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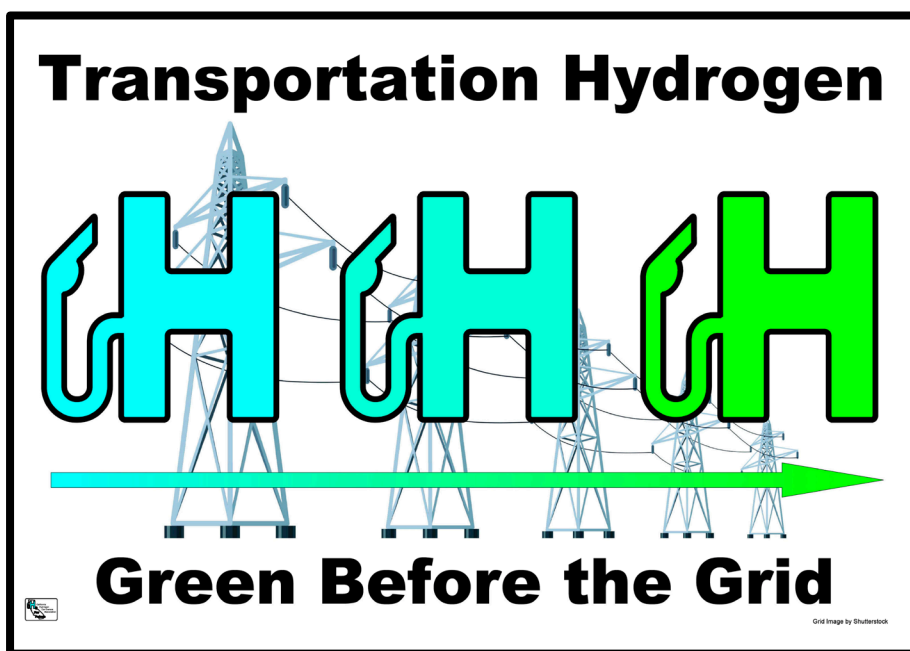
## California Hydrogen Car Owners Association (CHCOA) Proton Monthly – May 2024

May 19, 2024

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CHCOA members do not advocate for hydrogen cars just because they can refuel in 5 minutes, or because they are great cars to drive. While these aspects of the hydrogen car experience are true, we primarily advocate for these cars because they will play an integral role in California's green energy future.

Inspirational slogans are important for advocacy groups like CHCOA. Along with ["200 by 2030"](#) and ["Build It, and They Will Come"](#) we have chosen, *"Transportation Hydrogen, Green Before the Grid"*. Is it necessary that



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hydrogen production be green before the grid? Not necessarily. Is it important that the public, the H2 industry and government make every effort to make it green as soon as feasible? Yes.

*Earlier this month Bobbie and I were lucky enough to talk to Dr. Timothy Lipman, Co-Director of the Transportation Sustainability Research Center at UC Berkeley about this, and other subjects. His thoughts about how fast transportation hydrogen can become green are on Page 2.*

- Greg Cane [greg@h2tonps.org](mailto:greg@h2tonps.org)  
- Bobbie Cane [bobbie@h2tonps.org](mailto:bobbie@h2tonps.org)



## Can Hydrogen Really Get to Green Before the Grid?

By Greg and Bobbie Cane

Dr. Timothy Lipman graciously offered to talk to us about his work and the current state of “greenness” (aka, low carbon intensity) of transportation hydrogen in California. We met via Zoom earlier this month.

Dr. Lipman is the Co-Director of the [Transportation Sustainability Research Center](#) (TSRC) at UC Berkeley and has authored/co-authored numerous papers regarding the state of fuel cell technology and the hydrogen energy system infrastructure.



Tim Lipman - Institute of Transportation Studies

He said that yes, getting to 100% “green” hydrogen is very possible – the technology is there via electrolysis with green inputs and biogas/biomass pathways - but there are currently economic and policy barriers that are delaying that desired outcome.

When most of us FCEvers think of low, or zero, carbon intensity (CI) for the production of hydrogen, we think of electrolysis. But, there are two other promising technologies which can have zero (or negative) CIs:

- Biogas – uses captured methane from a dairy or wastewater treatment plant to produce hydrogen.
- Biomass – Although still mainly in the developmental stage, this process uses household green waste or forest waste to produce hydrogen.

Another way to lower carbon intensity is by capturing the CO<sub>2</sub> from steam reformation. Steam reformation is still the most common way that hydrogen is produced, but currently there is no requirement that the CO<sub>2</sub> produced be captured from this process.

One of the complications right now is how “green” is defined. For example, currently most hydrogen used in California comes from the new Air Liquide facility in North Las Vegas. They use steam reformation of natural gas to produce hydrogen but buy credits for biogas from the Midwest – a process called “Directed Biogas<sup>1</sup>”. Although

natural gas is used, this method of hydrogen production is considered green by California and the U.S. Environmental Protection Agency.

As Lipman cautioned, “Don’t let the perfect become the enemy of the good”. There is a definite movement towards lower carbon intensity hydrogen other than using steam reformation, but it will take time, money, and political commitment to make it happen. His view is that there will be a parallel timeline with the electric grid – hydrogen and electricity will become greener at about the same rate.

**The perfect “green” hydrogen technology is not yet economically feasible for widespread adoption, but we must not let the “perfect become the enemy of the good.” - T. Lipman, Ph.D., May 2024**

Dr. Lipman forwarded three policy briefs on the carbon intensity of hydrogen production and its uses in California’s clean energy transition, as follows:

- *Hydrogen Can Have a Much Lower Carbon Intensity than Fossil Fuels But This Largely Depends on How It Is Produced and Distributed, Sept. 2022*
- *Driving California’s Transportation Emissions to Zero, April 2021*
- *Introduction to the Hydrogen Market in California, Sept 2020*

(These have been saved in the [CHCOA library](#).)

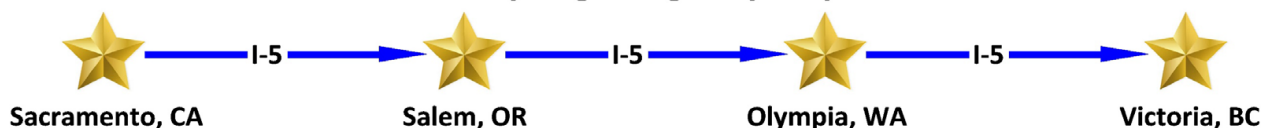
The first report is particularly well worth a read as it addresses, in greater depth, the options for reducing the carbon intensity of hydrogen production in California’s transportation future.



UNIVERSITY OF CALIFORNIA Berkeley  
**Transportation Sustainability**  
RESEARCH CENTER

1) See - [An Overview of Renewable Natural Gas from Biogas](#), US EPA, pg 37.

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## Intrepid Protoner

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### John Michael Parkan



We've had the distinct pleasure of getting to know an outstanding hydrogen advocate, John Michael Parkan.

Originally from Southern California, John Michael attended USC School of Cinematic Arts and worked with various film companies until he decided to create his own – Providence Entertainment.

We first became aware of John Michael through another CHCOA member, Tadashi Ogitsu, who recommended that we watch "[At War With The Dinosaurs – an Anti-Apocalyptic Documentary](#)", directed by Mr. Parkan. The 2020 documentary takes an in-depth look at hydrogen and fuel cells as a solution to air pollution and as a way to end dependence on fossil fuels. We highly recommend it! It's an informative and thought-provoking film.



On Set: At War with the Dinosaurs

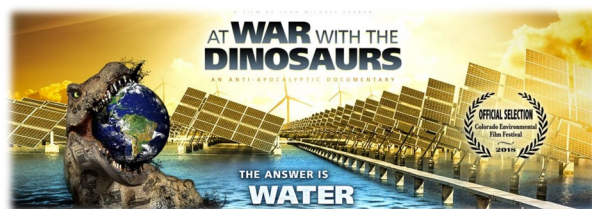
The documentary took several years to make, John Michael recalls, and entailed dozens of interviews with prominent advocates and foes of FCEVs in several different countries. The catalyst

for his documentary was a speech he attended several years ago in Hawaii by Larry Burns. Mr. Burns is the former corporate Vice President of Research and Development for General Motors and has championed fuel cells for many years. He was, and is still, adamant that fuel cell vehicles are the way to go. (Just this year, [GM and Honda teamed up](#) and began commercial production of hydrogen fuel cell systems). This spurred John Michael into learning all that he could about fuel cell electric vehicles.

After a while, he became suspicious that so many battery electric vehicle (BEV) proponents and some environmentalists were actively speaking out against fuel cell vehicles, and decided that making the documentary was the best way to combat the inaccuracies being voiced regarding FCEVs.

John Michael has owned two Mirais in his life; first a 2018 model, and now a 2021 model. Unfortunately, he and his wife recently realized that they were spending too much on H<sub>2</sub> fuel, (something many of us can relate to) and so he purchased a BEV – a Honda Ioniq. But don't worry – he still has the Mirai and is still very much convinced that hydrogen is his preferred choice, once the price comes down. He is finding out in real time that electric cars have their own set of headaches, including the fact that it takes 11 hours to charge at his house, with a 110-volt system.

When asked about what he is going to work on next, he was appropriately reserved, stating, "I don't want to telegraph"... my current plans. "It's like Spielberg revealing he's working on Jaws or Close Encounters." 😊 Whatever he does, we know that he will continue to be an enthusiastic, credible, and diligent voice of advocacy for FCEVs!

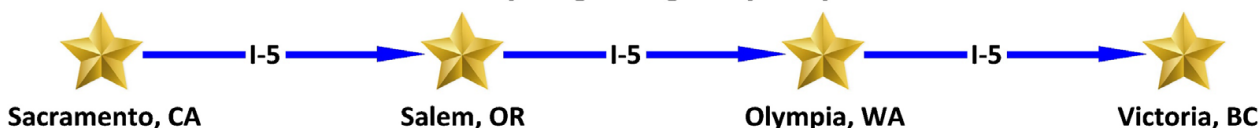


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Here at CHCOA, we try to avoid selfish, self-promotion. At the risk of crossing that line, we are going to wish the Proton Monthly a happy birthday on the anniversary of one year of publication.



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## The First Premiere, and Major Future

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### A Tour of the Cal State LA H<sub>2</sub> Research and Fueling Facility

On a sunny March day in Los Angeles, four CHCOA members enjoyed a tour of the Cal State LA Hydrogen Research and Fueling Facility, managed by Dr. David Blekhman, Professor of Technology specializing in Sustainable Energy and Transportation.

Built in 2011, this station was the first in the world to provide hydrogen to retail customers on the per kilogram basis instead of a contract. Originally started with a \$2.8 M leading grant from the California Air Resources Board, the goal was to learn about H<sub>2</sub> technology and train students in its application.

The first part of the tour was led by a student intern, Favian Orozco, a mechanical engineering major at the University. Favian has been around the facility since high school when his college-aged older brother was working there. So, it was a natural that Favian began to work there as well when he became a student at Cal State LA. He ably answered all of our questions and showed us the components of the plant, such as the electrolyzer, compressors, chiller, storage tanks, and the control room. One item of particular note: Since 2020, an onsite 1 MW photovoltaic installation has provided enough energy to the campus microgrid to offset the energy for running the electrolyzer.



*Dr. Blekhman describes the  
operational features of the plant*

As a part of the original plant design, they included a large internal walkway to make it easy for the public to see the different parts of the plant. They had expected to give tours, and indeed, they have! According to Blekhman, over the years thousands of people, including many from other

countries, have toured the plant, hoping to learn more about hydrogen refueling stations.

In its heyday, hydrogen was produced onsite, and the H<sub>2</sub> station right outside their fence could dispense 60 kg/day. They were able to fuel 15-20 cars/day, and 2-3 students worked there to operate the plant.

After being in operation for 11 years, the plant was temporarily decommissioned in order to secure upgrade and expansion funding. The need for decommissioning was largely due to the aging equipment with some additional issues related to the high cost and availability of repair parts during, and after, the pandemic. Dr. Blekhman shared that they have recently been selected for a \$7 million grant from the Federal Highway Administration to reconfigure the facility into a high-capacity, light- to heavy-duty vehicle hydrogen fueling station. They are looking for a 20% match grant and, if secured, plan to modernize the whole facility and to have it operational again in 1-2 years.

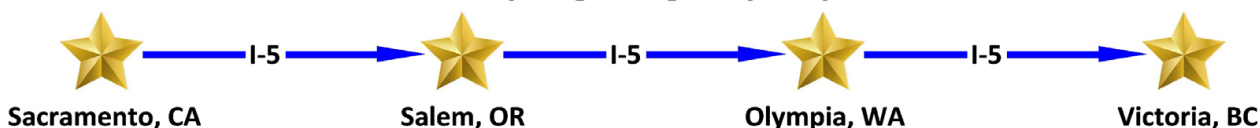
Since they are in a “pre-upgrade” mode, they are spending time developing training materials for a technology course in hydrogen infrastructure. This is a continuation of their education and training mission. As an additional note of interest, Dr. Blekhman related that a few of the current First Element Fuel employees are former students of Cal State LA. Other former interns are also working in the hydrogen industry.

Cal State LA and their Hydrogen Research and Fueling Facility were premiere trailblazers in early H<sub>2</sub> research. If the remaining necessary funding can be secured, it is clear that they will continue to play a major role in heavy-duty and light-duty fueling infrastructure and research. We wish them well in this important ongoing endeavor!

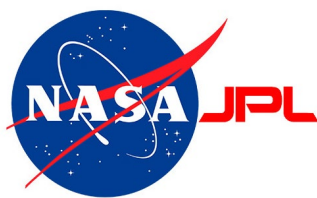
If you would like to learn more about the Cal State station, take a look at: <https://youtu.be/h8Q3mHeZZBE>



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## Hosting CHCOA at the Jet Propulsion Laboratory

**By Anastassios Petropoulos, PhD  
Aerospace Engineer**

Hydrogen has a long history of use in extraterrestrial transportation. Of course, that is just a cryptic way of saying 'rocketry' --- the combustion of hydrogen with oxygen has propelled many a launch vehicle from the early days of the Space Age. Thus, it was only natural for me, as a CHCOA member and JPLer, to invite Greg and Bobbie Cane, CHCOA Founders, and John Michael Parkan, CHCOA member and film director, to visit a group of hydrogen car enthusiasts at the Jet Propulsion Laboratory in Pasadena, California, and share their insights into the use of hydrogen for terrestrial transportation.

Their visit took place last month, and started with a whirlwind tour of such JPL landmarks as Mission Control and the von Karman Auditorium and Museum, where we spoke of many of the space missions led by JPL, from the US's first orbital spacecraft, Explorer 1, to current and future missions such as Psyche and Europa Clipper. After the tour, we convened with a number of other JPLers with an interest in sustainable transportation, some of whom drive hydrogen fuel cell cars, others of whom were not that familiar with FCEVs. Bobbie and Greg gave a presentation about the founding and goals of CHCOA. They also described their 2022 trip in their FCEV to California's National Parks, finishing their presentation with the classic observation that "If we build it they will come," referring to the hydrogen refueling infrastructure, with a chart comparing South Korea and California with respect to growth of infrastructure and number of FCEVs.



For the second part of the meeting, John Michael showed well-chosen excerpts from the 2020 documentary he directed, 'At War with the Dinosaurs', which really hit home the fraught politics that shackled the adoption of FCEVs which started with so much promise over 15 years ago. The ensuing discussion touched on many aspects, including the fact that FCEVs and Battery Electric Vehicles are sister technologies and both have significant roles to play in a future of sustainable transportation.

It was a pleasure to host this visit by CHCOA at JPL. I believe all of us enjoyed it and learnt something new!

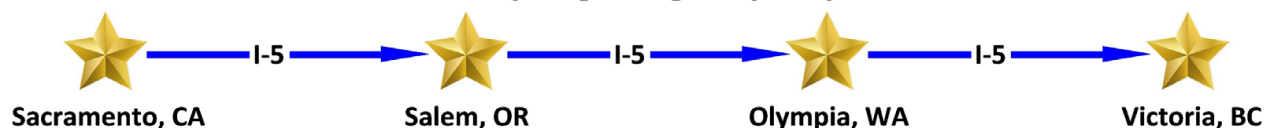
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One of the central goals of CHCOA is to increase the public's awareness of hydrogen vehicles. To further that end, the Public Awareness of H<sub>2</sub> Workgroup was created. This workgroup, along with the Research Workgroup, continue to build an [online research library](#) of transportation hydrogen documentation. A screenshot of the contents is below:

...	>	Research Group	>	Library - Public Access	▼
Type	▼	People	▼	Modified	▼
Name	↑				
CA Senate and Assembly Bills	2				
Film Documentaries_Hydrogen & FCEVs	2				
Fueling_LD	2				
Fueling_MD/HD	2				
Fueling_Mobile	2				
Government Reports and Solicitations	2				
Hydrogen and Fuel Cells_General Information	2				
Hydrogen Highway	2				
Hydrogen Price at the Station	2				
Media Articles and Reports	2				
Organization Reports	2				
Public Awareness of H2	2				
Research Institution Reports	2				
Station Growth	2				
Station Reliability	2				

**Take a look at it, or better yet, let us know if there is salient information that you think should be added.**

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## Hydrogen Snippets



### From Water...



Admittedly, we've gotten off to a bit of a slow start. The Trip on the Hydrogen Highway Workgroup has contacted several companies that offer mobile H<sub>2</sub> fuelers. The next step will be to look at the route, stops and events.



... to Water

- - -

### Trip around NorCal

In our work to update H<sub>2</sub> station status (see [Research Library](#)), seven sites:

- Vacaville – Chevron
- West Sacramento (Capitol Ave) - Nikola
- Fremont (Warm Springs) – First Element
- San Jose-East Santa Clara – First Element
- Woodside - HTEC
- Redwood City – First Element
- El Cerrito – First Element

were visited to photograph the status of construction. At some locations, construction had not yet been started; at one station, construction was almost complete.

**We can use help on keeping status information up-to-date. This work is integral to our goal of making 200 by 2030. If you have a little extra time and would like to be a part of this important work, drop me a line at [greg@h2tonps.org](mailto:greg@h2tonps.org).**

### CHCOA on CEC Committee

CHCOA is now represented on the newly reconstituted California Energy Commission - Clean Transportation Program Investment Plan – [Advisory Committee](#). The Committee's first meeting will be on June 7.

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### Station Goal Tracker

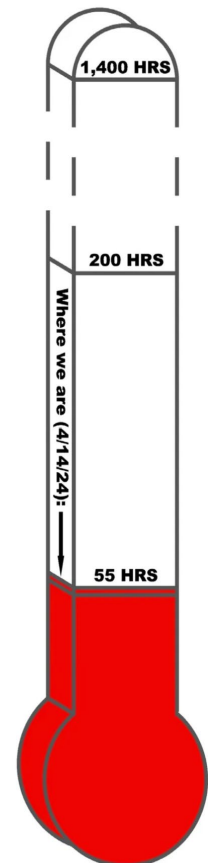
The Station Goal Tracker was created soon after Assembly Bill 126 became law last October. AB 126 provides a minimum of 15% of the funds appropriated by the Legislature from the Alternative and Renewable Fuel and Vehicle Technology Fund for hydrogen station construction until July 2030, resulting in at least \$106,353,000.

At that time, there were 54 open retail light-duty hydrogen refueling stations (LD HRS). Since that time, we have added one station, so that we now have 55 LD HRS. Within the next few weeks, the Port of Oakland will open the LD dispensers to the public, making 56 HRS. We are glad for the progress and believe that those stations "in the pipeline" will add a number of additional stations in the near term.

We would be remiss if we did not gratefully acknowledge here the work of the Hydrogen Fuel Cell Partnership in maintaining, over these many years, this record of open retail stations.

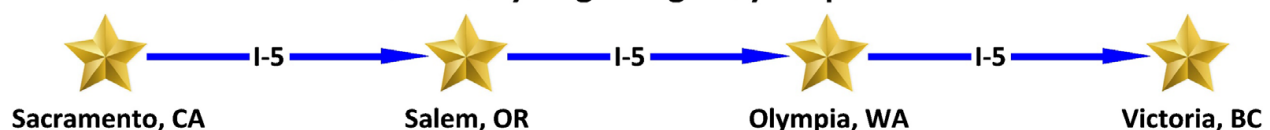
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Eleven CHCOA members have registered to attend the Summit this year. Way up from three last year!



CALIFORNIA  
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### Status of the California Bills that CHCOA is currently tracking:

**AB 2147** Mathis. Clean Transportation Program: hydrogen-fueling stations report: job creation and workforce development. This bill would require CEC and State Boards Joint Review and Report to also include progress made on job creation and workforce development in support of H2 fueling. Passed through Transportation Committee; referred to Appropriation Committee: Current status as of 5/16/24: Held Under Submission.

See: [A Guide for Accessing California Legislative Information on the Internet](#)

**SB 1418** Archuleta/Newman/Petrie-Norris. Hydrogen-fueling stations; administrative approval: checklist: This bill would require every city, county or city and county to adopt an ordinance that creates an expedited, streamlined permitting process for HRS, as specified: Current status as of 5/16/24: Read 2<sup>nd</sup> time in Appropriations Committee; ordered to 3<sup>rd</sup> reading.

**Bill is making progress. See chart on next page.**

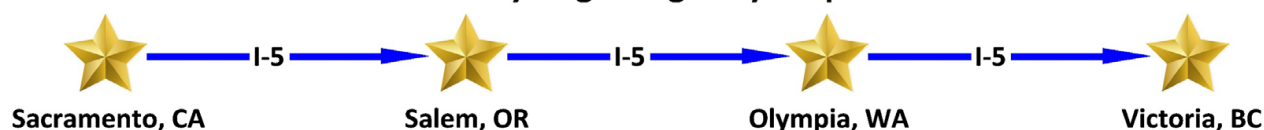
**SB 1420** Caballero/Archuleta/Dodd/Newman; This bill defines “renewable hydrogen” and “qualified clean hydrogen” and includes those classes of hydrogen in a set of transportation fuel content standards for 2025, 2030, and 2045. Current status, as of 5/16/24; Passed in Appropriations Committee as amended; ordered to 2<sup>nd</sup> reading.

**Bill is making progress. See chart on next page.**

**SB 1387** Newman. CA Hybrid and ZEV Truck and Bus Voucher Incentive Project: vehicle eligibility. This bill expands eligibility to include a ZEV exceeding 8,500 lbs. purchased for fleet operations or for commercial use. Current Status: as of 5/16/24; Passed in Appropriations Committee; ordered to 3<sup>rd</sup> reading.

**Bill is making progress. See chart on next page.**

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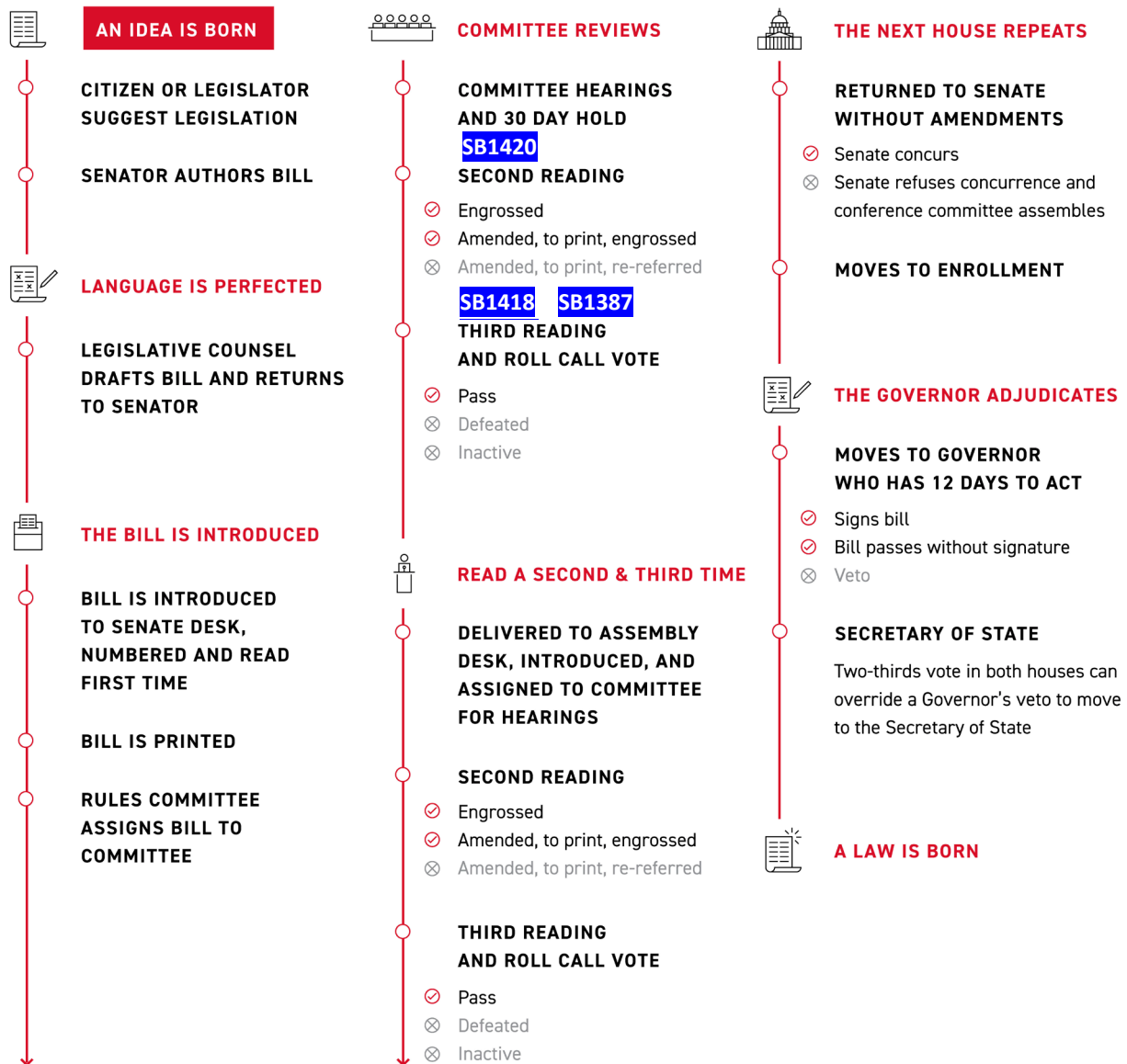




At a glance:

# HOW A BILL BECOMES A LAW

This chart portrays the typical process of a bill originating in the Senate. Except for a few minor differences, the process for bills originating in the Assembly follows the same flow.



Sources: California State Senate

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