

# Renewable Energy in the 50 States: Western Region



# Acknowledgements

## About ACORE



ACORE, a 501(c)(3) non-profit membership organization, is dedicated to building a secure and prosperous America with clean, renewable energy. ACORE seeks to advance renewable energy through finance, policy, technology, and market development and is concentrating its member focus in 2015 on National Defense & Security, Power Generation & Infrastructure, Transportation, and International Initiatives. Additional information is available at [www.acore.org](http://www.acore.org).

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Crowell & Moring's multi-service Energy Group handles regulatory and transactional matters, as well as litigation, compliance, and enforcement proceedings on behalf of renewable energy companies across the United States.

**Introduction Authored by:** Nancy Saracino, Jack Stoddard, and Cameron Prell

## Special Thanks

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## About this Report

This report contains high-level summaries about renewable energy in each of the western states, including information about energy production, installed capacity, economic development, state policies, regulatory issues, and other factors shaping market development. States profiled include Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The report is a living document that will continue to evolve with updates and periodic revision.

Each state summary contains the following information:

- ▶ **Electricity Generation by Source:** Percentage of generation from each electricity source during the last full calendar year. Total electricity generated is represented in terawatt hours (TWh). Source: Energy Information Administration (EIA), *Electricity Monthly Update*.
- ▶ **Renewable Electric Capacity:** Total nameplate capacity of renewable energy projects in operation at the end of the last calendar year and the year prior. Capacity is represented in megawatts (MW). Sources: Lawrence Berkeley National Laboratory, *Wind Technologies Report*; Solar Energy Industries Association (SEIA); EIA, *Form EIA-860 detailed data*; Geothermal Energy Association, *Annual US Geothermal Power Production and Development Update*.
- ▶ **Renewable Transportation:** Total operating ethanol and biodiesel production capacity at the end in the last calendar year and cumulative installed clean fueling stations. Biofuel production capacity is represented in millions of gallons per year (mGy). “Clean fueling stations” includes public facilities that offer biodiesel, 85% ethanol (E85), and/or hydrogen, as well as electric vehicle charging outlets. Sources: Renewable Fuels Association, *Ethanol Industry Outlook*; EIA, *Monthly Biodiesel Production Report*; U.S. Department of Energy Alternative Fuels Data Center, *Alternative Fueling Station Counts by State*.
- ▶ **Private Sector Investment:** Annual asset finance, venture capital, and private equity investment in the last two calendar years and the first half of the current year. Indicates the grossed-up estimates for completed, Bloomberg New Energy Finance (BNEF)-tracked deals. Represented in millions of U.S. dollars. Venture capital and private equity transactions reflect new investment in renewable energy technology and early stage companies. Asset finance transactions reflect the funds committed for newly built renewable energy projects, including debt and equity finance and funding from internal company balance sheets. Source: BNEF.
- ▶ **Policies and Other:** Renewable portfolio standard (RPS) target and technology carve outs; net metering policy; notable state financial incentives; Environmental Protection Agency (EPA) Clean Power Plan reduction targets (states have a choice to meet emissions rate, mass, or mass plus new source complement targets); and the regional transmission organization (RTO) or independent system operator (ISO) operating in state. Sources: Database of State Incentives for Renewables & Efficiency (DSIRE), EPA, BNEF, state government websites.

*Please note that this report contains research and data from well-cited, reliable sources that have not been independently verified by ACORE. The report does not attempt to forecast industry success or failure and should not be used to make decisions on project development or for legal advice.*

# Acronyms

**CAISO:** California Independent System Operator

**CPP:** Clean Power Plan

**EIM:** Energy imbalance market

**EPA:** Environmental Protection Agency

**GW(h):** Gigawatt (hour)

**H1:** First half of a calendar year

**IOU:** Investor-owned utility

**ISO:** Independent system operator

**kW(h):** Kilowatt (hour)

**MGY:** Millions of gallons per year

**MISO:** Midcontinent Independent System Operator

**MW(h):** Megawatt (hour)

**NEM:** Net energy metering

**PACE:** Property-assessed clean energy

**PUC:** Public utility commission

**PURPA:** Public Utilities Regulatory Policy Act

**PV:** Photovoltaic

**REC:** Renewable energy credit

**R&D:** Research and development

**RPS:** Renewable portfolio standard

**RTO:** Regional transmission organization

**SPP:** Southwest Power Pool

# Introduction: Renewable Energy in the West

**Authors: Nancy Saracino, Jack Stoddard, and Cameron Prell, Crowell & Moring LLP**

Dynamic changes in markets and policy continue to create opportunities and present challenges for renewable generation in the western United States. Renewable supply in western states has continued to increase rapidly as a result of state and federal policy initiatives. In order to integrate further increases in renewable capacity, regulators are looking to increase energy storage and flexible demand response capacity, which can help smooth the intermittency inherent in wind and solar as well as reduce the need to curtail production during periods of oversupply.

It is increasingly evident that the electric grids of western states are interdependent and complementary. To take fullest advantage of renewable supplies, fully utilize existing transmission infrastructure and manage costs to ratepayers, grid operators and regulators are looking to move towards an integrated western grid. In 2014, PacifiCorp and the California ISO launched a regional real-time balancing market, known as the Energy Imbalance Market or EIM. NV Energy will join the EIM in November 2015 and Arizona Public Service and Puget Sound Energy are slated to join in 2016.

The recently adopted EPA Clean Power Plan may serve as an additional catalyst for further regional coordination. Although states can adopt individual compliance plans, they have latitude to propose regional solutions, which could be more cost effective than state-by-state proposals.

With residential customers continuing to turn to rooftop solar, western states are grappling with the financial and political challenges presented by increasing reliance on distributed generation. Regulators will be faced with important policy decisions in rate making proceedings in 2015 and 2016 that will have a big influence on the future rate of growth of distributed solar.

California continues to push policies that will drive new development opportunities for renewables, and given the size of electricity demand in California, these policies create new potential for renewable and transmission development throughout the West. Governor Brown has taken an aggressive position with respect to carbon reduction by establishing an interim greenhouse gas reduction target of 40% below 1990 levels by 2030 and a long range target of 80% below 1990 levels by 2050. California is currently on track to reduce its greenhouse gas emissions to 1990 levels by 2020, as required under current law.

Meanwhile, the California legislature recently passed legislation to increase California's renewable portfolio standard to 50% by 2030. Given the size of the California market, the 50% RPS mandate will mean new rounds of renewable project development in California and neighboring states, which will present further cause for robust regional coordination.

## WESTERN ENERGY IMBALANCE MARKET YIELDS PROMISING RESULTS

The data from the EIM market operation to date indicates that it is delivering on its promise of reliability, economic, and renewable integration benefits. These benefits can also be translated into greenhouse gas reductions. The California Independent System Operator, which operates the EIM, estimated in a recent report that the first eight months of market operations with just one EIM participant, PacifiCorp, avoided 1,553 metric tons of CO<sub>2</sub> emissions by reducing renewable curtailment.

The EIM results in cost savings because it allows the grid operator to move energy to where it is needed to manage imbalances in load and generation. For example, when California is faced with excess supply, the ISO



can use the excess to balance load in PacifiCorp's Nevada service area. In addition, resources are dispatched more efficiently than is possible with manual hour-ahead dispatch. The EIM takes into account forecasts, outages, prices and transmission constraints for generation resources of all participating members, and makes decisions every five minutes about which generation resources can best meet demand most cost effectively. This sophisticated optimization of resources simply is not possible without an integrated market. Quicker adjustments also mean lower costs for renewable integration. A 2014 study conducted to evaluate the potential benefits of Puget Sound Energy (PSE) joining the EIM estimated that, by 2020, PSE would save \$9 million a year in wind integration costs. The study estimated that PSE would also realize \$18-\$20 million a year in benefits by 2020, due to lower resource reserves, enhanced flexibility, and greater generation dispatch savings. The study further found that current EIM participants would benefit by \$3.5-\$4 million a year as a result of PSE joining the market.

With NV Energy joining the market this year, and with both Portland General Electric and Idaho Power announcing in September of 2015 that they intend to explore joining the EIM, the next 12 months will be important to evaluating whether the market continues to deliver benefits and moderate the excess supply situation that is beginning to emerge with more renewable generation coming onto the grid.

The ISO and PacifiCorp are also exploring moving past the EIM to a fully integrated western energy market. In October 2015, the two entities issued a report that indicates cost reductions ranging from \$3.4 to \$9.1 billion in the first 20 years of the market through better grid management and efficiencies gained by collective planning for resource needs. A fully integrated market would provide even greater opportunities than under the EIM for regional dispatch of renewable resources, and the study describes benefits associated with reduced curtailment of renewable energy, and lower overall costs to build new renewable resources.

## IMPLEMENTATION OF CLEAN POWER PLAN IN THE WEST

On August 3, 2015, the U.S. EPA released the final version of its Clean Power Plan, a first-of-its-kind federal regulation of carbon dioxide emissions from existing fossil fuel-fired power plants under Section 111(d) of the Clean Air Act. As designed, the final Clean Power Plan mandates that each state develop a plan by 2016 to reduce the carbon intensity of its generation portfolio by 2030. Each reduction target is different, and states have great flexibility to develop a compliance plan that suits their particular energy market and policy needs, including fuel switching, increased deployment of clean energy or energy efficiency, and utilization of interstate emissions trading.

The Clean Power Plan (CPP) regulates CO<sub>2</sub> emissions in the state in which they occur, meaning highly carbon-intensive states have a proportionally greater compliance obligation than lower carbon-intensive states. This poses a unique challenge for many western regulators. Utilities in western states with stringent compliance goals may have renewed interest in siting clean energy generation in-state or purchasing trading instruments from other states. The Clean Power Plan is designed to give states incentive to adopt trading-ready plans that use common metrics, standards and criteria. A de facto form of regional cooperation is likely to emerge among all trading-ready states, which could translate into greater energy market coordination.

California will play a pivotal role. It has the nation's only economy-wide cap-and-trade program, imports a substantial amount power, and does not have a stringent compliance obligation under the new law. To develop a "trading-ready" plan, California will have to navigate several differences between what could serve as a potential Clean Power Plan emissions trading platform and the state's current carbon market, which applies to types of entities and also applies to imported power. However, given the interdependency of the western grid, it is likely that western states will explore development of a regional, rather than state-by-state, compliance plan. There are strong incentives for states throughout the western interconnection to cooperate on resource planning, transmission infrastructure, and development of a common emissions trading infrastructure. A

regional plan would likely be more cost effective and enable states to access higher-impact and lower-cost carbon reductions in other states.

## **DISTRIBUTED SOLAR AND UTILITIES CONTINUE TO BATTLE OVER NET METERING**

Over the past couple of years, regulators in western states have increasingly been confronted by battles over Net Energy Metering (NEM) rules between distribution utilities and companies selling rooftop solar. Solar developers strongly support extension of existing NEM programs as critical to helping states achieve renewable, solar, and distributed generation mandates and argue that benefits provided by distributed solar exceed the costs. Distribution utilities, conversely, argue that NEM, as presently structured, results in inefficient cross-subsidies to customers with rooftop solar systems, to the detriment of those without. To address this concern, utilities have advocated for caps on the amount of capacity that can participate in NEM, for lower rates paid for power provided by NEM systems, and for fixed fees to reflect the costs of maintaining the grid.

In Nevada, the newest battleground in the rooftop solar wars, new installations of solar ground to a halt when the state reached its statutorily imposed 235 MW cap, four months ahead of schedule. NV Energy, meanwhile, submitted a proposal to restructure NEM rate design under which NEM customers could elect to either: (1) pay additional demand, service and energy charges intended to reflect costs incurred on their behalf; or (2) pay and be paid on a time-of-use basis. Nevada regulators, however, maintained the existing NEM framework at least through the end of 2015.

In Arizona meanwhile, the Arizona Corporation Commission is holding hearings on utility proposals to more than triple the existing fixed charge on customers with rooftop solar. In addition, a solar developer is suing the Salt River Project for new demand and distribution charges averaging \$50 for customers with new rooftop solar systems. Arizona is currently on track to meet its target of 6% renewables by 2016.

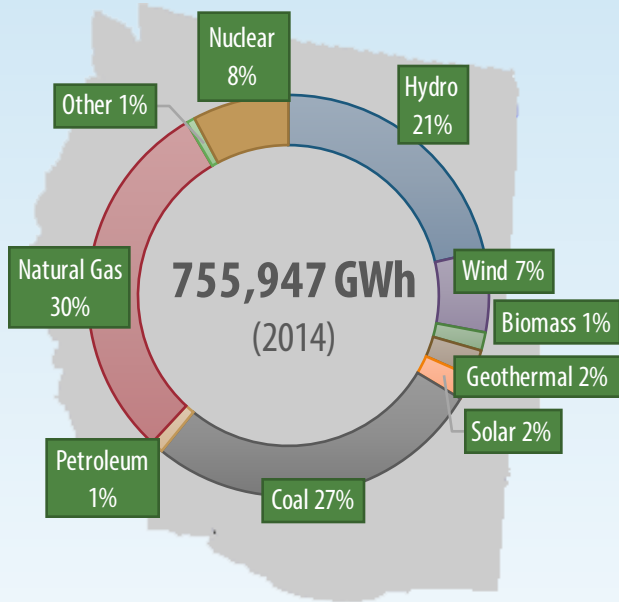
In California, the three major investor-owned utilities proposed in August 2015 to reduce net metering rates paid to residential customers while adding new monthly charges for access to the grid. The California Public Utilities Commission is scheduled to rule on the proposals and approve a new NEM tariff by the end of 2015. Under current law, the new tariff will take effect on July 1, 2017 or when rooftop solar participating in NEM reaches 5% of aggregate customer peak demand, whichever comes first.

In Hawaii, which recently enacted a mandate to reach 100% renewables by 2045, regulators have reached a decision on NEM. The Hawaii NEM program was argued to be unsustainable because it compensated NEM customers at Hawaii's retail rates, which are among the highest in the country. In October 2015, the Hawaii Public Utility Commission replaced its existing net metering program with two new customer options for customers with distributed renewable generation onsite: (1) a "Grid-Supply" program under which the customer will be compensated for excess power at a rate that is approximately half the rate paid under the prior NEM program; (2) a "Self-Supply" program that provides for streamlined review and interconnection of new systems and allows for incorporation of energy storage devices but does not compensate the customer for excess generation. Under either program, customers will be required to pay a minimum utility bill of \$25. The PUC also directed HECO to develop a time-of-use tariff to encourage customers to use energy in the middle of the day in order to consume Hawaii's surplus of low cost solar energy. The decision has been met by criticism from the solar industry and a lawsuit from a solar industry association.

It remains to be seen how regulators will balance utility concerns about the costs of net metering against distributed solar's contribution to state renewable mandates. Due to significant decreases in the cost of solar panels since NEM programs were first established, regulators may conclude that some amount of NEM rate reform will not hamper continued growth of distributed solar. Other states may choose a compromise solution and couple partial rate reform with removal of caps on aggregate NEM capacity.



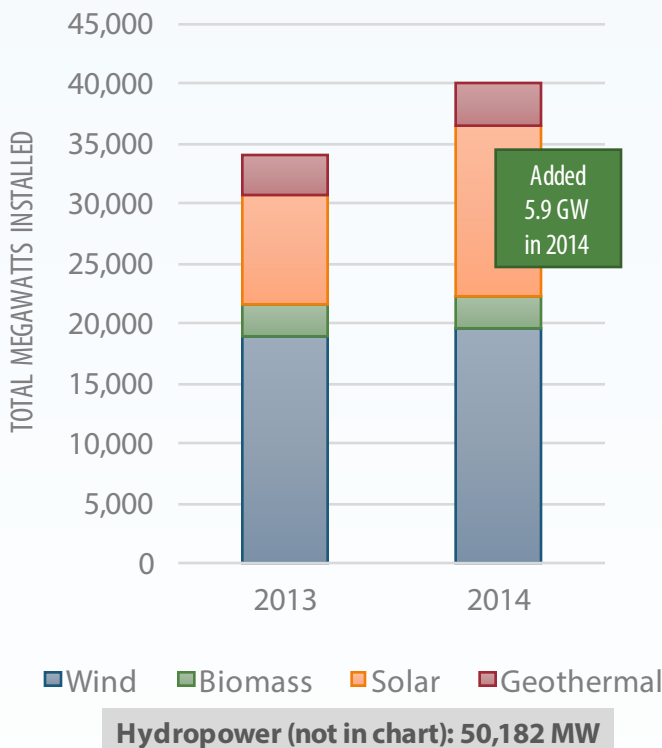
# RENEWABLE ENERGY IN THE WEST



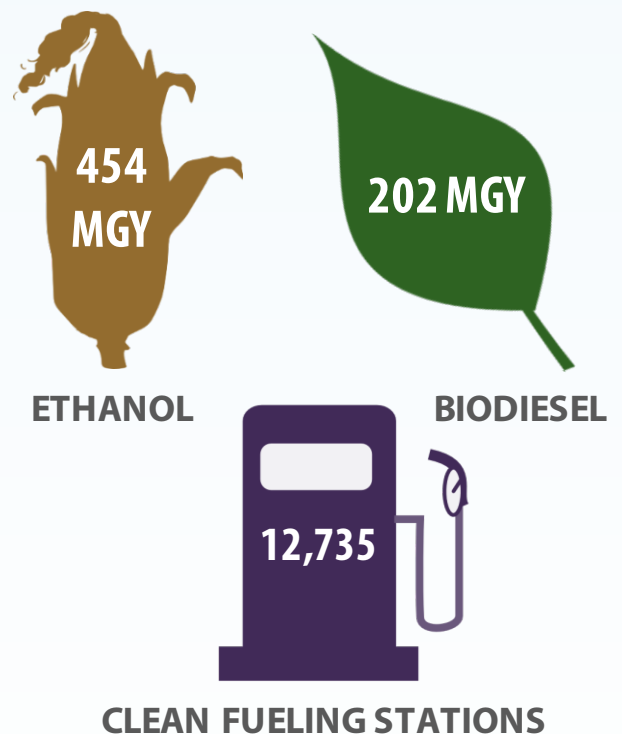
- ▶ Attracted nearly **half** of the country's combined venture capital, private equity, and asset finance investment in the renewable energy sector in 2014
- ▶ Renewable energy produced roughly **one third** of the region's total electricity generation in 2014 (compared to about 13% nationally)
- ▶ **50%** of the nation's total installed renewable power capacity is located in the 13 western states, including **60%** of all hydro, **70%** of all solar, and **100%** of all geothermal power
- ▶ Contains strong and diverse natural resources well suited for the deployment of nearly all renewable energy technologies: solar PV and thermal, wind, hydro, biomass, geothermal, marine, waste, and biofuel

States profiled: AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA, WY

## TOTAL ELECTRICITY GENERATION



## RENEWABLE ELECTRIC CAPACITY

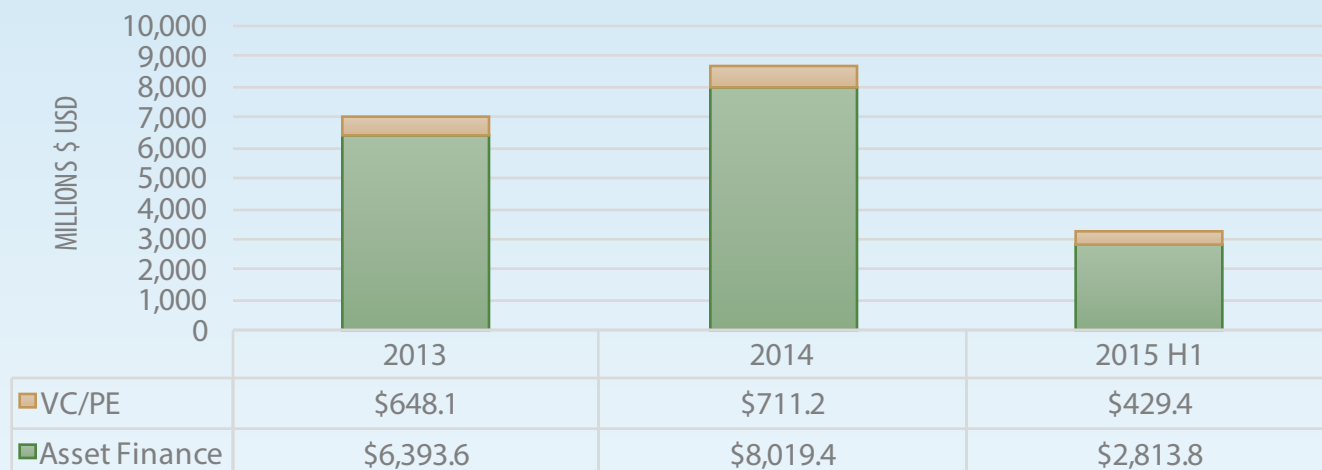


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN THE WEST

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



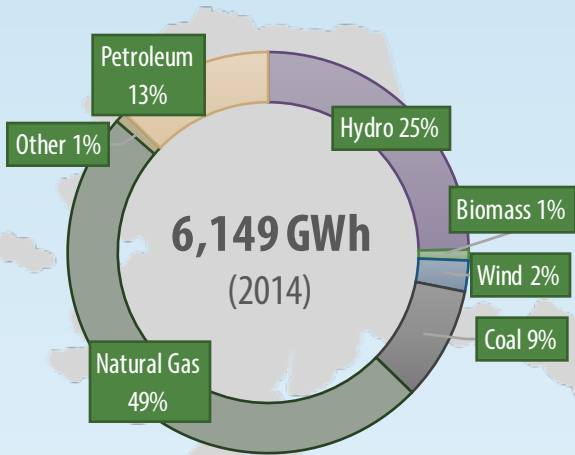
<b>RPS</b>	Nine of 13 states have binding targets, one state has a voluntary goal; many contain carve outs for distributed generation
<b>Net Metering</b>	11 of 13 states offer traditional net metering, one has replaced net metering with alternative programs
<b>Financial Incentives</b>	Tax incentives, production incentives, loans, and other financial incentives designed to encourage renewable energy installations, production, manufacturing, private investment, and research
<b>Clean Power Plan Reduction Targets</b>	<i>Combined:</i> Final emissions rate goal: 11,442 lb/MWh by 2030; Final mass goal: 221.5 million short tons by 2030; Final mass goal with new source complement: 237.7 million short tons by 2030 (excludes Alaska and Hawaii, which do not have mandates at this time)
<b>RTO/ISO</b>	SPP, CAISO, and MISO operate in some parts of the Western Region

## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
 More information: [www.acore.org/50states](http://www.acore.org/50states)

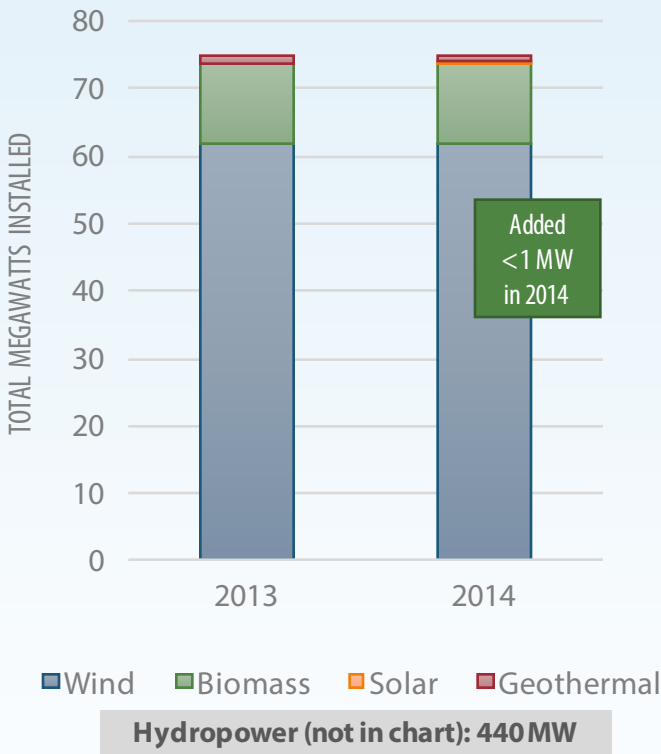


# RENEWABLE ENERGY IN ALASKA

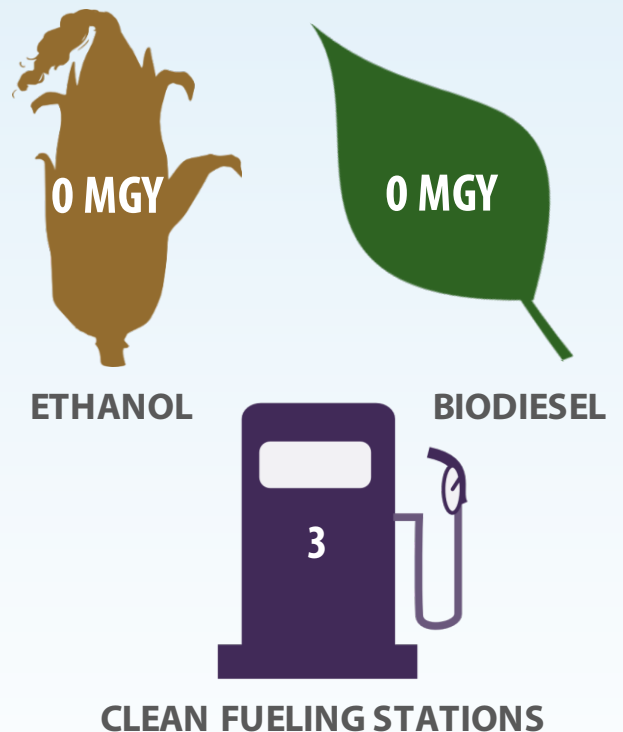


- ▶ Renewable capacity accounts for over **one quarter** of state electricity generation, predominately via an extensive hydroelectric system
- ▶ Has some of the **highest electricity and gasoline prices** in the nation; looking to renewables to make energy more affordable but has not established an RPS policy
- ▶ State and federal government providing support for small-scale renewable energy projects that feed into larger transmission grids and the 150 remote, stand-alone grids serving rural villages
- ▶ Wind power capacity has increased **20-fold** between 2007 and 2014, to 60 MW
- ▶ Geothermal, biomass, hydrokinetic, solar, and the state's other renewable resources are also being developed for a variety of applications, including both electricity generation and direct energy use

## TOTAL ELECTRICITY GENERATION



## RENEWABLE ELECTRIC CAPACITY

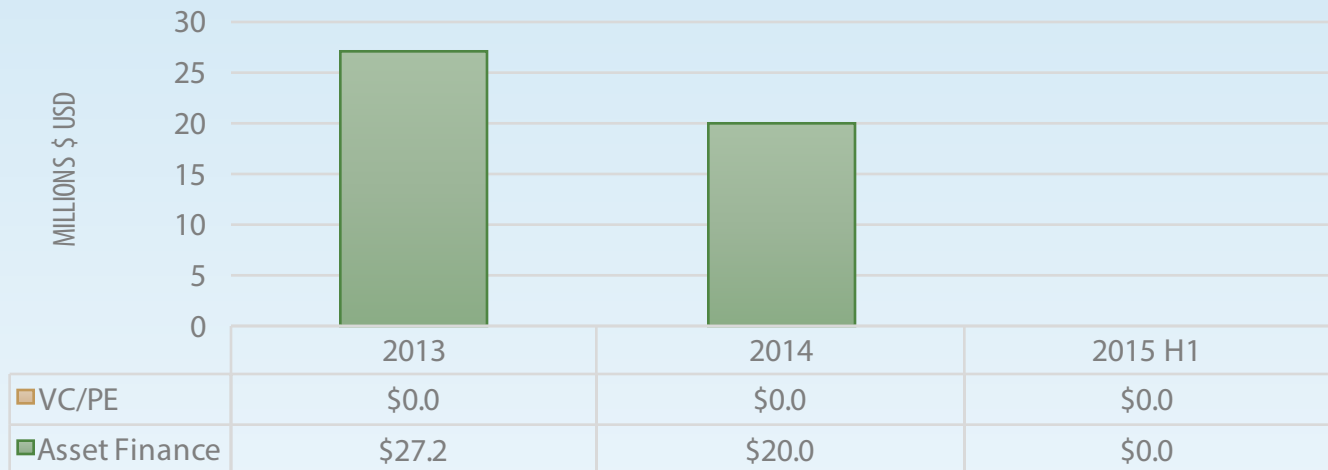


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN ALASKA

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



<b>RPS</b>	None
<b>Net Metering</b>	Utilities with annual retail sales of 5 GWh or more; projects up to 25 kW; reconciles excess generation monthly at the non-firm power rate (not the retail rate)
<b>Financial Incentives</b>	Grants and loans for local utilities, local governments, and independent power producer installations
<b>Clean Power Plan Reduction Targets</b>	<i>EPA has not set carbon emission mandates for noncontiguous states and island territories at this time</i>
<b>RTO/ISO</b>	-

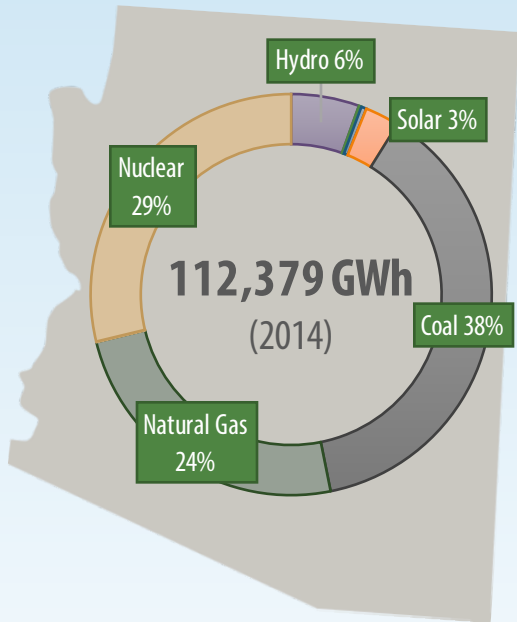
## SOURCES

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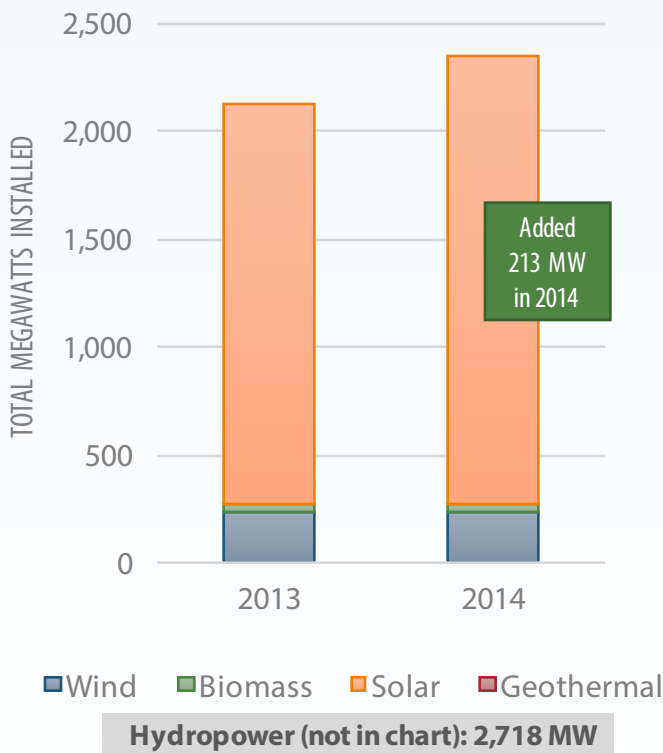


# RENEWABLE ENERGY IN ARIZONA

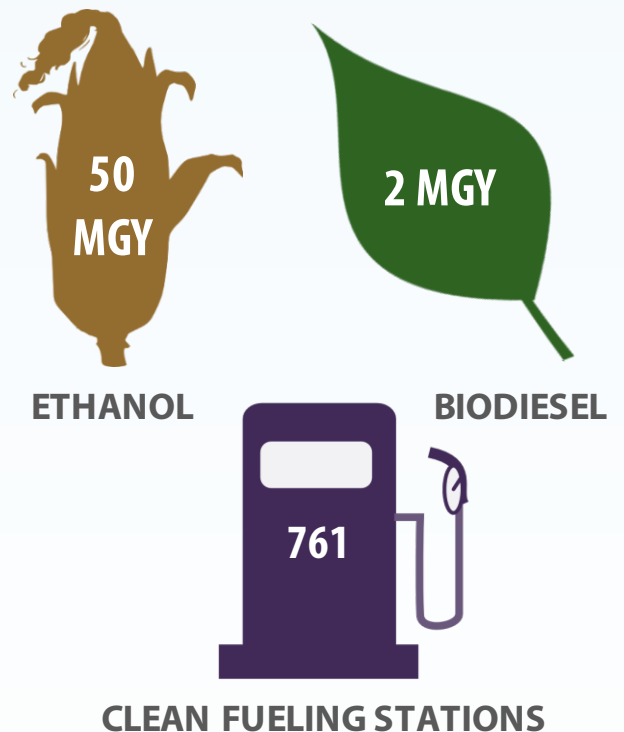


## TOTAL ELECTRICITY GENERATION

- ▶ Has the **second highest solar capacity** of any state, but installed only half as much capacity in 2014 than the year prior after it introduced a net metering charge and other policy changes unfavorable to distributed generation
- ▶ Exports roughly **two thirds** of its solar capacity to other states; the development of new power lines and integration with California's energy imbalance market will further enhance regional collaboration
- ▶ On track to meet its **15% RPS by 2025**, which includes 4.5% from distributed generation
- ▶ In 2014, solar and wind project development attracted **\$413.6 million** in private-sector investment
- ▶ To provide clean, reliable power for its installations in both Arizona and California, the U.S. Department of Defense has agreed to purchase hundreds of megawatts of solar power generated in the state, including **210 MW** from the Mesquite solar farm near Phoenix



## RENEWABLE ELECTRIC CAPACITY

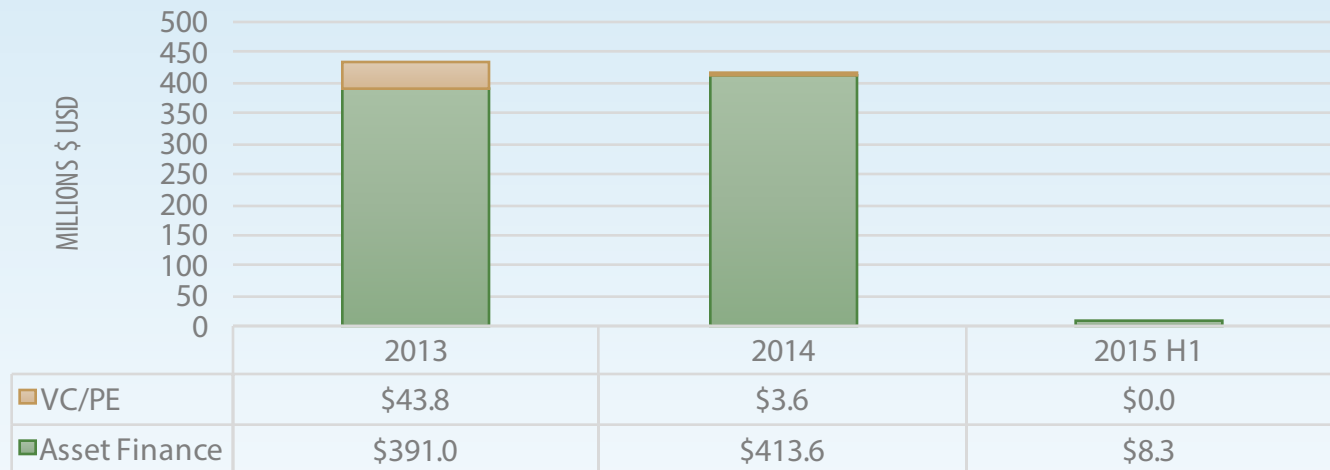


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN ARIZONA

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



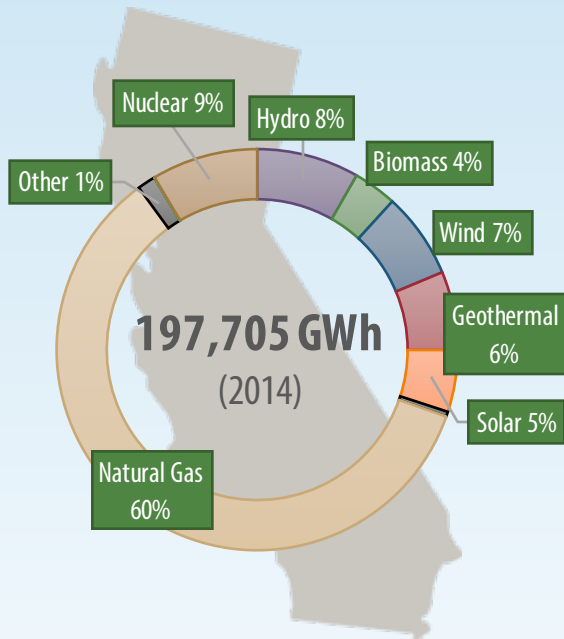
<b>RPS</b>	15% by 2025; 4.5% from distributed generation
<b>Net Metering</b>	IOUs, electric co-ops; projects may not exceed 125% of customer's total connected load; \$0.70/kW monthly charge for new solar customers
<b>Financial Incentives</b>	Personal and corporate tax credits for residential, commercial, industrial, and other renewable production and installations; sales and property tax; tax incentives for in-state renewable energy product manufacturers
<b>Clean Power Plan Reduction Targets</b>	Percent change from 2012 baseline to 2030 target: Emissions rate: -33.6%; Mass goals: -25%; Mass goals with new source complement: -20%
<b>RTO/ISO</b>	-

## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
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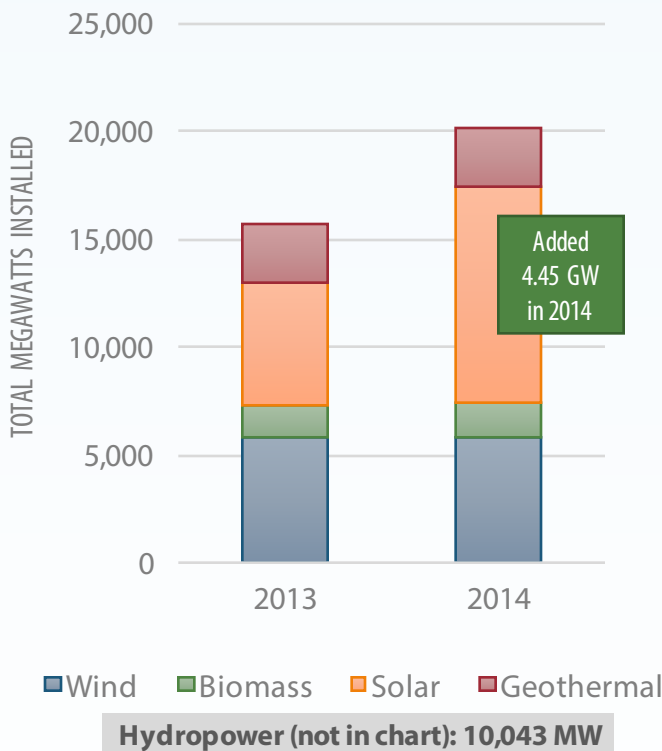


# RENEWABLE ENERGY IN CALIFORNIA

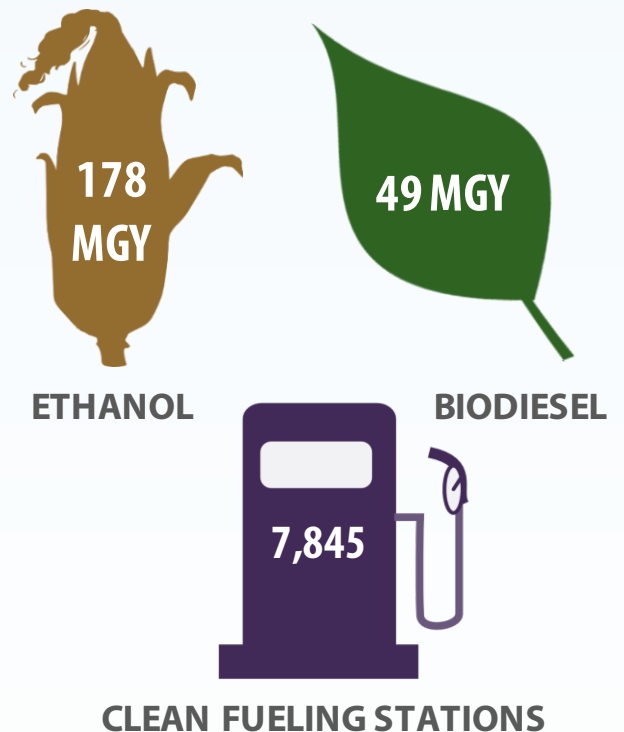


## TOTAL ELECTRICITY GENERATION

- ▶ Increased its renewable portfolio standard in 2015 to **50%** renewables by 2030 – one of the most aggressive standards in the nation – expected to accelerate development of solar, wind, and other resources
- ▶ The Energy Commission estimates that **25%** of electricity retail sales were served by RPS-compliant renewable resources in 2014
- ▶ Installed a record **4.3 GW** of new solar power capacity in 2014, increasing cumulative installed capacity to **9,977 MW** – more than any other state
- ▶ Strong policy support and the state's robust and diverse renewable resources help attract more asset finance and venture capital/private equity investment than any other state, with **\$5.2 billion** invested in 2014
- ▶ The California Independent System Operator is in the process of transforming into a regional organization, merging its imbalance market with entities in a number of neighboring states



## RENEWABLE ELECTRIC CAPACITY

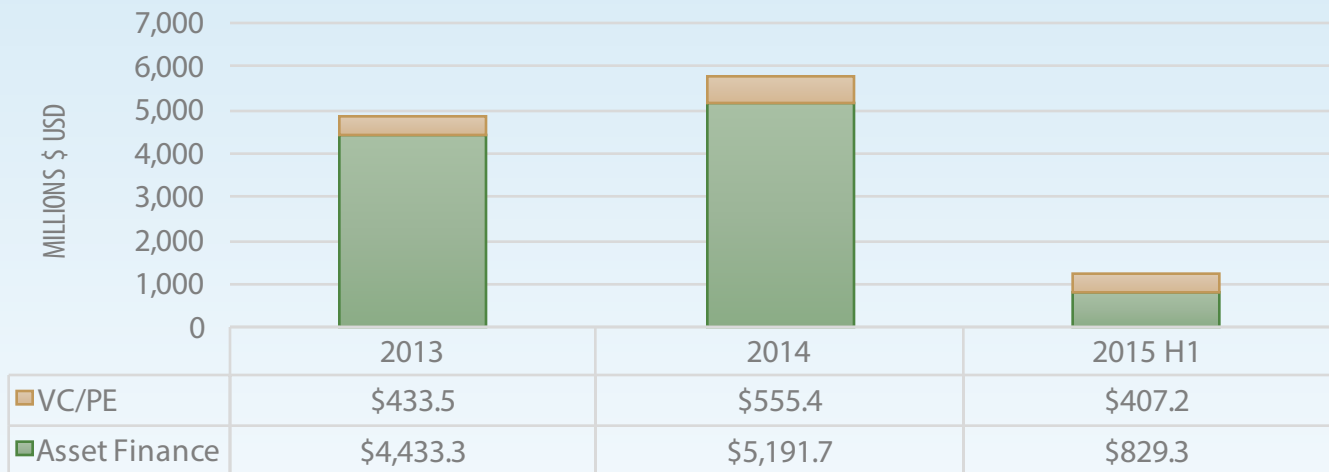


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN CALIFORNIA

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



<b>RPS</b>	50% by 2030; 1,325 MW of energy storage by 2020 (independent from RPS)
<b>Net Metering</b>	All utilities; projects up to 1 MW; bill credit transfer program systems up to 5 MW; aggregated, virtual, and community net metering allowed; PUC expected to approve a new tariff by the end of 2015
<b>Financial Incentives</b>	<b>CLEEN Center:</b> Provides low-cost financing vehicles & reduces risks of projects; <b>Go Solar California! Campaign:</b> incentives to encourage 3 GW of distributed solar by end of 2016 and 585 million therms of solar hot water by end of 2017; <b>Re-MAT program:</b> long-term contracts for projects up to 3 MW; <b>Other:</b> Rebates to generate renewable electricity; PACE financing program for non-residential properties; tax incentives for manufacturing
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target:</i> Emissions rate: -13.2%; Mass goals: -3%; Mass goals with new source complement: +6%
<b>RT0/ISO</b>	CAISO

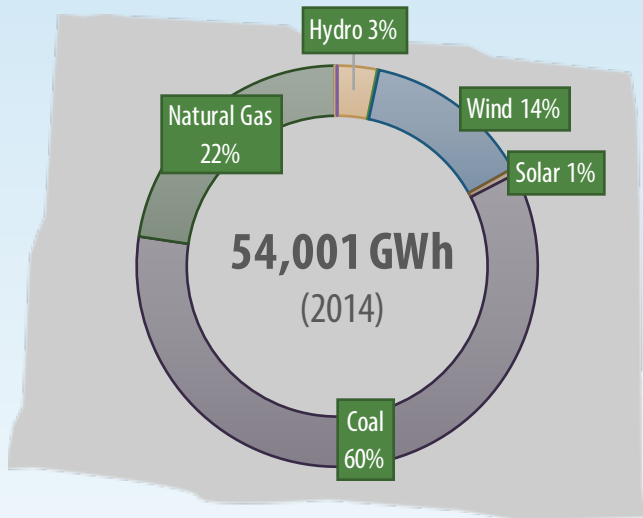
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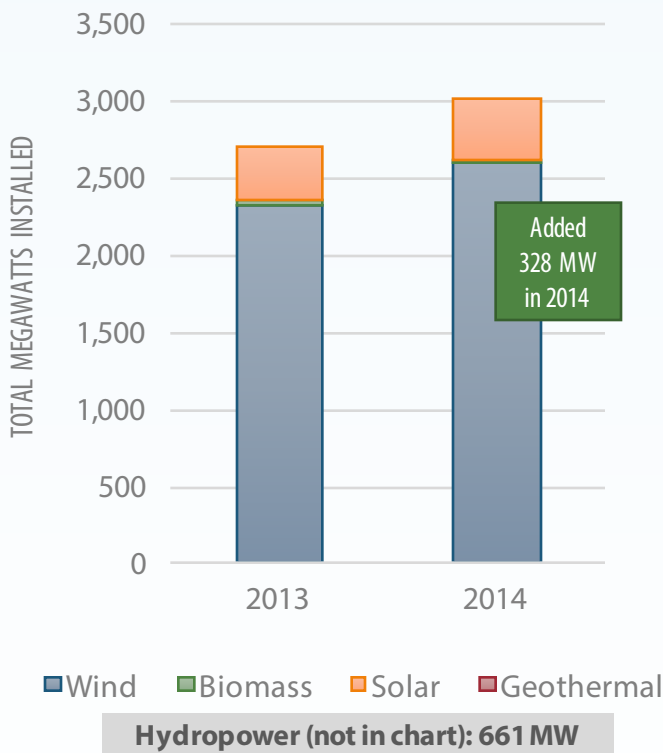


# RENEWABLE ENERGY IN COLORADO

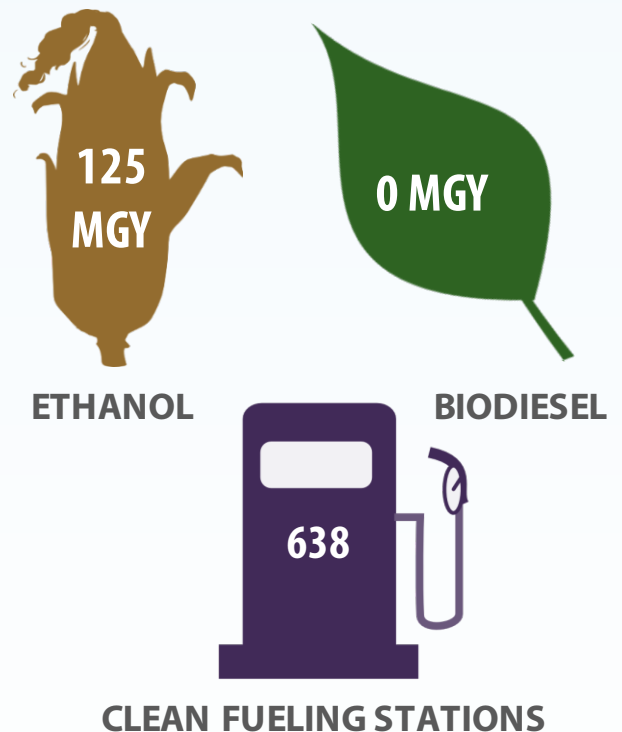


## TOTAL ELECTRICITY GENERATION

- ▶ Ranks **first in the country** for wind manufacturing jobs, third for overall wind industry jobs, and seventh for installed wind power capacity (AWEA)
- ▶ The state's 30% RPS helped attract **\$719 million** in asset finance for renewable energy projects in the first half of 2015
- ▶ The falling prices of wind and solar recently encouraged the state's two largest coal-burning utilities to develop a **22 MW** solar installation near Wellington and **150 MW** wind farm in Kit Carson County
- ▶ Offers expedited permitting process for small-scale, low-impact hydropower; nearly 60 small hydro projects are operating in western Colorado
- ▶ Home to the National Renewable Energy Laboratory, the leading research, development, and deployment facilities of the U.S. Department of Energy focused on renewable energy



## RENEWABLE ELECTRIC CAPACITY

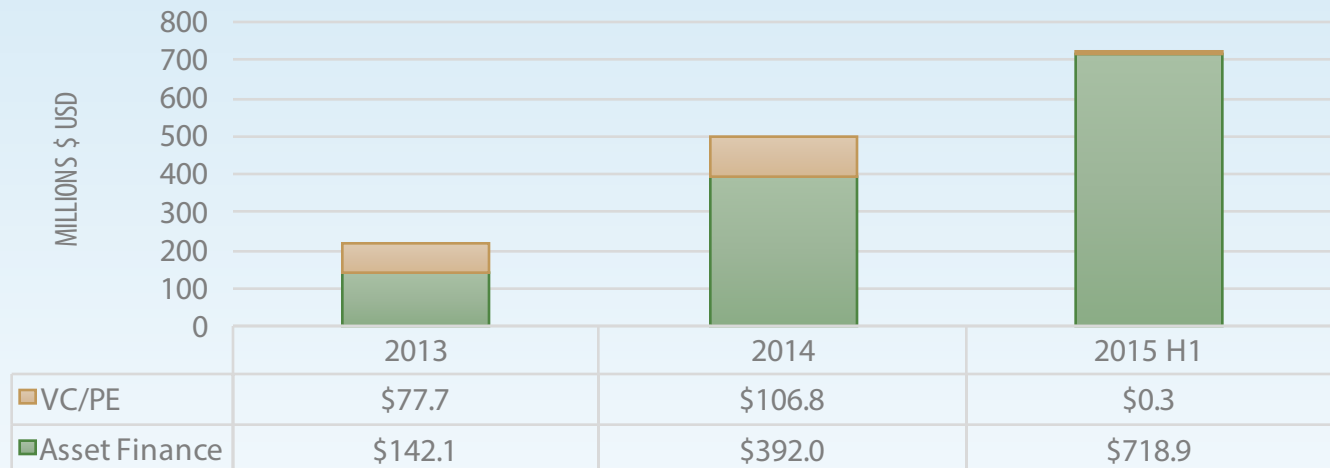


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN COLORADO

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



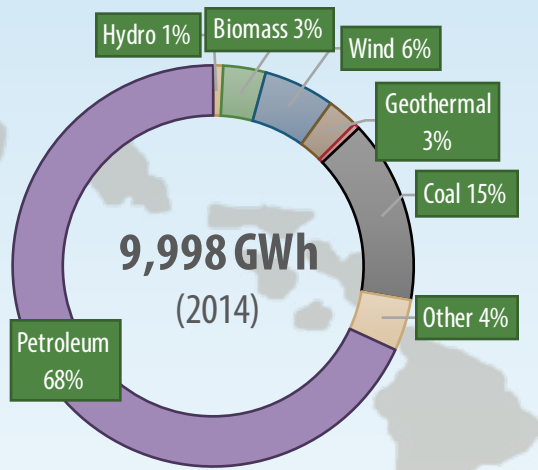
<b>RPS</b>	30% by 2020 (IOUs) (includes non-renewable alternative sources); 3% from distributed generation (different requirements for other utilities)
<b>Net Metering</b>	IOU customers: projects may not exceed 120% of customer's average annual consumption; community net metering allowed; muni/co-op customers: projects up to 25 kW for residential; 10 kW for non-residential
<b>Financial Incentives</b>	Property and sales tax incentives; revolving loan program for renewable energy projects and companies; enacted PACE enabling legislation
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target:</i> Emissions rate: -38.3%; Mass goals: -31%; Mass goals with new source complement: -26%
<b>RTO/ISO</b>	-

## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
 More information: [www.acore.org/50states](http://www.acore.org/50states)

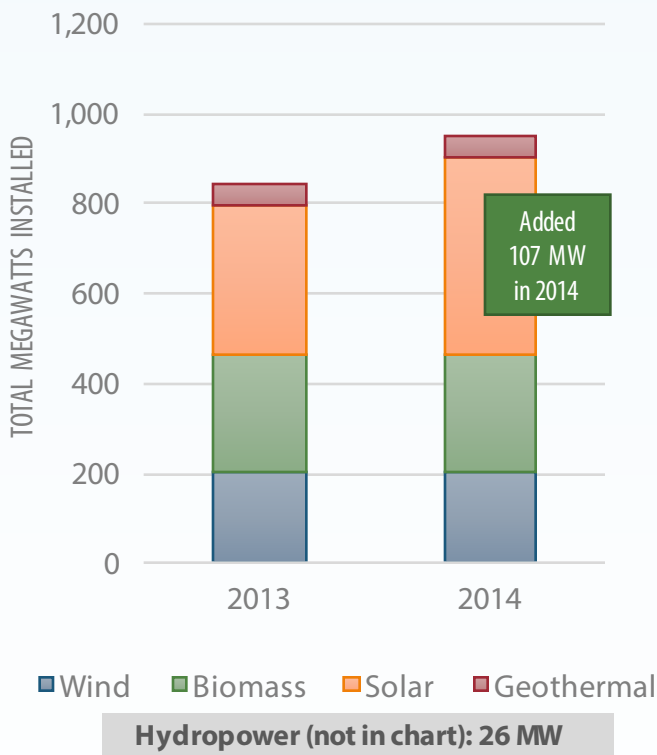


# RENEWABLE ENERGY IN HAWAII

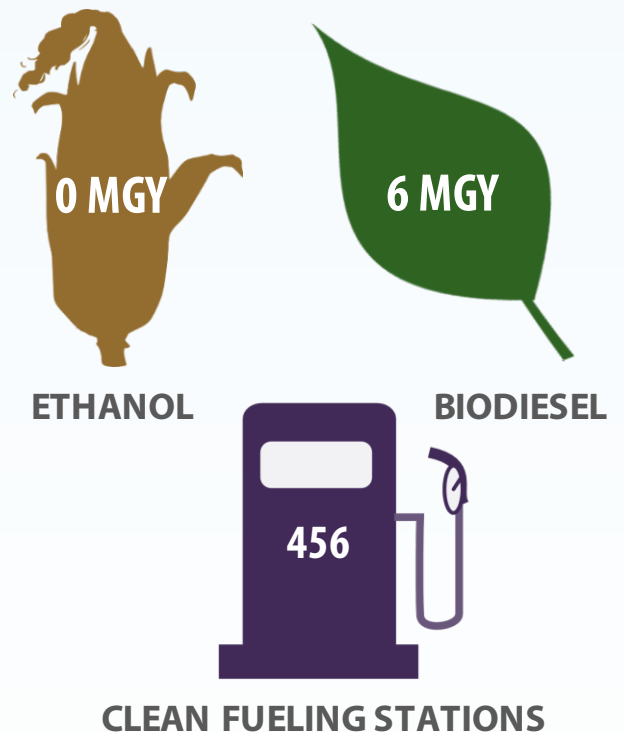


- ▶ Increased its RPS in 2015 to **100% by 2045**, becoming the only state in the country to mandate all its electricity sales come from renewables
- ▶ Leads the nation in solar energy per capita, with **107MW** installed in 2014; nearly **one in eight homes** have installed solar PV systems (SEIA)
- ▶ Currently imports most of the energy it consumes, resulting in the **highest electricity prices in the nation**
- ▶ The state's RPS and financial incentives, along with its considerable renewable resources, attract substantial investment and development
- ▶ A leader in the research and development of emerging technologies, such as ocean thermal energy conversion and floating offshore wind turbines
- ▶ Replaced its net metering policy in 2015 with new programs that no longer compensate customers at the retail rate

## TOTAL ELECTRICITY GENERATION



## RENEWABLE ELECTRIC CAPACITY

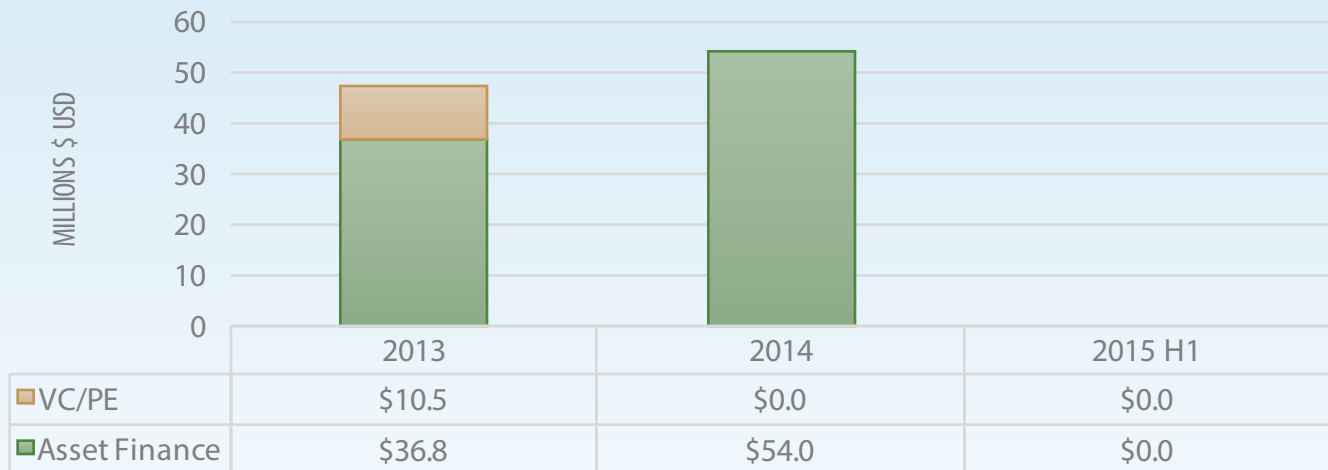


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN HAWAII

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



<b>RPS</b>	100% by 2045
<b>Net Metering</b>	In lieu of net metering, offers a “grid-supply” program, under which the customer is compensated for excess power at a fixed rate (lower than retail) or a “self-supply option” that provides for streamlined review and interconnection of systems and allows energy storage but does not compensate for excess generation; <i>sets a minimum utility bill of \$25</i>
<b>Financial Incentives</b>	<b>Green Bank:</b> market-based financing mechanism to make low-cost capital available for loans; <b>Feed-in tariff:</b> long-term contracts for projects up to 5 MW; <b>Other:</b> corporate and personal tax credits for commercial and residential installations; rebates for solar water heaters; loans for farmers, ranchers, and aquaculturalists for renewable energy production
<b>Clean Power Plan Reduction Targets</b>	<i>EPA has not set carbon emission mandates for noncontiguous states and island territories at this time</i>
<b>RTO/ISO</b>	-

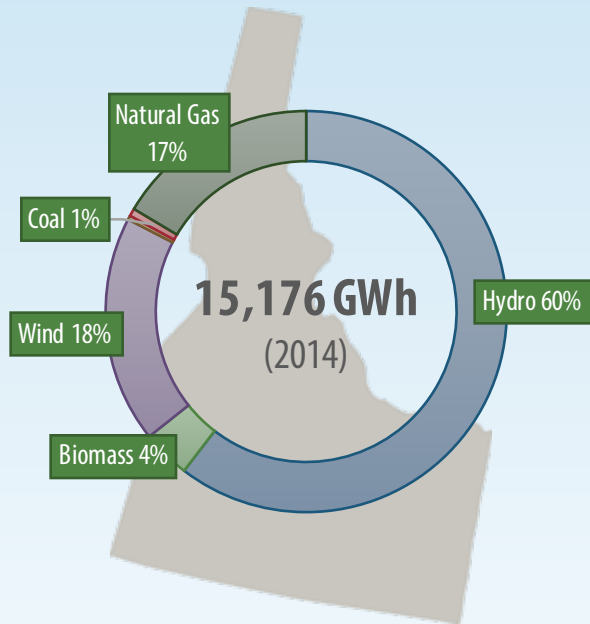
## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
 More information: [www.acore.org/50states](http://www.acore.org/50states)



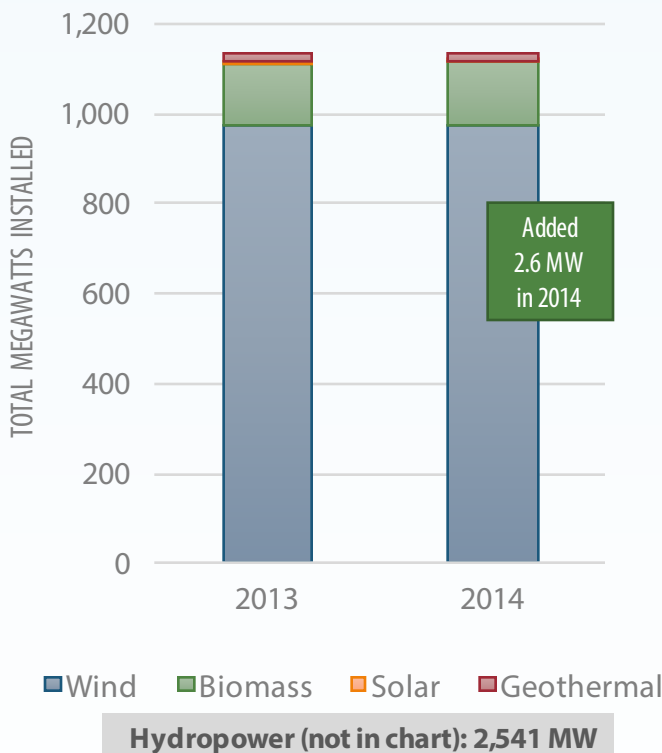


# RENEWABLE ENERGY IN IDAHO

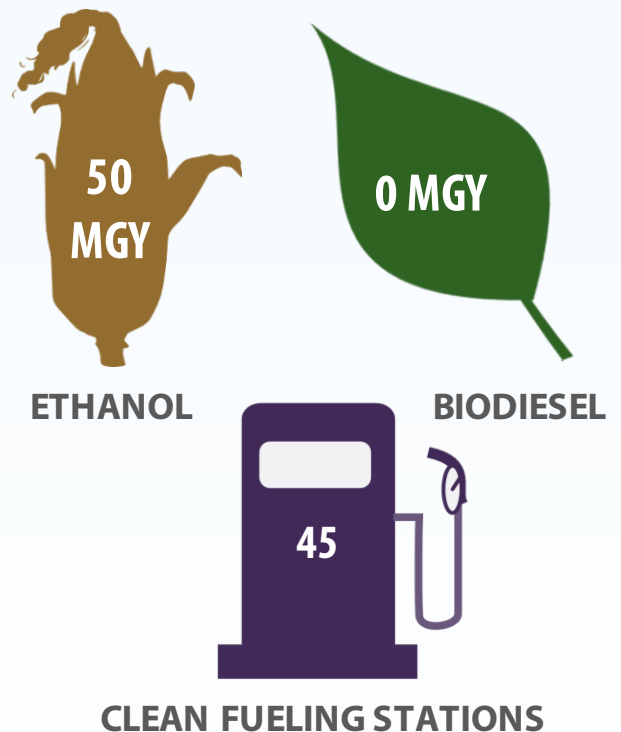


## TOTAL ELECTRICITY GENERATION

- ▶ The state's wind power generation is notable for a state without an official target for renewable energy, developing into an export market and generating nearly **one fifth** of the state's electricity in 2014
- ▶ Hydropower supplies the largest portion of the state's electricity generation, generating **60%** in 2014
- ▶ However, the public utility commission **recently reduced PURPA contracts** for renewable energy from 20 years to two years, which, coupled with the absence of an RPS, could hold back renewable project development in the state
- ▶ With the state's plentiful sunshine, solar power is an economically attractive resource, but to date only a few megawatts have been installed
- ▶ Idaho Power's 2015 integrated resource plan calls for the closure of two coal plants and considers the development of community solar and energy storage



## RENEWABLE ELECTRIC CAPACITY

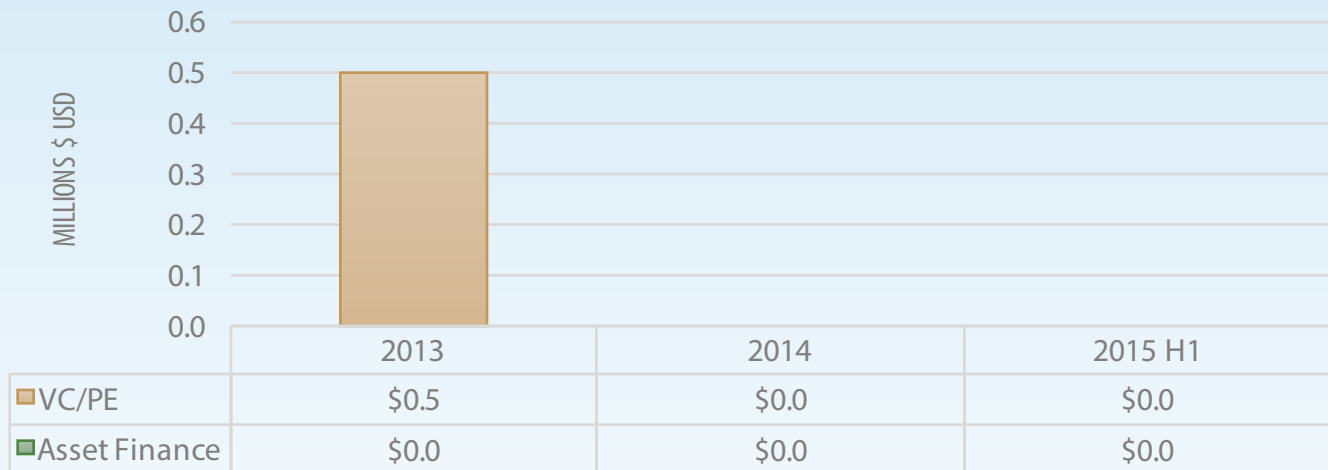


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN IDAHO

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



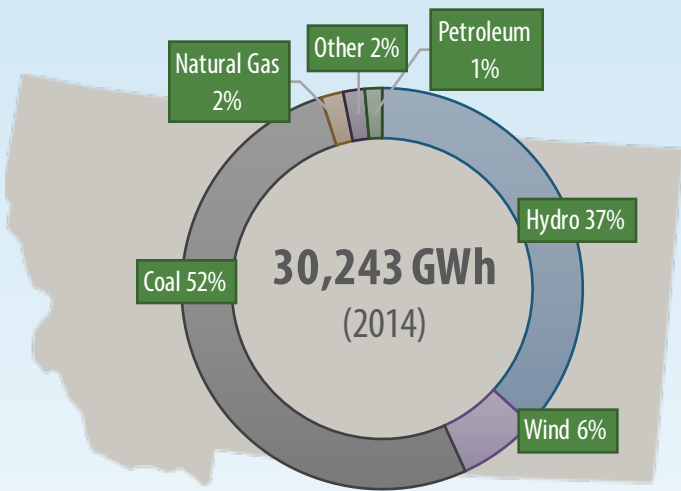
<b>RPS</b>	None
<b>Net Metering</b>	Voluntary utility policies
<b>Financial Incentives</b>	Personal tax deduction for residential installations; loans for customer-sited renewable systems; property tax incentives
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target: Emissions rate: -7.6%; Mass goals: +4%; Mass goals with new source complement: +14%</i>
<b>RTO/ISO</b>	-

## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
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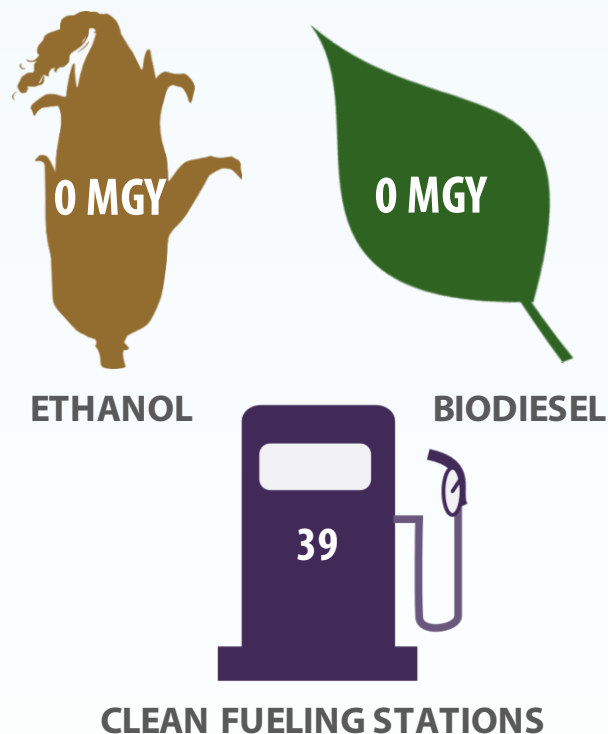
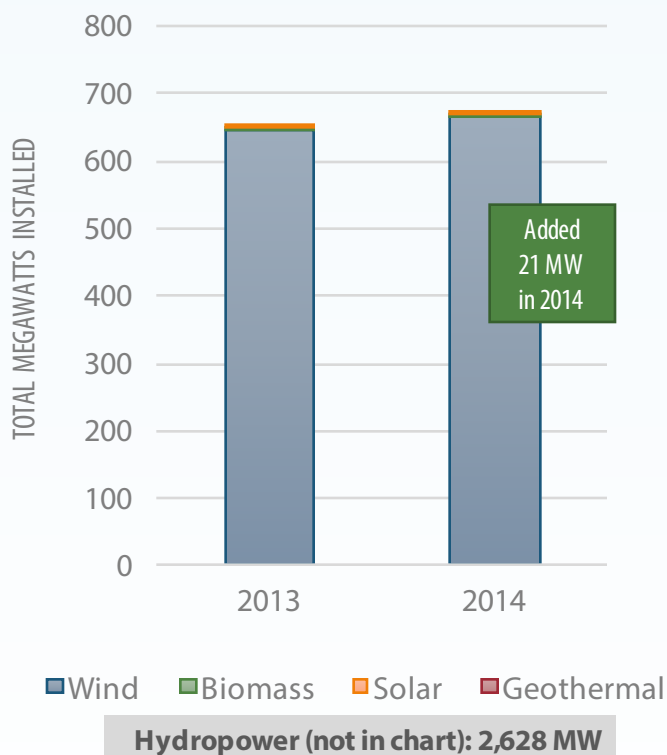


# RENEWABLE ENERGY IN MONTANA



- ▶ Benefits from strong wind speeds, electricity-grade geothermal resources, agricultural feedstocks for biomass, and suitable solar insolation for renewable energy development
- ▶ Added **20 MW** of new wind power capacity in 2014, ranking 15th in the nation
- ▶ Since its RPS was enacted ten years ago, **60%** of new energy capacity constructed in the state has been wind power
- ▶ Besides wind and hydropower, which together account for roughly **43%** of state electricity generation, few of its other renewable resources are being developed

## TOTAL ELECTRICITY GENERATION



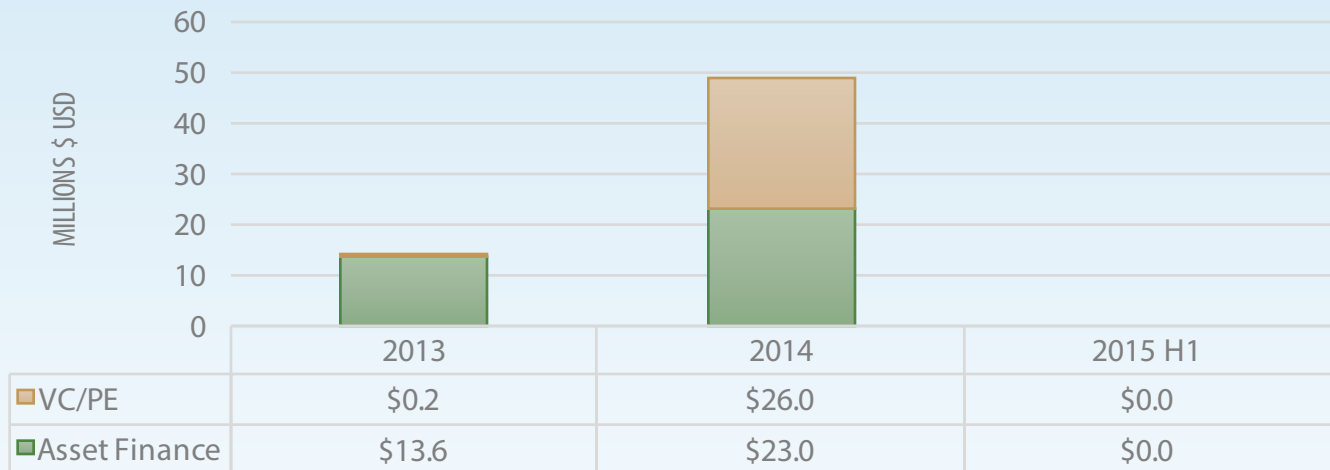
## RENEWABLE ELECTRIC CAPACITY

## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN MONTANA

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



<b>RPS</b>	15% by 2015
<b>Net Metering</b>	IOUs; projects up to 50 kW
<b>Financial Incentives</b>	Revolving loan program for residential, non-residential, and local government installations; personal and corporate tax credits for commercial and net metered energy investments of \$5K or more; personal tax credits for residential projects; property tax incentives; property tax abatement for new production or manufacturing facilities and R&D equipment
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target:</i> Emissions rate: -47.4%; Mass goals: -41%; Mass goals with new source complement: -38%
<b>RTO/ISO</b>	MISO (some regions)

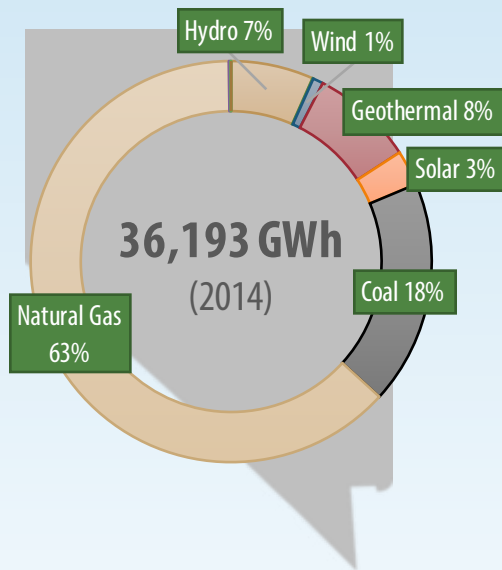
## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Northwest, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA; More information: [www.acore.org/50states](http://www.acore.org/50states)



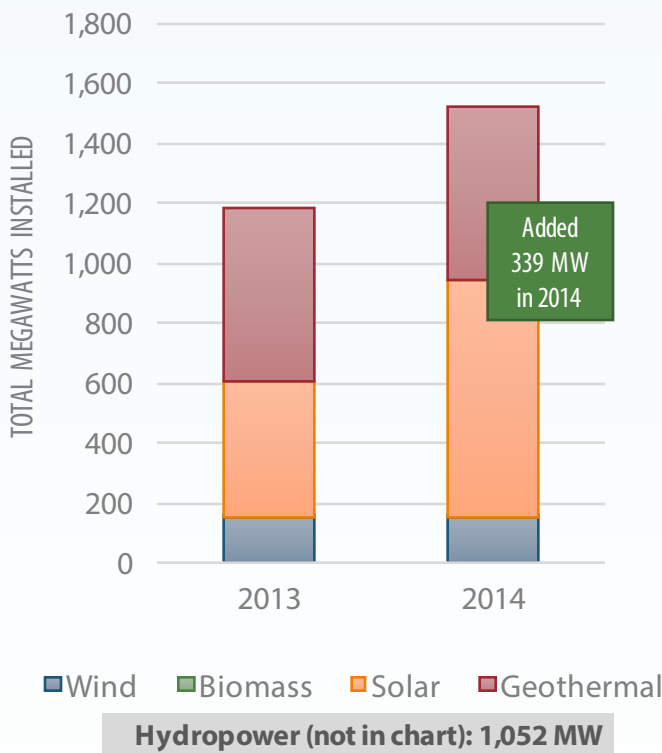


# RENEWABLE ENERGY IN NEVADA



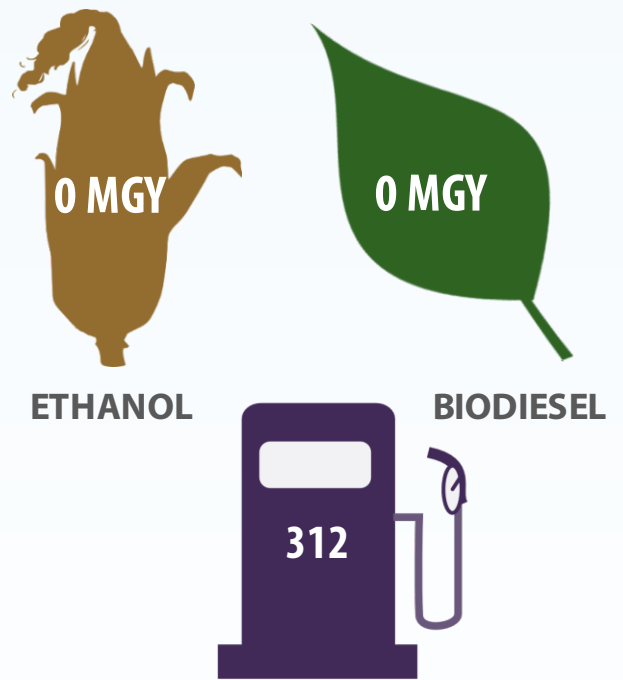
- ▶ Installed **339 MW** of solar energy in 2014 and ranks fifth in the country for total installed solar capacity
- ▶ Renewable energy is increasingly cost-competitive in Nevada; in July 2015, NV Energy signed a PPA to purchase power from the 100 MW Playa Solar 2 project for only **3.87 cents per kWh**
- ▶ Contains some of the best solar and geothermal energy resources in the nation and is a substantial producer of electricity from each
- ▶ Policies have helped sustain the growth of its renewable energy industry, including a target of 25% renewable energy by 2025 with a solar energy carve-out, and have helped attract **\$793 million** in asset finance for renewable energy projects in the first half of 2015
- ▶ Expected to set new, long-term rules on solar net metering at the beginning of 2016

## TOTAL ELECTRICITY GENERATION



■ Wind ■ Biomass ■ Solar ■ Geothermal

## RENEWABLE ELECTRIC CAPACITY



ETHANOL

BIODIESEL

CLEAN FUELING STATIONS

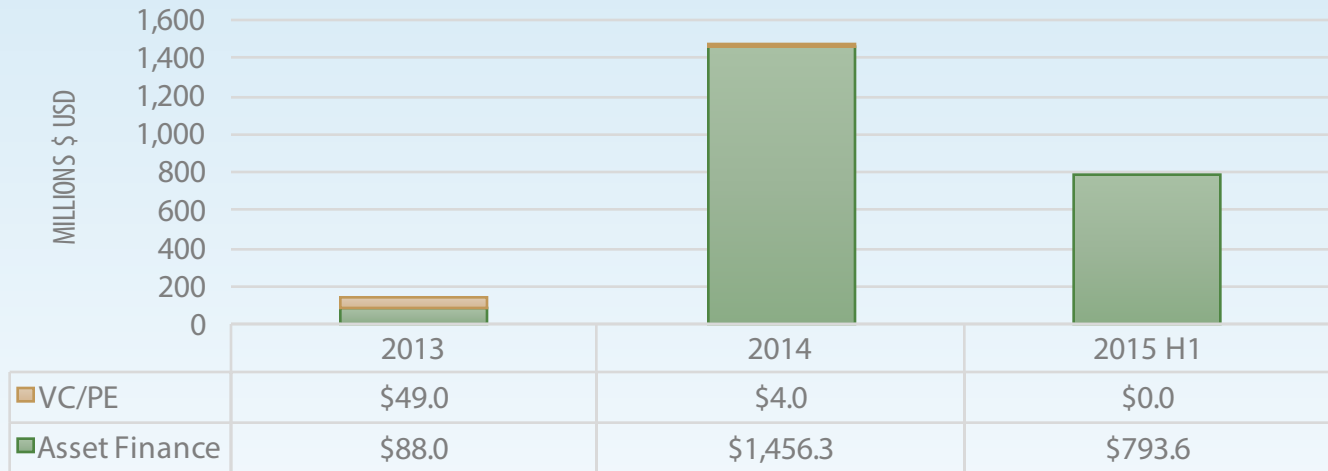
## RENEWABLE TRANSPORTATION



# RENEWABLE ENERGY IN NEVADA

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



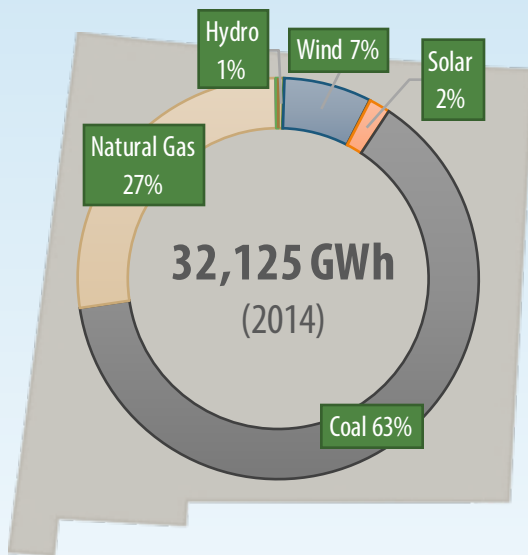
<b>RPS</b>	25% by 2025; 1.5% from solar
<b>Net Metering</b>	IOUs; projects up to 1 MW (or 100% of customer's annual demand); aggregated net metering allowed for certain technologies; to set new rules in 2016
<b>Financial Incentives</b>	Portfolio energy credit trading program; revolving loan program for commercial, government, and industrial installations and for manufacturers of renewable energy system components; property and sales tax incentives; enacted PACE-enabling legislation
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target:</i> Emissions rate: -22.4%; Mass goals: -13%; Mass goals with new source complement: -5%
<b>RTO/ISO</b>	CAISO (some regions)

## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
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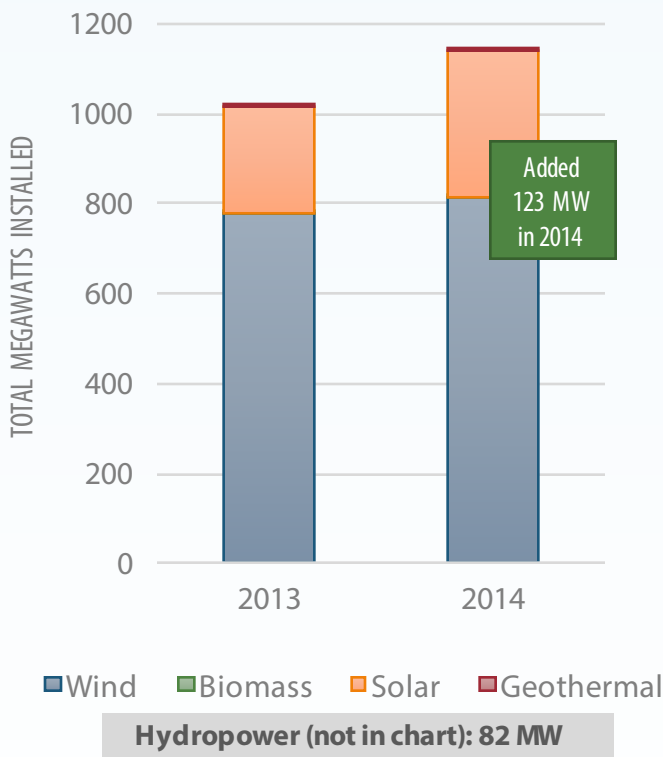


# RENEWABLE ENERGY IN NEW MEXICO

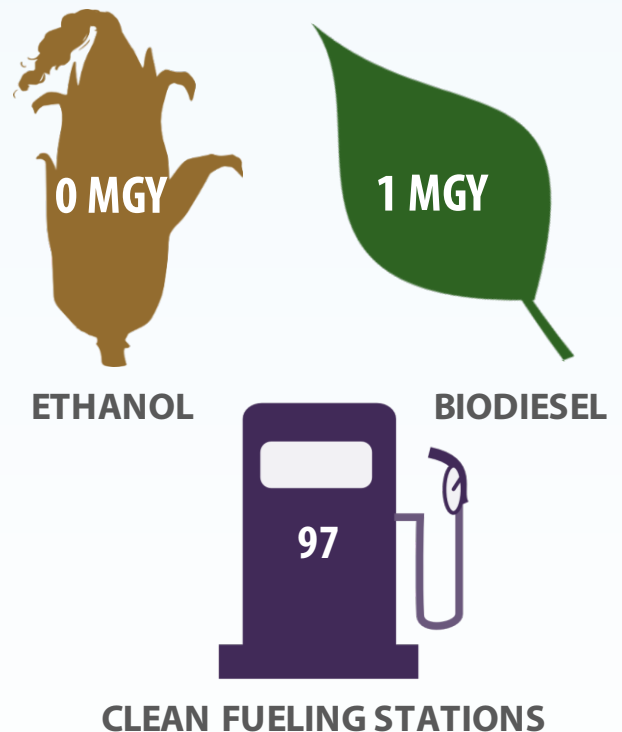


## TOTAL ELECTRICITY GENERATION

- ▶ The Governor announced an “all-of-the-above” state energy plan in September 2015, which includes recommendations for development of renewable energy and energy storage technologies
- ▶ A strong RPS of **20% by 2020** and a broad array of tax incentives drive continued renewable development in the state, helping to attract **\$420 million** in asset finance for renewable energy projects in the first half of 2015
- ▶ Installed **88 MW** of solar capacity and **35 MW** of wind capacity in 2014
- ▶ Xcel recently signed agreements to purchase power from two New Mexico solar plants (totaling 140 MW) for **3.5 cents** per kilowatt hour
- ▶ The SunZia Project, two high-voltage transmission lines and substations that will transport power from the state across the Southwest, is expected to support further development of renewable energy markets



## RENEWABLE ELECTRIC CAPACITY

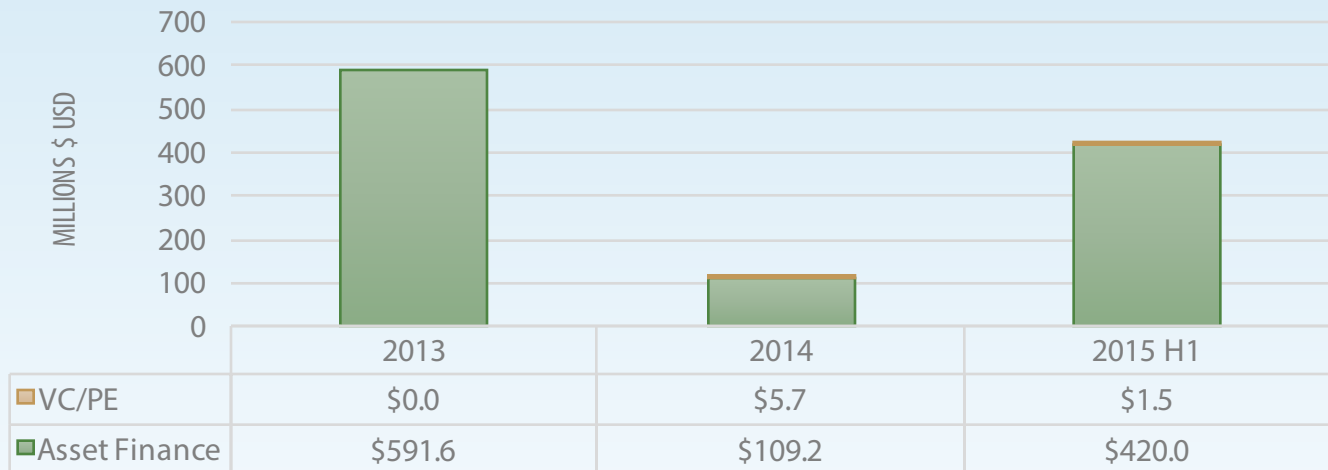


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN NEW MEXICO

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



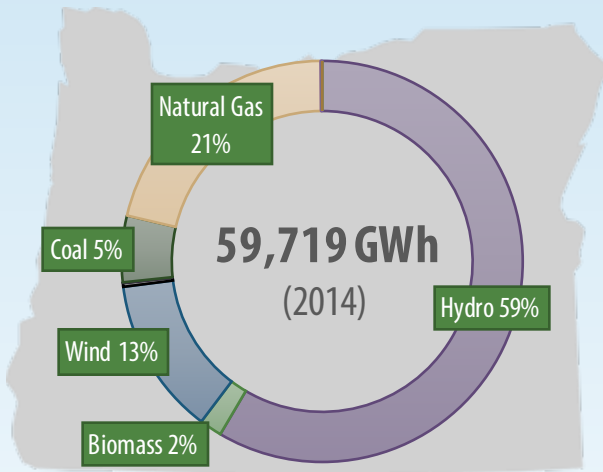
<b>RPS</b>	20% by 2020 (IOUs): 6% from wind; 4% from solar; 1% from other renewables; and 0.6% from distributed renewables; 10% by 2020 (rural electric cooperatives)
<b>Net Metering</b>	IOUs, electric co-ops; projects up to 80 MW
<b>Financial Incentives</b>	Production tax credits for commercial and industrial renewable generation; tax credits for residential, agricultural, and commercial installations; revolving loan program for distributed generation that supports drinking water infrastructure; property and gross receipts tax incentives; tax credit for renewable manufacturing products and components; enacted PACE-enabling legislation
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target:</i> Emissions rate: -36.3%; Mass goals: -28%; Mass goals with new source complement: -24%
<b>RTO/ISO</b>	SPP (some regions)

## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
 More information: [www.acore.org/50states](http://www.acore.org/50states)

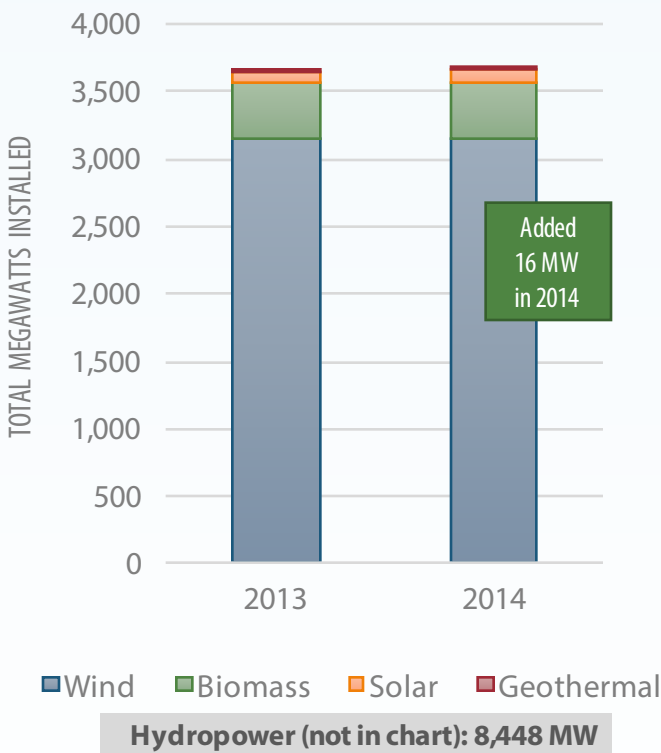


# RENEWABLE ENERGY IN OREGON

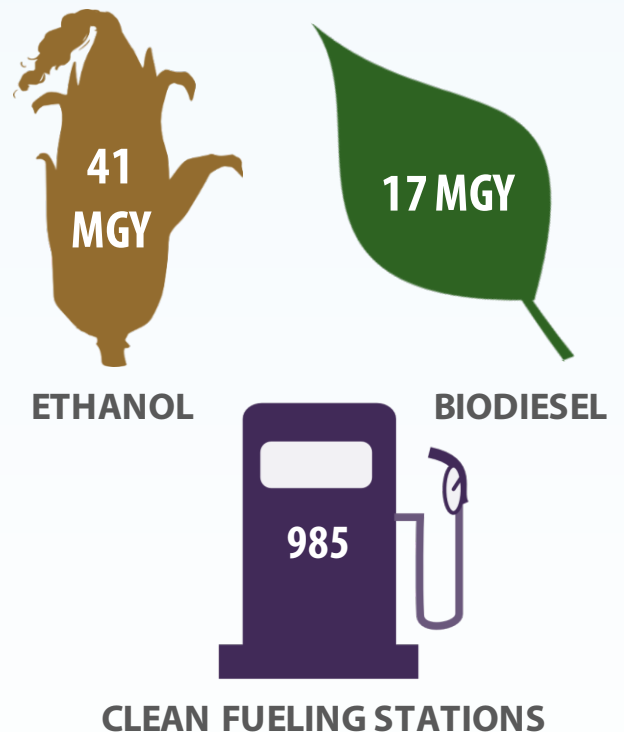


- ▶ Ranks **sixth** in the nation for installed wind capacity and is home to one of the largest wind farms in the country
- ▶ Hydropower alone provides around **60%** of the electricity generated in the state, but Oregon also imports a substantial amount coal-fired generation from other states
- ▶ Enacted energy storage legislation in June 2015 requiring certain utilities to procure one or more qualified energy storage systems with the capacity to store at least 5 MWh of electricity
- ▶ The state's geothermal resource potential ranks **third** in the country, and is used for both electricity generation and direct-heat applications
- ▶ The state is considering adjustments to its popular tax credit program in response to criticism about its implementation

## TOTAL ELECTRICITY GENERATION



## RENEWABLE ELECTRIC CAPACITY

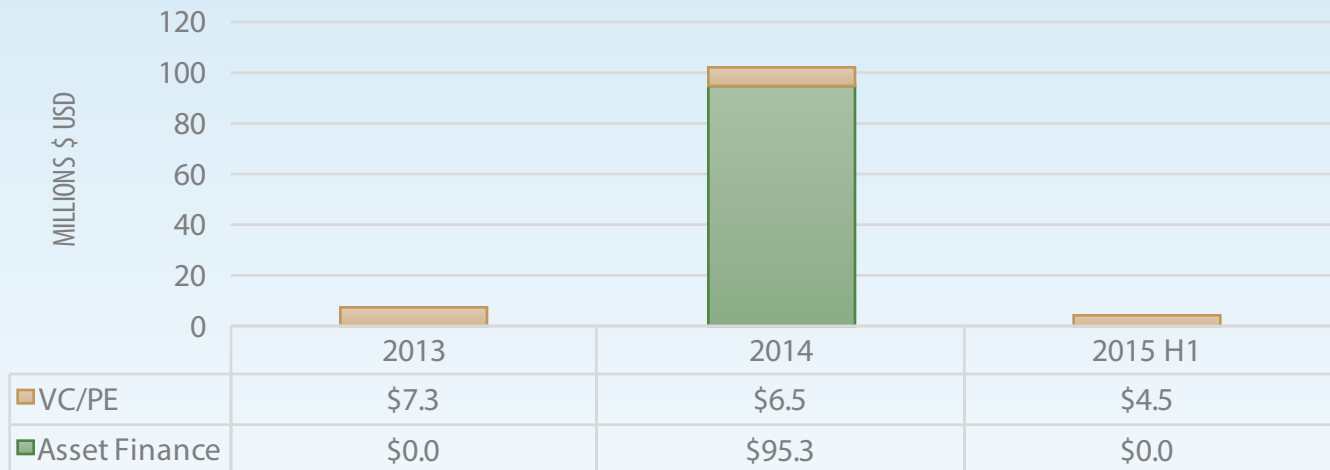


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN OREGON

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



<b>RPS</b>	25% by 2025 (large utilities): 20 MW from solar PV (500 kW-5 MW); 10% by 2025 (small utilities); 5% by 2025 (smallest utilities)
<b>Net Metering</b>	All utilities (except Idaho Power); non-residential projects up to 2 MW, other projects up to 25 kW; aggregated net metering allowed
<b>Financial Incentives</b>	Solar volumetric incentive rate and payment program for projects up to 500 kW; personal and corporate tax credits for a variety of energy projects and manufacturing facilities; loans, grants, and rebates for a variety of renewable energy projects, applications (small and large), and feasibility studies; property tax incentives; enacted PACE-enabling legislation
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target:</i> Emissions rate: -20%; Mass goals: -10%; Mass goals with new source complement: -2%
<b>RTO/ISO</b>	-

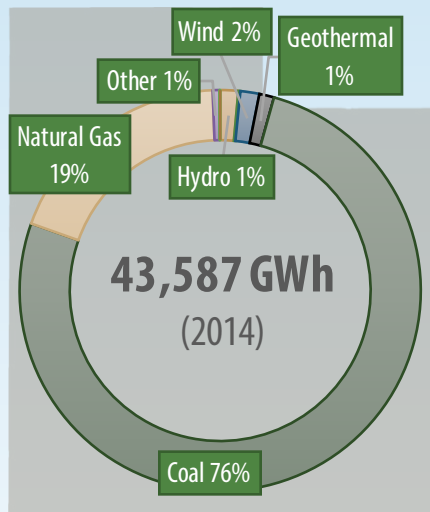
## SOURCES

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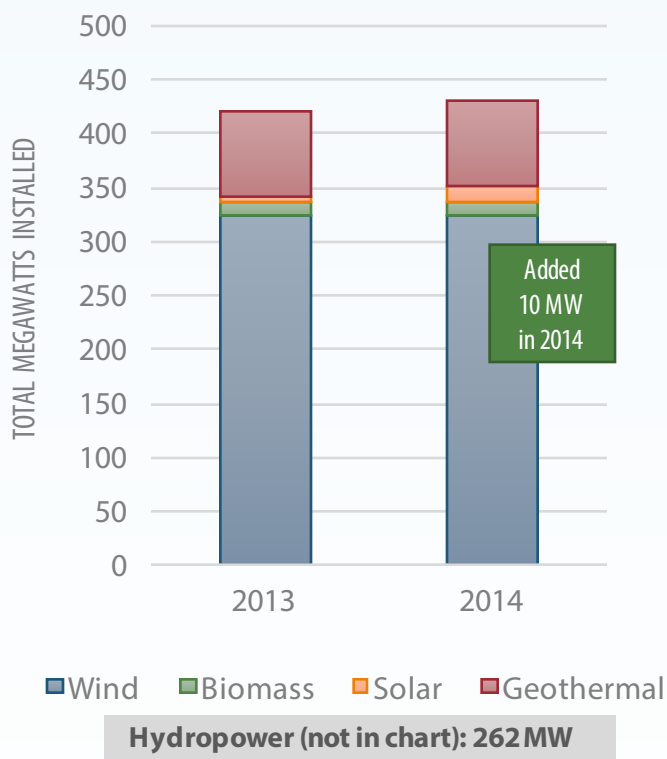


# RENEWABLE ENERGY IN UTAH

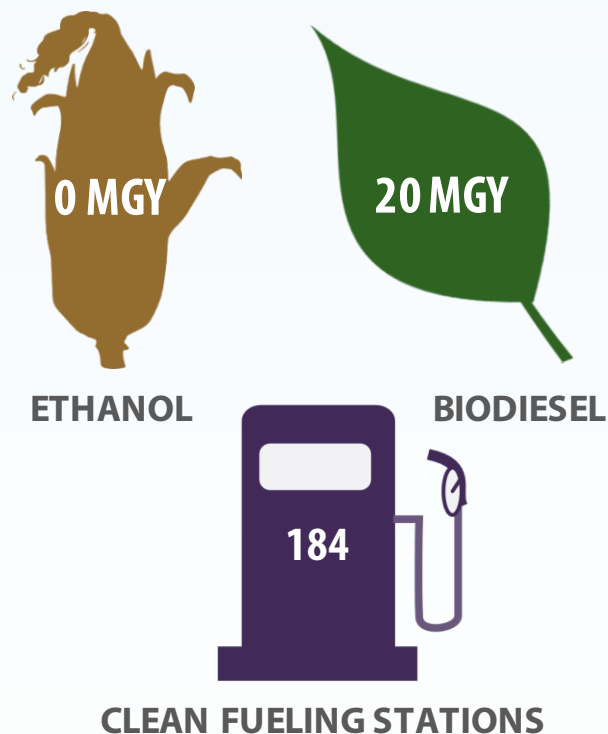


## TOTAL ELECTRICITY GENERATION

- ▶ Contains vast and diverse renewable energy resource potential
- ▶ Developers are now using PURPA to secure long-term power purchase agreements for solar projects in the state, which will bring hundreds of megawatts of new capacity to the state's grid within the next few years
- ▶ Provides an array of tax incentives and programs to help residents and businesses provide clean energy to the state's grid
- ▶ Net exporter of power to neighboring states, including wind farms that supply power to California
- ▶ Renewable project development attracted **\$264.3 million** in asset finance in 2014
- ▶ Rocky Mountain Power has suggested a new rate system for net metering customers, with the Public Service Commission expected to make a decision in 2016



## RENEWABLE ELECTRIC CAPACITY

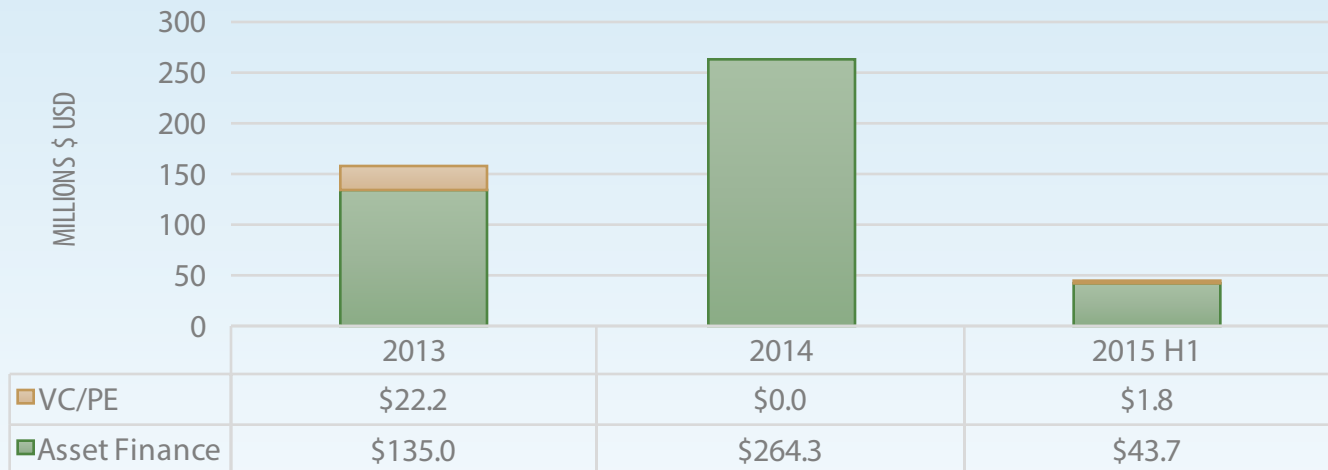


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN UTAH

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



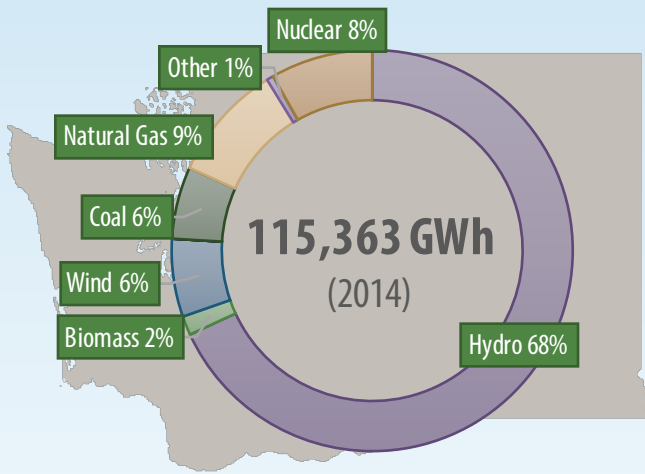
<b>RPS</b>	Voluntary goal: 20% by 2025 (part of the requirement may be met by methane gas from coal operations)
<b>Net Metering</b>	IOUs, electric co-ops; non-residential projects up to 2 MW, residential projects up to 25 kW; meter aggregation allowed at same or adjacent location
<b>Financial Incentives</b>	Personal and corporate tax credits for commercial and residential installations; PACE financing program for non-residential systems; sales tax incentives; tax credits for renewable energy manufacturing and construction
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target:</i> Emissions rate: -34.1%; Mass goals: -26%; Mass goals with new source complement: -21%
<b>RT0/ISO</b>	-

## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
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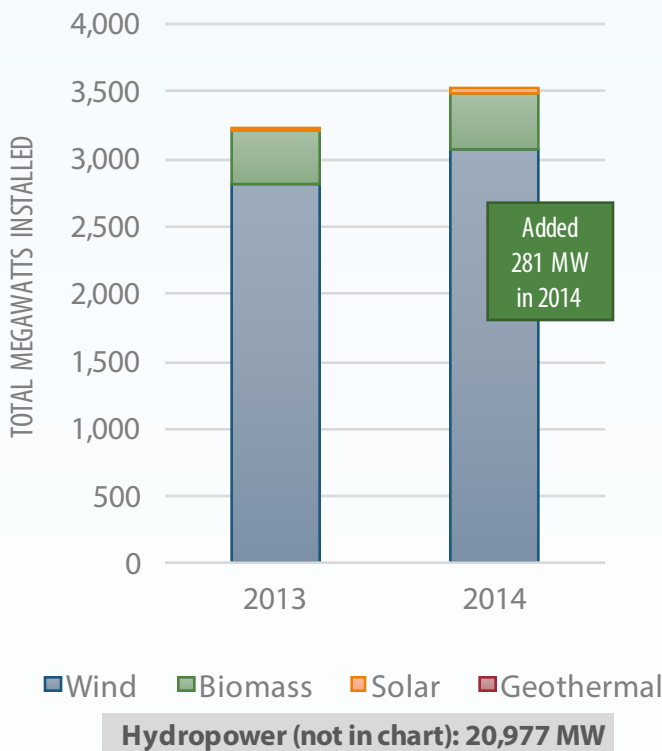


# RENEWABLE ENERGY IN WASHINGTON

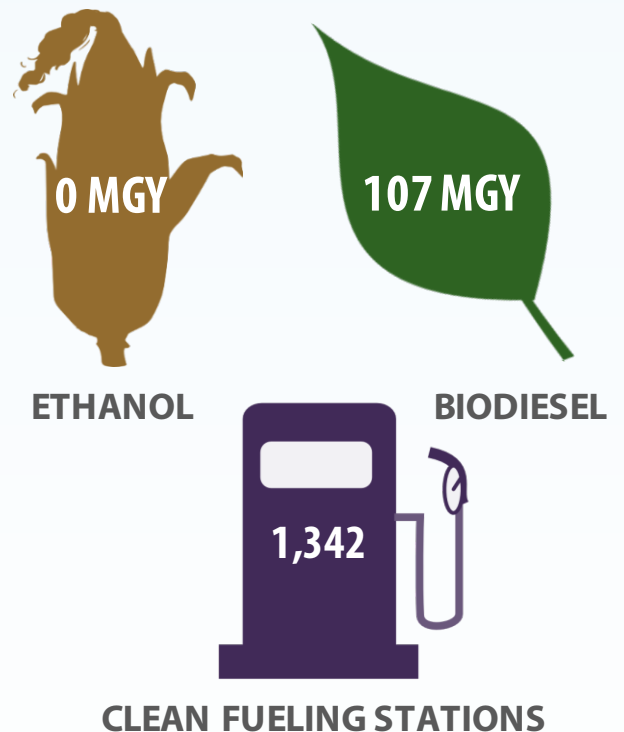


## TOTAL ELECTRICITY GENERATION

- ▶ Hydropower is the largest contributor to Washington's electricity generation portfolio, regularly generating **three quarters** of total power produced in the state
- ▶ Has created an attractive environment for renewable energy production through tax incentives, production incentives, and a **15% by 2020** renewable portfolio standard
- ▶ Installed **267 MW** of wind power in 2014, boosting total capacity to over **3,000 MW** (ranking seventh in the country)
- ▶ Makes use of its vast wood and wood waste resources for bioenergy production
- ▶ Has great potential to expand its abundant wave, ocean, geothermal, and other renewable energy resources



## RENEWABLE ELECTRIC CAPACITY

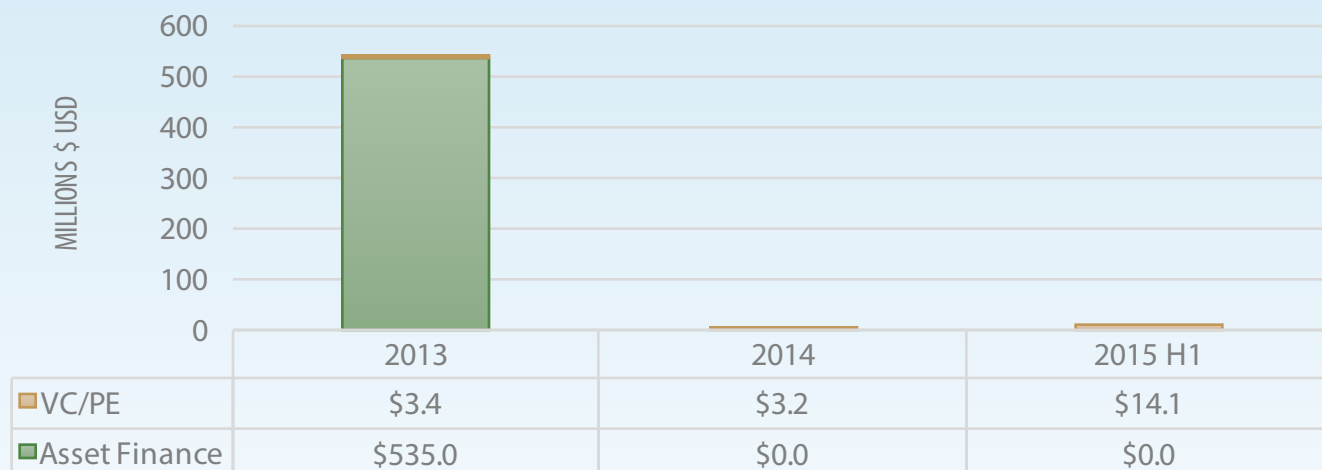


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN WASHINGTON

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



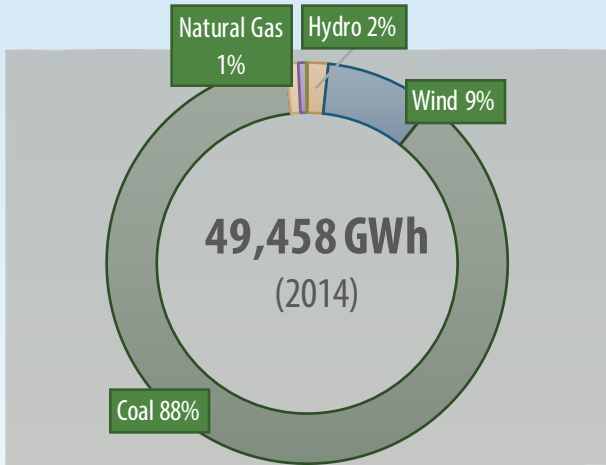
<b>RPS</b>	15% by 2020
<b>Net Metering</b>	All utilities; projects up to 100 kW; aggregated and community net metering allowed; aggregate capacity limited to 0.5% of utility's 1996 peak demand (below average)
<b>Financial Incentives</b>	Production incentives for residential and non-residential projects (paid by utilities in exchange for a tax credit equal to the cost of payments); incentives for commercial and residential solar projects; sales tax incentives; business and occupation tax incentives for renewable energy manufacturing
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target:</i> Emissions rate: -37.2%; Mass goals: -30%; Mass goals with new source complement: -24%
<b>RT0/ISO</b>	-

## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
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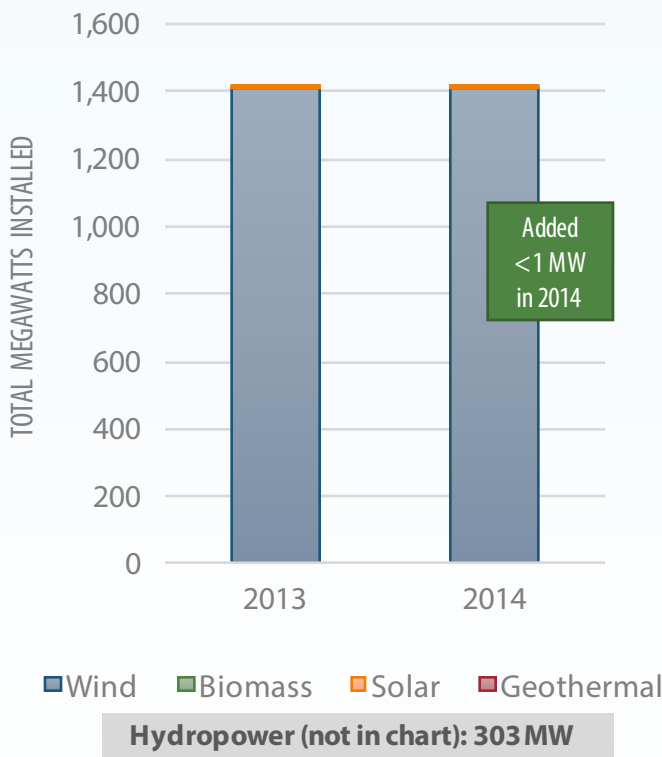


# RENEWABLE ENERGY IN WYOMING

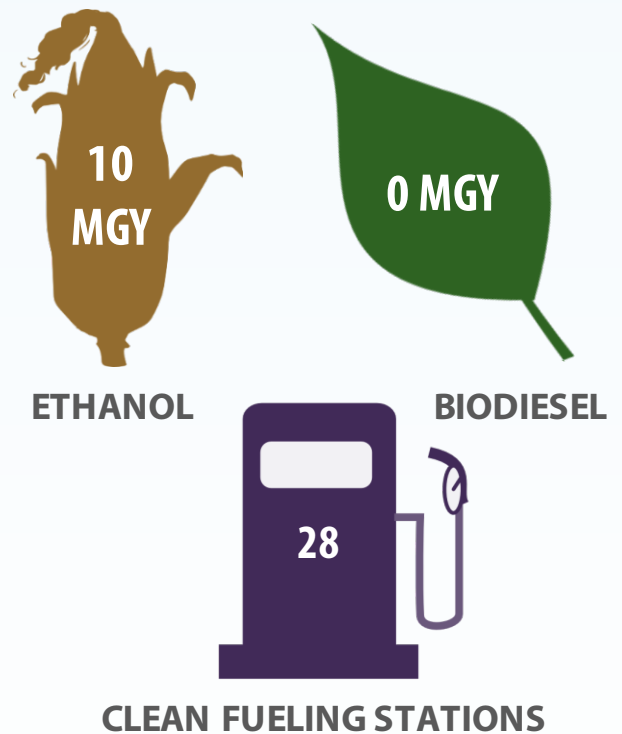


## TOTAL ELECTRICITY GENERATION

- ▶ Supports distributed generation through net metering, but does not have an RPS or offer significant financial incentives to ramp up production – and is home to the only wind production tax in the nation
- ▶ Chosen to be the site of the nation’s largest proposed onshore wind project, the **3 GW** Chokecherry and Sierra Madre wind farm to be located on public and private land and export power to other states in the region
- ▶ Ranks among the bottom states for solar energy capacity
- ▶ Heavily reliant on electricity generated from its immense coal resources
- ▶ After completing most of the initiatives identified in the Governor’s 2013 energy strategy, is now gathering input to develop a new strategy by early 2016
- ▶ Rocky Mountain Power recently announced plans to gradually shift away from coal and enhance use of natural gas, wind, and energy efficiency



## RENEWABLE ELECTRIC CAPACITY

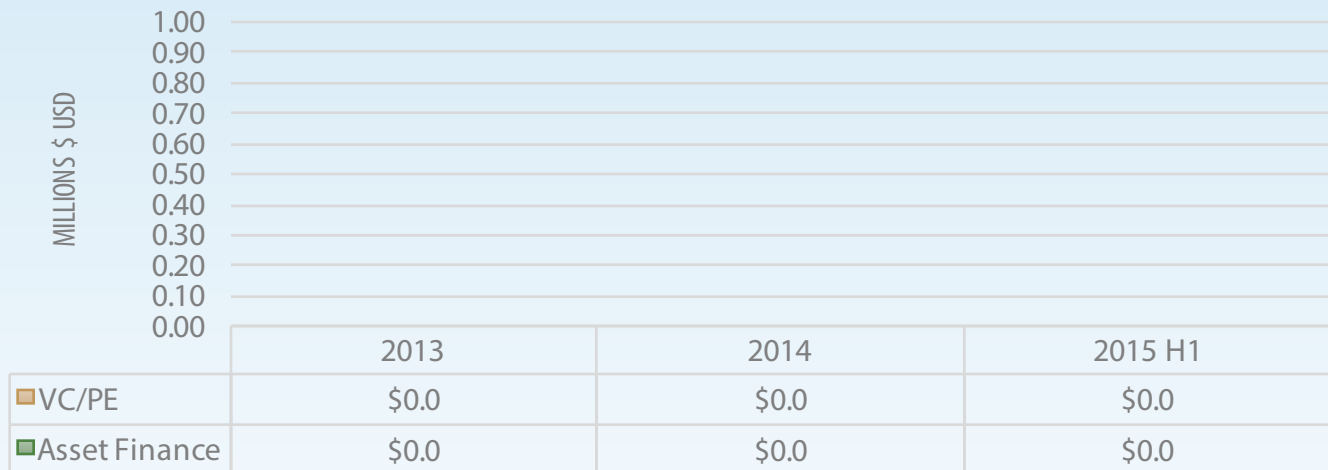


## RENEWABLE TRANSPORTATION

# RENEWABLE ENERGY IN WYOMING

## PRIVATE SECTOR INVESTMENT

Asset Finance, Venture Capital & Private Equity (Dollars in Millions)



<b>RPS</b>	None
<b>Net Metering</b>	IOUs, electric co-ops, irrigation districts; projects up to 25 kW
<b>Financial Incentives</b>	Enacted PACE-enabling legislation
<b>Clean Power Plan Reduction Targets</b>	<i>Percent change from 2012 baseline to 2030 target: Emissions rate: -43.9%; Mass goals: -37%; Mass goals with new source complement: -33%</i>
<b>RTO/ISO</b>	-

## SOURCES

Bloomberg New Energy Finance, Database of State Incentives for Renewables & Efficiency, Energy Information Administration, Geothermal Energy Association, Lawrence Berkeley National Laboratory, Renewable Fuels Association, Solar Energy Industries Association, state government websites, U.S. Department of Energy, U.S. EPA  
 More information: [www.acore.org/50states](http://www.acore.org/50states)

