Alternative Fuels: Existing Conditions

January 15, 2015

Kevin Wood

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Introduction

What is the Alternative Fuel Existing Conditions Report?

- Detailed information about how the region has already addressed alternative fuels in the past
- Provides a benchmark on San Diego's current state of alternative fuel use
- Creates guidance for Refuel participants to better understand the regional transportation energy landscape

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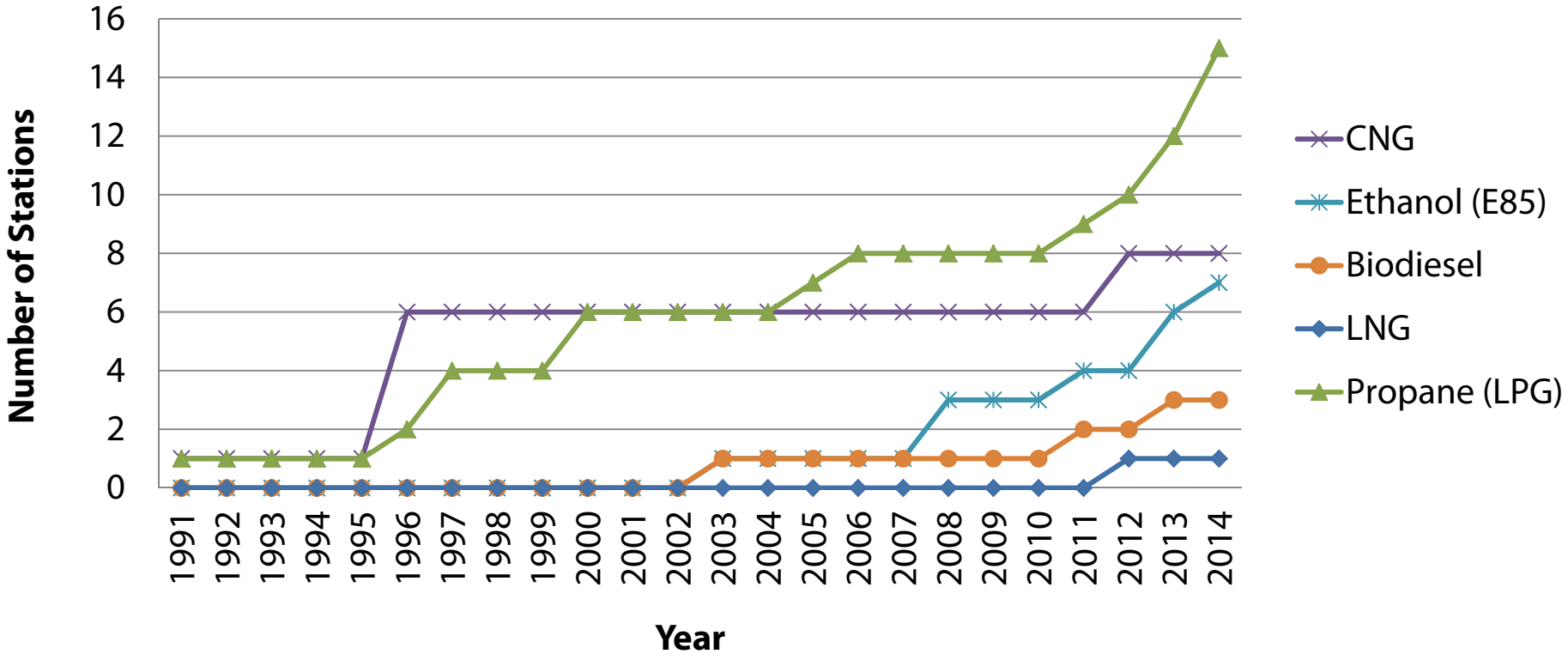
Public Alternative Fuel Infrastructure

San Diego County, 1991-2014



Source: Department of Energy Alternative Fuel Data Center (2014) http://www.afdc.energy.gov/

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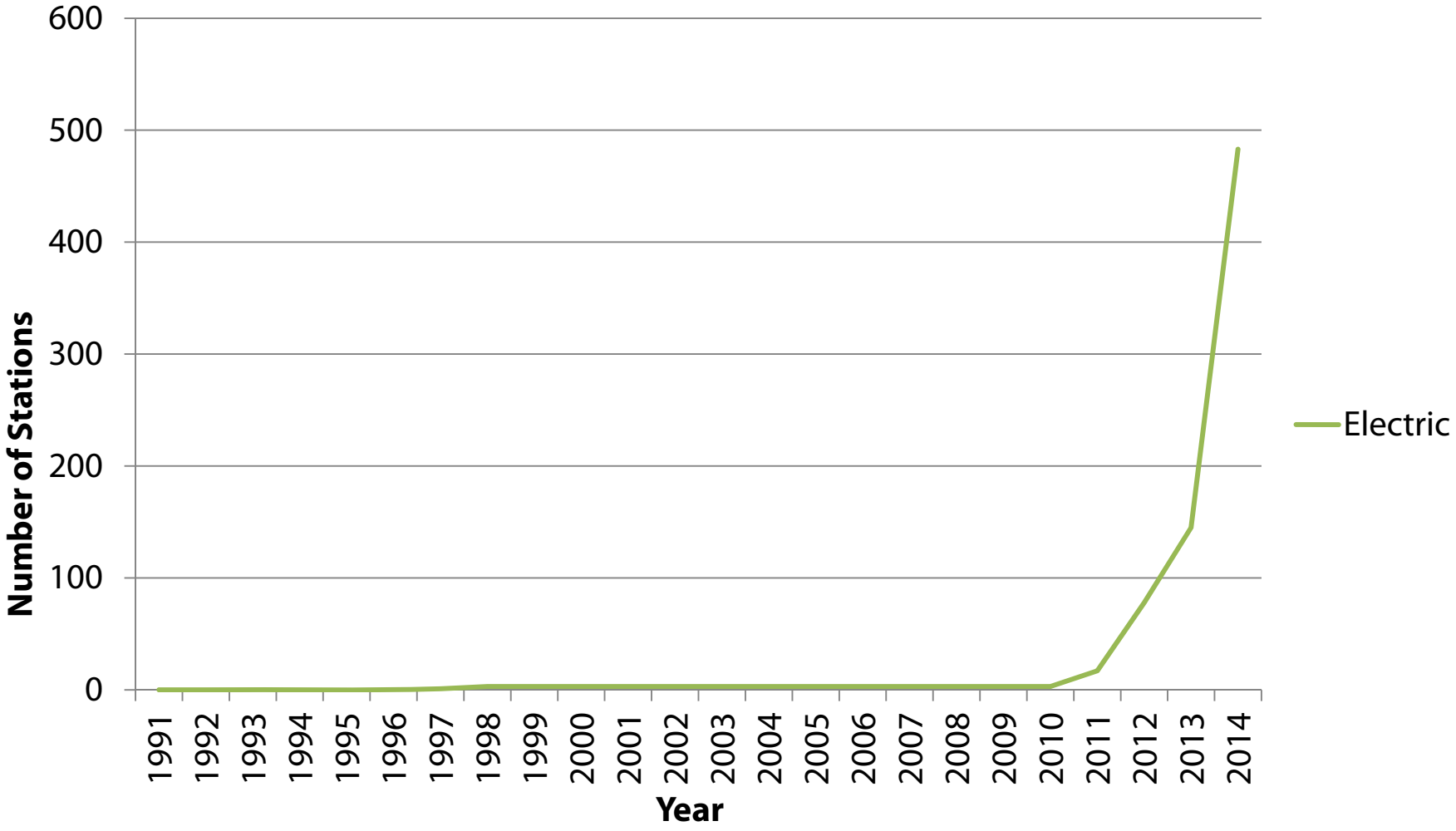
Public EV Charging Infrastructure



Source: Department of Energy Alternative Fuel Data Center (2014) http://www.afdc.energy.gov/

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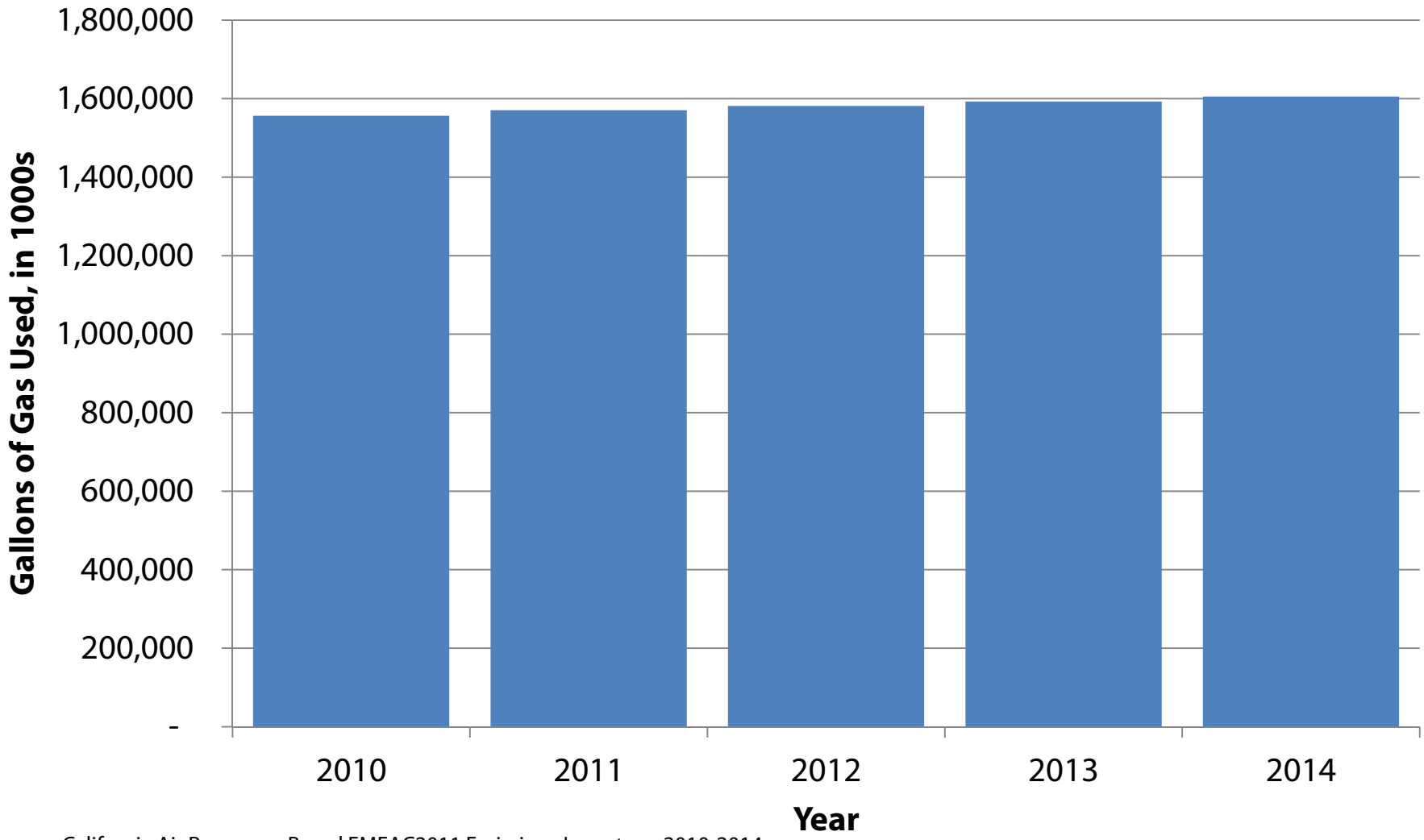
Gasoline Consumption in San Diego County



Source: California Air Resources Board EMFAC2011 Emissions Inventory, 2010-2014

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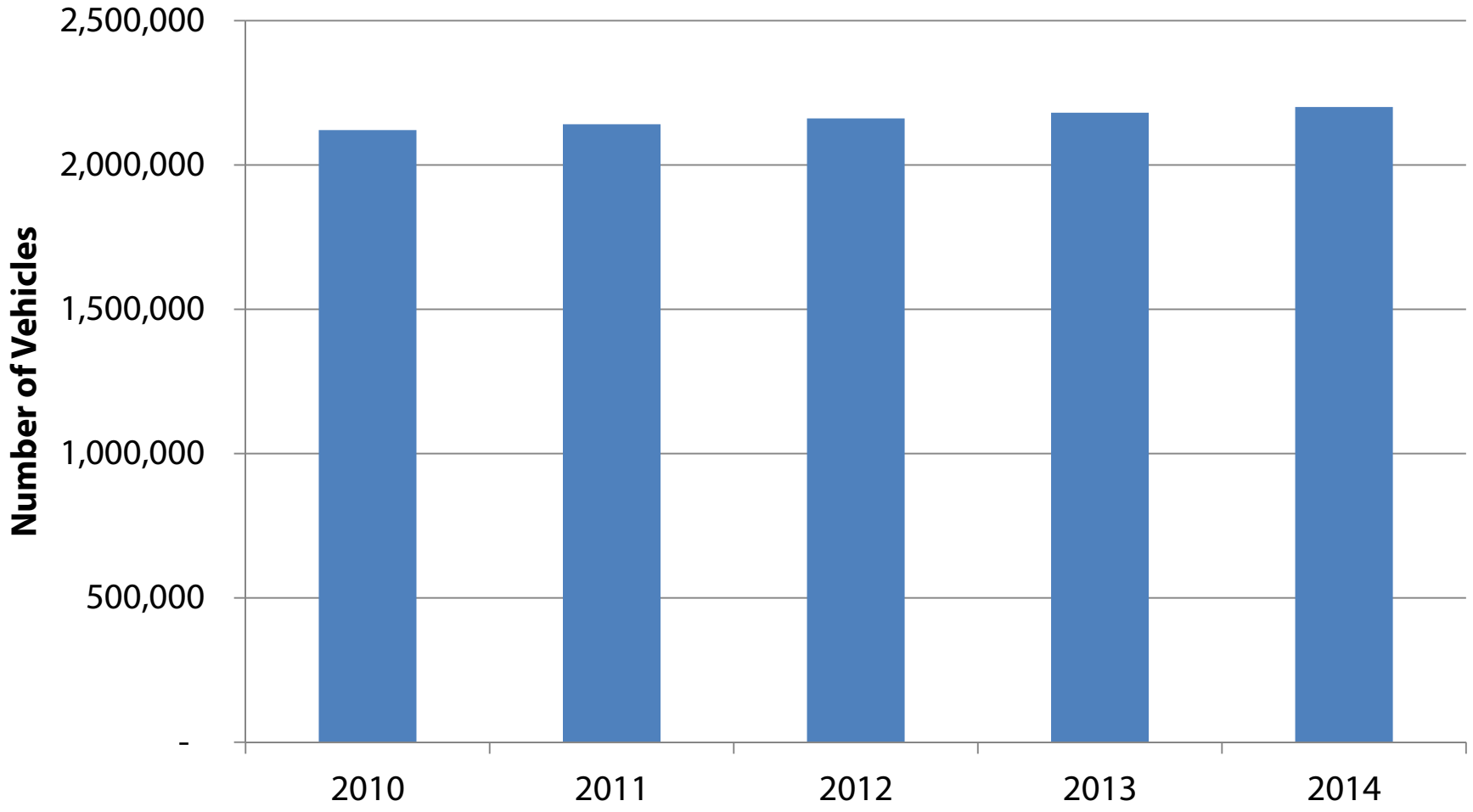
Light-Duty Vehicle Growth

San Diego County, 2010-2014



Source: California Air Resources Board EMFAC2011 Emissions Inventory, 2010-2014

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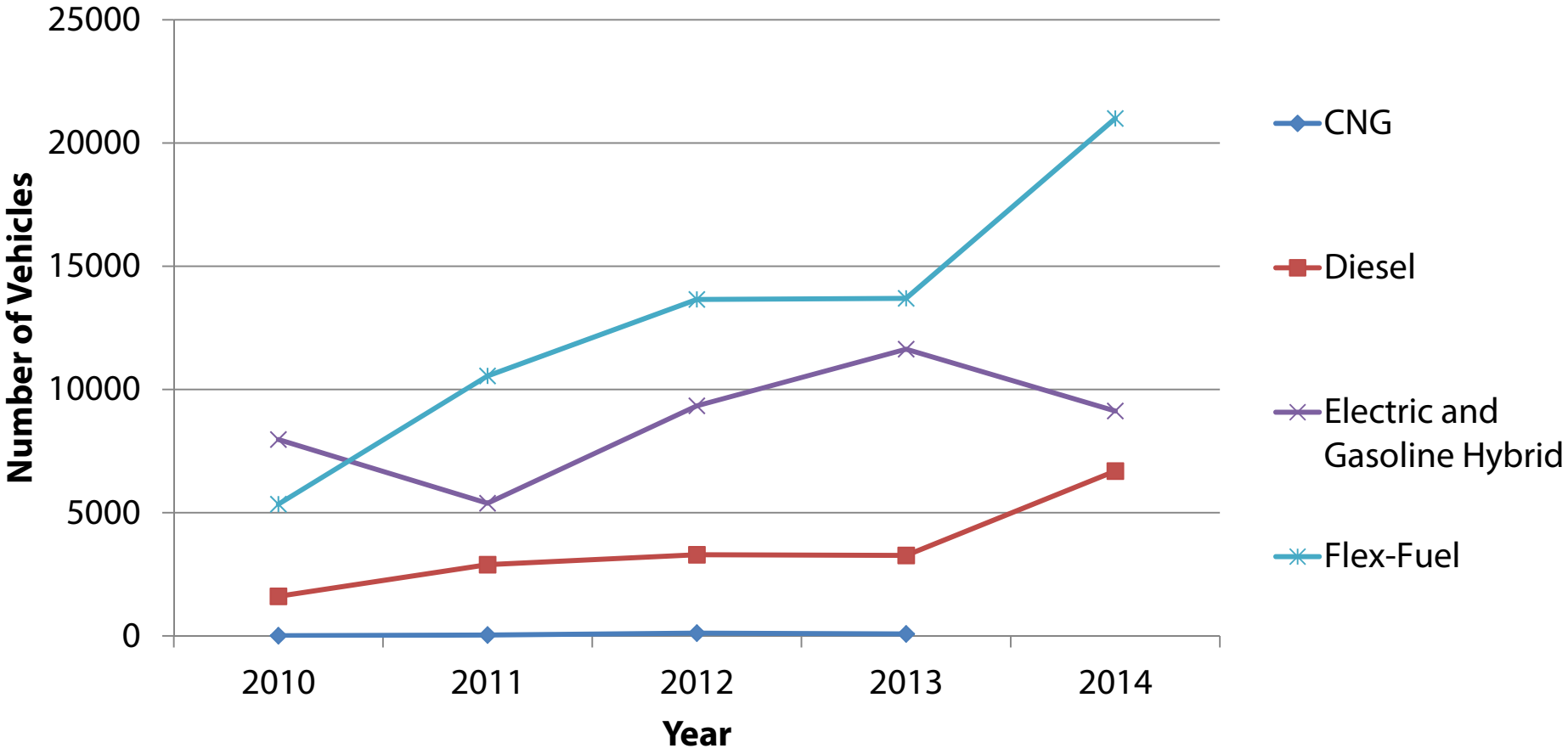
New Alternative Fuel Light-Duty Vehicle Sales

San Diego County, 2010-2014



Source: National Renewable Energy Laboratory analysis, R.L. Polk, POLK_VIO_DETAIL_2014, January 2015.

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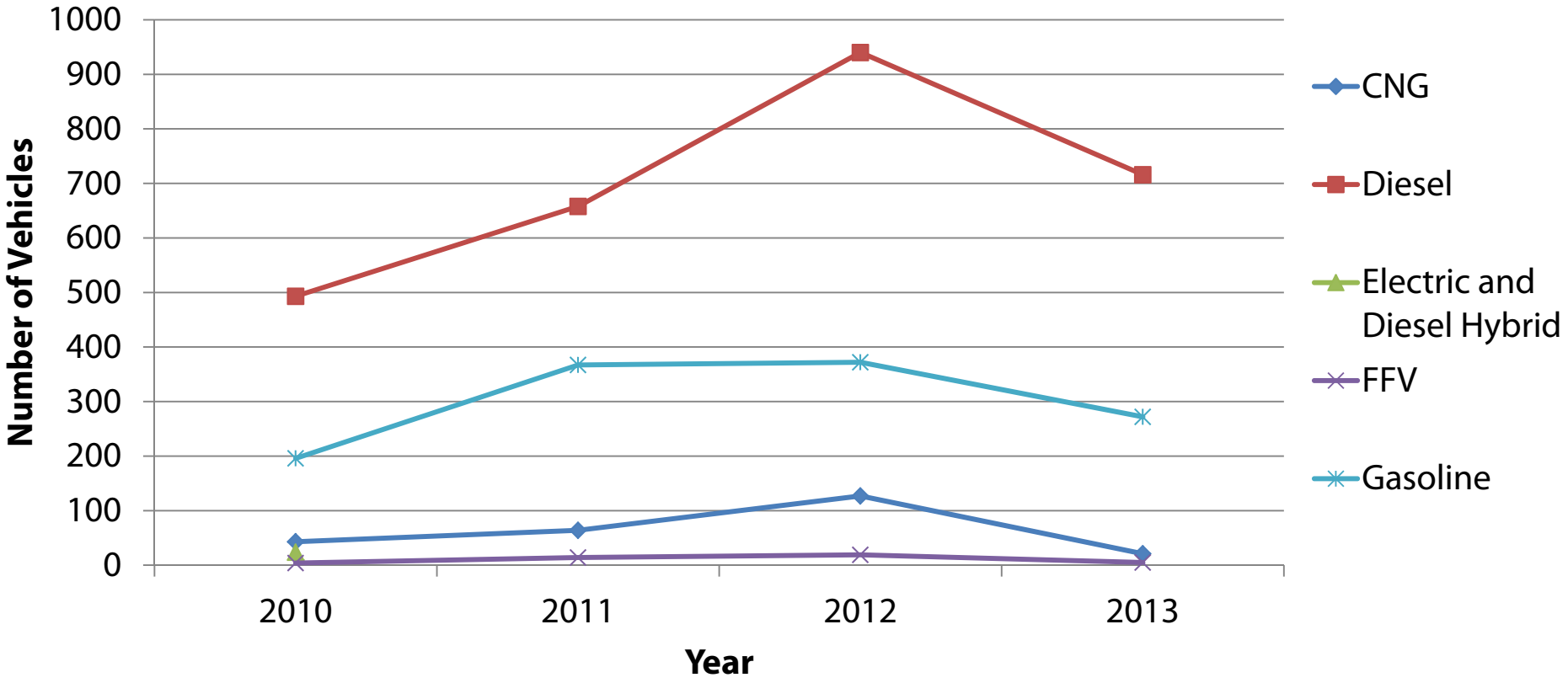
New Alternative Fuel Med- and Heavy-Duty Vehicle Sales

San Diego County, 2010-2013



Source: National Renewable Energy Laboratory analysis, R.L. Polk, POLK_VIO_DETAIL_2014, January 2015.

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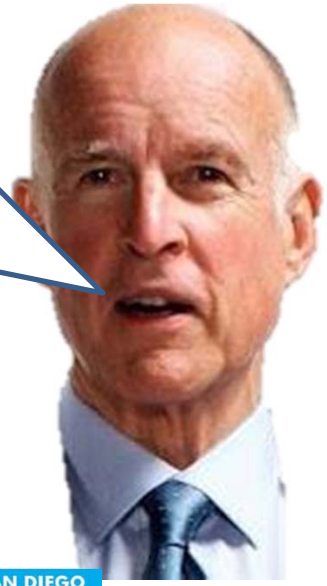
Alternative Fuel-oriented State Policies and Goals

Policy Origin	Objectives	Goals and Milestones
AB 32	GHG Reduction	Reduce GHG emissions to 1990 levels by 2020 and 80% below 1990 levels by 2050
Low Carbon Fuel Standard	GHG Reduction	10% reduction in carbon intensity of transportation fuels in California by 2020
State Alternative Fuels Plan (AB 1007)	Petroleum Reduction	Reduce petroleum fuel use to 15% below 2003 levels by 2020
Bioenergy Action Plan(Executive Order S-06-06)	In-State Biofuels Production	Produce in California 20% of biofuels used in state by 2010, 40% by 2020, and 75% by 2050
AB 2076	Petroleum Reduction	Increase use of alternative fuels to 20% of on-road transportation fuel use by 2020 and 30% by 2030
Integrated Energy Policy Report	GHG Reduction	Increase alternative fuel use to 9% by 2012, 11% by 2017, and 26% by 2022; helps meet AB 1007
Executive Order B-16-2012	ZEV Mandate	Accommodate 1 million zero-emission vehicles by 2020 and 1.5 million by 2025
Energy Policy Act of 2005; Energy Independence and Security Act of 2007	Renewable Fuel Standard	36 billion gallons of renewable fuel used in the US by 2022
Clean Air Act	Air Quality	80% reduction in NOx by 2023
Governor Brown Inaugural Address 2015	Petroleum Reduction	Reduce petroleum use in cars and trucks by up to 50% within the next 15 years (2030)

Adapted from California Energy Commission

“Reduce today’s petroleum use in cars and trucks by up to 50 percent [by 2030].”



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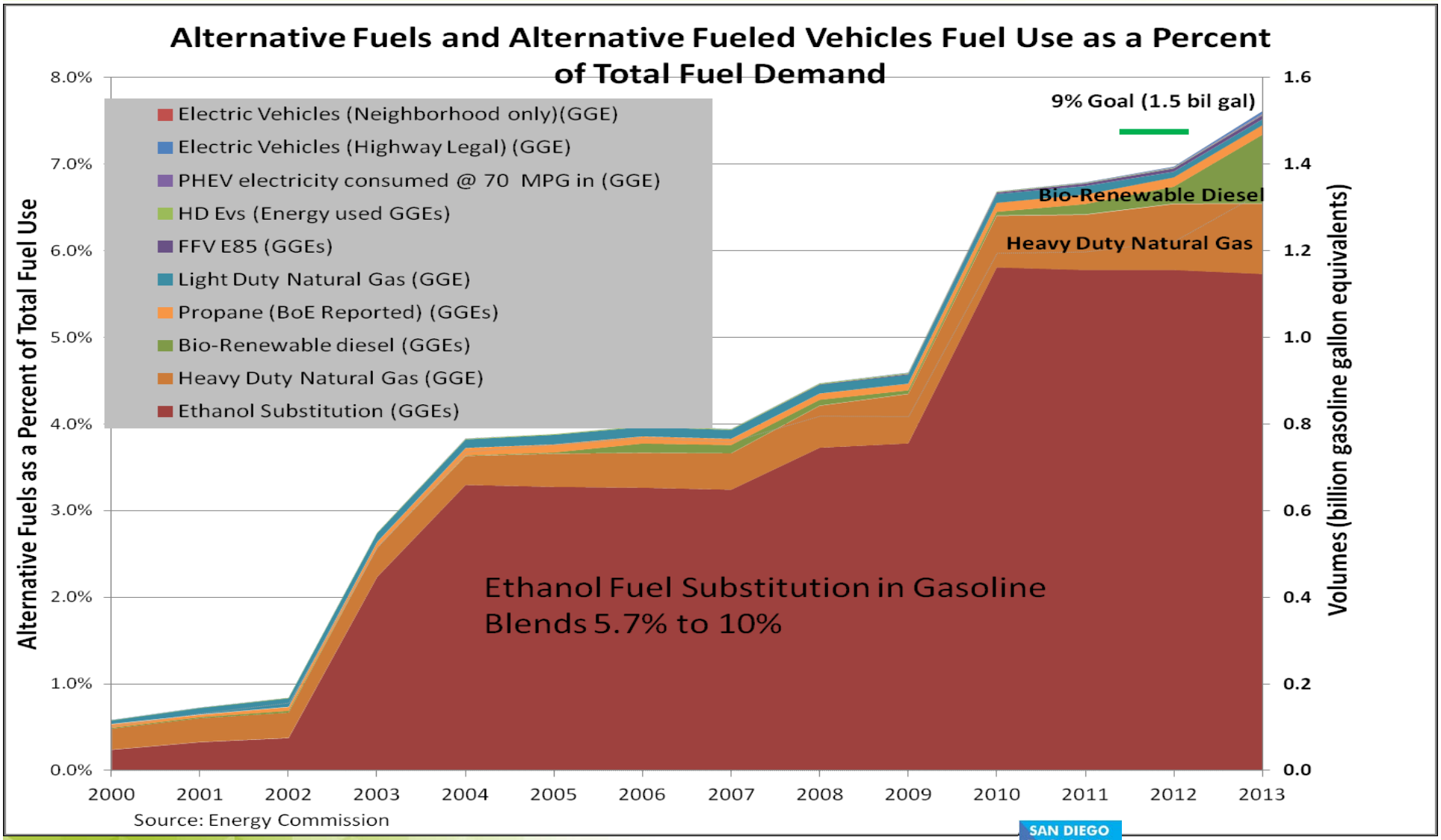
Achieving Our Alternative Fuel Goals



Source: Yowell, Gary. "Historical Trends and Petroleum Reduction Technologies Performance" (2013)

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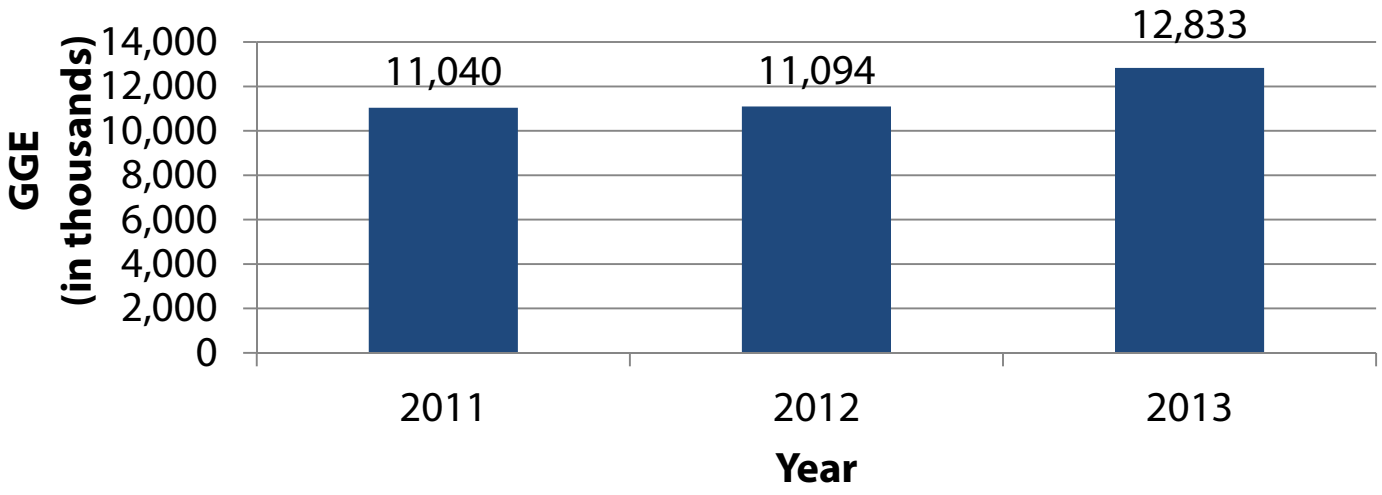
Achieving State Alternative Fuels Plan – San Diego County

Category	2011	2020 Forecasted	2020 Targets	Reductions to Reach Targets
Number of Vehicles	2,684,261	3,235,795		
Gasoline and Diesel Consumption (gal)	1,398,552,571	1,377,129,080	1,236,408,810	140,720,270

Yearly Gallons of Gasoline Equivalent (GGE) Reduced by San Diego Regional Clean Cities Coalition and Stakeholders



140,720,270
needed to reach target vs BAU

13,000,000
already reduced by Clean Cities

127,720,270
left to reduce

Source: *California Motor Vehicle Stock Travel and Fuel Forecast* (MVSTAFF) 2010 Report

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CALGreen Code

Multi-Family Residential	
Mandatory	Make at least 3% of total parking spaces ready for PEVs (through electrical capacity, building plans, etc.). - Developments under 17 units exempt
	Construction documents should show where EVSE are to be located; at least ONE EVSE needs to be located in a common area for use by all residents.
Voluntary	(Tier 1 & Tier 2) Make at least 5% of total parking spaces ready for PEVs (through electrical capacity, building plans, etc.). - Developments under 17 units exempt
Single-Family Residential	
Mandatory	Install raceway and electrical panel capacity to support 40 amp capacity electrical circuit.
Voluntary	(Tier 1 & Tier 2) Install complete 208/240-volt branch circuit at minimum 40 amps.
Nonresidential	
Mandatory	Install electrical panel capacity to support 40 amp capacity electrical circuit.
	If there are more than 50 parking spaces, at least 1 or more must be ready for PEVs,
Voluntary	(Tier 1) At least 4% of parking spaces must be ready for PEVs.
	(Tier 2) At least 6% of parking spaces must be ready for PEVs.

Source: State of California. Revision Record for the State of California: Supplement 2013 Title 24, Part 11, California Green Building Code. 1 July 2015. https://www.iccsafe.org/cs/codes/Errata/State/CA/5570S133.pdf

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Municipal Alternative Fuel Goals

Jurisdiction	CAP Year	Alternative Fuel Goals
Carlsbad	2014	Promote an increase in the amount of ZEV miles traveled from a projected 15% to 25% of total vehicle miles traveled by 2035.
		Increase the proportion of fleet low and zero-emissions vehic
Chula Vista	2008	100% clean vehicle replacement policy for city fleet.
		100% clean vehicle replacement policy for city-contracted fle
Encinitas	2011	Obtain alternative fuel and more fuel efficient fleet vehicles f
National City	2011	Develop streamlined permitting requirements and standardiz charging stations.
		Continue to integrate alternative transportation fuels and veh tors.
Port of San Diego		ueled, electric, o rgo equipment).
San Diego (City)		es in the municipal fleet to 50% by 2020 and 90% by 2035.
		unicipal solid waste collection trucks to compressed natural gas or other
		of 6,000 charging stations by 2020 and 30,000 by 2035, sufficient to support miles driven by 2020 and 25% by 2035.
San Diego (County)		purchase, led by the community.
		1% municipal fleet greater efficiency per year 2013-2020.
San Marcos	2013	Reduce GHG emissions associated with the City's vehicle and equipment fleet by 15% below 2005 levels by 2020 and 21% below 2005 levels by 2030. Have a total of 12 vehicle replaced by 2006 and 2030.
		Achieve a 2 percent reduction in light-duty vehicle emissions above Advanced Clean Car Standards in 2020 and a 5% reduction in 2030. Achieve a switch of 10% of heavy-duty vehicles to alt fuels by 2020 and 20% switch to alt fuels by 2030.
		5% of construction vehicles and equipment utilize new technologies, CARB-approved low carbon fuel, or are electrically-powered by 2020 and 15% by 2030.
UC San Diego	2008	Replace gasoline-powered vehicles with alternatively-fueled vehicles.

Increase the number of zero-emission vehicles in the municipal fleet to 50% by 2020 and 90% by 2035. (City of SD)

Reduce City's vehicle fleet GHG emissions by 15% below 2005 levels by 2020. (City of San Marcos)

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CEC Awards Given to San Diego County

PON #	PON Name	Date Released	Total Amount Available	Amount Awarded to SD County
11-601	Biofuels Production Facilities	1/11/2012	$46,423,263	$3,153,657
11-602	Alternative Fuels Infrastructure: Electric, Natural Gas, Propane, E85 & Diesel Substitutes Terminals	2/8/2012	$30,210,000	$1,737,234
			Electric: $9,746,468	$1,624,734
			E85: $1,350,000	$112,500
12-605	Natural Gas Fueling Infrastructure	11/29/2012	$5,741,381	$897,471
13-603	Alternative Fuel Readiness Plans	8/12/2013	$2,275,080	$300,000
13-605	Centers for Alternative Fuels and Advanced Vehicle Technology	8/23/2013	$3,533,526	$272,263
13-606	Electric Vehicle Charging Infrastructure	11/8/2013	$13,669,928	$1,122,855
13-607	Hydrogen Refueling Infrastructure	11/22/2013	$40,598,814	$1,451,000
14-603	Zero Emission Vehicle (ZEV) Readiness	9/9/2014	$3,300,000	$300,000
	**PON: Program Opportunity Notice*		**$145,751,992**	**$9,234,480**

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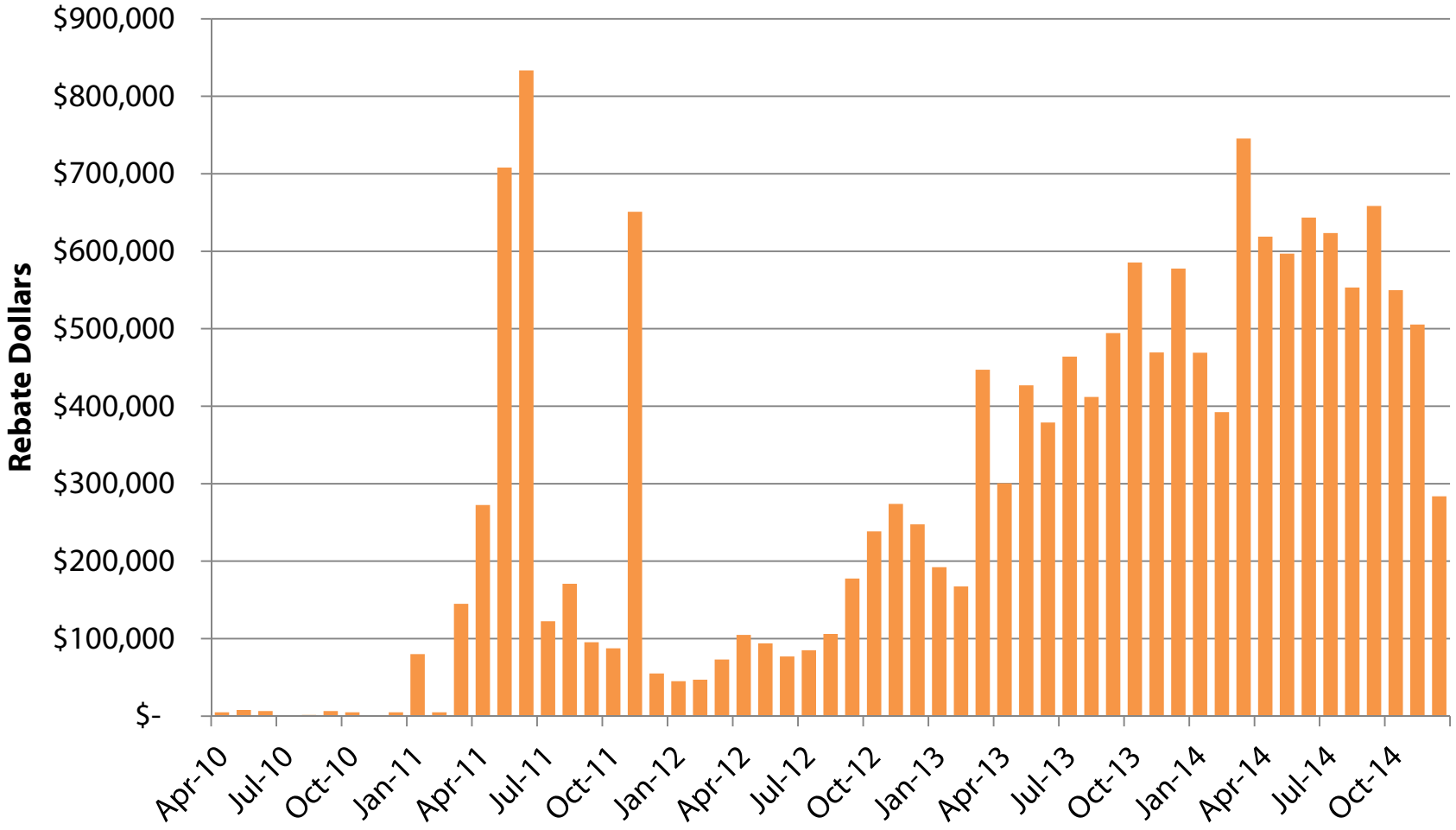
CVRP Funding in San Diego County



Total: >7,400 EVs; $16.8 million

Source: Center for Sustainable Energy (2015). California Air Resources Board Clean Vehicle Rebate Project, Rebate Statistics. Data last updated December 16, 2014. Retrieved December 16, 2014 from http://energycenter.org/clean-vehicle-rebate-project/rebate-statistics

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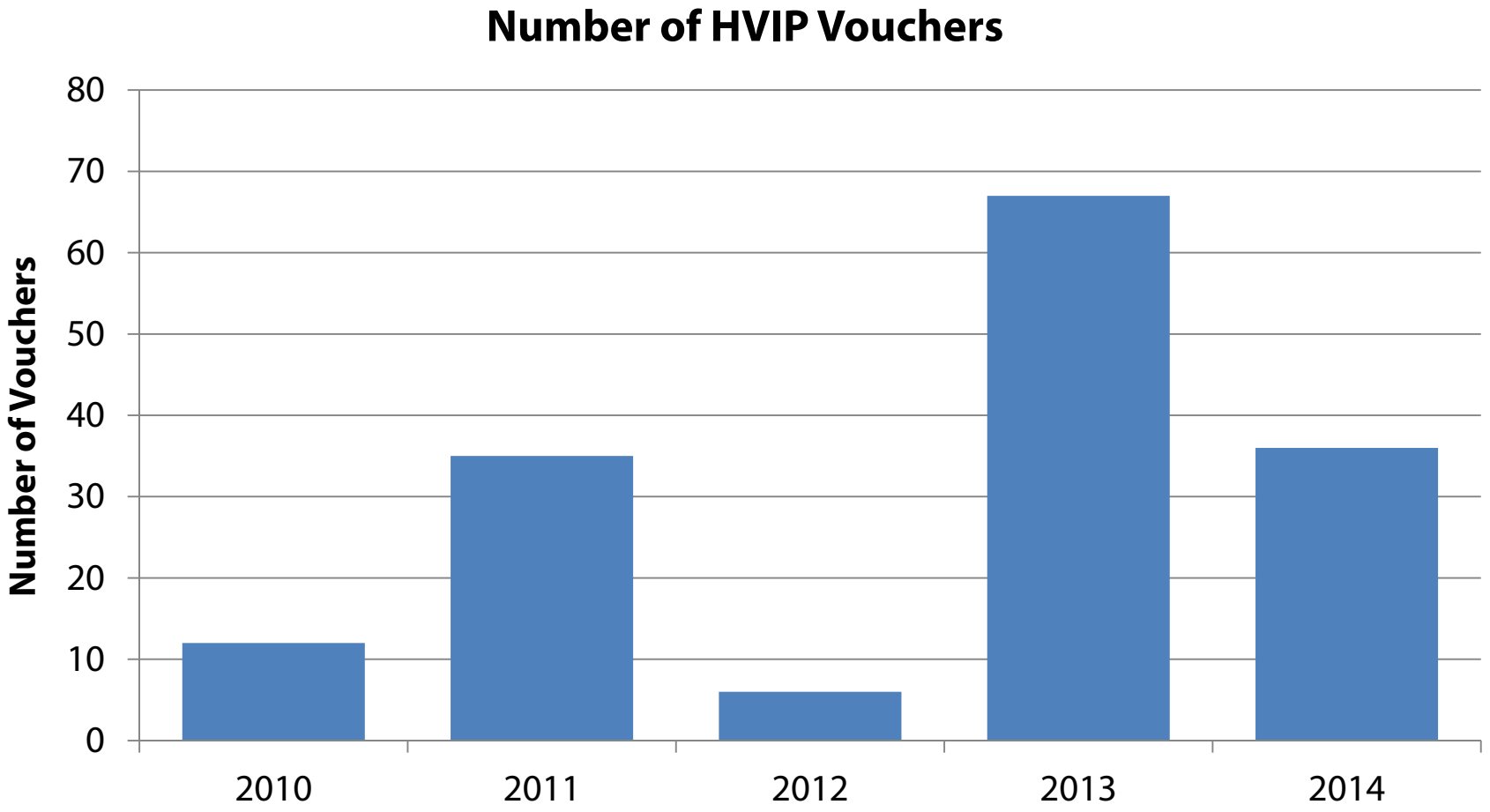
California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)

San Diego County



Total: 169 Vehicles; $4.9 million

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San Diego County APCD Funds

Proposition 1B Goods Movement Emission Reduction Program (GMERP)

GMERP	Diesel	CNG	Propane	Total
Truck Replacement	434	20	0	454
Truck Repower	0	0	47	47
Retrofit w/ Diesel Particulate Filter	70	0	0	70
Marine Repower	3	0	0	3
Total				**574**

- Goal: reduce air pollution emissions and health risks that come from freight movement in CA.
- Funds retrofits, replacements, and repowers
- Total: $22.6 million since 2009

Carl Moyer Voucher Incentive Program (VIP)

Carl Moyer	Diesel	CNG	Propane	Total
Truck Replacement	212	0	0	212

- Goal: Allows smaller fleets to quickly replace or retrofit old, diesel engines.
- Total: $3 million/yr

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Alternative Fuel Training

Workforce/Technical

- Biodiesel (2) – One-day training and Biodiesel fuel making courses
- Natural Gas (4) – One-day engine technical training
- Electricity (on-going) – SD Electrical Training Trust & Cuyamaca College offer Electric Vehicle Infrastructure Training Program
- Miramar College Advanced Transportation Technology and Energy program – ongoing classes for students to learn about advanced transportation technology

First Responder

- Training for tow-truck drivers on alt fuel vehicles
- SD regional fire personnel training

Municipal Staff

- Electricity – One training in 2012 as part of Readiness Planning
- Clean Cities seminars
- Future – ZEV Implementation Project to help train local gov. officials

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Survey Results

1. How familiar are you with the following alternative fuels: not familiar at all, slightly familiar, somewhat familiar, moderately familiar, or extremely familiar? Extremely familiar would mean that you would feel comfortable explaining basic information about the fuel and/or have used the fuel.

	Not at all familiar	Slightly familiar	Somewhat familiar	Moderately familiar	Extremely familiar
Biodiesel	0 0.0%	3 33.3%	2 22.2%	3 33.3%	1 11.1%
Electricity	0 0.0%	0 0.0%	0 0.0%	2 22.2%	7 77.8%
Ethanol (E85)	1 11.1%	2 22.2%	4 44.4%	1 11.1%	1 11.1%
Hydrogen	1 11.1%	2 22.2%	4 44.4%	2 22.2%	0 0.0%
Natural Gas (LNG/CNG)	0 0.0%	2 22.2%	4 44.4%	2 22.2%	1 11.1%
Propane (LPG)	2 22.2%	1 11.1%	3 33.3%	2 22.2%	1 11.1%

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Survey Results

What types of resources can we provide

	Very undesirable	Undesirable	Neutral	Desirable	Very desirable
Fact sheets or reference guides on general information about alternative fuels	0 0.0%	0 0.0%	3 33.3%	3 33.3%	3 33.3%
Case studies of jurisdictions or private fleets that use alternative fuels	0 0.0%	0 0.0%	1 11.1%	3 33.3%	5 55.6%
Guidance on availability of funding for alternative fuel vehicles and infrastructure installation projects	0 0.0%	0 0.0%	0 0.0%	0 0.0%	9 100.0%
Sample permits and zoning codes for alternative fuel infrastructure	0 0.0%	0 0.0%	3 33.3%	2 22.2%	4 44.4%
Webinars or in-person workshops on specific alternative fuels	0 0.0%	0 0.0%	2 22.2%	4 44.4%	3 33.3%
A telephone or online help line to get specific alternative fuel questions answered	0 0.0%	0 0.0%	5 55.6%	2 22.2%	2 22.2%

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Conclusion/Next Steps

- More survey data, more vehicle data
- What other information can be provided to help you better understand regional transportation energy use?

- Full assessment report for March meeting

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Alternative Fuels: Barriers Table

January 15, 2015

Jessica Jinn

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Icon Key

Biodiesel

Ethanol

Natural Gas

Electricity

Hydrogen

Propane

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Education

1. Lack of Public Knowledge on Alternative Fuels

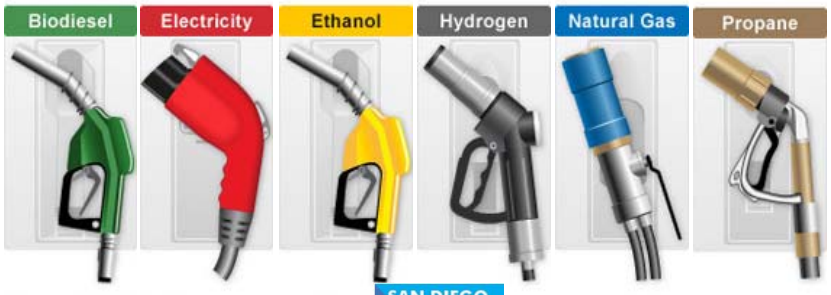
- Lack of knowledge and misconceptions about alternative fuels and advanced vehicle technology.
- Additional education on hydrogen is needed since it is a newer vehicle technology.

Barrier pertains to:

2. Training and Education for Municipal Staff

- Lack of knowledge about alternative fuels and advanced vehicle technology.
- Need for education on procedures for servicing AFVs.
- Additional education on hydrogen is needed since it is a newer vehicles technology.

Barrier pertains to:



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Education

3. Training and Education for Emergency Personnel and Transportation Fleet Staff

- Lack of safety and technical training for AFVs and AFI.

Barrier pertains to:

4. TOU Utility Rates

- Need to discourage charging when electricity supplies are in high demand and cost more. Support of time of use (TOU) pricing.

- High demand charges that impact EVSE host utility bills. Expensive metering options to access TOU rates.

Barrier pertains to:

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Alternative Fuel Infrastructure

5. Station Development: Codes & Permitting

- Need for increased guidance on EVSE. Propane, natural gas, and hydrogen station installation process.
- Direction on how city staff and station developers can work together to ease station deployment process.

Barrier pertains to:

6. Station Development: Site Assessment

- Station developers have come across right of way and easement issues
- Stations should be located along fleet routes.

Barrier pertains to:

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Alternative Fuel Infrastructure

7. Access to Public Alternative Fuel Stations

- Lack of AFV adoption due to limited infrastructure near where fleets need to refuel.
- Lack of station access for heavy-duty vehicles.

Barrier pertains to:

8. EVSE at Multi-Unit Dwellings

- Consumer lack of knowledge regarding EVSE installation in these buildings. Need to educate and work with HOAs to identify and find solutions to unique building challenges.

Barrier pertains to:

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Alternative Fuel Infrastructure

9. Workplace Charging

- Lack of understanding regarding benefits and approaches to workplace charging.

Barrier pertains to:

10. Infrastructure Costs

- Lack of capital for station construction and operation costs.
- Who pays for the upfront costs of the infrastructure? The grantee, ratepayer or end user.
- Risk of investment.
- Need justification/incentives for higher costs to build stations.
- Need partners to justify investment.

Barrier pertains to:

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Alternative Fuel Vehicles

11. Selecting Appropriate AFVs

- Advise municipal staff and businesses on isolating alternative fuels that will meet fleet needs.

Barrier pertains to:

12. Procuring and Financing AFVs

- Initial higher costs of AFVs barrier to adoption.

Barrier pertains to:

Alternative Fuel Vehicles

13. Converting Conventional Vehicles to an Alternative Fuel

- Lack of understanding on the regulations, conversion kits available or companies that provide retrofit services.

Barrier pertains to:

14. AFV Technology

- AFVs lifespan and range (mainly for EVs) in some cases is not competitive with conventional vehicles.

- Technology will keep improving, people not making the investment until technology improves.

Barrier pertains to:

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