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

Mission:

ARCHES is a public-private partnership to create a sustainable statewide clean hydrogen (H_2) hub in California and beyond, utilizing local renewable resources to produce hydrogen with the objective to fully decarbonize the regional economy, while prioritizing environmental justice, equity, economic leadership and workforce development.

ARCHES Principles

Statewide

Leveraging California's size and diverse geography and economy to produce, transport, store, and use H_2 at scale with multiple clusters of each, provides an ideal H_2 test-bed for the nation.

Green

California has long led the nation and the world in environmental innovation and policy and will do so again with clean H_2.

Stakeholder and Community-Engaged

Built-in and ensured at all stages of the process.

Equity and Justice Centered

Prioritized in all decisions with a focus on California's impacted, disadvantaged, low-income, and tribal communities.

Aligned with State Interests

To move California toward a robust H_2 economy and marketplace, and a cleaner, greener future.

Solution-Oriented

Focused on implementation with targeted research and innovation to achieve the DOE's $2/kg 5-year goal and the administration's $1/kg 10-year goal.

Objective and Unbiased

Representing and ensuring the interests of all parties.

Multi-Dimensional

Considering all aspects of a successful H_2 economy.

Connected

Within California and other H_2 hubs.

ARCHES Priorities

- Prioritize renewable, clean H_2 (green H_2).
- Focus efforts on communities with the largest pollution burden.

- Invest in the energy system, taking a multi-sectoral approach.

- Develop public policy that enables early-markets, while private capital scales them.
- Prioritize hardest to abate sectors with biggest emissions profiles, focusing on creating economically sustainable markets.
- Create an economically sustainable, expanding, renewable

Background: Federal Hydrogen Hub Program

Clean H_2[1] from renewable sources offers enormous potential for a zero-carbon energy future. The Biden Administration's *Hydrogen Earth Shot Challenge* aims to reduce the cost of H_2 by 80% within one decade, from the current ~$5 per kilogram (kg) down to $1 per kg. In support of this goal, the Infrastructure Investment and Jobs Act (IIJA)[2] aims to establish a network of regional hubs that will deploy clean H_2 technologies at scale.

The IIJA appropriates $8B over 5 or more years to establish *at least* 4 regional H_2 hubs, with a minimum of one focused on renewable sources. Hubs will create a network of clean H_2 producers, consumers, and infrastructure to deliver clean H_2 at a cost of $2/kg by 2026 and $1/kg by 2031. The federal program will consist of a 3-18 month planning phase and 8-12 year deployment phase, as specified by The US Department of Energy (DOE) Notification of Intent.[3] The DOE will require a 1:1 cost share from award recipients for hub construction and deployment. The majority of hub funding will support technology demonstrations and deployments, such as electrolyzers to produce clean H_2 at solar power plants, infrastructure to transport H_2, and end users like heavy-duty trucks to consume the H_2. 7-10% of hub funding is expected to go toward research, complemented by synergistic DOE research grant funding. The hubs must demonstrate and evaluate methods for H_2 production, processing, delivery, storage, and end-uses, and that they can become part of a national H_2 network to facilitate an H_2 economy.[1] Additional DOE support after the hub funding is expected to connect regional hubs and continue building a national H_2 economy. Environmental and energy justice, workforce development, safety, and codes and standards are all additionally integral to the DOE clean H_2 hub program. The DOE's Funding Opportunity Announcement (FOA) is anticipated in September-October 2022, setting criteria and a deadline for hub applications.

ARCHES: A Statewide Partnership for a California Hub

ARCHES is a statewide public-private partnership built on California's long-standing H_2 and renewable energy leadership to serve as the applicant and organizer for a statewide H_2 hub.

The State—led by GO-Biz alongside other state agencies, the legislature, local governments, and the State's institutions of higher education, including UC and its three national laboratories—provides vision, leadership, oversight, accountability, and matching funds. Industry partners bring deep technical expertise and capability for building an H_2 network in California and significant in-kind matching capacity. Local governments, environmental justice advocates, nonprofits, and organized labor bring a strong focus on community engagement, public health, environmental protection, workforce development, and other issues of critical importance to ARCHES.

ARCHES is anticipated to include major deployment clusters in the Los Angeles Basin and Bay Area and extend into the Central Valley, Inland Empire, and other regions (and possibly neighboring states) with high renewable resources, geologic storage possibilities, key transportation corridors, and need for clean energy and reduced pollution.

Why a California renewable H_2 hub is poised to succeed and meet California's needs

The IIJA requires at least one Hub to produce H_2 using renewable resources. California's leadership and early efforts on transitioning to 100% renewable, zero-carbon electricity, and developing H_2 infrastructure makes the State especially competitive to win a renewable clean H_2 hub award. California's extensive renewables portfolio will be essential to power electrolyzers that make clean, renewable H_2, decarbonize sectors that are hard to electrify directly, and develop long-duration energy storage solutions.

An H_2 hub is an excellent investment of California resources. It will fast-track the development and implementation of H_2 infrastructure in California, grow California's clean energy

economy, advance environmental justice goals by accelerating the transition to zero-emissions technologies in polluted communities, provide good high-road union careers and clean energy job training to California's workforce, provide R&D funding to develop the technological innovations needed to advance clean H_2 technology, and kickstart California's H_2 marketplace, maintaining California's competitive edge as the new H_2 economy emerges.

The H_2 economy also presents real opportunities to retain and expand California's clean energy workforce, which will build out the vast renewable energy generation needed to power electrolyzers and implement H_2 production, storage, delivery, and end-use technologies. The conversion of significant fossil fuel distribution infrastructure will also allow for sustained employment otherwise at risk in the transition to clean energy.

Endnotes

[1] "Clean hydrogen" is defined in the IIJA as H2 produced with a carbon intensity equal to or less than 2 kilograms of carbon dioxide-equivalent produced at the site of production per kilogram of H2 produced. Federal agencies and stakeholders may re-evaluate this definition over the next 5 years (Sec. 40315 (a)),

[2] https://www.congress.gov/bill/117th-congress/house-bill/3684/text

[3] DOE Notice of Intent to issue Funding Opportunity Announcement No.: DE-FOA-0002779. https://oced-exchange.energy.gov/FileContent.aspx?FileID=72980077-30f7-4c57-b1e2-7b0bf8e52697

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