LANCASTER

HYDROGEN SISTER CITIES

Creating a
Better Tomorrow.
Together.

The City of Lancaster, California, was the first United States city to embrace hydrogen power, earning the moniker of the "First Hydrogen City." As Lancaster continues to lead the way in adopting hydrogen, the City has teamed up for a historic "sister city" agreement with Namie, Japan, in which the two cities agree to use hydrogen within their green energy strategy — kicking off a cutting-edge Sister Cities partnership. Now, through an exciting initiative, Lancaster and Namie, as sister cities, have partnered with the County of Hawai'i to share knowledge, networks, and strategies for accelerating progress in hydrogen and adopting fuel cell technologies.

THE COMMITMENT

Today, cities operate in an era of high internet connectivity; however, genuine ties across continents are still challenging to achieve, especially during a global pandemic. In the fall of 2020, two unlikely cities, Lancaster, CA, and Namie, Japan, were connected by a common goal -- hydrogen sustainability across the pacific.

This unique relationship merges the advantages of the virtual world with real-life connections among the municipalities for their mutual benefit. Each already pioneer in hydrogen, city leadership and staff believe that taking hydrogen development to the next level can be more readily achieved through open dialogue, consistent communication, and goal sharing among these similarly committed cities. The vision is a deeply interwoven and dedicated endeavor to become more well-informed and implement new technologies and policy options toward a mutual goal of decarbonization made possible by clean hydrogen.

THE AIM IS TO CREATE SIGNIFICANT PROGRESS TOWARD CARBON NEUTRALITY BY 2035 BY FOCUSING ON THREE MAJOR AREAS:

1. PERSONAL IMPACTS ON CITIZENS

2. HYDROGEN INFRASTRUCTURE

3. ENVIRONMENTAL BENEFITS

The Motivation

Each municipality represents diverse geographies, demographics, economic drivers, and levels of hydrogen deployment. From Lancaster in the high desert (population 180,000) to the tropical County of Hawai'i in the central Pacific (population 200,000) to the seaside town Namie in northern Japan (population 17,000), they are different. The industrial bases and potential demand for hydrogen vary widely, greatly influencing hydrogen deployment choices thus far.

At the same time, the municipalities are connected through their dedication to the early adoption of hydrogen demonstration projects, a desire for a profound transition to hydrogen, and visionary leadership recognizing hydrogen for its environmental and economic benefits. Japan and the U.S. have national policies mandating hydrogen advancement, trade, and shared energy security interests. Japan's "Hydrogen Society" is a national goal for a society powered by clean hydrogen fuel embedded in a foundation of supportive infrastructure. In the U.S., programs such as the H2 Twin Cities are designed to help communities like Lancaster to deploy clean hydrogen in conjunction with friends in Japan. And no potential partner could have a better relationship with cities in Japan and the U.S. mainland than Hawai'i, which effectively bridges the Mentors as the Mentee municipality.

Unfortunately, our communities have also shared an increasing number of natural disasters. Most of these natural disasters result from rapid climate change, requiring accelerated infrastructure resiliency and sustainable energy solutions mitigated with environmentally responsible development.

LANCASTER, CA

Lancaster has taken bold steps to become Southern California's premier green power community. In the last decade, Lancaster transformed from an unknown community in Los Angeles County to the world's solar capital by leveraging its abundance of sunshine and open space. Leading the combat against climate change with unconventional ideas and unique partnerships, the City has achieved much more than energy conservation.

The City has successfully attracted solar farms by revising land-use policies, zoning codes, and inspection processes. This business-friendly approach contrasted with other more restrictive cities and led to the expansion of solar energy production. Solar Lancaster was the first green initiative undertaken by the City in 2010, a partnership that resulted in the development of solar power at municipal facilities and twenty-six school sites throughout the community. The school site alone saved $1 million in under three years.

The City's quest continued through the creation of the first city Community Choice Aggregator (CCA) in the State, Lancaster Choice Energy (LCE). Through this program, the City provided 100% renewable energy production for the community before the local investor-owned utility offered this option to its customers. LCE was enthusiastically received by the community, with 93% of residents and business owners opting to participate in the program. Additionally, within the first year of operation, LCE proved its commitment to being a green leader by partnering with solar developer sPower to build a ten-megawatt solar project for LCE customers. The California Choice Energy Authority, a joint powers organization, was designed to help cities create a CCA by leveraging Lancaster's knowledge and experience. To date, Lancaster has played a vital role in the development of CCAs in the cities of Pico Rivera, Rancho Mirage, San Jacinto, and six others in Southern California.

In addition to developing green programs, Lancaster has led the way in developing green policies. Lancaster was the first City to create an ordinance requiring solar on all new residential rooftops, which Santa Monica and San Francisco eventually mirrored in their cities. Lancaster also streamlined the permitting and inspection process for homeowners considering adding solar to their rooftops.

With these efforts, Lancaster is positioned as the nation's first Net-Zero Energy City, which generates more energy than it consumes. In partnership with Lancaster, Antelope Valley Transit Authority is also the nation's first all-electric bus fleet, with each bus built locally at BYD. The City drove innovation by partnering with KB Home and local manufacturer BYD to launch a community of affordable homes featuring solar, battery, and LED lighting systems. Lancaster is poised to move towards hydrogen energy to continue building on a decade of green energy development.

IN RECOGNITION OF THE CITY'S UNIQUE, PIONEERING ROLE, THE CITY OF LANCASTER IS SEEKING DESIGNATION AS A CENTER FOR INNOVATION FOR HYDROGEN DEVELOPMENT. IN THIS ROLE, THE CITY WILL CONTINUE TO LEAD A TREND OF CITIES AROUND THE WORLD SHIFTING INTO USING HYDROGEN.

FIRST US HYDROGEN CITY

The City of Lancaster developed a vision for hydrogen as a new way to decarbonize the City further – a mission the City embarked on over a decade ago in 2009. Lancaster attracted companies that had already built innovative hydrogen projects and are being developed with significant companies. Lancaster was committed to becoming the world's first "Net Zero" energy city and achieved that goal in 2019. Now Lancaster generates more clean energy than it consumes.

Hydrogen has wide-reaching benefits, including improving air quality, providing a secure and reliable energy source, reducing greenhouse gas emissions, and creating highly skilled jobs. Hydrogen is abundant in our environment and can be produced from diverse domestic resources with the potential of near-zero greenhouse gas emissions. Hydrogen as an alternative fuel stem from its ability to power fuel cells with domestic production, fast fueling times, and high efficiency. About half of the US population lives in areas where air pollution levels are high enough to impact public health and the environment negatively.

Focused on hydrogen, Lancaster is working with several organizations to increase the production and use of hydrogen and other sources of clean energy:

- **SGH2 IS BRINGING A GREEN HYDROGEN PRODUCTION FACILITY TO LANCASTER.**
- **CHOSHU IS WORKING ON A PILOT PROJECT WITH THE CITY OF LANCASTER TO TRANSITION THE CITY HALL BUILDING TO RUN SOLELY OFF HYDROGEN POWER.**
- **HELIOGEN, A START-UP AND A WINNER OF FAST COMPANY'S 2020 WORLD-CHANGING IDEAS AWARDS, USES MIRRORS TO CREATE 1,800-DEGREE SOLAR POWERED HEAT FOR INDUSTRIAL FACTORIES.**
- **HITACHI ZOSEN INOVA IS DEVELOPING A $100 MILLION ANAEROBIC DIGESTION PLANT THAT GENERATES RENEWABLE NATURAL GAS (RNG) FROM ORGANIC WASTE FOR CONVERSION TO CLEAN HYDROGEN.**
- **HYDROPLANE IS ADVANCING THE BALL IN HYDROGEN POWERED AVIATION.**
- **AS A MEMBER OF THE HYDROGEN BUSINESS COUNCIL AND CALIFORNIA FUEL CELL PARTNERSHIP, LANCASTER IS COMMITTED TO BUILDING A HYDROGEN INFRASTRUCTURE, INCLUDING FUELING STATIONS.**

Lancaster is a prime example of a city that has taken the initiative to become a greener community and supported a regional initiative to encourage other cities to do the same. With the City's goal of creating a better tomorrow together, these hydrogen initiatives speak volumes about the kind of change and future that are in store for the Lancaster community.

NAMIE, JAPAN

Namie, a historic fishing and farming town in Japan's Fukushima prefecture, is still overcoming the devastation from the Great East Japan Earthquake and the subsequent tsunami that caused the Daiichi nuclear tragedy of March 11, 2011. After 11 years, its residential population remains less than 10 percent of the pre-earthquake norm. One of Fukushima's key strategies is to redefine the area's energy profile, focusing on hydrogen. Namie believes that turning to renewable hydrogen and becoming energy self-sufficient will set a positive example for energy policy for the region, the country, and the world.

In 2020, the Fukushima Hydrogen Research Field (FH2R) was completed in Namie—one of the largest solar-to hydrogen production plants in the world. In July of 2021, carbon-free hydrogen produced by FH2R was used to fuel the flame of the Tokyo Olympic torch and the official fuel cell vehicles for the Olympic events. In the future, the facility will serve to provide studies on the implementation of the hydrogen supply chain. FH2R has become Namie and Fukushima's symbol of recovery and innovation. Namie is widely recognized as the World's First Hydrogen City.

RELATIONSHIP WITH LANCASTER

There are three key focus areas—personal impacts on citizens, hydrogen infrastructure, and environmental benefits. As Sister Cities, Lancaster and Namie will develop workforces and regional economies while aiming to ensure environmental justice for all. The number of end-users and beneficiaries of hydrogen will be used to measure these personal impacts. More specifically, the number of jobs created by the hydrogen industry and the number of passenger FCVs on the road. To increase end-user awareness, there will be informative marketing outreach and education programs.

Secondly, a significant effort will be made to ramp up hydrogen infrastructure by 2027. All municipalities plan to increase fueling stations in the near term. The collaboration will increase access to both public resources and the private industry. The Clean Energy Ministerial / DOE program

provides a much-needed grant for maintaining this intra-city cooperation. In the private sector, technology companies on both sides of the Pacific have expressed deep interest in foreign market opportunities in hydrogen. The municipalities will be a catalyst for this exchange.

As we come full circle to the initial driver of this collaboration—decarbonization and climate change mitigation —the goal is to track the environmental impact of hydrogen deployment via greenhouse gas emission reductions as our mutual metric of progress.

H2 Twin Cities: The County of Hawai'i, Hawaii, United States

Among the three municipalities, the County of Hawai'i (also known as the "Big Island") might be the most susceptible to the natural disasters mentioned, particularly with rising sea levels and volcanic activity. The silver lining is that among these municipalities, the Big Island also has the most varied renewable resources including solar, wind, hydro, geothermal, and biomass. Hydrogen production can take advantage of these diverse resources to fuel high-efficiency or backup power systems and to provide dense energy storage capabilities with rapid refueling times. These hydrogen attributes are especially attractive to island residents challenged by limited available land.

For the County of Hawai'i, transit including outbound air travel is the greatest contributor to greenhouse gas emissions at approximately 75%, making the transportation sector a high priority in hydrogen advancement.

The City of Lancaster, Namie and County of Hawai'i applied to the Clean Energy Ministerial and U.S. Department of Energy's H2 Twin Cities Mentor-Mentee Program. The City of Lancaster and Namie will act as mentors to the County of Hawai'i as it develops its own hydrogen infrastructure and end uses.

The County of Hawai'i Hydrogen Achievements To Date

- Hawai'i Natural Energy Institute (HNEI)'s 65 kg/day production capacity
- One stationary refueling station along with three distribution trailers (100 kg each)
- One 21-passenger hydrogen bus in Kona with two more 19-passenger buses in Hilo by end of 2022
- One stationary fueling station to be installed at the mass transit bus yard

CONTACT

Alexus Merino

Assistant to the City Manager

44933 Fern Avenue

Lancaster, CA 93534

+1 661.723.6081

amerino@cityoflancasterca.gov

LANCASTER