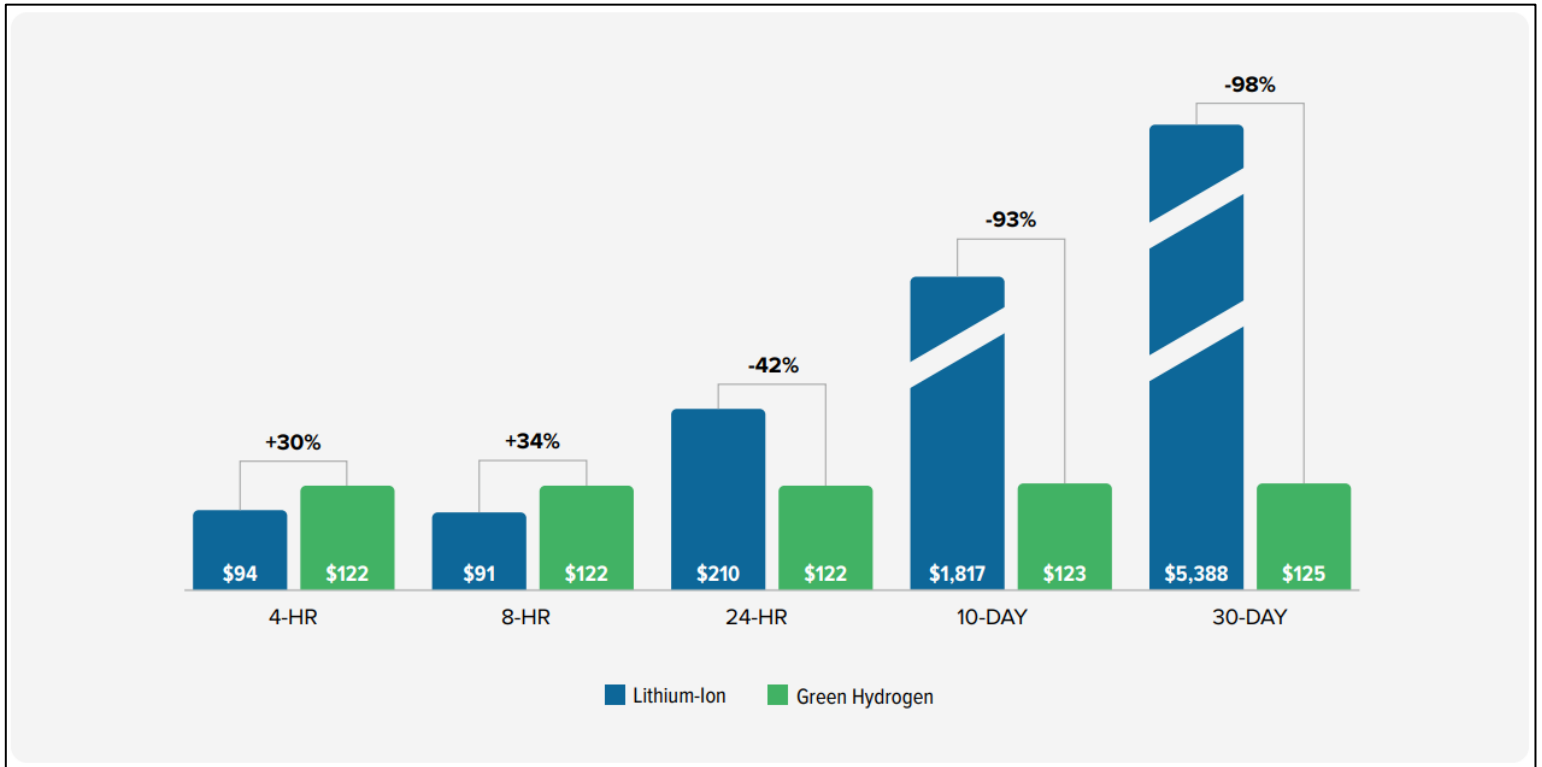


Figure 15 | Levelized Cost of Energy ($/megawatt-hour) of Energy Storage by Discharge Time[52]

- Source: Green Hydrogen Coalition [2022 Green Hydrogen Guidebook]