Hydrogen and Fuel Cells are Essential for Sustainability

By Jack Brouwer, Director of the National Fuel Cell Research Center at UC Irvine

Every city and state is trying to find the best way to fight the causes and adapt to the consequences of climate change. Unfortunately, if Santa Clara City Council approves a new resolution proposed by Silicon Valley Power, it may be on the cusp of doing it all wrong.

On Tuesday evening, the Council will vote on a proposal which Silicon Valley Power says will advance renewable power. The resolution will actually drive up CO2 emissions and make air quality worse.

The city's utility has proposed that businesses who want to install clean, reliable on-site power (to reduce their vulnerability to grid outages or to rising power costs) should use renewables only, even if other alternatives also reduce or eliminate greenhouse gas emissions.

Such a requirement would irrationally restrict business choice. There exist today various clean, on-site power options whose contributions to reducing CO_2 emissions are comparable to or even exceed the reductions achievable with renewable electricity and batteries alone.

Silicon Valley Power's proposal is a bad idea which also completely ignores the fact that renewables are intermittent and can't meet the always-on 24-7 needs of industrial companies, some of the largest energy users, such as data centers, that are the backbone of our economy.

Perhaps most importantly, a requirement such as that proposed by Silicon Valley Power would likely increase greenhouse gases and almost certainly worsen air pollution and public health. Intermittent renewable technologies must be complemented by some type of dispatchable power generator. In the City of Santa Clara that flexible power is provided by fossil-fuel combustion power plants which power up when renewable generators are unavailable or unable to meet peak demand.

I have dedicated my career to identifying zero criteria pollutant and zero greenhouse gas emitting technologies and systems. A recent publication in Science[1] that I co-authored concludes that it will take more than renewable electric power generators and batteries to achieve zero emissions and California's carbon reduction goals. Hydrogen and electrochemical energy conversion will be essential to enabling complete decarbonization, while also making energy delivery more resilient and cost effective.

We will also certainly require more than renewable power to meet California's goals for power reliability. For the past decade, California has led the nation in power outages. Silicon Valley Power itself reported dozens of electrical outages last year.

Hospitals and emergency centers need power that won't put their patients at risk. Data centers and advanced manufacturing facilities need power that won't interrupt their vital contributions to our digital economy.

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[1] Davis, S., N. Lewis, M. Shaner, S. Aggarwal, D. Arent, I. Azevedo, S. Benson, T. Bradley, J. Brouwer, Y-M. Chiang, C. Clack, A. Cohen, S. Doig, J. Edmonds, P. Fennell, C. Field, B. Hannegan, B. Hodge, M. Hoffert, E. Ingersoll, P. Jaramillo, K. Lackner, K. Mach, M. Mastrandrea, J. Ogden, P. Peterson, D. Sanchez, D. Sperling, J. Stagner, J. Trancik, C-J. Yang, K. Caldeira, *Net-zero emissions energy systems*, Science, Vol. 360, Issue 6396, 29 June 2018.

If the City of Santa Clara passes this short-sighted resolution, zero pollutant emission fuel cell systems—that deliver power security while also reducing emissions--are one of the technologies that companies would no longer be able to deploy in the City.

This cutting-edge technology provides always-on, high efficiency and low-emission power which is a perfect complement to intermittent renewable power resources.

Unlike combustion power plants, fuel cells produce electricity without the air pollutants that form smog, cause asthma, and worsen public health. Because fuel cells run 24/7, and reduce emissions relative to the grid when the sun is not shining nor the wind blowing, they actually reduce CO_2 emissions by a comparable amount to renewables. They also require virtually no water during normal operation—a critical sustainability benefit as California emerges from its worst drought in 1,200 years.

If the city's businesses and institutions are precluded from using clean, reliable power technology, they will instead remain reliant on electricity generated by burning natural gas at one of Silicon Valley Power's three natural gas power plants – an outcome that is the exact opposite of Silicon Valley Power's stated intent! Some of Silicon Valley Power's plants are more than 30 years old, and their increased utilization is almost certain to increase carbon emissions.[2]

In addition to this, if clean fuel cell systems are ruled out, dirty diesel generators may also become further entrenched as the peaking power and backup power option of choice —an outcome that runs counter to the Bay Area Air Quality Management District's goal to be diesel-free by 2033.

Thankfully, the Santa Clara City Council can correct course. They should vote "no" on this proposal and, instead of rushing through a resolution that could harm the environment, work with stakeholders and experts to find solutions that actually accomplish the goal: reliable, sustainable, and ultimately zero emissions energy conversion to power a prosperous Santa Clara.

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[2] http://www.siliconvalleypower.com/Home/ShowDocument?id=5763

[3] http://www.siliconvalleypower.com/solar-and-green-power/santa-clara-green-power/santa-clara-green-power-faq#energycredit

[4] http://www.siliconvalleypower.com/solar-and-green-power/renewable-energy-faq#100