



**Clean &  
Prosperous**  
INSTITUTE



# SUMMER 2022 TRIP REPORT

**CALIFORNIA  
STUDY  
MISSION 2.0**

# WHAT CAN WA LEARN FROM CA?

## WE TRAVELED SOUTH TO FIND OUT.

### LEADERS ARE LEARNERS

**W**ashington state is a climate action leader. And that's good for Washington, as it positions us well to prosper in the burgeoning clean economy. But we're not alone, as other states are innovating in business and public policy.

Washington's architects of the Climate Commitment Act (CCA) studied bills from other states — particularly California — to optimize ours. Now, as we implement the CCA and build our clean energy economy, it's important that we continue to learn from other states. That's why in June, the Clean & Prosperous Institute led our [second study mission](#) to California.

The 2022 study mission began on June 22nd in Sacramento and concluded in Silicon Valley two days later. Forty-five community, business and government leaders heard from dozens of experts in California about investments and innovative projects that are protecting the climate, improving air quality, and building a clean economy. As we gathered at the historic Citizen Hotel in Sacramento in the shadow of the capitol building, our delegation, led by Senator Christine Rolfes and Representatives Jake Fey, Joe Fitzgibbon, King County Executive Dow Constantine and Seattle Port Commissioner Fred Felleman, were welcomed by the Executive Officer of the California Air Resources Board (CARB) Richard Corey and International Liaison Sarah Jo Szambelan. Our delegation received high-level briefings from other top CARB

staff, including Craig Segall, who oversees the incentive programs for transportation, Peter Christensen, who runs the medium and heavy-duty vehicle incentive program, Bailey Smith, who is a specialist in light duty incentive programs, and Vernon Hughes, Assistant Air Quality Chief.

To get around, we rode on a double decker all-electric motor coach, the Proterra-powered battery electric [Van Hool TDX25E motorcoach](#), the largest zero emissions passenger vehicle on the road today; took a cruise on the largest hybrid-electric ferry, the MV [ENHYDRA](#), built in Bellingham by All American Marine; and even got stuck on California's Amtrak train between Martinez and Oakland because of a brush fire across the tracks! A number



*Fire over the train tracks between Martinez and Oakland forced our team to turn around and Uber to our next stop!*

In addition to many other excellent presentations, our delegation hit the road (and the water and the rails) for a number of exciting tours, including:

**TESLA'S** electric vehicle manufacturing facility

**SILA NANOTECHNOLOGIES'** innovative battery manufacturing plant

**BLOOM ENERGY'S** fuel cell and electrolyzer advanced manufacturing facility

**PACCAR's** Innovation Center

A **HYDROGEN FUELING** demonstration organized by Toyota and the California Fuel Cell Partnership

A briefing on the **SAN FRANCISCO FERRY'S DECARBONIZATION PLAN** while cruising on San Francisco Bay.

of us noted that unfortunately, climate change will be sparking more and more fire incidents like this. It made our trip all the more impactful as we watched the smoke billowing over the tracks ahead.

By the end of our three days and two nights, this group of energized policy experts, government leaders and community stakeholders from both states wrapped up the study mission with renewed enthusiasm, deeper connections, and new learnings. In this Trip Report, we want to share some of what we learned with you.

First, some quick [history](#) on California's pioneering quest to clean up its air. In 1967, Governor Ronald Reagan approved the Mulford-Carrell Air Resources

Act to create the organization known today as [CARB: California Air Resources Board](#). This committed California to a unified, statewide approach to aggressively address the serious issue of air pollution.

That same year, the Federal Air Quality Act was passed, giving California the ability to set its own more stringent air quality rules. California did exactly that, motivated by Southern California's legendary smog. Some of the first recognized episodes of 'smog' occurred in Los Angeles in the summer of 1943. Visibility was only three blocks. People suffered from burning eyes and lungs, and nausea. The phenomenon was termed a "gas attack" and blamed on a nearby butadiene plant.

Since CARB was formed, a lot of progress has been achieved in California, including the nation's first tailpipe emissions standards for hydrocarbons and carbon monoxide (1966), oxides of nitrogen (1971), and particulate matter from diesel-fueled vehicles (1982); Catalytic converters, beginning in the 1970s; Zero-emission vehicle (ZEV) regulation (1990) that requires manufacturers to produce an increasing number of ZEVs; The nation's first greenhouse gas (GHG) emissions standards for cars (mandated by the Legislature in 2002 and approved by CARB in 2004); and California's Advanced Clean Cars Program (2012), which reduces both conventional "criteria" pollutants and greenhouse gas emissions from automobiles.

With that as background, let's dive into the details of this jam-packed, 3-day study mission.



*Governor Ronald Reagan approving the Mulford-Carrell Air Resources Act, 1967.*

By the end of our three days and two nights, this group of energized policy experts, government leaders and community stakeholders from both states wrapped up the study mission with renewed enthusiasm, deeper connections, and new learnings.

# LESSONS LEARNED

From transportation decarbonization to improving air quality in overburdened communities and even “cows to cars,” the lessons were many. Becky Kelley, Governor Jay Inslee’s climate policy lead, opened the conference with greetings from the Governor. Clean & Prosperous Institute Executive Director Michael Mann had us all pause for a moment to remember founder David Giuliani who died of cancer in March. Best known as the co-inventor of the Sonicare toothbrush, David turned all of his attention over the past 10 years to solving the problem of climate change. This organization that he founded carries on his climate action legacy.

The programming kicked off with a high-level presentation from CARB officials Richard Corey, Executive Officer, and Sarah Jo Szambelan, International Liaison. They spoke about next steps for California’s climate policy and its upcoming third scoping plan, including briefing us on the incentives and regulations that are being put in place to meet the goal of cutting greenhouse gas emissions to 40% below 1990 levels by 2030. Some of these policies aim to double building efficiency, increase renewable fuels, clean up freight movement, achieve 60%



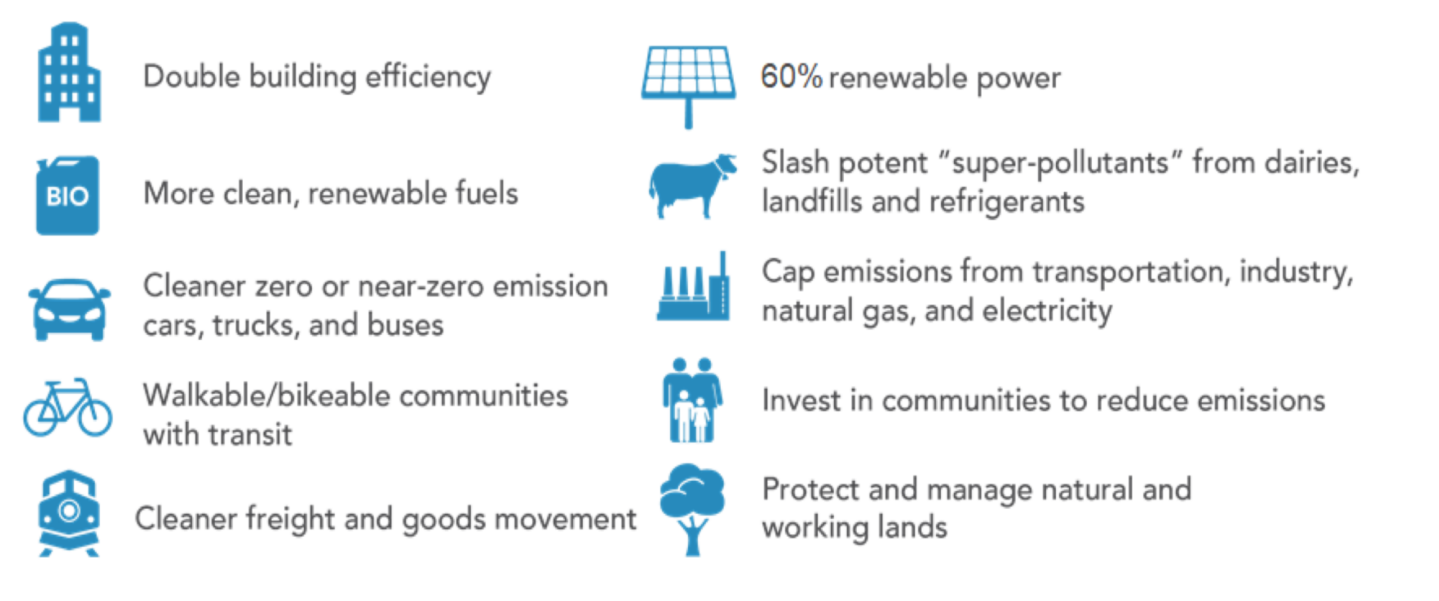
Photo: Kurt Guenther

Clean & Prosperous Founder and fierce climate advocate, David Giuliani, was honored with a moment of silence as the study mission launched.

renewable power, and slash the super potent “super-pollutants” from dairies, landfills and refrigerants (see chart from second scoping plan below).

## 2017 Scoping Plan Portfolio

40% below 1990 levels by 2030 (incentives, regs, carbon pricing)





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The demand for EVs and EV charging is surging and will continue to grow. We know that ultra-low carbon intensity fuel from organic waste like dairy manure can help meet that need and are excited to be successfully operating one of the first dairy digester projects in the Pacific Northwest.

**DAN EVANS,**  
co-founder and  
President of  
[Promus Energy](#)

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## LESSON #1: DAIRIES DRIVE DECARBONIZATION

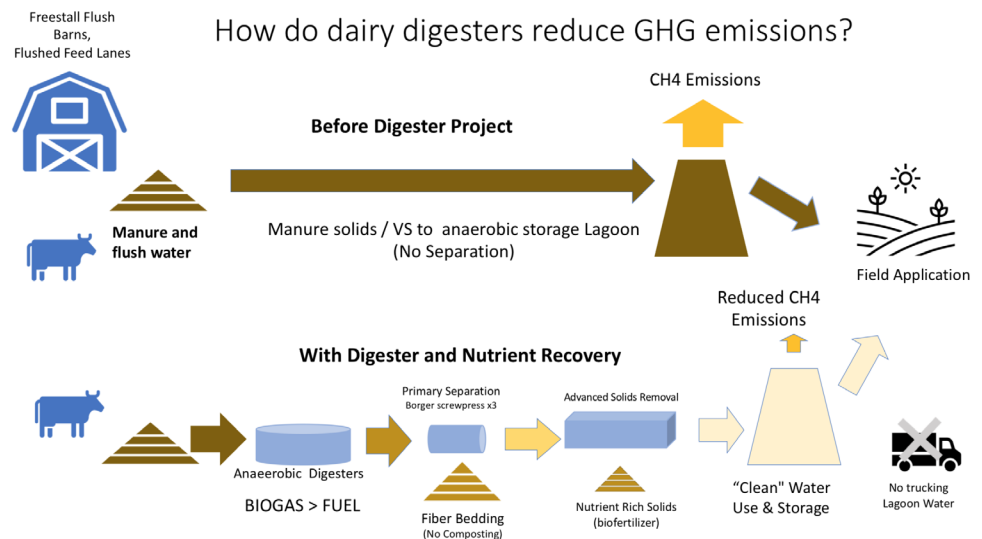
### WHAT WE LEARNED

Dairy operations in California produce 45% of the total methane emissions in the state. In 2016, California passed SB 1383 which focuses on reducing methane from manure and seeks a 40% reduction in methane emissions by 2030. One of the more cost-effective ways to do

that is by providing grants to dairies for digesters that capture methane from manure and channel that energy into electricity or renewable natural gas for both the transportation and consumer sectors. It's a win-win.

According to the annual [California Climate Investments report](#), the Dairy Digester Research and Development Program (DDRDP) alone is achieving more GHG (CO<sub>2</sub>e) reductions than any other climate investment, achieving 29% of total GHG reductions while being allocated just 2.1% of the funds implemented to date.

CARB's DDRDP dairy digester program has provided funding for projects serving 177 dairies which are projected to reduce over 21 million tons of CO<sub>2</sub>e over ten years. It is reducing carbon emissions at less than \$10 per ton.



### WHAT WE CAN DO IN WASHINGTON

Companies like Promus Energy and Koe Energy, along with the Washington State Dairy Federation, are promoting dairy digesters in Washington state to reduce methane emissions, and as an additional way to meet the increasing demand for powering electric vehicles.



*Dairy digesters are producing 29% of the greenhouse gas reductions in California using just 2.1% of the funding from their cap and trade program.*

With funding from the recently-passed Climate Commitment Act, Washington can establish a grant program to support our state's dairies and create low-carbon transportation fuels. We can even extend the program to other sources of organic waste streams like food waste and wastewater treatment facilities.

Avoiding or lowering methane emissions will help Washington state cost-effectively reduce greenhouse gas emissions and help in our efforts to reach our goal of net zero by 2050.

## LESSON #2: WISE INVESTMENTS OF CAP-AND-TRADE DOLLARS = TRANSPORTATION DECARBONIZATION PROGRESS

### WHAT WE LEARNED

We heard from CARB and California Energy Commission (CEC) leadership about their investments in Low Carbon Transportation programs — programs that could be considered for implementation in Washington state.

Due to these investments and other programs, air quality is improving in overburdened California communities. Cap-and-Trade revenues are being wisely invested and carefully monitored, delivering results that benefit everyone, especially in communities of color and disadvantaged communities that are three times more likely to suffer the effects of GHG emissions.

A recent analysis by California's Office of Environmental Health Hazard Assessment (OEHHA) titled, "[Benefits and Impacts of Greenhouse Gas Limits on Disadvantaged Communities](#)" shows that reduced emissions driven by California's Cap-and-Trade program have major health benefits, including a reduction in premature pollution-related deaths. The report concludes that "the greatest beneficiaries of reduced emissions from

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*There are approximately 270,000 dairy cows in Washington state and just a small fraction of dairies are currently using digesters, in part because of the high cost of installation and conversion.*

**JAY GORDON,**  
Policy Director for the  
[Washington State Dairy Federation](#)

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both HDVs and facilities subject to the Cap-and-Trade program have been in communities of color and in disadvantaged communities.” A wide gap still remains, however, and programs like the transition to zero-emission heavy duty vehicles will expedite further emissions reductions in these communities.

**VERNON HUGHES, THE ASSISTANT AIR QUALITY CHIEF FOR CARB**, described how air quality is improving in the state even with growth in population and vehicle miles traveled. Air quality monitors are being used to ensure that particulate matter from transportation and stationary emission sources are being reduced.

## Community Air Grants Prepare Recipients to Participate in the Process

- Community-led air monitoring
- Technical training and education
- Action plans to reduce local toxic air pollution
- Increasing residents’ engagement

**\$25 million awarded in 2018, 2019, and 2021**

**Almost 100 grants awarded throughout the State**

**\$10 million solicitation for 2022-23**



**BAILEY SMITH, AIR RESOURCES SUPERVISOR FOR CARB**, specializes in the California Climate Investment programs and in particular, the investments in light duty vehicles. She said that ten years into the program, their lessons learned were many including the importance of coordinating and partnering with the implementing agencies, building capacity, targeting benefits to priority populations and defining those benefits and equity metrics. Smith said the California Climate Investments are reducing GHG emissions at an average cost of \$138 per MTCO<sub>2e</sub>. That includes:

- **50% OF THE FUNDING** benefitting priority populations
- **170,000 URBAN TREES** added to the California landscape
- **MORE THAN 800** transit agency projects funded
- **721,000 ACRES** of land being preserved or restored
- **419,000 REBATES** issued for zero-emission and plug-in hybrid vehicles
- **70,000 TONS** of criteria air pollutants reduced



## PETER CHRISTENSEN, AIR RESOURCES

**SUPERVISOR FOR CARB**, specializes in medium-and heavy-duty vehicles. He said accelerating the transition away from fossil fuels in the Medium-and-Heavy Duty Vehicle sector (M/HDV) is a central focus of California's climate investments using Cap-and-Trade revenue. These investments show up in the air quality data reported by the OEHHA.

## THE HYBRID AND ZERO-EMISSIONS TRUCK AND BUS VOUCHER PROGRAM (HVIP)



California is especially pleased with the success of HVIP. The program works to support private innovation

and grow the green economy by funding such projects as: zero-emission drayage truck incentives, a rural school bus pilot project, incentives for small trucking fleets and independent owner operators, Clean Cars 4 All (a program that uses incentives to help lower-income consumers living in and near disadvantaged communities replace their old higher-polluting vehicles with newer and cleaner transportation), and many others. HVIP accelerates commercialization by providing point-of-sale vouchers to make advanced vehicles more affordable. David Duncan of 4 Gen Logistics in Southern California used the incentive program to purchase 20 all-electric trucks from Kenworth for

his commercial drayage fleet. Converting the fleet to electric will [reduce carbon emissions](#) while substantially improving air quality in overburdened port communities.

California is also providing incentives for charging infrastructure. [Energize](#) (Energy Infrastructure Incentives for Zero-Emission Commercial Vehicles) is the nation's first incentive project to accelerate the deployment of infrastructure needed to fuel zero-emission trucks, buses and equipment, replacing old, polluting equipment with clean battery-electric and hydrogen options.

Another highlight of the trip was learning about California's [ZANZEFF](#) project (Zero and Near Zero Emission Freight Facilities), which helped PACCAR and Toyota to partner on a "shore-to-store" demonstration to reduce carbon emissions from port drayage activities in Long Beach. Toyota's R&D chief Andrew Lund said "Moving toward emissions-free trucks is more important than ever, and the ZANZEFF project has been instrumental in getting us closer to that goal."

**THE CLEAN OFF-ROAD EQUIPMENT VOUCHER INCENTIVE PROJECT (CORE)** is a \$125 million project intended to encourage California off-road equipment users to purchase or lease currently commercialized zero-emission off-road equipment. This streamlined voucher incentive project helps offset the higher cost of zero-emission technology with a point-of-sale discount.

## Clean Off-Road Equipment Voucher Incentive Project (CORE)

- Launched in February 2020: 500 vouchers and \$71M
- Originally - funding for eligible zero-emission cargo handling equipment, terminal tractors, rail car movers, airport tugs, loaders & GPUs, and transportable refrigeration units (TRUs)
- FY2021-2022 funding: \$165M – expand funding beyond freight
  - \$30M ZE equipment purchase by small business landscaping companies
  - Zero-emission agriculture and construction equipment added to eligibility list





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*There is tremendous opportunity to leverage the clean energy/carbon reduction policies recently enacted by Washington to launch new and successful clean energy opportunities to reduce carbon emissions in our state.*

**MAURA BRUEGER,**  
Director of  
Government &  
Legislative Affairs  
for Seattle City Light

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### **THE CLEAN TRANSPORTATION PROGRAM INVESTMENT PLAN**

California supports innovations in a broad portfolio of transportation and fuel technologies that help meet its energy, clean air, and climate change goals. The program invests up to \$100 million annually, leveraging public and private investments to accelerate the development of clean, efficient, low-carbon technologies to reduce greenhouse gas emissions and petroleum dependence. The latest investment plan update includes deployment of accelerated charging and hydrogen fueling stations, in-state ZEV-related manufacturing, cross-agency coordination through the Zero-Emissions Infrastructure Plan (ZIP), and measures to ensure that investments benefit disadvantaged communities.

### **THE COMMUNITY AIR PROTECTION PROGRAM (CAPP)**

Passed in 2017, CAPP established enhanced emissions reporting, air monitoring, and emissions reduction requirements. The program works to reduce pollution exposure in communities prioritized by environmental, health and socio-economic information.

## **WHAT WE CAN DO IN WASHINGTON**

The public-private partnerships promoted by California’s HVIP, EnergIZE, ZANZEFF, CORE, Clean Transportation, and Community Air Protection programs are models for Washington to follow. Real-world data shows that state-funded incentives really do work and help the private sector to speed commercialization and clean the air in communities that need it most. Washington can implement these types of programs with Cap-and-Invest revenues. We have identified several high-potential opportunities for decarbonizing transportation in Washington state, and published our analyses in this report, [Washington’s Decisive Decade: An Emerging Roadmap for Transportation Decarbonization & Cleaner Air](#).

We have [joined California's](#) zero-emission vehicle (ZEV) and advanced clean truck (ACT) requirements for new trucks, amplifying a market signal that already spurs companies like [PACCAR-Kenworth to build electric heavy-duty trucks](#) in our state. In fact, one of the most fascinating tours of this trip was at [PACCAR's Innovation Center](#) in Silicon Valley, where we saw first-hand the next-generation research and emerging technologies that will benefit future vehicle performance. PACCAR's Innovation Center is also accelerating development of electric and hydrogen fuel cell powertrains, as well as the deployment of big data analytics.

With revenue raised by the Climate Commitment Act, such as that with targeted allocation in the new Move Forward Washington transportation package, the state can lead significant, near-term decreases in local air pollution and GHGs while accelerating the shift towards clean vehicles. As of now, only a small portion of the Move Forward Washington funds are clearly allocated for heavy-duty ZEV vehicles. More emphasis on transitioning away from fossil fuels in the Medium-and-Heavy Duty Vehicle sector would be a win-win for the health of our most disadvantaged communities and for our economy.

## LESSON #3: PUBLIC INVESTMENTS ATTRACT PRIVATE INVESTMENTS

As Washington state builds a cleaner, more competitive economy, what is the role of private investment and what is the role of public investment? Many believe that states can boost business by

investing public funds to demonstrate, incubate, and scale meaningful innovation.

## WHAT WE LEARNED

[California Climate Investments](#) is putting billions of Cap-and-Trade dollars to work supporting new affordable housing, increasing mobility through transit, advancing low- and zero-emission technologies, facilitating more sustainable agriculture, and more.

Last year more than 75,000 new projects were implemented within 73 programs administered by 22 state agencies. These projects are projected to reduce GHG emissions by nearly 10 million metric tons over the course of their lifetimes, equivalent to taking about a million cars off the road for a year. These outcomes and more are detailed in the latest California Climate Investments [Annual Report](#). Programs span everything from agriculture and air quality to weatherization and zero-emission freight facilities.

Across California, these projects are also creating and supporting employment opportunities and improving public health and the environment. Of special note is the fact that at least 35% of these investments are made in disadvantaged and low-income communities.

## WHAT WE CAN DO IN WASHINGTON

Funding for this division of CARB comes from a decade of Cap-and-Trade auction proceeds, something that will be getting started in Washington state next year through the Climate Commitment Act.

## Cumulative Project Outcomes



50% of funding benefiting priority populations (\$5.2 billion+)



800+ transit agency projects funded, adding or expanding transit service



563,812 individual projects implemented



419,000 rebates issued for zero-emission and plug-in hybrid vehicles



8,939 affordable housing units under contract



721,000 acres of land preservation or restoration



170,000 urban trees



70,000 tons of criteria air pollutant reductions

California Climate Investments programs are reducing GHG emissions at an average cost of **\$138 PER MTCO<sub>2</sub>e**



These are just some examples of how public investments from carbon revenues are catalyzing private sector innovation and investment. Beginning in the first quarter of 2023, Washington state will hold its first auction under the Climate Commitment Act, generating opportunities here to make similar investments in our net-zero carbon economy of the future.

## LESSON #4: INCENTIVES ARE ELECTRIC

### WHAT WE LEARNED

EV incentives are essential if we are going to reach greenhouse gas emission goals.

Jonathan Changus is the Director of California Transportation Programs with the Center for Sustainable Energy. He gave our delegation a [snapshot look](#) at how Washington state is doing in the quest to meet our vehicle electrification goals. In 2021, 7.8% of Washington’s new passenger vehicle sales were EVs. But, our state needs to be at 31% by the end of 2023 to be on track to meet our 2030 goal.

### By the Numbers: EVs in Washington

4 <sup>th</sup>	Most EV sales between 2011-2021 ( <a href="#">Autos Innovate</a> )	Mostly indicative of how poorly other states are doing
7.8%	Of new passenger vehicle sales in 2021 were EVs ( <a href="#">EPRI</a> )	Sales need to be 31% by the end of 2023 to be on track
1.3%	Of all passenger vehicles on the road are EVs ( <a href="#">EPRI</a> )	There are 76x more gas & diesel vehicles than EVs

Recent WA trends are encouraging but fall well short of the progress needed to meet the 2030 goal

So what do we do? What is California doing?  
**INCENTIVIZE, INCENTIVIZE, INCENTIVIZE.**

Changus told us that incentives work well to accelerate the zero-emission vehicles (ZEVs) market. China has spent over \$200 billion on EV incentives since 2009, and in 2021 EVs accounted for 16% of new car sales. In Norway, where incentives have been in place since 1990, EV sales reached 84% in March 2022. In California where incentives were introduced in 2010, EVs were 16.3% of new light-duty vehicles by Q1 2022. Clearly, incentives can help consumers overcome barriers to adopting new technology.

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*I feel a sense of responsibility to get even smarter and more focused on climate policy because the state legislature lost our climate policy guru and expert, Senator Carlyle.*

**CHRISTINE ROLFES,**  
Washington State Senator

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*This body of work by Clean & Prosperous Washington provided a framework for legislative leaders to invest in transportation projects and programs that will continue to help Washington reach our carbon reduction targets while improving air quality for overburdened communities.*

#### **REPRESENTATIVE**

**JAKE FEY,**

trip attendee and longtime proponent of ensuring a cleaner, more sustainable transportation system for our state

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#### **CLEAN & PROSPEROUS INSTITUTE RESEARCH DIRECTOR, KEVIN**

**TEMPEST** reviewed the [Decisive Decade Report](#), describing the seven case studies Clean & Prosperous Institute completed in January. CPI developed a methodology to calculate the carbon and air quality benefits of decarbonization strategies, and analyzed electrification of ferries, shore power, drayage trucks, motor coaches, passenger vehicles and cargo-handling equipment.



#### **EVS CAN BE BIG AND YELLOW, TOO**

We heard from the Twin Rivers Unified School District near Sacramento. Of the 60 school buses used to transport 5,000 students each day, 49 are electric. How did they do this? They gathered incentive funding for both buses and infrastructure. Notice the blue hubcaps and bumper on the electric bus? The School District’s Ray Manalo said it was a visible way of getting kids and parents excited about the transition to clean energy buses.

#### **WHAT WE CAN DO IN WASHINGTON**

Washington’s passenger EV sales tax exemption is winding down, just as the transition to vehicle electrification is ramping up. Fortunately for us, last session the Legislature indicated interest in designing new electric vehicle purchase incentives by putting aside \$120 million for the task, with \$25 million specifically directed to overburdened communities.

One of California’s most effective environmental justice programs is Clean Cars 4 All, which helps lower-income residents replace old, polluting cars with cleaner, more fuel-efficient vehicles. The program’s guiding legislation directs benefits to low-income and disadvantaged communities and has a heavy emphasis on consumer protections and education.

Regarding the need to increase the passenger vehicle EV market, Gustavo Collantes, CEO of Logios, spoke highly of Washington’s electric vehicle sales tax exemption. “It is a good model for a ‘cash on the hood’ incentive”, he said.



## LESSON #5: CLEAN FUELS ARE CLEANING CALIFORNIA'S AIR

California passed its clean fuel standards in 2009 and has been implementing it since 2011.

Tim Zenk, President of Molecule said California is achieving quantifiable climate and economic benefits from its Low Carbon Fuel Standard program.

“Clean fuel standards work to cost effectively reduce climate pollution and give consumers affordable ways through new clean transportation fuels to take action in climate.”

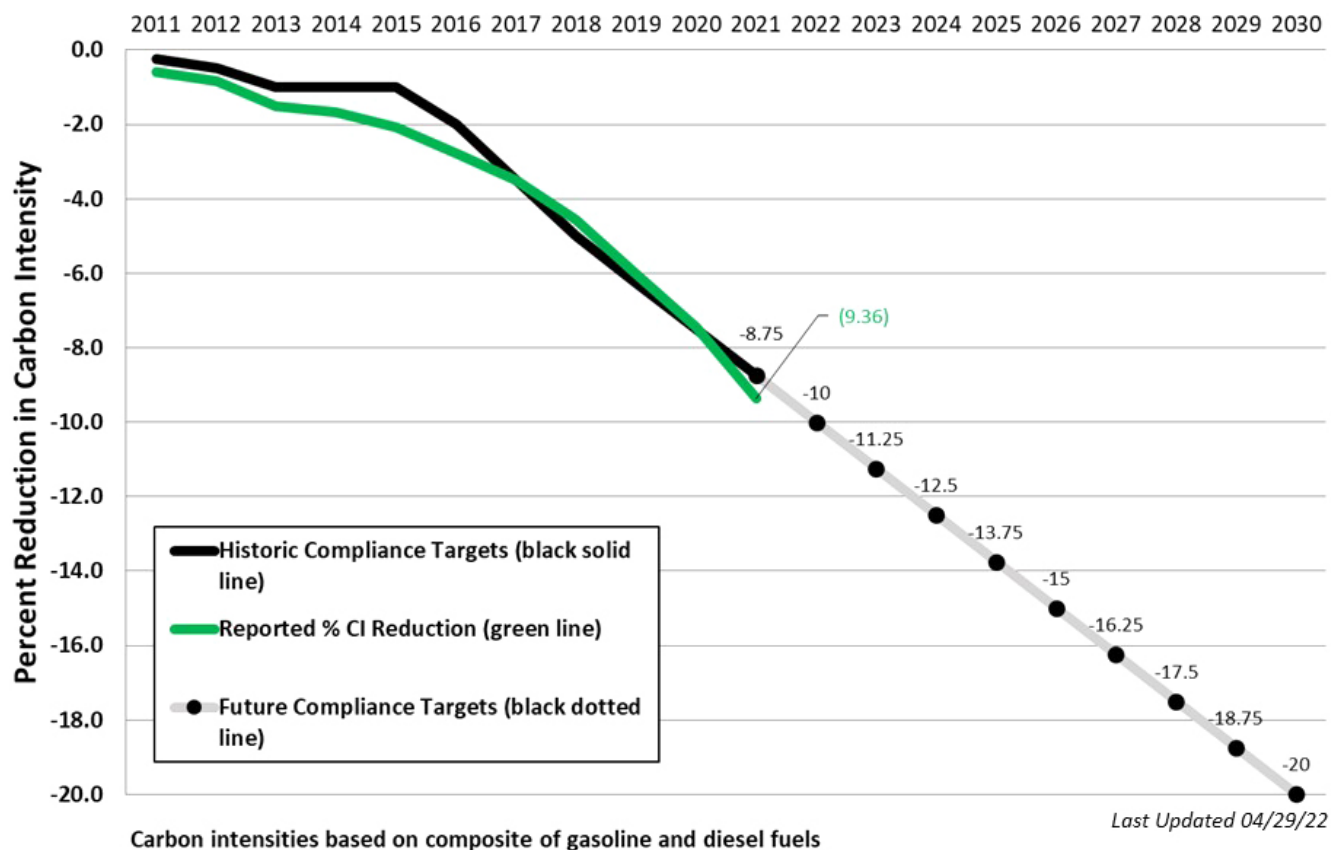
California's GDP has grown 115% over the last 12 years while emissions have leveled off to rise less than 4%.

During this same period without a clean fuels policy, Washington saw its emissions grow by 21% while GDP grew at a rate of 58%.

## WHAT WE CAN DO IN WASHINGTON

In 2021, Washington state passed its own Clean Fuel Standard which will go into effect in 2023, providing opportunities for lower-carbon fuels to generate credits. This policy will give an economic boost for biofuels, EV charging and renewable diesel projects in the state. In order to implement the policy fully, Washington legislators have required that a low-carbon fuels production facility be constructed in the state. Supporting this type of clean energy development is a high priority for Clean & Prosperous Washington.

## 2011-2021 Performance of the Low Carbon Fuel Standard



This figure shows the percent reduction in the carbon intensity (CI) of California's transportation fuel pool. The LCFS target is to achieve a 20% reduction by 2030 by setting a declining annual target, or compliance standard. The compliance standard was frozen at 1% reduction from 2013-2015 due to legal challenges. Years in which more alternative fuels were brought to market (green line) than needed to meet the compliance standard (black line) result in banked credits. Banked credits can be used in future years to meet the standard, such as in 2020. The program will continue post 2030 at a 20% reduction.



## HANDS-ON DEMOS AND TOURS TELL THE REAL STORY: CALIFORNIA'S COMPANIES ARE THRIVING IN A LOW-CARBON ECONOMY

To a person, everyone agreed that the hands-on demonstrations were fascinating learning experiences and worth every minute. From seeing hydrogen fueling stations and touring Tesla's first factory, to visiting a Silicon Valley battery startup and riding aboard a hybrid-electric ferry on San Francisco Bay, we got a glimpse of the future and the future is now!

### HYDROGEN FUELING STATIONS ARE ON THE RISE IN CALIFORNIA

We headed out in the Sacramento heat and soon were seeing what a typical hydrogen fueling station looks like while getting a demonstration of fueling a Toyota Mirai and Hyundai Nexo.

Our first stops were hydrogen fueling stations by Shell Oil and Iwatani. The Iwatani attendant demonstrated for us, and while it looked very similar to a conventional gas nozzle, the difference is that hydrogen gas, rather than liquid, is flowing into the vehicles, where it then is converted in fuel cells into electricity to power the car.

Today there are 56 hydrogen stations available in California, with 118 new stations in development. At the time of publication of this report, there were zero hydrogen fueling stations publicly available in Washington.



Photos (clockwise from top): King County Executive Dow Constantine at Sacramento hydrogen fueling station. Hydrogen fuel station in Sacramento. Photo Credits: Lee Keller





Photos (left to right): California Fuel Cell Partnership headquarters; Photo Courtesy CFCP. Clean & Prosperous Institute Research Director Kevin Tempest at CA Fuel Cell Partnership Demo Center; Photo credit: Lee Keller

**THE NEXT STOP WAS A TOUR AND LUNCH TO LEARN ABOUT THE WORK OF THE CALIFORNIA FUEL CELL PARTNERSHIP.** Founded in 1999, the [California Fuel Cell Partnership](#) is an industry/government collaboration aimed at expanding the market for fuel cell electric vehicles powered by hydrogen to help create a cleaner, more energy-diverse future with no-compromise zero emission vehicles. We saw a display of the Hyundai Fuel Cell Stack, Ballard stationary fuel cells, Nissan's H70 tank, and an Air Liquide dispenser kiosk.

**BILL ELRICK, EXECUTIVE DIRECTOR OF THE CALIFORNIA FUEL CELL PARTNERSHIP** said, "Twenty years ago, the California Fuel Cell Partnership started

with a question: Can we successfully replace gasoline with hydrogen as a transportation fuel? The answer today is a resounding yes."

Elrick went on to say that no single company or government entity could do this alone and that it needed the best scientists, engineers, policy experts and consumer specialists at the table. So, for two decades, this collaboration unfolded and today, thousands of hydrogen operated vehicles are on U.S. roads, with a large percentage of them being in California. And despite slight setbacks because of COVID, the goal is still to have 200 hydrogen fueling stations operational by 2025 and 1,000 of them by 2030.

## TOURS CONTINUED: ELECTRIC AT SEA, BUILT IN WASHINGTON STATE

Perhaps the highlight of any trip to San Francisco is a cruise on the Bay. Our group saw Alcatraz and the Bay Bridge from aboard the [MV Enhydra](#), the cleanest boat in San Francisco's Red and White passenger excursion fleet. This vessel is different from most on the water, as it is a lithium-ion battery plug-in hybrid vessel, built in Bellingham, Washington in 2018 by [All American Marine](#) and launched the same year. Maritime decarbonization incentives from Cap-and-Trade dollars have also promoted the construction of another Bellingham-built boat, the nation's first hydrogen fuel cell ferry, the SeaChange.



On the San Francisco Bay aboard the MV Enhydra. Photo Credit: Lee Keller

We heard from Lauren Gularte, Government and Regulatory Affairs Manager with the The San Francisco Bay Area Water Emergency Transportation Authority (WETA), about their ongoing efforts to transition to zero-emission ferry service. The agency is currently completing a two-pronged study investigating both clean marine propulsion technology and shoreside infrastructure needs that will inform policy decisions going forward. Ferries aging out of San Francisco Bay Ferry service will be replaced with new zero-emission vessels. WETA may also convert some current ferries to zero-emission propulsion systems over the next decade.

In addition, it was recently announced that the California State Transportation Agency (CalSTA) has awarded a \$14.9 million grant to develop a high-frequency network connecting some of San Francisco's fastest growing neighborhoods with battery-electric ferries. The grant will fund construction of ferries and shoreside charging infrastructure to support the San Francisco Clean Ferry Network, which will use zero-emission ferries to connect waterfront San Francisco neighborhoods including Downtown, Treasure Island and Mission Bay.



*The cleanest boat in San Francisco's Red and White passenger excursion fleet, built in Bellingham, WA.*  
Photo Credit: Lee Keller

## TOURS CONTINUED: ACROSS THE BAY, WHERE IT WAS ALL ABOUT THE BATTERIES (AND AMPING UP WA'S ECONOMY)

Batteries are becoming more and more critical as the world increasingly trades fossil fuel power for emissions-free electricity. Lithium-ion batteries now power everything from our digital watches and mobile phones to drones, EVs, and ferry boats.



*Sila Nanotechnologies' colorful lobby in Silicon Valley, where they are making a breakthrough silicon anode material for lithium-ion battery production.* Photo Credit: Lee Keller

Across the Bay from San Francisco in Alameda, we were ushered into the colorful headquarters of [Sila Nanotechnologies](#), a visionary startup that is making a breakthrough silicon anode material for lithium-ion battery production. The upshot? Smaller batteries that last longer, charge faster, and are less expensive to produce. (Read more [here](#), in Sila's white paper, "A Battery-Powered American Energy Revolution".)

Sitting in their brightly decorated employee break room, we heard from co-founder and **CEO Gene Berdichevsky** who talked about his background, how he came to co-found Sila and why he's building their largest production facility in Moses Lake, Washington.



Colorful in his own right, Berdichevsky was born in Ukraine, raised in Russia, and immigrated with his family to the U.S. when he was only nine years old. He studied engineering at Stanford and was the 7th employee at Tesla. With significant investments from both the private and public sectors, he's leading a team of engineers who are developing anode materials that will improve energy density and lower the costs of EV batteries. He told [Forbes](#) as well as our group, "First and foremost we're pushing for higher energy density," estimating that Sila's anodes provide up to a 20% improvement in energy efficiency compared to the best current lithium-ion battery packs. They can also charge faster and hold down costs by reducing the number of cells needed to go the



same distance. “If you’ve got a vehicle that has 1,000 cells in it and it gives you the range you want when each battery stores 20% more energy, you can go from 1,000 cells to 800 cells. Now the vehicle is lighter and it’s cheaper to make,” added Berdichevsky.

#### THAT TECHNOLOGY WILL HELP POWER

**WASHINGTON’S CLEAN ENERGY ECONOMY.** In May, Sila [announced](#) it will open its first stand-alone factory in [Moses Lake, WA](#) to produce anode material for 100,000 to 500,000 electric Mercedes-Benz G-Class vehicles. It will all be done inside a converted 600,000-square-foot industrial building on 160 acres in Moses Lake and is estimated to produce enough jobs to make it one of the largest employers in the region.

“Each [of the two] production line[s] on this new plant will be about 100 times the throughput of the existing production line we have in Alameda,” Berdichevsky told [TechCrunch](#). The decision to open a facility in Moses Lake came down to talent, clean hydropower and the ability to find a pre-existing space.

After hearing from CEO Berdichevsky, we donned safety glasses, masks and gloves, and moved out onto the super-clean, high-tech production floor. What struck us all was how compact this facility was and yet how enormous the impact is that it’s already having, as young companies like this one compete to find more efficient and more environmentally-friendly ways to continue moving our economy away from fossil fuels.

## TOURS CONTINUED: THE FUTURE IS NOW AT TESLA’S MAMMOTH FACTORY

Californians aren’t just buying EVs, they’re amping up their economy by building them. In fact, the 2 millionth Tesla was scheduled to roll off the production line in July this year. Our group got a VIP, “no photos allowed” tour of Tesla’s enormous production factory, a building large enough to hold 92 football fields!

We were ushered into the waiting area, taken through a maze of halls and led into an almost “Disneyland-like” loading zone, where we boarded little red trams for a ride through the largest auto production factory in North America.

We watched in awe as hundreds of huge robots (named after some of Elon Musk’s favorite movie characters) moved the largest Tesla components along the assembly line. Just a week prior to our visit, the factory set a new single-day production record, estimated to be about one car per minute!

As we wheeled past more giant robots with names like Wolverine and Iceman, we learned that Tesla had added a second floor to house even more robots in order to accommodate larger production numbers.



*Half the study mission took a tour of Tesla’s enormous production factory, a building large enough to hold 92 football fields, pictured here. Photo Credit: Lee Keller*

We didn’t want this glimpse into modern factory production to end as we continued around corner after corner, narrowly sliding past robotic wagons carrying different auto parts to their appointed stations. It looked like a city, as Tesla had added many features to brighten what was once a dark, enclosed space and we could see employees enjoying their breaks under the added skylights, the neatly painted floors with white

epoxy and lots of natural plants to create gathering spaces.

Aristotle’s quote, “*Quality is not an act, it is a habit*,” adorned one of the walls we drove past, as we prepared to end this fascinating, hour-long tour.

But perhaps the group’s favorite quote and one we will all remember, read: “*When something is important enough, you will do it, despite the odds.*”

## TOURS CONTINUED: OFF TO SILICON VALLEY AND BLOOM ENERGY FOR FUEL CELLS AND ELECTROLYZERS

Twenty-year-old [Bloom Energy](#), welcomed our group for a peek behind the scenes at this innovative plant, officially opened just days before our arrival. Bloom Energy manufactures both fuel cells and electrolyzers. The newly operational, state-of-the-art 164,000 square foot facility, is a \$200 million investment in clean energy. At full capacity and buildout, this facility will manufacture enough fuel cells annually to produce as much electricity as a nuclear power plant.

Fuel cells generate electricity without combustion through a chemical process. Various forms of gas are used to convert into electricity. Fuel cells are an excellent application for generating clean energy where electricity supplies are limited or curtailed, like industrial facilities, data centers, hospitals and mobile transportation vehicles.

The greener the fuel, the lower the carbon intensity of the electricity produced. Green hydrogen is one source of a low-carbon feedstock. That's why Bloom also manufactures electrolyzers which turn water into hydrogen.

Some people in our delegation were very interested in how renewable natural gas can be used as a feedstock. Bloom recently installed a fuel cell at the Bar 20 dairy in Kerman, CA. The waste from cow manure is turned into a biogas and then used to create electricity with Bloom fuel cells. This waste-



*Fuel cells generate electricity without combustion through a chemical process.*

to-energy project eliminates methane emissions and provides clean electricity for use on the farm and to export to the grid. "Biogas from California's dairy farms has the potential to generate 300MW+ of power", Bloom estimates, "equivalent to powering approximately 600,000 electric vehicles, each traveling 15,000 miles per year."

Washington's dairy industry can use this Bloom technology to do the same.

"We need to find ways to help our dairies compete in a low-carbon economy," stated Jay Gordon of the Washington Dairy Association. "Turning our waste stream into a revenue stream is an excellent way to support rural economies."

## TOURS CONTINUED: PACCAR'S INNOVATION CENTER

Last on our tour but certainly not least was the Innovation Center built by Washington's own PACCAR, maker of Kenworth and Peterbilt trucks, in Silicon Valley. As we were welcomed into the center -- some of it off limits -- we heard from Kenworth's Sean Henebry, Zero Emissions Marketing Manager, who shared what they are doing to "drive to zero emissions."

He briefed us on the significance of California's [HVIP](#) (Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program), as well as the [Energize](#) (Energy

Infrastructure Incentives for Zero-Emission Commercial Vehicles) program. We'd heard about both earlier in the trip, but the significance of these programs, funded in part with Cap-and-Trade revenues, is they are making it possible for PACCAR to develop and sell zero emission trucks, such as the Kenworth T680E Battery Electric and T680 Fuel Cell Trucks.

Because state, county and local governments have significant purchasing power, they can help accelerate the transition from older, dirtier technologies to more





*Photos (left to right): Senator Christine Rolfes tests out Kenworth's all-electric T680E truck at the PACCAR Innovation Center. PACCAR Innovation Center. King County Executive Dow Constantine announcing the purchase of a Kenworth all-electric truck on June 9th in Renton.*

advanced clean alternatives not only through incentives but also through their buying decisions. As an example, King County recently [announced the purchase](#) of the Kenworth T680E battery-electric heavy duty truck (pictured here with King County Executive Dow Constantine) that will be used to haul garbage. “We are once again catalyzing new markets to accelerate the

transition to zero-emission fleets, this time with reliable heavy-duty trucks built right here in King County,” said Constantine. “By leveraging the purchasing power of one of the nation’s largest counties, we are proving to manufacturers that there is strong demand for vehicles that cut greenhouse gas emissions, lower maintenance costs, improve air quality, and reduce noise pollution.”

## A FRONT ROW SEAT TO THE FUTURE

We were pleased that our group included representatives from both houses of the State Legislature, along with the Port of Seattle and the state’s largest county, King County. As our delegation readied to head home, filled with a renewed sense of what is possible, State Senator Christine Rolfes said, “I feel a sense of responsibility to get even smarter and more focused on climate policy because the state legislature lost our climate policy guru and expert, Senator (Reuven) Carlyle (who retired this past session). I am vowing to take that responsibility very seriously!”

Indeed, from the deepened friendships, new contacts formed and a true front row seat to the future, our delegation agreed these were three very worthwhile days.



*Closing thoughts came from four visionary leaders who joined us on this year’s Study Mission: L to R, WA State Senator Christine Rolfes, Port of Seattle Commissioner Fred Felleman, King County Executive Dow Constantine and WA State Representative Jake Fey.*

# APPENDIX

## LESSON LEARNED: DAIRIES DRIVE DECARBONIZATION

### WHAT WE CAN DO IN WASHINGTON

Companies like Promus Energy and Koe Energy, along with the Washington State Dairy Federation, are promoting dairy digesters in Washington state to reduce methane emissions, and as an additional way to meet the increasing demand for powering electric vehicles.

With funding from the recently-passed Climate Commitment Act, Washington can establish a grant program to support our state's dairies and create low-carbon transportation fuels. We can even extend the program to other sources of organic waste streams like food waste and wastewater treatment facilities.

Avoiding or lowering methane emissions will help Washington state cost-effectively reduce greenhouse gas emissions and help in our efforts to reach our goal of net zero by 2050.

## LESSON LEARNED: WISE INVESTMENTS OF CAP-AND-TRADE DOLLARS = TRANSPORTATION DECARBONIZATION PROGRESS

### WHAT WE CAN DO IN WASHINGTON

The public-private partnerships promoted by California's HVIP, EnergiIZE, ZANZEFF, CORE, Clean Transportation, and Community Air Protection programs are models for Washington to follow. Real-world data shows that state-funded incentives really do work and help the private sector to speed commercialization and clean the air in communities that need it most. Washington can implement these types of programs with Cap-and-Invest revenues. We have identified several high-potential opportunities for

decarbonizing transportation in Washington state, and published our analyses in this report, Washington's Decisive Decade: An Emerging Roadmap for Transportation Decarbonization & Cleaner Air.

We have joined California's zero-emission vehicle (ZEV) and advanced clean truck (ACT) requirements for new trucks, amplifying a market signal that already spurs companies like PACCAR-Kenworth to build electric heavy-duty trucks in our state. In fact, one of the most fascinating tours of this trip was at PACCAR's Innovation Center in Silicon Valley, where we saw first-hand the next-generation research and emerging technologies that will benefit future vehicle performance. PACCAR's Innovation Center is also accelerating development of electric and hydrogen fuel cell powertrains, as well as the deployment of big data analytics.

With revenue raised by the Climate Commitment Act, such as that with targeted allocation in the new Move Forward Washington transportation package, the state can lead significant, near-term decreases in local air pollution and GHGs while accelerating the shift towards clean vehicles. As of now, only a small portion of the Move Forward Washington funds are clearly allocated for heavy-duty ZEV vehicles. More emphasis on transitioning away from fossil fuels in the Medium-and-Heavy Duty Vehicle sector would be a win-win for the health of our most disadvantaged communities and for our economy.

## LESSON LEARNED: PUBLIC INVESTMENTS ATTRACT PRIVATE INVESTMENTS

### WHAT WE CAN DO IN WASHINGTON

California has directed over \$11 billion into over a half million carbon reduction projects, attracting billions of dollars of private sector investments. Beginning in the first quarter of 2023, Washington state will hold its first auction under the Climate Commitment Act, generating opportunities here to make similar investments towards our net-zero carbon economy of the future.



# APPENDIX

## LESSON LEARNED: INCENTIVES ARE ELECTRIC

### WHAT WE CAN DO IN WASHINGTON

Washington's passenger EV sales tax exemption is winding down, just as the transition to vehicle electrification is ramping up. Fortunately for us, last session the Legislature indicated interest in designing new electric vehicle purchase incentives by putting aside \$120 million for the task, with \$25 million specifically directed to overburdened communities.

One of California's most effective environmental justice programs is Clean Cars 4 All, which helps lower-income residents replace old, polluting cars with cleaner, more fuel efficient vehicles. The program's guiding legislation directs benefits to low-income and disadvantaged communities and has a heavy emphasis on consumer protections and education.

Regarding the need to increase the passenger vehicle EV market, Gustavo Collantes, CEO of Logios, spoke highly of Washington's electric vehicle sales tax exemption. "It is a good model for a 'cash on the hood' incentive," he said.

## LESSON LEARNED: CLEAN FUELS ARE CLEANING CALIFORNIA'S AIR

### WHAT WE CAN DO IN WASHINGTON

In 2021, Washington state passed its own Clean Fuel Standard which will go into effect in 2023, providing opportunities for lower-carbon fuels to generate credits. This policy will give an economic boost for biofuels, EV charging and renewable diesel projects in the state. In order to implement the policy fully, Washington legislators have required that a low-carbon fuels production facility be constructed in the state. Supporting this type of clean energy development is a high priority for Clean & Prosperous Washington.

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## WHAT DO YOU THINK?

Please let us know your thoughts on how Washington should move forward.

 **EMAIL** [info@cleanprosperouswa.com](mailto:info@cleanprosperouswa.com)

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## CALIFORNIA STUDY MISSION 2.0

Wednesday, June 22 – Friday, June 24, 2022  
Sacramento and San Francisco Bay Area

# OUR PARTICIPANTS

## Elected Officials

### **Dow Constantine, Executive**

King County

Executive Constantine is serving his fourth term as King County Executive. He also serves as Vice-Chair of Sound Transit. A former member of the King County Council and the WA State Senate and House of Representatives, Dow is focused on meeting two of our greatest generational challenges building equity and opportunity, and confronting climate change.

### **Fred Felleman, Commissioner**

Port of Seattle

Commissioner Fred Felleman is the longest serving member of the current Seattle Port Commission. He founded the Port's Energy and Sustainability Committee in 2016 and has since led the Port's efforts to reduce its carbon footprint by expanding the use of shore power, advancing the use of sustainable aviation fuels, and leading the effort to establish a protocol to identify ways to reduce the energy demand of new construction projects, including the installation of solar arrays. Fred also serves as a Managing Member of the Northwest Seaport Alliance.

### **Jake Fey, Representative**

Washington State Legislature

Representative Fey serves as Chair of the House Transportation Committee and as a member of the House Environment and Energy Committee. One of Jake's top priorities in the legislature is ensuring a cleaner, more sustainable transportation system for our state. In 2019, Jake introduced the Green Transportation bill, aimed at helping switch to electric vehicles and cleaner fuels, with incentives to buy electric vehicles and help to build the infrastructure to charge electric vehicles in the state. The law also offers grants to help mass transit agencies electrify their fleets.

### **Joe Fitzgibbon, Representative**

Washington State Legislature

Representative Joe Fitzgibbon represents the 34th Legislative District. As the chair of the House Environment & Energy Committee, he was a key architect of the Climate Commitment act (CCA) and the Clean Fuels Standard. Joe is also a member of the Appropriations and Rural Development, Agriculture & Natural Resources committees.

## Elected Officials

(Continued)

### **Christine Rolfes, Senator**

Washington State Legislature

Senator Rolfes represents the 23rd Legislative District and serves as Chair of the Ways and Means Committee. In addition, Christine is the Senate's chief budget writer and negotiator, and helped shepherd passage of historic investments in clean energy through the operating budget.

## Attendees

### **Bruce Agnew, Director, Regional Infrastructure Accelerator**

PNWER

As Director of the PNWER RIA, Bruce oversees the acceleration of two projects: drayage truck electrification for owner-operators at Seattle and Tacoma ports, and highway-rail grade separation at Pines Road crossing in Spokane Valley, WA. PNWER is 1 of 5 US DOT-designated Regional Infrastructure Accelerators (RIAs).

### **Marissa Aho, Policy Director/Chief Resilience Officer**

WA Department of Natural Resources

Marissa is the Policy Director/Chief Resilience Officer for the WA Department of Natural Resources (DNR). She and her team lead policy development and climate action planning and implementation, including DNR's Carbon Project, Plan for Climate Resilience, and the Watershed Resilience Action Plan for the Snohomish Watershed.

### **Justin Allegro, Director, State Government Relations**

The Nature Conservancy

Justin is part of the government relations and external affairs team at the Washington Chapter of The Nature Conservancy, the nation's largest environmental organization committed to urgently confronting the climate crisis.

### **Cassie Bordelon, Senior Government Affairs Representative**

Puget Sound Energy

Cassie is the Senior Government Affairs Representative for Puget Sound Energy (PSE), the state's largest energy utility with a mission for deep decarbonization and greenhouse gas emissions reduction. PSE will be coal free by 2025, carbon neutral by 2030, and will have 100% clean electricity by 2045.

### **Stephanie Bowman, Governor's Maritime Sector Lead**

Washington State Department of Commerce

As Maritime Sector Lead, Stephanie is responsible for developing and implementing state policies that support the sustainability and expansion of the maritime industry in Washington.

### **Anne-Catherine Briand-Fortin, Senior Attachée, Public Affairs and Government Relations**

Québec Government Office in Los Angeles

### **Maura Brueger, Director of Government & Legislative Affairs**

Seattle City Light

Maura is the director and legislative affairs for Seattle City Light. As a member of the General Manager's

leadership team, she directs federal, state and council relations and policy for the municipal electric utility for 940,000 residents in the City of Seattle and several franchise communities. City Light owns generation, distribution and transmission assets.

### **Allison Campbell, Transportation Electrification Specialist**

City of Seattle

Allison works at the City's Office of Sustainability and Environment where she coordinates City-wide efforts to decarbonize and electrify the transportation sector.

### **Bryce Campbell, Foreign Policy and Diplomacy Service Officer**

Consulate General of Canada

Bryce is a senior policy advisor at the Canadian Consulate in Seattle for energy and environment files, including climate action. He joined the Consulate six years ago following a series of leadership roles at Washington, DC think tanks.

### **John Clauson, Executive Director**

Kitsap Transit

John is the Executive Director of Kitsap Transit, a Public Transportation Benefit Area Authority that serves Kitsap County. The agency is currently undergoing efforts to further electrify their operations with additional battery electric buses and battery electric ferries.



**Adam Day, Senior Government  
Affairs Associate**  
First Mode

Adam is Senior Government Affairs Associate of First Mode, a technology-agnostic engineering services firm. First Mode started as a company with a focus on space but recently they designed, built, integrated, and tested a 2-megawatt proof-of-concept hydrogen fuel cell to power a mine haul truck, working to decarbonize heavy industry.

**Greg Dronkert, Board Member**  
ZEV co-op

Greg is a founding board member of Zero Emission Vehicle Cooperative, a Washington nonprofit carshare enterprise. ZEV co-op uses only electric vehicles and emphasizes solutions for underserved communities. Greg has enjoyed a long and purposeful career in passenger transportation and logistics. His companies include Pacific Mobility Group and PacWesty.

**Sean Eagan,**  
**Government Affairs Director**  
The Northwest Seaport Alliance

Sean is the Government Affairs Director of the Northwest Seaport Alliance (NWSA). The NWSA includes the Ports of Seattle and Tacoma and is actively focused on decarbonization efforts like drayage electrification, shore power for ocean-going vessels and reducing emissions from cargo handling equipment.

**Banu Erdim, Sustainability &  
Environmental, Social & Governance  
Analyst**  
Kitsap Bank

Banu plays a key role in leading the bank's work on comprehensive sustainability goals, stakeholder engagement, communications, education and strategic initiatives related to clean energy. She also joined the Strategic Energy Innovations' award-winning fellowship program as 2020-2021 Climate Corps Fellow.

**Dan Evans, President**  
Promus Energy LLC / Koe Energy LLC

Dan has been involved in energy projects, policy, and permitting for over 30 years. He served 20 years as a senior advisor to members of Washington's Congressional delegation, seven years with a NW law firm, and as an independent consultant on energy, water, and other resource initiatives. Dan was co-lead investigator of a 2012 federal and state funded study of the feasibility of converting dairy digester operations from the production of power to RNG.

**Eric ffitich, Senior Government  
Relations Manager**  
Port of Seattle

Eric is the Senior Government Relations manager and policy advisor for the Port of Seattle. Port of Seattle is a local government representing King County and charged by the Legislature with operating transportation facilities to support economic development. They prioritize moving commerce while reducing the emissions from their operations.

**Rod Gleysteen, VP Operations**  
PACIFICA

Rod is a co-founder of Pacifica, which has a 25-year history of developing living wage jobs in Washington assembling and integrating innovative projects. Currently, Pacific is tasked by DOE's ARPA-E to research and deliver a techno-economic study and demonstration project on practical uses of hydrogen in transportation and industry.

**Jay Gordon, Policy Director**  
Washington State Dairy Federation

Jay has advocated for agricultural conservation policy and programs for 35 years and has served as Policy or Executive Director with the Dairy Association for 22 years. In addition, he farms grain, feed, seed and vegetables on his family's 8th generation farm in the Chehalis valley.

**Dr. Angela Griffin, CEO**  
Launch

Angela is the CEO of Launch, a Seattle-based nonprofit serving children ages 3-12 and their families, with a focus on early childhood development, kindergarten readiness, and afterschool enrichment. She also currently serves in an elected position on the WA State Board of Education.

**Will Hausa,**  
Chair-Government Affairs  
Tabor 100

Will oversees the identification and promotion of Tabor100's legislative agenda. Tabor 100 is an entrepreneurial hub is that committed to economic power, educational excellence and social equity for African-Americans and the community at large.

**Greg Herlin, Board Member**  
Clean & Prosperous Washington

Greg serves as a board member for Clean & Prosperous Institute and Clean & Prosperous Washington. He was named Seattle Business Magazine's "Manufacturing Executive of the Year" in 2013, and holds a place on PSBJ's Fastest Growing Companies "Hall of Fame". Greg co-founded Cashmere Molding in 1991 serving as President and CEO. Through the use of innovative revolutionary Advanced Manufacturing Techniques, Cashmere led the way in "onshoring" millions of dollars in injection molded plastics. Greg is now the President & CEO of C-Keg, leading the IoT revolution in the beverage industry.

**Austin Hicks, Senior Vice President,**  
Public Affairs  
Strategies 360

Prior to S360, Austin served as an aide to U.S. Sen. Maria Cantwell (D-WA) in Washington, D.C., where he worked to execute the office's outreach and communications strategy. Most recently, Austin served as deputy press secretary for the Democratic Governors Association.

**Francesca Hillery, Program & Communications Manager**  
Global Ocean Health

Francesca is the Program and Communications manager of Global Ocean Health (GOH). The vision of GOH is a future in which human societies enjoy abundant seafood, healthy seas and thriving coastal communities by reducing pollution, converting waste streams into useful products, and aligning our economy with the natural systems upon which life depends.

**Deborah Jensen, Executive Director**  
Audubon Washington

Deborah is the Executive Director of Audubon Washington, the state office of the National Audubon Society. She leads Audubon's work in partnership with 25 Audubon chapters across the state and the 50,000 members to help protect the places birds need now and in the future. She currently serves on the Puget Sound Leadership Council and the Board of Climate Solutions. She is a past-chair of the Washington Wildlife and Recreation Coalition and has an MS and PhD in Energy and Resources from UC Berkeley.

**Molly Keenan, Senior Vice President**  
Lodestar Strategic

Molly is the Senior Vice President of Lodestar Partners. She previously served as a senior advisor to Governor Inslee and Congresswoman DelBene. She is an executive member of the Evergreen Action Board.

**Becky Kelley, Senior Policy Advisor for Climate**  
Office of the Governor

Becky is a senior policy advisor on climate issues for Governor Jay Inslee. In that role, Becky led the Governor's efforts to pass Washington's groundbreaking climate legislation, including the Climate Commitment Act and the Clean Fuel Standard. Becky is the former president of the Washington Environmental Council.

**Christa Lim,**  
Regulatory Affairs (West)  
Shell Energy North America

Christa leads regulatory advocacy across all Western state agencies for Shell Energy North America

**Dennis McLerran, Of Counsel**  
Cascadia Law Group PLLC

Dennis is the past EPA Region 10 Administrator and Puget Sound Clean Air Agency Director. He works at Cascadia Law Group and Cascadia Policy Solutions on climate strategies, policies with clients (Port of Seattle, NW Seaport Alliance, PSE) and board member of many NGOs, institutions, and companies.

**Nate Miles, Vice President**  
Highflyers LLC

Nate is a Social Equity Outreach vendor to key clean energy companies. He has served on the boards of both the Urban League and the NAACP.

**Matt Miller, State Government  
Affairs and Public Policy Manager**  
Puget Sound Energy

Matt is the public policy manager and leads the utility's efforts regarding state public policy. Puget Sound Energy (PSE) is the largest energy utility in Washington state, with a mission for deep decarbonization and greenhouse gas emissions reduction. PSE will be coal free by 2025, carbon neutral by 2030, and will have 100% clean electricity by 2045.

**Hilary Moffett, Vice President**  
Fortescue Future Industries

Hilary is a Vice President of Fortescue Future Industries (FFI). FFI is a global green energy company committed to producing zero-carbon green hydrogen from 100 per cent renewable sources. The company has announced it will evaluate the feasibility of converting the former Centralia coal mine into a green hydrogen production facility.

**Bill Patz, Co-Founder**  
Pacifica Energy LLC

Bill founded Pacifica, which has a 25-year history of developing living wage jobs in Washington assembling and integrating innovative projects. Currently, Pacific is tasked by DOE's ARPA-E to research and deliver a techno-economic study and demonstrate a carrier medium delivering H2 for on-site use.

**Uzma Siddiqi, Sr. Manager Grid  
Modernization and Strategic Tech**  
Seattle City Light

Uzma is the manager of Grid Modernization and Strategic Tech at SCL. She explores what the electrical grid will look like as it transitions to lower-carbon sources, with a goal

that the grid will have more control and observability and will happen with increased reliability, resiliency, and equity.

**Jeremy Smithson, CEO / Founder**  
Puget Sound Solar

Jeremy is the CEO and founder of Puget Sound Solar. He installed the first net-metered solar projects in Seattle, Lynnwood, Sequim, and Port Townsend. Jeremy started EV Support in 2009 and now has 49 employees designing, installing, and servicing solar energy systems and EV charging stations.

**Gina Topp, Chief Legal Counsel and  
Policy Advisor**

King County Executive Office  
Gina is responsible for providing strategic counsel on Executive initiatives, including key environmental priorities

**Edwin Wanji, Founder & CEO**  
Sphere Solar Energy

Edwin is the founder and CEO of Sphere Solar Energy. Edwin oversees operations, community outreach, and directs the nonprofit division. The mission of Sphere Solar Energy is to expand access to affordable clean energy in underserved communities, and to provide work force training and education.

**Tom Wolf, Senior Government  
Affairs Manager, US West Coast**  
bp America

Tom is the Senior Government Affairs Manager, of the US West Coast for BP America. Bp's ambition is to become a net zero company by 2050 or sooner, and to help the world reach net zero. Consistent with this ambition, they actively advocated for the passage of the CCA

in Washington state. Now, bp wants to make sure it works in real life. Tom's role is to be bp's lead for that outcome.

**Joe Woods, Government Affairs  
Consultant**

Cedar Grove Composting  
Among other duties as the Managing Partner of Pacific Public Affairs, Joe represents Cedar Grove Composting, an environmental solutions company that recycles organic waste into innovative products and composts more than 350,000 tons of residential and commercial yard and food waste annually.

**David Yeaworth, Commission  
Strategic Advisor**

Port of Seattle  
David is a strategic advisor for the Port of Seattle Commission. In addition to staffing Commissioner Fred Felleman, David facilitates the Commission's Waterfront and Industrial Lands Committee. Issues in his portfolio include sustainable aviation fuel, marine habitat, and responsible outdoor tourism.

**Tim Zenk, President of Molecule LLC**  
Neste

Tim has worked in renewable energy project development and policy for two decades to build new technologies for difficult to decarbonize sectors. Presently, he is the president at Molecule LLC where he works at the nexus of policy, finance and technology to fight climate change.

**Jennifer Ziegler, Contract Lobbyist**  
Toyota Motor North America

Jennifer represents Toyota in Washington State. Toyota manufactures the nation's leading

passenger fuel cell-powered vehicle, the Mirai. Other clients include Kaiser Aluminum, the Washington Roundtable and HNTB Engineering.

## Speakers

**Michael Boccadoro**, Executive Director  
Dairy Cares

**Patrick Brecht**, Project Manager for the Clean Transportation Program Investment Plan  
California Energy Commission  
Patrick is a Project Manager and Primary Author for California's Clean Transportation Program Investment Plan, a part of California's Energy Commission. Patrick has been with the Energy Commission since 2012. He has a master's degree in Sustainable Transportation from the University of Washington and a BA in Int'l Relations from Cal State Sacramento.

**Joe Burgard**, Captain  
Red & White Fleet

**Jonathan Changus**, Director CA and CARB Programs  
Center for Sustainable Energy  
Jonathan Changus supports the implementation of California's statewide electric vehicle (EV) and EV infrastructure programs and leads the Center for Sustainable Energy's (CSE) clean transportation engagement and outreach teams. Previously, he worked at the Northern California Power Agency and held a variety of positions advising state legislators and the governor. He holds a Master of Public Policy and a B.S. in social sciences from California Polytechnic State University, San Luis Obispo.

**Peter Christensen**, Innovative Strategies Lead, Mobile Source Control Division

California Air Resources Board

Peter has been with the California Air Resources Board (CARB) since 2008 and currently manages a team of professionals dedicated to continuing the long history of air quality improvement in California. His team is developing and implementing innovative incentive programs to bring cleaner technologies to the entire spectrum of transportation: from cars and trucks to marine vessels and trains. He attended UC Davis in Environmental Biology and Management.

**Gustavo Collantes**, CEO & Co-Founder  
Logios

Gustavo has 20 years' experience in electric mobility, innovation strategy, technology system analysis, consumer behavior, infrastructure planning, and carbon mitigation strategies. At Logios, he is focused on strategies to integrate zero-emission transportation and energy technologies. Its mission is to maximize the efficiency and impact of clean tech deployment. He has his Master of Science in Aerospace Engineering from the Israel Institute of Technology and a Ph.D. in Transportation Technology Policy from UC Davis.

**Richard Corey**, Executive Officer  
California Air Resources Board

Richard has over 30 years of professional experience in the air quality and climate change field. His team at CARB of approximately 1,700 engineers, scientists, technicians and analysts, are responsible for a broad range of programs including cleaner

emission standards for motor vehicles and equipment, fuels, climate, incentives, and air toxics. Some of the key programs that his team is responsible for implementing include the zero- and near-zero-emission standards for mobile and off-road sources (e.g., cars, trucks, fork lifts, cargo handling equipment, motor cycles, and lawnmowers), low carbon fuel standard, cap-and-trade regulation, and focused efforts to drive down emissions and exposure in impacted communities throughout the state. Richard has his Bachelor of Science in Environmental Toxicology and his Masters in Business Administration from UC Davis.

**Bill Elrick**, Executive Director  
California Fuel Cell Partnership

Bill has spent over two decades in private and public work addressing environmental and energy issues for the transportation industry. At the California Fuel Cell Partnership (CaFCP), he is working to put alternative fuels and advanced technology vehicles into regular service for all by growing the market for fuel cell electric vehicles and hydrogen fuel. The CaFCP's goal is to create a sustainable future for zero-emission cars, trucks, and buses primarily by producing renewable hydrogen for transportation.

**Lauren Gularte**, Manager,  
Government Affairs

Water Emergency Transportation Authority

Lauren manages government affairs for San Francisco's Water Emergency Transportation Authority (WETA), a regional public transit agency responsible for developing, operating, and expanding San Francisco Bay Ferry service. Her work



has included the consolidation and takeover of municipal ferry services, overhauling the agency's emergency response plans and programs and helping develop the agency's fleet plan to transition to zero emissions.

**Vernon Hughes, Assistant Division Chief for the Air Quality Planning and Science Division**

California Air Resources Board

Vernon is the Assistant Division Chief of CARB's Air Quality Planning and Science Division. He previously led the Community Assessment Branch in CARB's Office of Community Air Protection, which was established in 2017 in response to AB 617. The Community Air Protection Program's focus is to reduce exposure in communities most impacted by air pollution.

**Michael Lord, Executive Engineer, Sustainability and Regulatory Affairs**  
Toyota Motor North America

Michael is currently for California regulation and policy related to zero emission vehicles (ZEV), greenhouse gas (GHG) and criteria emissions reduction for Toyota. He helps develop Toyota's technology roll-out strategy and acts as the interface with regulatory authorities on issues related to advanced powertrains, such as Plug-in Hybrid Electric Vehicles (PHEV), Battery Electric Vehicles (BEV) and Fuel Cell Electric Vehicles (FCEV). Michael has a B.A. in Physics from the University of Pennsylvania and studied Japanese language at Sophia University in Japan.

**Ray Manalo, Vehicle Maintenance Manager**

Twin Rivers School District

**Stephan Olsen, General Manager of PACCAR Innovation Center**  
PACCAR

As the General Manager of the PACCAR Silicon Valley Innovation Center, Stephan oversees the coordination of next-generation research by identifying emerging technologies that will benefit future vehicle performance. Technology areas of focus include advanced driver assistance systems (ADAS), artificial intelligence, vehicle connectivity and augmented reality. The Innovation Center is also accelerating partnerships in the development of electric and hydrogen fuel cell powertrains, as well as the deployment of big data analytics.

**Raef Porter, Transportation and Climate Change Program Manager**  
Sacramento Metropolitan Air Quality Management District

Raef's experience in smart mobility, sustainability, and public sector innovation helps him lead teams and stakeholders through the design, planning, implementation, and evaluation of complex projects. He's passionate about the cause and helping create desirable places for everyone to live, work, and play. Raef's master's degree is focused on Urban and Regional Planning from Portland State University.

**Liane Randolph, Chair**  
California Air Resources Board

Liane was appointed Chair of the California Air Resources Board in December 2020. Starting in 2015, she served six years as a Commissioner at the California Public Utilities Commission (CPUC). Prior to the CPUC, she served from 2011 to 2014 as Deputy Secretary and General

Counsel at the California Natural Resources Agency. Liane earned a Juris Doctor degree from the University of California, Los Angeles School of Law.

**Craig Segall, Deputy Executive Officer, Mobile Services Incentives**  
California Air Resources Board

Craig was appointed Deputy Executive Officer, Mobile Sources and Incentives in May 2021. He plays a key role in creating a zero-emission transportation sector and addressing long-standing transportation inequities to achieve California's clean air, community protection, and climate goals. Craig's responsibilities include all facets of new and emerging air pollution control programs and policies related to mobile emissions sources. In addition, he oversees the incentive programs in the Sustainable Transportation and Communities Division and the Mobile Source Control Division.

**Bailey Smith, Lead of Climate Investments Assessment**

California Air Resources Board

Bailey has been at CARB since 2013, working to support the implementation California Climate Investments, which comprises a suite of programs utilizing Cap-and-Trade auction proceeds. Bailey's current team oversees tracking and reporting program outcomes. Bailey holds degrees in engineering from University of Colorado Denver and Colorado School of Mines.

**Sarah Jo Szambelan, International Liaison**

California Air Resources Board

Sarah Jo joined CARB last year and serves as the agency's International Liaison. She has deep research

experience across climate policy at every level of government, as well as transportation policy, travel behavior, and transportation pricing. She holds a BS in Environmental Economics from UC Berkeley.

## Clean & Prosperous Institute

**Michael Mann, Executive Director**  
Clean & Prosperous Institute

Michael serves as the Executive Director for the Clean and Prosperous Institute. His firm, Cyan Strategies, specializes in government affairs and business development for companies reducing carbon emissions through their business activities. Michael previously served as the Director of the City of Seattle's Office of Sustainability and Environment and as the District Director for then Congressman Jay Inslee, the current Governor of Washington.

**Isaac Kastama, Advisor**

Clean & Prosperous Institute

Isaac is the Managing Partner of Water Street Public Affairs LLC, a public affairs firm representing diverse clients in energy, and business. Isaac has built effective coalitions of regulated industries and environmental interests and has over ten years of experience representing clients in Washington. He had deep involvement in the legislative process to enact the 100% Clean Electricity Standard, Clean Fuel Standard, and Climate Commitment Act. Isaac holds a B.A. in Public Policy Analysis from Pomona College and is a graduate of the University of Washington, Michael G. Foster School of Business

Executive Leadership Development Program.

**Kevin Tempest, Research**  
Clean & Prosperous Institute

Kevin is the team's Research and Development Scientist, leading decarbonization and climate policy analysis including the *Building Back Better: Investing in a Resilient Recovery for Washington State* and *Washington's Decisive Decade: An Emerging Roadmap for Transportation Decarbonization & Cleaner Air* reports. Kevin spent two years as a staff scientist in climate and energy topics at Stockholm Environment Institute-U.S, publishing on carbon infrastructure lock-in, natural gas as a bridge fuel, fossil fuel supply-side (extraction) strategies, and global urban greenhouse gas emissions modelling. He holds a M.Sc in Oceanography from the University of Washington.

**Lee Keller, Public Relations**  
Development

Clean & Prosperous Institute

Lee managed communications and public affairs at Weyerhaeuser and managed communications for the campaign to build a new football and soccer stadium in Seattle (now known as Lumen Field). Lee then served as director of external affairs for Paul Allen's parent company, Vulcan Inc., where she was responsible for general strategic planning, counsel, and external affairs in addition to community and governmental outreach for many of Vulcan's projects including the construction of the stadium, development in South Lake Union, The Hospital Project in London, and the Experience Music Project.

**Kim Tryhorn, Principal**  
Cyan Strategies

Kim has been leading the logistics and planning for Clean & Prosperous Institute's California Study Mission. Through her position at Cyan Strategies, she has worked extensively with companies and organizations in Washington state, strategizing on ways to reduce carbon emissions through business and policy development. Prior to Cyan Strategies, she held positions in the City of Seattle Mayor's Office and for then-US Congressman Jay Inslee's Office.

**Lorrie McKay, Principal**  
Cyan Strategies

Lorrie has over two decades of executive branch level, local government experience in the Puget Sound region. Her areas of focus are intergovernmental relations, community relations and communications. Lorrie served 14 years in the King County Executive's office and most recently, 11 years in the City Manager's Office at the City of Kirkland prior to joining Cyan Strategies in 2021.

**Dominic Canterbury, Operations**  
Clean & Prosperous Institute

Dominic is a Principal at Turbine Agency and has led successful marketing and technology projects for startups, nonprofits, regional businesses, and national and international clients.

**Chloe Croll, Intern**

Clean & Prosperous Institute

Chloe studies environmental sustainability at California Polytechnic State University in San Luis Obispo.