

“NextUp” Energy Forum: Green Hydrogen Key Takeaways

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I’ll be frank with you. This deep dive into green hydrogen was one of BizFed Institute’s most challenging programs to plan and execute. Our desire to thoroughly demystify this tricky topic for every unique member of our diverse audience – while spotlighting issues relevant to LA Basin residents at large – led us to vet dozens of potential speakers. We sought to recruit industry heavyweights with deep knowledge of Southern California, as well as perspectives and areas of expertise as varied as the interests of business leaders, innovators, and the environmentally conscious from within our vast network who registered to attend the two-panel session. (We ended up logging a new record with more than 230 registrations for this forum!) For the registrants who attended, I hope we achieved our overarching goal of better acquainting you with green hydrogen and its potential to improve life in Southern California.

Thank you for getting excited about what’s next,



Kevin Harbour
BizFed Institute President

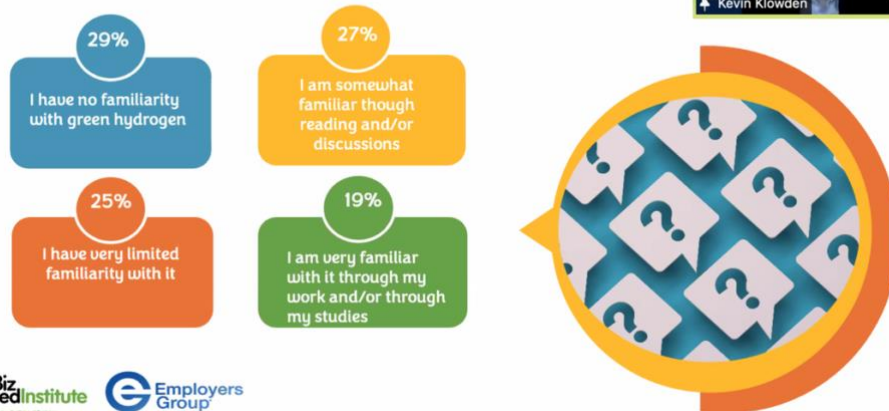


BizFed Institute Chair **Jonathan Parfrey** opened the forum by swiftly addressing “The ‘Why’ Factor.” Why should hydrogen matter to business leaders across every sector? California has committed to an ambitious goal of reducing its greenhouse gas emissions to 40% below 1990 levels during this decade. The state has also pledged – albeit by executive order, without the force of law – to reach carbon neutrality by 2045. This means the removal of as much carbon dioxide from the atmosphere as the state emits. The clock is ticking. How do we get there in our lifetimes?

In a nutshell, Jonathan explained, California has moved to decarbonize the electricity sector and shift functions that are currently powered by fossil fuel to clean electricity. However, there are key sectors of the economy that cannot be electrified. You cannot bend steel with electricity. You cannot make cement with electricity. You cannot exclusively power most trucks used for long-haul transportation with lithium-ion batteries.

Even for functions that *can* be electrified – and there are many, as evidenced by Jonathan’s rave reviews of his Tesla Model 3, Thanksgiving-tested electric oven, and highly efficient electric dryer – hydrogen could serve as a denser fuel that affordably generates more megawatts. We thank our forward-thinking Chair for teeing up fruitful forum discussions aimed at answering two key questions: Is green hydrogen a means to help California meet its climate goals? And can it simultaneously spur economic growth in Southern California?

What is your level of familiarity with green hydrogen?



Next up in our program was a brief explainer of how BizFed Institute’s “NextUp” programming brings together thought leaders invested in exploring early-stage ideas. Educating our members about solutions that are right around the corner will empower them to reimagine how they tackle issues we face today, said BizFed Founding CEO **Tracy Hernandez**. One of our most powerful “NextUp” research initiatives involves parsing real-time intelligence to gauge attitudes about these early-stage ideas. **Kevin Klowden**, Executive Director of the Milken Institute’s California Center and a managing economist at the Institute, stepped up to deliver a series of eye-opening findings from our “Energy Flash Poll.”

- 103 respondents completed the 8-question poll. The sectors they self-reported representing include professional services, real estate, transportation, energy, construction, education, public agency, chamber of commerce, technology, retail/wholesale, hospitality, goods movement, financial services, entertainment/travel, and other.
 - Green hydrogen is not a widely understood reliant energy option. 54% of respondents reported having “no familiarity” or “very limited familiarity” with green hydrogen.
 - Green hydrogen does, however, have the potential to be a widely embraced reliant energy option. 61% of respondents said the impact of continued green hydrogen development on their industries would be positive, while only 4% said it would be negative.
 - Respondents were in almost unanimous agreement that green hydrogen will become an “increasingly viable fuel source,” although concerns remain, chief among them the costs of producing green hydrogen, issues related to storage and transportation, and uncertainty about efficacy in both commercial and residential settings.
 - There is also significant concern that California may not be moving fast enough to take advantage of federal incentives to create the nation’s first hydrogen hub.
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Keynote speaker **Geoff Eisenberg**, partner at the Ecosystem Integrity Fund, emphasized the importance of balancing sustainability and profitability. “No one is going to invest in green hydrogen unless it makes economic sense,” he said. Why choose hydrogen if it costs more per kilogram to produce than a gallon of diesel? Now, for the first time, green hydrogen is “green enough” and cheap enough to warrant long-term purchase agreements. It’s quickly becoming a standout attraction to project developers because of four key factors that are shifting the balance of sustainability and profitability:

- Push for decarbonization
- Broadening use cases for hydrogen
- Policy support and increased investment
- Declining production costs driven by cheaper electricity and electrolyzers.

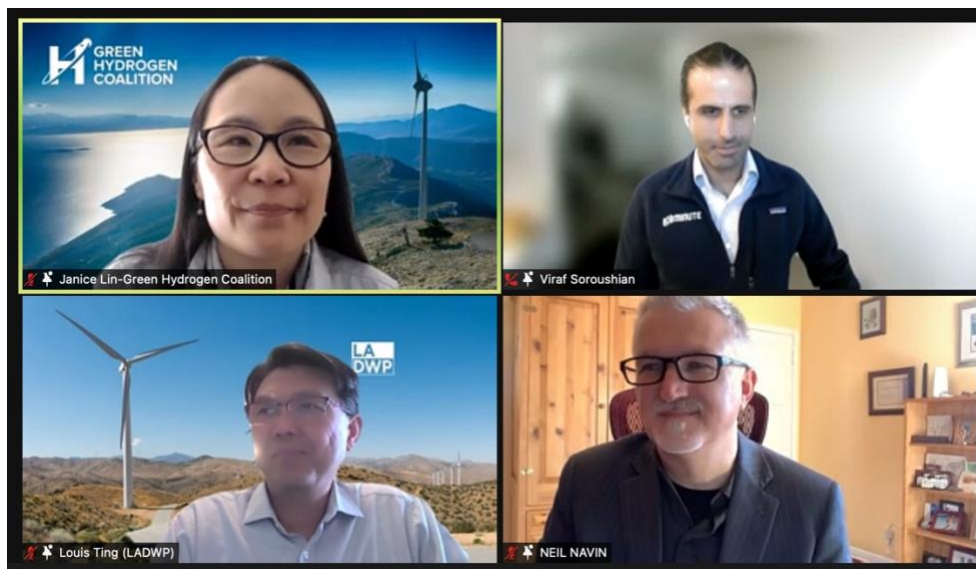
Geoff drilled down on Jonathan’s observation that certain essential functions cannot be powered with solar and batteries, including industrial processes, trucking, and shipping – sectors that form the beating heart of Southern California’s economic vitality. Hydrogen can be an effective replacement for diesel in these tough-to-electrify operations that involve heavy parts, long-distance travel, and molecular buildup or heat. It’s a flexible fuel, the lightest element on the periodic table, and offers decent energy density. Even challenges associated with hydrogen make it well-suited for our region. It naturally “wants to escape” and doesn’t want to be stored, transported, or forced into a pipeline, explained Geoff. The best thing to do is to use it where it’s produced. **The LA Basin is uniquely positioned to produce cheap hydrogen – using the abundant solar we overproduce in the middle of the day – and then use it locally to serve our robust customer base.**

Southern California ports could be game-changing leaders in green hydrogen adoption. The Ports of Los Angeles and Long Beach are “probably a good place to start” because of their un-electrifiable operations centered around heavy loads traveling long distances, according to Geoff. The Port of Los Angeles has already committed to moving forward with its \$82.5 million “Shore to Store” project entailing five new hydrogen fuel cell heavy-duty trucks with 2 hydrogen fuel stations, two battery-electric yard tractors, and two battery-electric forklifts.

Aviation, which is also difficult to decarbonize through other means, could be another market-rattling use case for green hydrogen. 81% of the world’s energy companies are already investing in hydrogen or are “eager to enter the market,” according to a study cited by Geoff. 67% of the world’s energy company leaders believe hydrogen offers the most appealing growth opportunities in the energy space.

According to the “Hydrogen Insights 2021” report released by the Hydrogen Council in collaboration with McKinsey & Company, **\$300 billion is committed to hydrogen projects through 2030**. Geoff expects this figure to triple during the next decade. Adoption at our ports could be key to attracting more of this capital to California and spurring project developers to build out hydrogen capacity. There are currently 228 hydrogen projects around the world, but most are located in European countries, which are not nearly as well-positioned as the LA Basin to support both large-scale supply and demand.

PANEL #1: Green Hydrogen in Energy Supply & Distribution



Moderator **Janice Lin**, founder of the Green Hydrogen Coalition (GHC), opened the first panel of the forum by describing how a simple question she asked while serving as executive director of the California Energy Storage Alliance led her to form the Coalition 2.5 years ago: “To achieve 100% renewable energy for California’s power sector, what duration of energy storage will we need in California?” She zeroed in on low-cost wind and solar, matched supply to demand, and arrived at the conclusion that we would need multi-day, weekly, monthly, and ultimately seasonal energy storage. Janice said green hydrogen, which the GHC defines broadly as hydrogen that has climate integrity and is not produced with fossil fuels, was the only logical renewable energy choice. She challenged her three panelists (who represent distinct players within the green hydrogen economy: producer, bankable consumer, and infrastructure/delivery/storage provider) to achieve three goals with their roundtable discussion:

- Ensure all attendees are calibrated on global progress in the hydrogen sphere, especially federal developments and how California (specifically the LA Basin) fits in.
- Provide a comprehensive list of high-priority green hydrogen opportunity and applications for the LA Basin.
- Answer questions about how civic and business leaders can work together to accelerate progress and spur enthusiasm for green hydrogen’s many local uses.

Panelist **Viraf Soroushian**, director of business development and technology at 8minute Solar Energy and a member of the company’s hydrogen program, called green hydrogen a “natural extension” of what our region is already implementing. But we’re not leading the pack on the international stage. 28 countries worldwide – mostly in Europe; also Australia, Japan, Korea, and Chile – have released hydrogen strategies and roadmaps. The United States is not on this list. Another 22 could release hydrogen strategies this year, encouraging much-needed dedicated funding. Internationally, hydrogen incentives and subsidies total \$100 billion through the end of the decade, which some analysts don’t believe is sufficient for hydrogen to become competitive. What California may lack in funding or coordinated strategy, however, it more than makes up for with potential, especially in the LA Basin. We are forecast to have a superior hydrogen supply/demand model, with both a robust customer base and exceptional ability to produce.

Panelist **Louis Ting**, director of power planning development and engineering for the Los Angeles Department of Water and Power, called for the strategic use of the more than 120 “Empire Building-sized” salt caverns in Utah available for the city’s hydrogen storage needs. This could solve the issue of seasonal storage, allowing producers to generate and stockpile significant amounts of green hydrogen for year-round use. But will it be enough? According to the LA 100 study completed last year, the LA Basin needs hydrogen generation capacity of approximately 2,600 megawatts to reliably serve residential, commercial, and industrial customers. Our current

capacity running natural gas stands at 3,300 megawatts. The business community can support efforts to make this transition equitably and efficiently.

Panelist **Neil Navin**, vice president of clean energy innovations for Southern California Gas Company, called the value of hydrogen as a decarbonizing tool a significant factor in the company's decision to commit to reaching carbon neutrality by 2045. SoCal Gas, which serves 22 million people, is the largest natural gas utility in the nation to make such a commitment. It's a big step for our region. Although often associated with entertainment and innovation, Southern California is the largest manufacturing center in the United States. The tough-to-electrify manufacturing sector supports essential, well-paying, stable middle-class jobs that require low-carbon and no-carbon solutions to keep pace with our economic growth and climate goals, said Neil. The transition to a sustainable and profitable hydrogen economy calls for collaborative efforts. Green hydrogen production for the region will likely take place in the LA Basin, Utah, and elsewhere, Neil predicted. We also need policies that provide more certainty for the market.

PANEL #2: Green Hydrogen Infrastructure



Moderator **Josh Bledsoe**, counsel in the Environment, Land & Resources Department at Latham & Watkins, applauded the timeliness and regional relevance of this conversation. He declared green hydrogen “as important in the LA Basin as it is anywhere in the world” due to our confluence of air quality challenges, energy reliability and resilience concerns, goods movement activity, and concentration of tough-to-electrify industries. Josh noted the difficulty of building energy infrastructure – or any type of infrastructure – in the LA Basin and challenged his four panelists (who represent the transportation, manufacturing, supplier, and technology sectors) to empower attendees with answers about how to build the right infrastructure, in the right way, in the right places to support hydrogen production, delivery, and adoption.

Panelist **Erik Neandross**, CEO of Gladstein, Neandross & Associates, believes green hydrogen developments are only in their first inning in the truck market. Transit has been the lead application for hydrogen fuel cells for the last two decades, but we can expect “something exciting” within the next five years. The Innovative Clean Transit (ICT) regulation adopted by the California Air Resources Board (CARB) in December 2018 is already fueling a shift in decarbonization strategies and broad interest in hydrogen. The rule requires all public transit agencies to gradually transition to a 100% zero-emission bus fleet. Initially, industry leaders expected at least 98% of compliance to be supported by battery electric solutions. Now, it looks like 30%-40% of agencies covered by the rule are considering hydrogen fuel cell vehicles as an alternative, Erik said. In order for hydrogen to be competitive in the commercial truck sector, we need public infrastructure that supports fast fueling and flexible storage.

Panelist **Rick Bohan**, vice president of sustainability at Portland Cement Association, pointed to hydrogen as a vital element in the road map to carbon neutrality the company rolled out last October. It's attractive for three key reasons: it's a clean fuel, has competitive energy per unit mass, and eliminates the 40% share of emissions currently

generated through combustion. However, challenges persist. The “average” (if there is such a thing) cement plant might use up to **100 metric tons** of hydrogen in a single day. That’s a lot. Do we have the infrastructure and capacity to generate that volume of supply? Delivery could also be an obstacle. California has seven cement plants, including six in the high desert area far from major metropolitan areas with grid capacity build into the system. How do we get the hydrogen to the plants? Rick is confident the attractive features that drive hydrogen demand will also drive the research necessary to overcome supply and infrastructure challenges.

Panelist **Eric Guter**, vice president of hydrogen for mobility solutions at Air Products, encouraged the acceleration of green hydrogen adoption to drive down costs, familiarize people with new technologies, and contribute to our collective success. He echoed other speakers’ excitement about hydrogen’s role in decarbonizing heavy industry and providing long-duration energy storage to compensate for seasonal patterns. Legislators should take note. Other states and nations look to California and often replicate the energy policies we implement. Eric encouraged support for technology-agnostic policies that incentivize industry to innovate and lower costs. “We’re going to need lots of hydrogen to achieve carbon neutrality,” he said. Air Products has announced upwards of \$12 billion in investments in low- and zero-carbon hydrogen production sources because “it’s a global issue – not just a California issue.”

Panelist **Tanya Peacock**, senior director of government affairs and policy at Bloom Energy, called the proliferation of local backup generators – which run almost uniformly on diesel – “an issue that needs to be addressed.” Backup generators increased 22% in the South Coast Basin in recent years and are concentrated in communities already considered environmentally vulnerable. Hydrogen fuel cells are a viable alternative, according to Tanya. Hydrogen fuel cell-powered microgrids can be combined with solar and batteries, potentially eliminating the need for diesel backup generators. At Stone Edge Farm in Sonoma, an integrated system of on-site solar, batteries, electrolyzers, and fuel cells generate enough energy to power farm operations indefinitely, even when disconnected from the local utility grid and running in “island mode.” Tanya also spotlighted a project to build India’s first green hydrogen microgrid. The initiative involves tapping into electricity from floating solar panels, generating hydrogen with a Bloom electrolyser, and powering a facility owned by the state utility with a fuel cell. “We definitely need some hydrogen fuel cell-powered microgrids in LA to stop the proliferation of diesel generators,” she said.

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