

Geothermal Energy and its Value

Imperial Valley Renewable Energy Summit

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Green energy you can rely on

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Introduction

Market leader with proven track record in the geothermal sector

Our mission is to become a leading global renewable energy provider



50
Years of
experience



595
\$million Revenue
in 2015

Own & Operate
nearly
700 MW

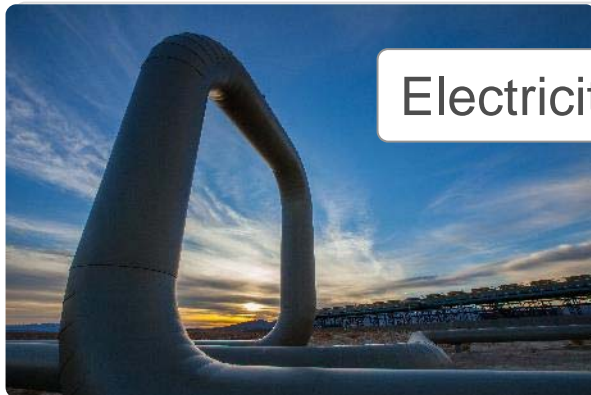


1,060
Employees



Business Segment Overview

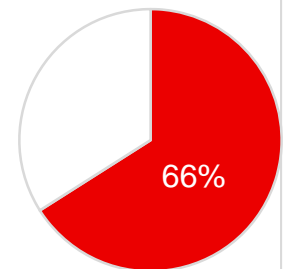
The only vertically integrated player with a balanced business model



Electricity

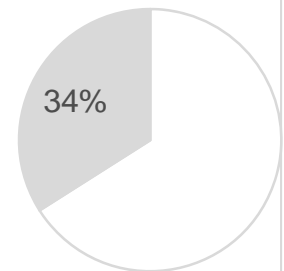
- Owns & operates 697 MW
- Sells firm & flexible electricity
- Fully contracted

Revenue¹



Products

- Technology leadership
- Sells geothermal and REG² power plants as well as other products to 3rd parties
- Provides EPC³ services

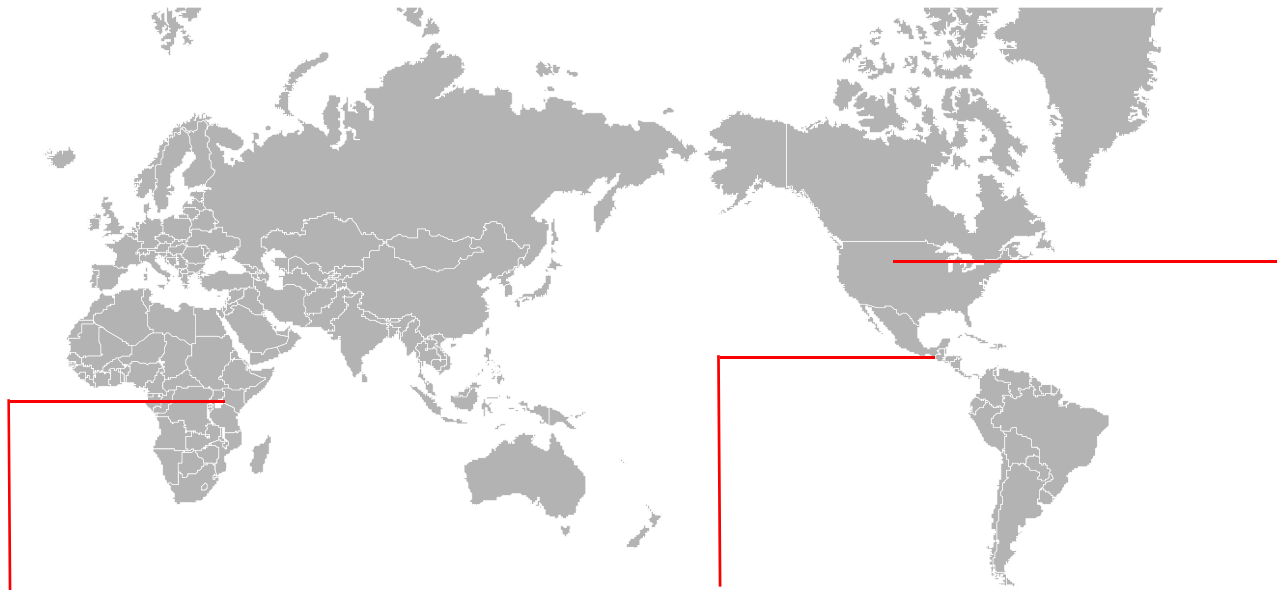


¹ Five years average (2011-2015)

² REG - recovered energy generation

³ EPC - engineering, procurement and construction

Ormat Global Operation - Nearly 700 MW



Kenya 139 MW	
Olkaria III Plants 1-4	139

Guatemala 43 MW	
Amatitlan	20
Zunil	23

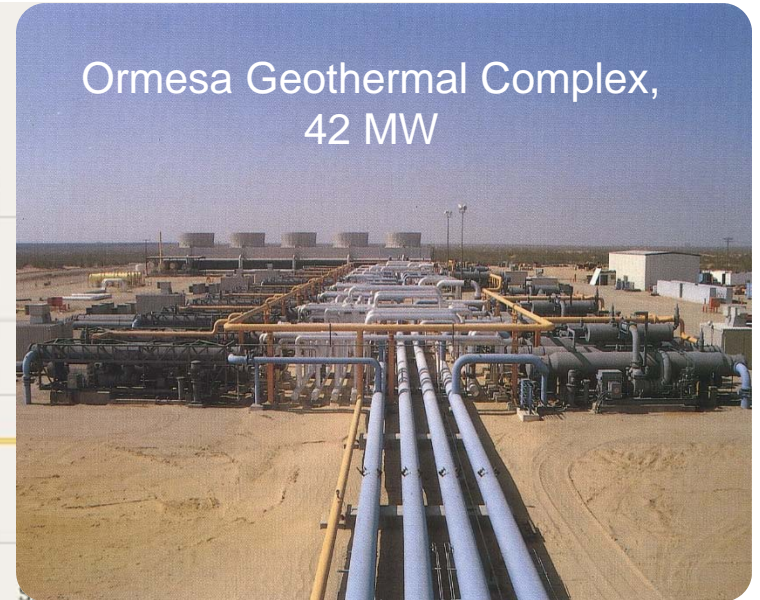
United States 515 MW	
Nevada (6 sites)	243
California (4 sites)	181
Hawaii	38
North & South Dakota, Minnesota, Colorado Montana & Colorado (REG ¹) (10 power plants)	53

¹ REG- Recovered Energy Generation
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Ormat in the Imperial Valley

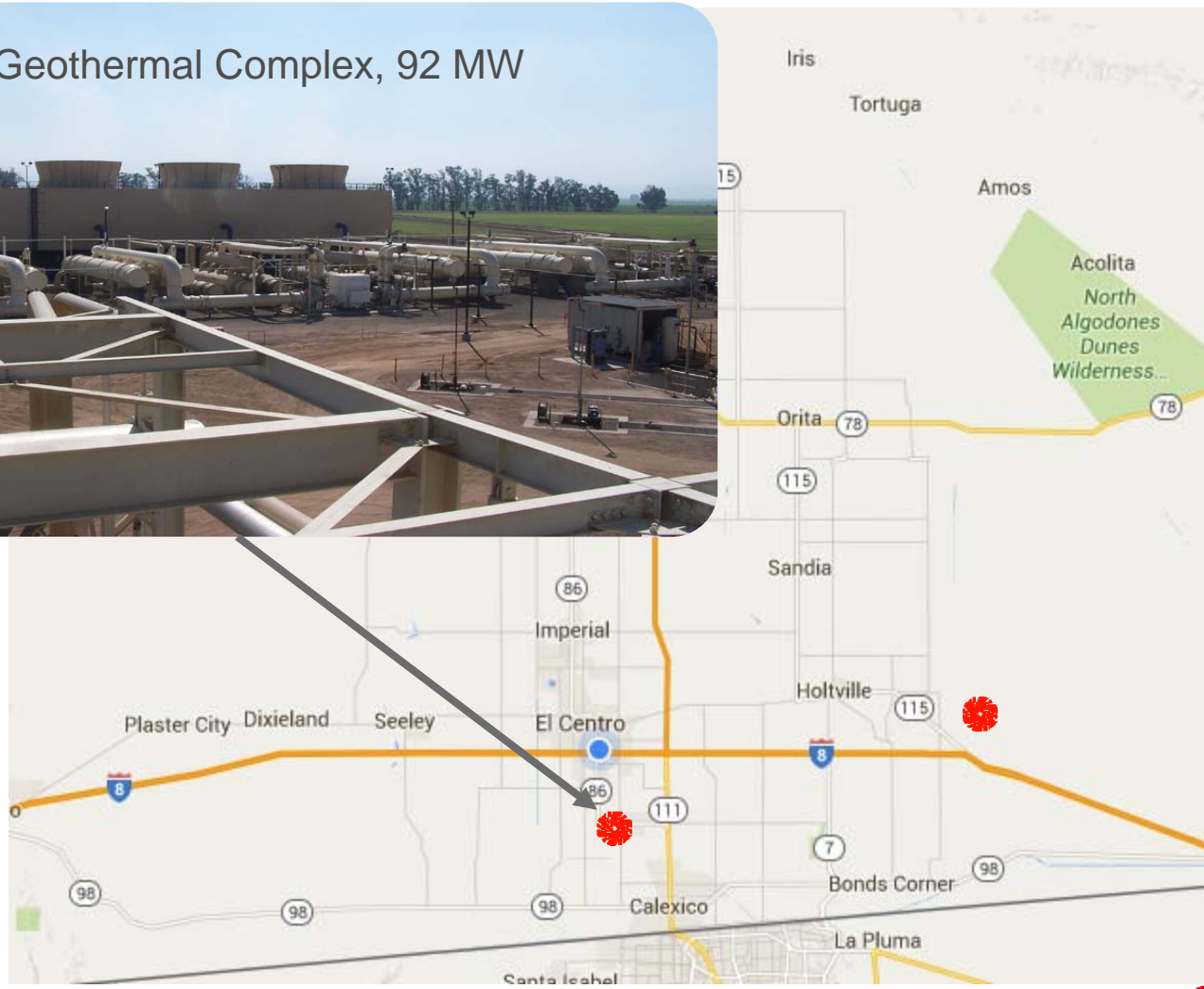


Ormesa Geothermal Complex,
42 MW

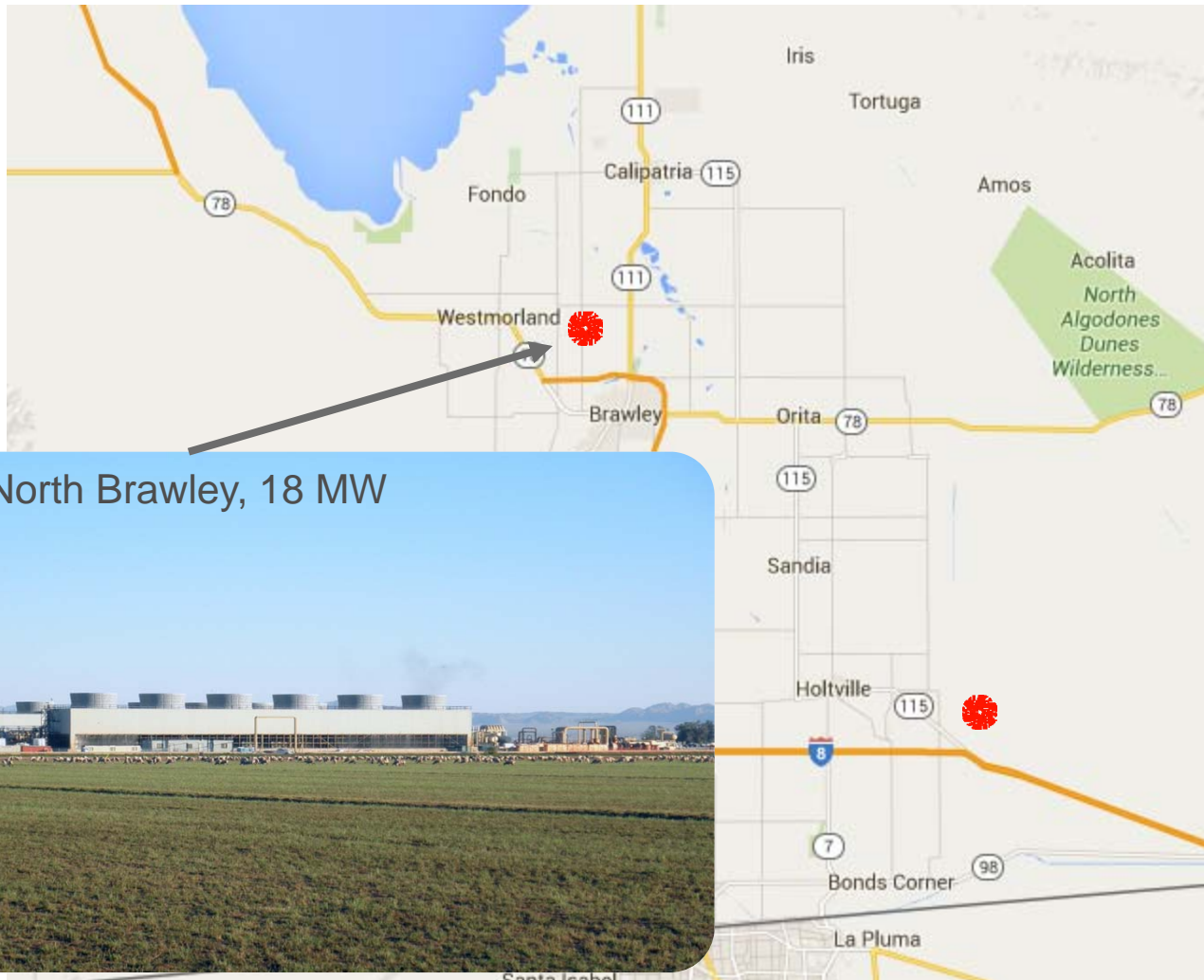


Ormat in the Imperial Valley

Heber Geothermal Complex, 92 MW



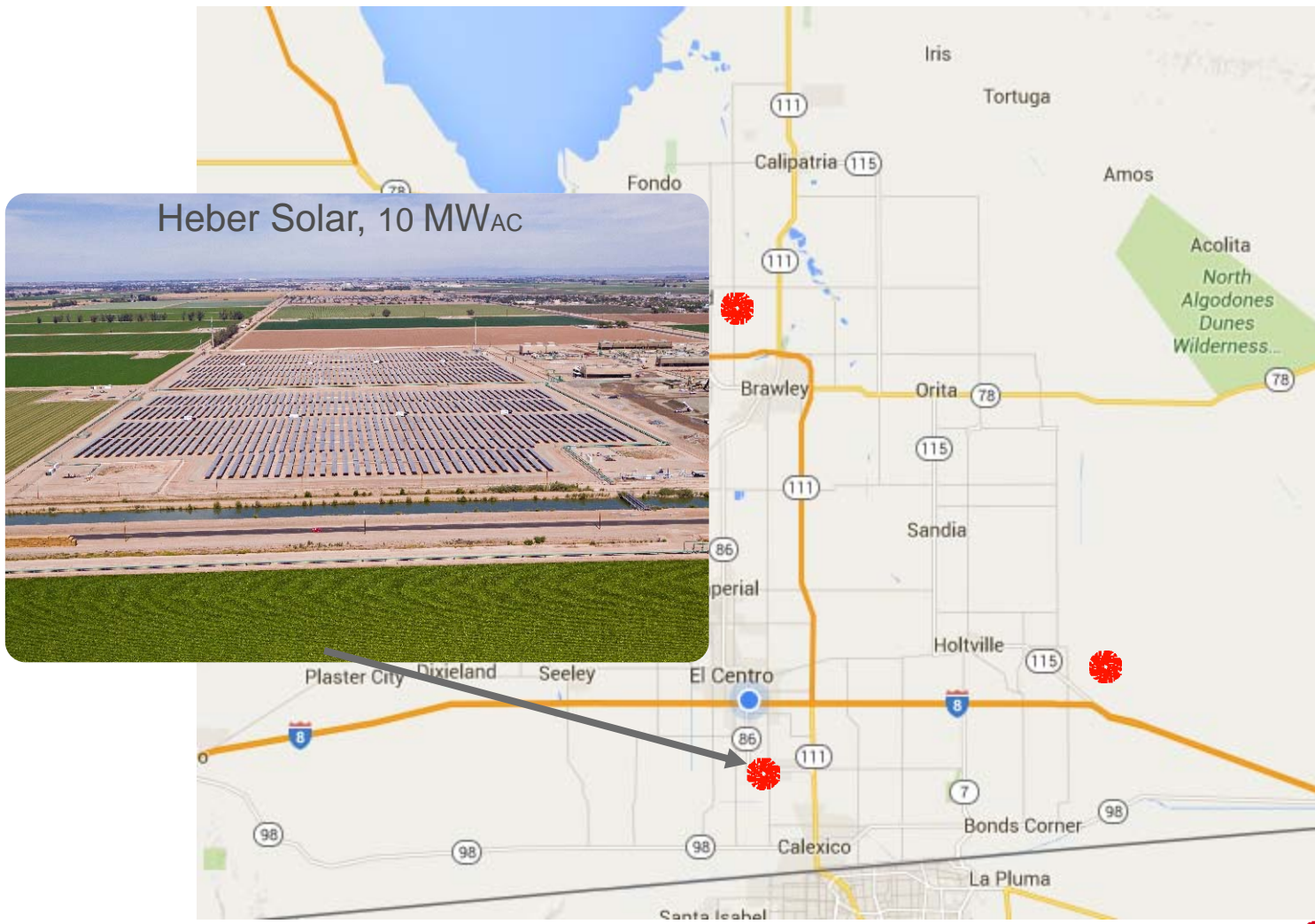
Ormat in the Imperial Valley



North Brawley, 18 MW

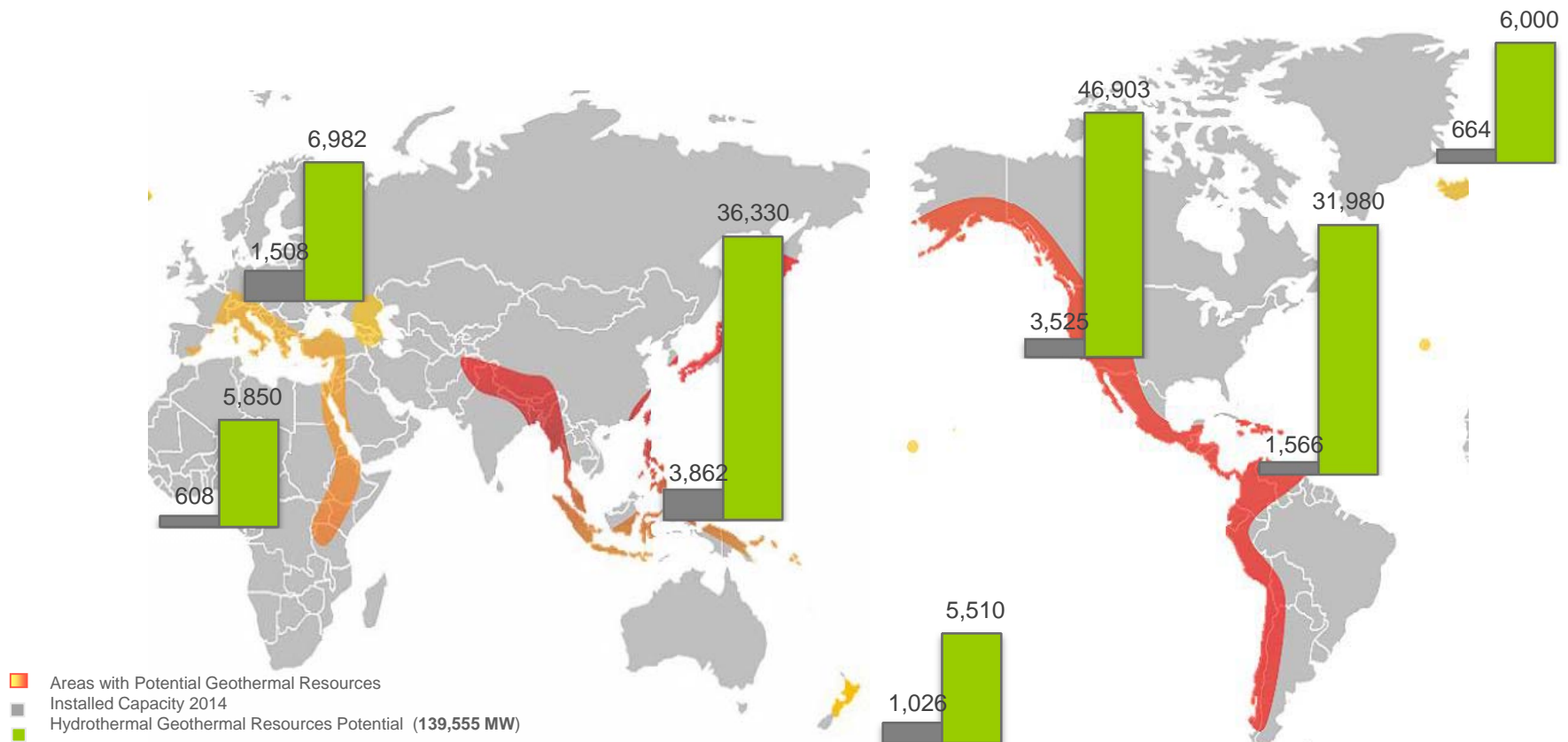


Ormat in the Imperial Valley



Global Geothermal Potential (MW)

Potential is over 10x the global installed capacity of 13GW



Source: Hydrothermal Geothermal Resources Potential, EMERGING ENERGY RESEARCH, LLC. Global "Geothermal Markets and Strategies: 2009–2020", May 2009. "Geothermal Power Generation in the World 2005–2010 Update Report" Ruggero Bertani Enel Green Power, via Dalmazia 15 – 00198 Roma (Italy) April 2010. 2015 Annual U.S. & Global Geothermal Power Production Report GEA Feb. 2015.

Growth Initiatives - Organic Growth and M&A

- Expanding geographical footprint and diversifying technologies
 - Added 29 MW in January 2016
 - Expect to add between 160 and 190 MW by YE 2018
 - Extensive activities to support long term growth



Project	Projected Capacity	Expected COD
Guadeloupe- Bouillante	7 MW ¹	H2 2016
Indonesia - Sarulla Project, Phase 1, (330 MW project)	14 MW ¹	YE 2016
Guadeloupe- Bouillante	4 MW ¹	2017
Honduras, Platanares	35 MW	2017
U.S. - Tungsten	25 MW-35 MW	2017
U.S. - Dixie Meadows	25 MW-35 MW	2018
Kenya, Menangai (35 MW project)	18 MW ¹	2018

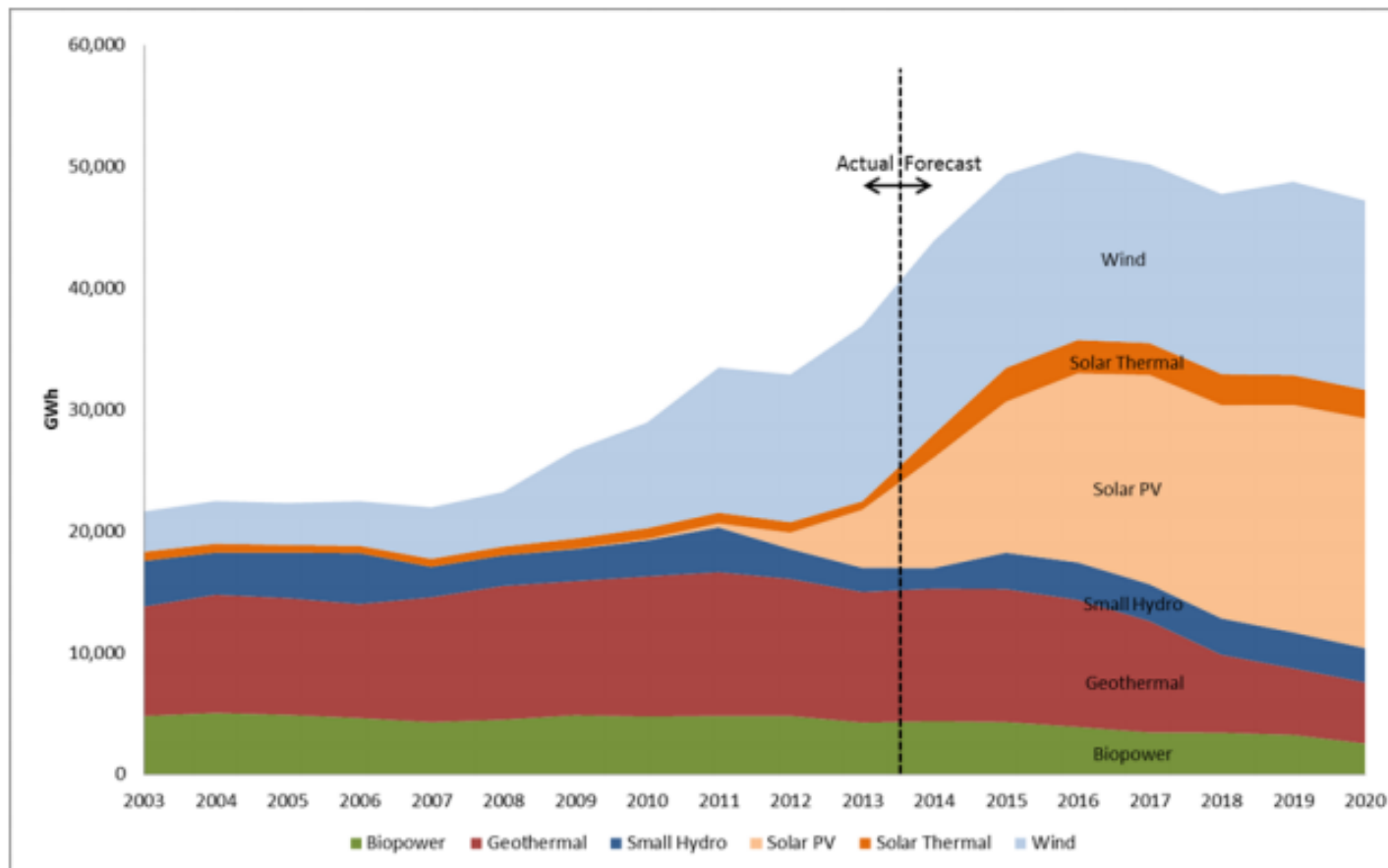
● Construction & Development
 ○ Business Development & Exploration
 ● M&A

¹ Ormat's share (12.75% in Sarulla ; 51% in Menangai 85% in Bouillante) ;

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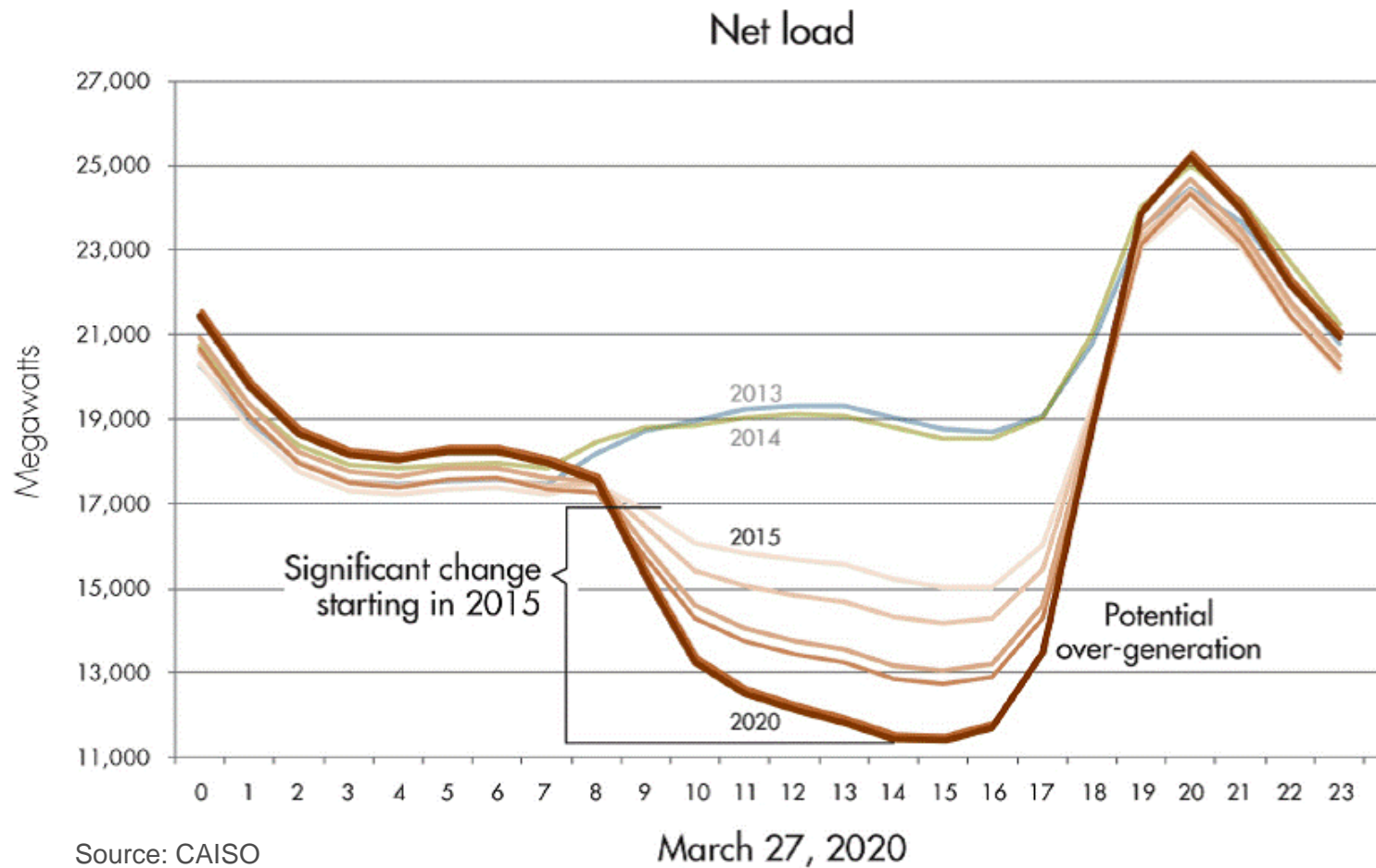
Intermittent Renewables Dominate the CA RPS

Renewable Resources Mix based on CA IOUs RPS Compliance Reports



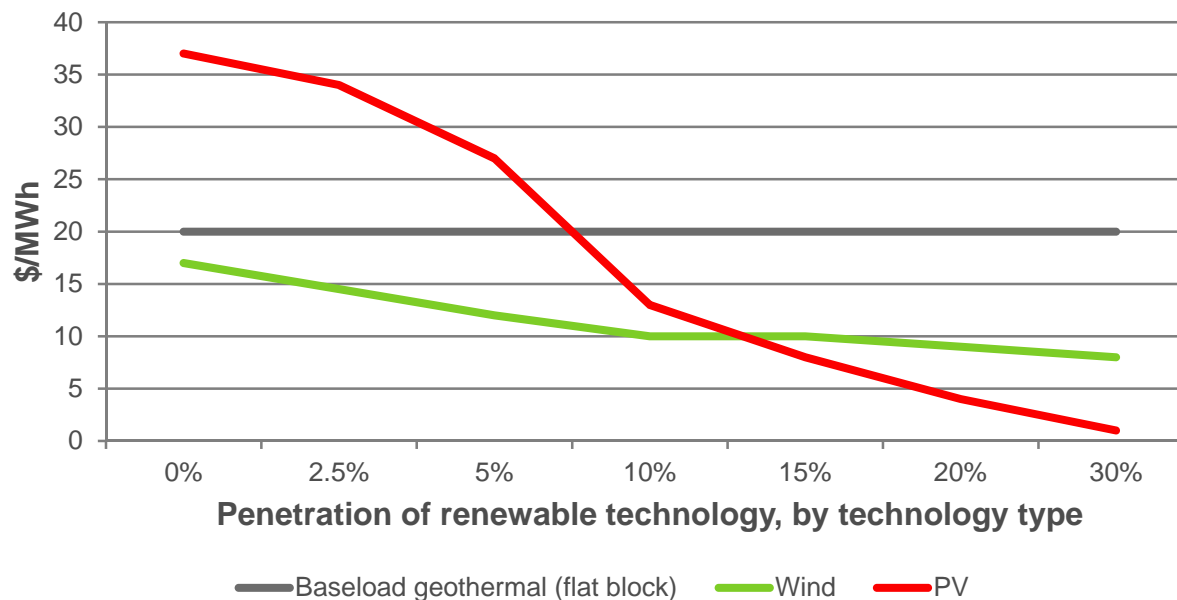
Source: CPUC, Q2 2015 RPS report

The Challenge of High Solar Penetration



Comparative Capacity Ratings

- As solar PV penetration increases, incremental capacity ratings and value decline (in the absence of mitigating measures); geothermal remains stable



- Multiple studies indicate that a diversified portfolio is key

Source: illustration based on results in Mills and Wiser, *Changes in the Economic Value of Variable Generation at High Penetration Levels*, LBNL, 2012; value shown is based on avoided CT in long-term supply equilibrium

Even Non-Flexible Geo Resources Reduce Over-generation Compared to High Solar PV Scenarios

% curtailment by resource type				
Technology	33% RPS	40% RPS	50% RPS Large Solar	50% RPS Diverse
Biomass	2%	9%	23%	15%
Geothermal	2%	9%	23%	15%
Hydro	2%	10%	25%	16%
Solar PV	5%	26%	65%	42%
Wind	2%	10%	22%	15%

1,950 MW of geothermal
 ↓
 50% RPS Large Solar

2,531 MW of geothermal
 ↓
 50% RPS Diverse

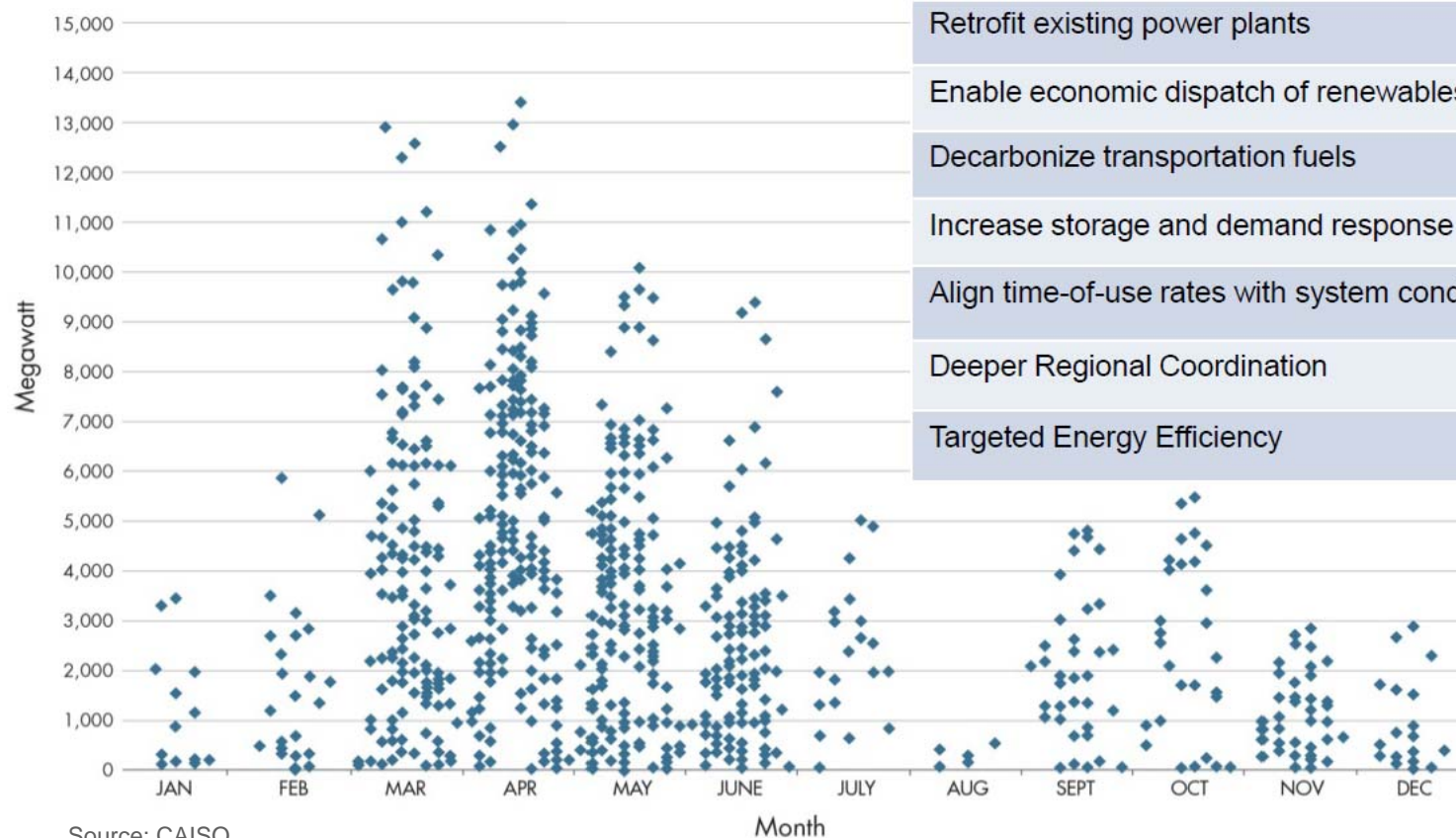
→ (Red arrow from 23% Geothermal in 50% RPS Large Solar to 15% Geothermal in 50% RPS Diverse)

Source: E3, Investigating a Higher Renewables Portfolio Standard in California, 2014

Note: For illustration only; there are additional “diverse portfolios” studies examining how to reduce over-generation

CAISO Forecast of Over-generation and Solutions

Potential for renewable curtailment in 2024 at 40% RPS could reach 13,000 MW



Source: CAISO

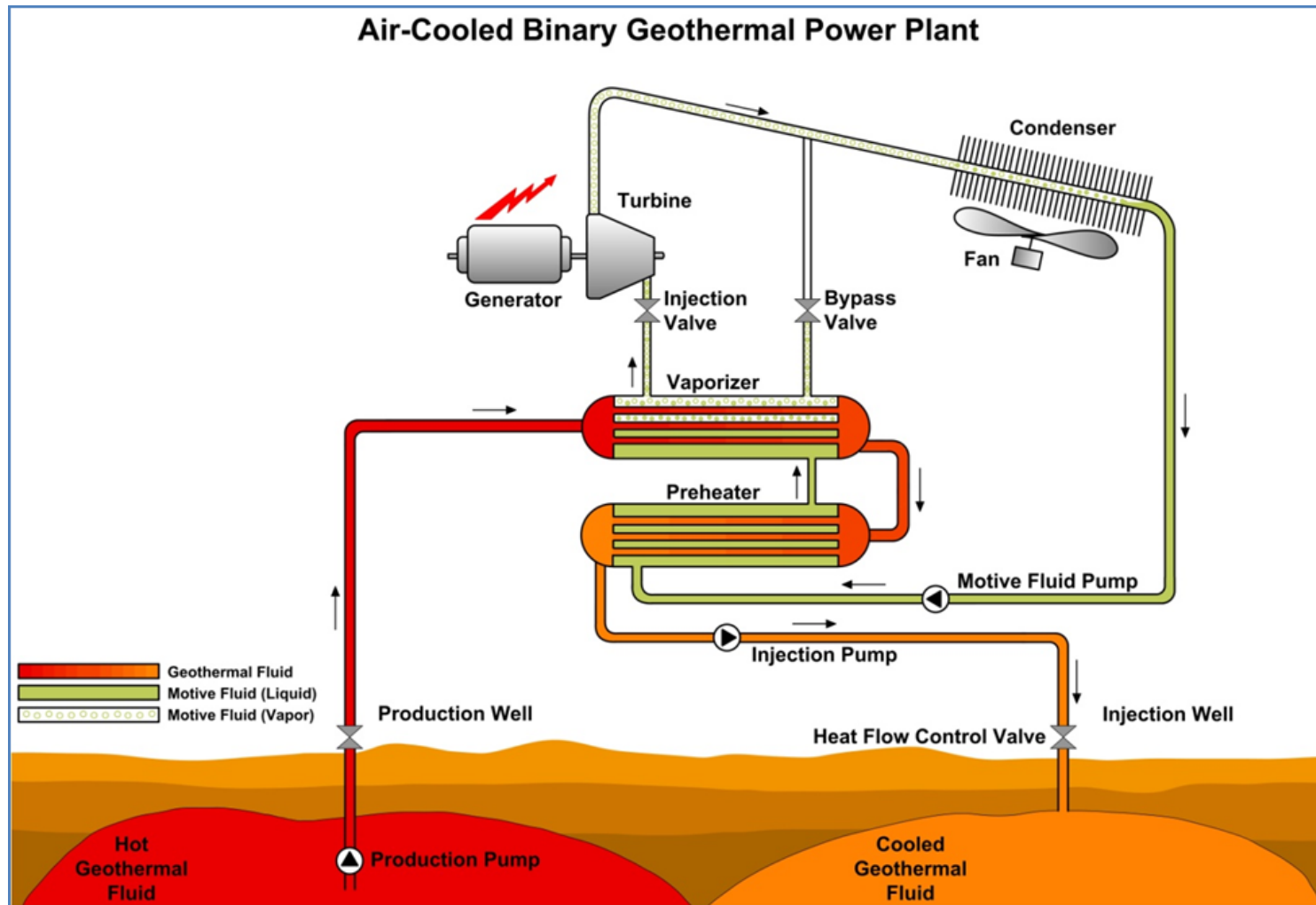
Solutions
Retrofit existing power plants
Enable economic dispatch of renewables
Decarbonize transportation fuels
Increase storage and demand response
Align time-of-use rates with system conditions
Deeper Regional Coordination
Targeted Energy Efficiency

Dispatchable Geothermal: 38 MW Puna Geothermal Venture

- Big Island, Hawaii
- Dispatchable energy
- Automatic Generator Control (AGC) remotely and automatically controlled by HELCO System Operator
- Dispatch: 22 ~ 38 MW
- Ramp rate up or down: 2 MW / minute
- Spinning reserve at all times: 3 MW



How it Works



Geothermal Power in a High Intermittent Renewables Mix - Firm, Flexible and GHG-Free

- Diversity (base-load)
- Flexibility and ancillary services
 - Flexible capacity
 - Spinning reserve
 - Regulation up and down
 - Voltage regulation
 - Fast ramping
 - Multiple cycles / day
 - 30% of nameplate / minute

Geothermal Power in a High Intermittent Renewables Mix - Firm, Flexible and GHG-Free

- Cost effective. >20% cost reduction in recent years:
 - Better exploration
 - More efficient power plant design
 - Reduction in O&M costs
- Significant growth potential

The Power of Experience



Thank you

For further information: www.ormat.com / info@ormat.com