ORMAT TECHNOLOGIES, INC.
Form 10-K
March 01, 2019

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UNITED STATES SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-K

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2018
Or
TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Commission file number: 001-32347

ORMAT TECHNOLOGIES, INC.

(Exact name of registrant as specified in its charter)

Delaware	**88-0326081**
(State or other jurisdiction of incorporation or organization)	*(I.R.S. Employer Identification Number)*
6140 Plumas Street, Reno, Nevada	**89519-6075**
(Address of principal executive offices)	*(Zip Code)*

(775) 356-9029

(Registrant's telephone number, including area code)

Securities Registered Pursuant to Section 12(b) of the Act:

Title of Each Class	**Name of Each Exchange on Which Registered**
Common Stock $0.001 Par Value	New York Stock Exchange

Securities Registered Pursuant to Section 12(g) of the Act:

None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Exchange Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of registrant’s knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of “large accelerated filer,” “accelerated filer” and “smaller reporting company” in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer | Accelerated filer | Non-accelerated filer | Smaller reporting company | Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

As of June 30, 2018, the last business day of the registrant's most recently completed second fiscal quarter, the aggregate market value of the registrant's common stock held by non-affiliates of the registrant was $2,108,534,590 based on the closing price as reported on the New York Stock Exchange. Indicate the number of shares outstanding of each of the registrant's classes of common stock as of the latest practicable date: As of February 26, 2019, the number of outstanding shares of common stock, par value $0.001 per share was 50,702,174.

Documents incorporated by reference: Part III (Items 10, 11, 12, 13 and 14) incorporates by reference portions of the Registrant's Proxy Statement for its Annual Meeting of Stockholders, which will be filed not later than 120 days after December 31, 2018.

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ORMAT TECHNOLOGIES, INC.

FORM 10-K FOR THE YEAR ENDED DECEMBER 31, 2018

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Glossary of Terms

When the following terms and abbreviations appear in the text of this report, they have the meanings indicated below:

Term	Definition
ACUA	Atlantic County Utilities Authority
Amatitlan Loan	$42,000,000 in initial aggregate principal amount borrowed by our subsidiary Ortitlan Limitada from Banco Industrial S.A. and Westrust Bank (International) Limited.
AMM	Administrador del Mercado Mayorista (administrator of the wholesale market — Guatemala)
ARRA	American Recovery and Reinvestment Act of 2009
Auxiliary Power	The power needed to operate a geothermal power plant's auxiliary equipment such as pumps and cooling towers
Availability	The ratio of the time a power plant is ready to be in service, or is in service, to the total time interval under consideration, expressed as a percentage, independent of fuel supply (heat or geothermal) or transmission accessibility
Balance of Plant equipment	Power plant equipment other than the generating units including items such as transformers, valves, interconnection equipment, cooling towers for water cooled power plants, etc.
BEAT	Base Erosion Anti-Abuse Tax
BESS	Battery Energy Storage Systems
BLM	Bureau of Land Management of the U.S. Department of the Interior
BOT	Build, operate and transfer
BSAAS	Battary Storage as a Servise
Capacity	The maximum load that a power plant can carry under existing conditions, less auxiliary power
Capacity Factor	The ratio of the average load on a generating resource to its generating capacity during a specified period of time, expressed as a percentage
CCA	
CDC	Caisse des Dépôts et Consignations, a French state-owned financial organization
CEO	Chief Executive Officer
CFO	Chief Financial Officer
C&I	Refers to the Commercial and Industrial sectors, excluding residential
CNEE	National Electric Energy Commission of Guatemala
COD	Commercial Operation Date
Company	Ormat Technologies, Inc., a Delaware corporation, and its consolidated subsidiaries
COSO	Committee of Sponsoring Organizations of the Treadway Commission
CPI	Consumer Price Index
CPUC	California Public Utilities Commission
DEG	Deutsche Investitions-und Entwicklungsgesellschaft mbH
DFIs	Development Finance Institutions
DOE	U.S. Department of Energy
DOGGR	California Division of Oil, Gas, and Geothermal Resources
DSCR	Debt Service Coverage Ratio
EBITDA	Earnings before interest, taxes, depreciation and amortization
EDF	Electricite de France S.A.

EGS	Enhanced Geothermal Systems
EIB	European Investment Bank
EMRA	Energy Market Regulatory Authority in Turkey
ENEE	Empresa Nacional de Energía Eléctrica
Enthalpy	The total energy content of a fluid; the heat plus the mechanical energy content of a fluid (such as a geothermal brine), which, for example, can be partially converted to mechanical energy in an Organic Rankine Cycle.

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EPA	U.S. Environmental Protection Agency
EPC	Engineering, procurement and construction
EPS	Earnings per share
ERC	Kenyan Energy Regulatory Commission
ERCOT	Electric Reliability Council of Texas, Inc.
Exchange Act	U.S. Securities Exchange Act of 1934, as amended
FASB	Financial Accounting Standards Board
FERC	U.S. Federal Energy Regulatory Commission
FIT	Feed-in Tariff
FPA	U.S. Federal Power Act, as amended
GAAP	Generally accepted accounting principles
GCCU	Geothermal Combined Cycle Unit
GDC	Geothermal Development Company
GEA	Geothermal Energy Association
Geothermal Power Plant	The power generation facility and the geothermal field
Geothermal Steam Act	U.S. Geothermal Steam Act of 1970, as amended
GHG	Greenhouse gas
GW	Giga watt
GWh	Giga watt hour
HELCO	Hawaii Electric Light Company
IDWR	Idaho Department of Water
IGA	International Geothermal Association
IID	Imperial Irrigation District
INDE	Instituto Nacional de Electrification
IOUs	Investor-Owned Utilities
IPPs	Independent Power Producers
IESO	The Independent Electricity System Operator (IESO) works at the heart of Ontario's power system.
IRS	Internal Revenue Service
ISO	International Organization for Standardization
ITC	Investment tax credit
ITC Cash Grant	Payment for Specified Renewable Energy property in lieu of Tax Credits under Section 1603 of the ARRA
JBIC	Japan Bank for International Cooperation
John Hancock	John Hancock Life Insurance Company (U.S.A.)
JOC	Joined operation contract
JPM	JPM Capital Corporation
KenGen	Kenya Electricity Generating Company Ltd.
Kenyan Energy Act	Kenyan Energy Act, 2006
KETRACO	Kenya Electricity Transmission Company Limited
KGRA	Known Geothermal Area
KLP	Kapoho Land Partnership
KPLC	Kenya Power and Lighting Co. Ltd.
kVa	Kilovolt-ampere
kW	Kilowatt - A unit of electrical power that is equal to 1,000 watts
kWh	Kilowatt hour(s), a measure of power produced
LADWP	Los Angeles Department of Water and Power

LCOE	Levelized Costs of Energy
	Load Serving Entities
Mammoth Pacific	Mammoth-Pacific, L.P.
MACRS	Modified Accelerated Cost Recovery System
MW	Megawatt - One MW is equal to 1,000 kW or one million watts
MWh	Megawatt hour(s), a measure of energy produced

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NBPL	Northern Border Pipe Line Company
NIS	New Israeli Shekel
NOC	Network Operations Center
NV Energy	NV Energy, Inc.
NYSE	New York Stock Exchange
NYISO	New York Independent System Operator, Inc.
OEC	Ormat Energy Converter
OFC	Ormat Funding Corp., a wholly owned subsidiary of the Company
OFC Senior Secured Notes	$190,000,000 8.25% Senior Secured Notes, due 2020 issued by OFC
OFC 2	OFC 2 LLC, a wholly owned subsidiary of the Company
OFC 2 Senior Secured Notes	Up to $350,000,000 Senior Secured Notes, due 2034 issued by OFC 2
Opal Geo	Opal Geo LLC
OPC	OPC LLC, a consolidated subsidiary of the Company
OPC Transaction	Financing transaction involving four of our Nevada power plants in which institutional equity investors purchased an interest in our special purpose subsidiary that owns such plants.
OPIC	Overseas Private Investment Corporation
OrCal	OrCal Geothermal Inc., a wholly owned subsidiary of the Company
OrCal Senior Secured Notes	$165,000,000 6.21% Senior Secured Notes, due 2020 issued by OrCal
ORC	Organic Rankine Cycle - A process in which an organic fluid such as a hydrocarbon or fluorocarbon (but not water) is boiled in an evaporator to generate high pressure vapor. The vapor powers a turbine to generate mechanical power. After the expansion in the turbine, the low-pressure vapor is cooled and condensed back to liquid in a condenser. A cycle pump is then used to pump the liquid back to the vaporizer to complete the cycle. The cycle is illustrated in the figure below:
Ormat International	Ormat International Inc., a wholly owned subsidiary of the Company
Ormat Nevada	Ormat Nevada Inc., a wholly owned subsidiary of the Company
Ormat Systems	Ormat Systems Ltd., a wholly owned subsidiary of the Company
ORIX	ORIC Corporation
ORPD	ORPD LLC, a holding company subsidiary of the Company in which Northleaf Geothermal Holdings, LLC holds a 36.75% equity interest
ORPD Transaction	Financing transaction involving the Puna complex and Don A. Campbell, OREG 1, OREG 2 and OREG 3 power plants in which Northleaf Geothermal Holdings, LLC purchased an equity interest in our special purpose subsidiary that owns such plants.
OrPower 4	OrPower 4 Inc., a wholly owned subsidiary of the Company
Ortitlan	Ortitlan Limitada, a wholly owned subsidiary of the Company
ORTP	ORTP, LLC, a consolidated subsidiary of the Company

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ORTP Transaction	Financing transaction involving power plants in Nevada and California in which an institutional equity investor purchased an interest in our special purpose subsidiary that owns such plants.
Orzunil	Orzunil I de Electricidad, Limitada, a wholly owned subsidiary of the Company
PEC	Portfolio Energy Credits
PG&E	Pacific Gas and Electric Company
PGV	Puna Geothermal Venture, a wholly owned subsidiary of the Company
PJM	PJM Interconnection, L.L.C.
PLN	PT Perusahaan Listrik Negara
Power plant equipment	Interconnection equipment, cooling towers for water cooled power plant, etc., including the generating units
PPA	Power purchase agreement
ppm	Part per million
PTC	Production tax credit
PUCH	Public Utilities Commission of Hawaii
PUCN	Public Utilities Commission of Nevada
PUHCA	U.S. Public Utility Holding Company Act of 1935
PUHCA 2005	U.S. Public Utility Holding Company Act of 2005
PURPA	U.S. Public Utility Regulatory Policies Act of 1978
Qualifying Facility(ies)	Certain small power production facilities are eligible to be “Qualifying Facilities” under PURPA, provided that they meet certain power and thermal energy production requirements and efficiency standards. Qualifying Facility status provides an exemption from PUHCA 2005 and grants certain other benefits to the Qualifying Facility
REC	Renewable Energy Credit
REG	Recovered Energy Generation
RER	Renewable Energy Resource certificate
RPS	Renewable Portfolio Standards
RTO	Regional Transmission Organization
SaaS	Software as a Service
SCADA	Supervisory Control and Data Acquisition
SCPPA	Southern California Public Power Authority
SEC	U.S. Securities and Exchange Commission
Securities Act	U.S. Securities Act of 1933, as amended
SO#4	Standard Offer Contract No. 4
SOL	Sarulla Operations Ltd.
Solar PV	Solar photovoltaic
SOX Act	Sarbanes-Oxley Act of 2002
Southern California Edison	Southern California Edison Company
SPE(s)	Special purpose entity(ies)
SRAC	Short Run Avoided Costs
TASE	Tel Aviv Stock Exchange
Tax Act	Tax Cuts and Jobs Act
UIC	Underground Injection Control
Union Bank	Union Bank, N.A.
U.S.	United States of America
U.S. Treasury	U.S. Department of the Treasury
USG	U.S. Geothermal Inc.

VAT	Value Added Tax
VEI	Viridity Energy, Inc.
Viridity	Viridity Energy Solutions Inc., our wholly owned subsidiary
WHOH	Waste Heat Oil Heaters

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Cautionary Note Regarding Forward-Looking Statements

This annual report includes “forward-looking statements” within the meaning of the Private Securities Litigation Reform Act of 1995. All statements, other than statements of historical facts, included in this report that address activities, events or developments that we expect or anticipate will or may occur in the future, including such matters as our projections of annual revenues, expenses and debt service coverage with respect to our debt securities, future capital expenditures, business strategy, competitive strengths, goals, development or operation of generation assets, market and industry developments and the growth of our business and operations, are forward-looking statements. When used in this annual report, the words “may”, “will”, “could”, “should”, “expects”, “plans”, “anticipates”, “believes”, “estimates”, “pr “projects”, “potential”, or “contemplate” or the negative of these terms or other comparable terminology are intended to identify forward-looking statements, although not all forward-looking statements contain such words or expressions. The forward-looking statements in this annual report are primarily located in the material set forth under the headings Item 1 — “Business” contained in Part I of this annual report, Item 1A — “Risk Factors” contained in Part I of this annual report, Item 7 — “Management’s Discussion and Analysis of Financial Condition and Results of Operations” contained in Part II of this annual report, and “Notes to Financial Statements” contained in Item 8 — “Financial Statements and Supplementary Data” contained in Part II of this annual report, but are found in other locations as well. These forward-looking statements generally relate to our plans, objectives and expectations for future operations and are based upon management’s current estimates and projections of future results or trends. Although we believe that our plans and objectives reflected in or suggested by these forward-looking statements are reasonable, we may not achieve these plans or objectives. You should read this annual report completely and with the understanding that actual future results and developments may be materially different from what we expect attributable to a number of risks and uncertainties, many of which are beyond our control.

Specific factors that might cause actual results to differ from our expectations include, but are not limited to:

- significant considerations, risks and uncertainties discussed in this annual report;
- geothermal resource risk (such as the heat content, useful life and geological formation of the reservoir);
- operating risks, including equipment failures and the amounts and timing of revenues and expenses;
- financial market conditions and the results of financing efforts;
- weather and other natural phenomena including earthquakes, volcanic eruption, drought and other natural disasters;
- political, legal, regulatory, governmental, administrative and economic conditions and developments in the U.S., Turkey and other countries in which we operate and, in particular, possible import tariffs, possible late payments, the

impact of recent and future federal, state and local regulatory proceedings and changes, including legislative and regulatory initiatives regarding deregulation and restructuring of the electric utility industry, public policies and government incentives that support renewable energy and enhance the economic feasibility of our projects at the federal and state level in the U.S., Turkey and elsewhere, and carbon-related legislation;

risks and uncertainty with respect to our internal control over financial reporting, including the identification of a material weakness which, if not timely remediated, may adversely affect the accuracy and reliability of our financial statements;

the impact of fluctuations in oil and natural gas prices under certain of our PPAs;

the competition with other renewable sources or a combination of renewable sources on the energy price component under future PPAs;

risks and uncertainties with respect to our ability to implement strategic goals or initiatives in segments of the clean energy industry or new or additional geographic focus areas;

risk and uncertainties associated with our future development of storage projects which may operate as "merchant" facilities without long-term sales agreements, including the variability of revenues and profitability of such projects;

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environmental constraints on operations and environmental liabilities arising out of past or present operations, including the risk that we may not have, and in the future may be unable to procure, any necessary permits or other environmental authorizations;

construction or other project delays or cancellations;

the enforceability of long-term PPAs for our power plants;

contract counterparty risk, including late payments or no payments;

changes in environmental and other laws and regulations to which our company is subject, as well as changes in the application of existing laws and regulations;

current and future litigation;

our ability to successfully identify, integrate and complete acquisitions;

our ability to access the public markets for debt or equity capital quickly;

competition from other geothermal energy projects and new geothermal energy projects developed in the future, and from alternative electricity producing technologies;

market or business conditions and fluctuations in demand for energy or capacity in the markets in which we operate;

when, if and to what extent opportunities under our commercial cooperation agreement with ORIX Corporation may in fact materialize;

the direct or indirect impact on our Company’s business of various forms of hostilities including the threat or occurrence of war, terrorist incidents or cyber-attacks or responses to such threatened or actual incidents or attacks, including the effect on the availability of and premiums on insurance;

our new strategic plan to expand our geographic markets, customer base and product and service offerings may not be implemented as currently planned or may not achieve our goals as and when implemented;

development and construction of Solar PV and energy storage projects, if any, may not materialize as planned; and

the effect of and changes in current and future land use and zoning regulations, residential, commercial and industrial development and urbanization in the areas in which we operate.

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PART I

ITEM 1. BUSINESS

Certain Definitions

Unless the context otherwise requires, all references in this annual report to “Ormat”, “the Company”, “we”, “us”, “our company”, “Ormat Technologies”, or “our” refer to Ormat Technologies, Inc. and its consolidated subsidiaries. A glossary of certain terms and abbreviations used in this annual report appears at the beginning of this report.

Overview

We are a leading vertically integrated company that is primarily engaged in the geothermal and recovered energy power businesses. We are also expanding into the storage, demand response and energy management business.

We design, develop, build, sell, own, and operate clean, environmentally friendly geothermal and recovered energy-based power plants, usually using equipment that we design and manufacture. Our objective is to become a leading global provider of renewable energy and we have adopted a strategic plan to focus on several key initiatives to expand our business.

Our owned geothermal power plants include both power plants that we have built and power plants that we have acquired. Most of the power plants that we currently own or operate produce electricity from geothermal energy sources. Geothermal energy is a clean, renewable and generally sustainable form of energy derived from the natural heat of the earth. Unlike electricity produced by burning fossil fuels, electricity produced from geothermal energy sources is produced without emissions of certain pollutants such as nitrogen oxide, and with far lower emissions of other pollutants such as carbon dioxide. As a result, electricity produced from geothermal energy sources contributes significantly less to global warming and local and regional incidences of acid rain than energy produced by burning fossil fuels. In addition, compared to power plants that utilize other renewable energy sources, such as wind or solar, geothermal power plants are generally available all year-long and all day-long and can provide base-load electricity services. Geothermal power plants can also be custom built to provide a range of electricity services such as baseload, voltage regulation, reserves and flexible capacity. Geothermal energy is also an attractive alternative to other sources of energy to support a diversification strategy to avoid dependence on any one energy source or politically sensitive supply sources.

In addition to our geothermal energy business, we manufacture and sell products that produce electricity from recovered energy or so-called “waste heat”. We also construct, own, and operate recovered energy-based power plants. We have built all of the recovered energy-based plants that we operate. Recovered energy comes from residual heat that is generated as a by-product of gas turbine-driven compressor stations, solar thermal units and a variety of industrial processes, such as cement manufacturing. Such residual heat, which would otherwise be wasted, may be captured in the recovery process and used by recovered energy power plants to generate electricity without burning additional fuel and without additional emissions.

In March 2017, we entered the energy storage, demand response and energy management markets following the acquisition of substantially all of the business and assets of Viridity Energy, Inc., a Philadelphia-based company. The acquired business and assets comprise our Other segment. We are using our Viridity business to accelerate long-term growth, expand our market presence in a growing market and further develop our energy storage, demand response and energy management services, including the VPower™ software platform. We plan to continue providing services and products to existing Viridity customers, while expanding our service offerings to include development and EPC into new regions and targeting a broader potential customer base.

We currently conduct our business activities in three business segments:

Electricity Segment. In the Electricity segment we develop, build, own and operate geothermal and recovered energy-based power plants in the U.S. and geothermal power plants in other countries around the world and sell the electricity they generate.

Product Segment. In the Product segment we design, manufacture and sell equipment for geothermal and recovered energy-based electricity generation and remote power units and provide services relating to the engineering, procurement, construction, operation and maintenance of geothermal, Solar PV and recovered energy-based power plants.

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Other Segment. In the Other segment, we provide energy storage, demand response and energy management related services as well as services relating to the engineering, procurement, construction, operation and maintenance of energy storage units mainly through our Viridity business.

Business Strategy

Our strategy is focused on further developing a geographically balanced portfolio of geothermal and recovered energy assets and continuing our leading position in the geothermal energy market with the objective of becoming a leading global provider of renewable energy. We intend to implement this strategy through:

- *Development and Construction of New Geothermal Power Plants* — continuously seeking out commercially exploitable geothermal resources, developing and constructing new geothermal power plants and entering into long-term PPAs providing stable cash flows in jurisdictions where the regulatory, tax and business environments encourage or provide incentives for such development;

- *Expanding our Geographical Reach* — increasing our business development activities in an effort to grow our business in the global markets in all business segments. While we continue to evaluate global opportunities, we currently see Turkey, New Zealand, Chile, Kenya, Honduras, China, Indonesia and Ethiopia as attractive markets for us. We are actively looking at ways to expand our presence in those countries.

- *Acquisition of New Assets* — expanding and accelerating growth through acquisition activities globally, aiming to acquire additional geothermal assets as well as technologies and projects that can support our storage business.

- *Manufacturing and Providing Products and EPC Services Related to Renewable Energy* — designing, manufacturing and contracting power plants for our own use and selling to third parties power units and other generation equipment for geothermal and recovered energy-based electricity generation;

- *Expanding into New Technologies* – leveraging our technological capabilities over a variety of renewable energy platforms, including solar power generation and energy storage. Initially, however, we expect that our focus will be on expanding our core geothermal competencies to provide high efficiency solutions for high enthalpy applications by utilizing our binary enhanced cycle and technology, as well as, expanding into steam geothermal generation equipment and facilities. We may acquire companies with integration and technological capabilities we do not currently have, or develop new technology ourselves, where we can effectively leverage our expertise to implement this part of our strategic plan.

- *Expand our Customer Base* - evaluating a number of strategies for expanding our customer base to the C&I and CCA markets. In the near term, however, we expect that the majority of our revenues will continue to be generated, with our traditional electrical utility customer base for the Electricity segment.

- *Increasing Output from Our Existing Power Plants* — increasing output from our existing geothermal power plants by adding additional generating capacity, upgrading plant technology, and improving geothermal reservoir operations, including improving methods of heat source supply and delivery.

- *Cost Saving by Increasing Efficiencies* — increasing efficiencies in our operating power plants and manufacturing facility including procurement by adding new technologies, restructuring of management control, automating part of our manufacturing work and centralizing our operating power plants.

- *Technological Expertise* — investing in research and development of renewable energy technologies and leveraging our technological expertise to continuously improve power plant components, reduce operations and maintenance costs, develop competitive and environmentally friendly products for electricity generation and target new service opportunities.

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The map below shows our worldwide portfolio of operating geothermal and recovered energy power plants as of February 26, 2019.

* In the Sarulla project, we include our 12.75% share only.

The charts below show the relative contributions of each of our segments to our consolidated revenues and the geographical breakdown of our segment revenues for the fiscal year ended December 31, 2018. Additional information concerning our segment operations, including year-over-year comparisons of revenues, the geographical breakdown of revenues, cost of revenues, results of operations, and trends and uncertainties is provided below in Item 7 — “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and Item 8 — “Financia Statements and Supplementary Data”.

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The following chart sets forth a breakdown of our revenues for each of the years ended December 31, 2017 and 2018 (*):

(*) The contribution of the Other segment to revenues in 2017 was lower than 0.5% and therefore rounded down to 0% in the graph above.

The following chart sets forth the geographical breakdown of revenues attributable to our Electricity, Product and Other segments for each of the years ended December 31, 2017 and 2018:

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Company Contact and Sources of Information

We file annual, quarterly and periodic reports, proxy statements and other information with the SEC. You may obtain and copy any document we file with the SEC at the SEC's Public Reference Room at 100 F Street, N.E., Room 1580, Washington D.C. 20549. You may obtain information on the operation of the SEC's Public Reference Room by calling the SEC at 1-800-SEC-0330. The SEC maintains an internet website at http://www.sec.gov that contains reports, proxy and other information statements, and other information regarding issuers that file electronically with the SEC. Our SEC filings are accessible via the internet at that website.

Our reports on Forms 10-K, 10-Q and 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act are available through our website at www.ormat.com for downloading, free of charge, as soon as reasonably practicable after these reports are filed with the SEC. Our Code of Business Conduct and Ethics, Code of Ethics Applicable to Senior Executives, Audit Committee Charter, Corporate Governance Guidelines, Nominating and Corporate Governance Committee Charter, Compensation Committee Charter, and biennial Sustainability Report, are also available at our website address mentioned above. If we make any amendments to our Code of Business Conduct and Ethics or Code of Ethics Applicable to Senior Executives or grant any waiver, including any implicit waiver, from a provision of either code applicable to our Chief Executive Officer, Chief Financial Officer or principal accounting officer requiring disclosure under applicable SEC rules, we intend to disclose the nature of such amendment or waiver on our website. The content of our website, however, is not part of this annual report.

You may request a copy of our SEC filings, as well as the foregoing corporate documents, at no cost to you, by writing to the Company address appearing in this annual report or by calling us at (775) 356-9029.

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Our Power Generation Business (Electricity Segment)

Power Plants in Operation

The table below summarizes certain key non-financial information relating to our power plants and complexes as of February 26, 2019. The generating capacity of certain of our power plants and complexes listed below has been updated from our 2017 disclosure to reflect changes in the resource temperature and other factors that impact resource capabilities:

Type	Region	Plant	Ownership[1]	Generating capacity (MW) [2]	Region 2018 Capacity Factor
Geothermal	California	Ormesa Complex	100%	39	
		Heber Complex	100%	81	
		Mammoth Complex	100%	29	
		Brawley	100%	13	
					75%
	West Nevada	Steamboat Complex	100%	65	
		Brady Complex	100%	26	
					85%
	East Nevada	Tuscarora	100%	18	
		Jersey Valley	100%	10	
		McGinness Hills	100%	140[4]	
		Don A. Campbell	63.3%	39	
		Tungsten Mountain	100%	27	
					92%
	North West Region	Neal Hot Springs[7]	60%	22[8]	
		Raft River[7]	100%	11	
		San Emidio[7]	100%	11	
					88%
	Hawaii	Puna	63.3%	38	
					33%[10]
	International	Amatitlan (Guatemala)	100%	20	
		Zunil (Guatemala)	97%	23	
		Olkaria III Complex (Kenya)	100%	150[6]	
		Bouillante (Guadeloupe Island)	60%[4]	15	
		Platanares (Honduras)	100%	38	
					95%
Total Consolidated				815	88%[10]

Geothermal					
Unconsolidated					
	Indonesia	Sarulla (SIL & NIL 1)	12.75%	42	
Geothermal					
REG		OREG 1	63.3%	22	
		OREG 2	63.3%	22	
		OREG 3	63.3%	5.5	
		OREG 4	100%	3.5[7]	
Total REG				53	78%
Total				**910**	

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1. We indirectly own and operate all of our power plants, although financial institutions hold equity interests in one of our Opal Geo subsidiaries, which owns the McGinness Hills Phases 1 and 2 geothermal power plants, the Tuscarora and Jersey Valley power plants and the second phase of the Don A. Campbell power plant, all located in Nevada. In the table above, we list these power plants as being 100% owned because all of the generating capacity is owned by Opal and we control the operation of the power plants. The nature of the equity interests held by the financial institution is described below in Item 7 — "Management's Discussion and Analysis of Financial Condition and Results of Operations" under the headings "Opal Transaction".

Notwithstanding our approximate 60% equity interest in the Bouillante power plant and 63.25% direct equity interest in the Puna, the first phase of Don A. Campbell, OREG 1, OREG 2 and OREG 3 power plants as well as the indirect interest in the second phase of the Don A. Campbell power plant owned by our subsidiary, ORPD, we list 100% of the generating capacity of the Bouillante power plant and the power plants in the ORPD portfolio in the table above because we control their operation. We list our 12.75% share of the generating capacity of the Sarulla power plant as we own a 12.75% minority interest. The revenues from the Sarulla project are not consolidated and are presented under "Equity in earnings (losses) of investees, net" in our financial statements.

2. References to generating capacity generally refer to the gross generating capacity less auxiliary power in the case of all of our existing power plants, except the Zunil power plant. We determine the generating capacity figures in these power plants by taking into account resource and power plant capabilities. In the case of the Zunil power plant, revenues are calculated based on a 24 MW capacity unrelated to the actual performance of the reservoir. This column represents our net ownership of such generating capacity.

3. In any given year, the actual power generation of a particular power plant may differ from that power plant's generating capacity due to variations in ambient temperature, the availability of the resource, and operational issues affecting performance during that year.

4. The McGinness Hills complex includes 48MW of phase 3 that reached commercial operation in December 2018.

5. We own 63.75%, CDC owns 21.25% and Sageos own 15%, of the Bouillante power plant.

6. The Olkaria complex includes a 11MW repowering addition that reached commercial operation on June 2, 2018.

7. The OREG 4 power plant is not operating at full capacity because of low run time of the compressor station that serves as the power plant's heat source. This results in lower power generation.

8. The Neal Hot Springs, Raft River and San Emidio are power plants that we acquired in April 2018 while acquiring US Geothermal Inc.

9. We own 60% and Enbridge own 40% of the Neal Hot Springs power plant.

10. The Puna geothermal power plant was shut down since May 3, 2018, when the Kilauea volcano located in close proximity to it erupted following a significant increase in seismic activity in the area. We are working to bring the power plant back to operation.

11. The total availability of the geothermal power plants excludes the Zunil power plant as its generating capacity is determined unrelated to its performance and the Puna power plant that is not in operation, both as discussed above.

All of the revenues that we derive from the sale of electricity are pursuant to long-term PPAs. Approximately 34.9% of our total revenues in the year ended December 31, 2018 were derived from the sale of electricity by our power plants to power purchasers that currently have investment grade credit ratings. The purchasers of electricity from our foreign power plants are mainly state-owned entities.

New Power Plants

We are currently in various stages of construction of new power plants and expansion of existing power plants. Our construction and expansion plan include 37 MW in generating capacity from geothermal and Solar PV power plants in the United States that we fully released for construction. In addition, we have several geothermal and Solar PV projects in the U.S. and Guadeloupe that are either under initial stages of construction or under different stages of development with an aggregate capacity of between 130 MW and 150 MW.

We have substantial land positions across 38 prospects, 28 prospects in the U.S., and 10 prospects in Ethiopia, Guadeloupe, Guatemala, Honduras, Indonesia and New Zealand that we expect will support future geothermal development and on which we have started or plan to start exploration activity. These land positions are comprised of various leases, exploration concessions for geothermal resources and an option to enter into leases.

In addition, we are currently developing a storage system in Georgetown, Texas.

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Our Product Business (Product Segment)

We design, manufacture and sell products for electricity generation and provide the related services described below. We primarily manufacture products to fill customer orders, but in some situations, we may manufacture products as inventory for future projects that we will own and for future third party projects.

Power Units for Geothermal Power Plants

We design, manufacture and sell power units for geothermal electricity generation, which we refer to as OECs. In geothermal power plants using OECs, geothermal fluid (either hot water, also called brine, or steam or both) is extracted from the underground reservoir and flows from the wellhead to a vaporizer that heats a secondary working fluid, which is vaporized and used to drive the turbine. The secondary fluid is then condensed in a condenser, which may be cooled directly by air or by water from a cooling tower and sent back to the vaporizer. The cooled geothermal fluid is then reinjected back into the reservoir. Our customers include contractors, geothermal power plant developers, owners and operators.

Power Units for Recovered Energy-Based Power Generation

We design, manufacture and sell power units used to generate electricity from recovered energy, or so-called “waste heat”. This heat is generated as a residual by-product of gas turbine-driven compressor stations, solar thermal units and a variety of industrial processes, such as cement manufacturing, and is not otherwise used for any purpose. Our existing and target customers include interstate natural gas pipeline owners and operators, gas processing plant owners and operators, cement plant owners and operators, and other companies engaged in other energy-intensive industrial processes.

EPC of Power Plants

We serve as an EPC contractor for geothermal and recovered energy power plants on a turnkey basis, using power units we design and manufacture. Our customers are geothermal power plant owners as well as our target customers for the sale of our recovered energy-based power units as described above. Unlike many other companies that provide EPC services, we believe that our competitive advantage is in using equipment that we manufacture and thus have better quality and better control over the timing and delivery of required equipment and their related costs.

Remote Power Units and Other Generators

We design, manufacture and sell fossil fuel powered turbo-generators with capacities ranging from 200 watts to 5,000 watts, which operate unattended in extreme hot or cold climate conditions. Our customers include contractors who install gas pipelines in remote areas and offshore platforms operators and contractors. In addition, we design, manufacture, and sell generators, including heavy duty direct-current generators, for various other uses. We are in the process of winding down these activities.

Our New Activity (Our Other Segment)

Our storage business currently manages, through the Viridity platform, curtailable customer loads of over 875 MW across 3,000 sites under contracts with leading U.S. retail energy providers and directly with large C&I customers, including management of a portfolio of non-utility storage assets located in the northeastern U.S. with over 80,000 operational market hours. We serve our distributed customers through a NOC, which is operated 24/7 using our VPower™ software platform and a SCADA platform. VPower™ services are provided to customers using a SaaS model under which we receive license fees and/or a portion of the revenue and savings that are achieved for our Viridity customers.

We expect that the ecosystem we created, combining our Viridity capabilities and our legacy Ormat capabilities, including among others, our global presence, experience in technology and system integration, development and EPC of power generation projects, flexible business models, and our reputation and experience in the geothermal and recovered energy sectors, will enable us to expand in the growing energy storage sector.

Our Viridity business obtained and maintains authorization from FERC to make wholesale purchase and sales of energy, capacity, and ancillary services at market-based rates, and we have confirmed membership status with eligibility to serve designated contractual functions within each of the following ISOs and RTOs: PJM, NYISO, and the ERCOT. Additionally, during the fourth quarter of 2017, we received formal notice of membership in MISO and ISO New England Inc. and have filed for membership in IESO – Ontario Canada. In the future, we may need to obtain and maintain similar membership and eligibility status with other ISO and RTO markets in which our Viridity business will operate.

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In 2018, we successfully brought on line our first two Ormat/Viridity-owned BESS projects: 1 MW / 1 MWh in Atlantic City, NJ and 20 MW / 20 MWh in Plumsted, NJ. We also started construction of another 20 MW/ 20 MWh project in Alpha, NJ and continued developing a 10 MW / 12.5 MWh project in Georgetown, Texas. We plan to continue and leverage our worldwide experience in project development and finance, as well as relationships with utilities and other market participants, to develop additional such BESS projects in the U.S. and internationally.

History

Ormat Technologies, Inc. was formed as a Delaware corporation in 1994 by our former parent company Ormat Industries. Ormat Industries was one of the first companies to focus on the development of equipment for the production of clean, renewable and generally sustainable forms of energy. On February 12, 2015, we successfully completed the acquisition of Ormat Industries in an all-stock merger, eliminating its majority ownership and control of Ormat Technologies.

Industry Background

Geothermal Energy

There are several different sources or methods of obtaining geothermal energy, which are described below.

Hydrothermal geothermal-electricity generation — Hydrothermal geothermal energy is derived from naturally occurring hydrothermal reservoirs that are formed when water comes sufficiently close to hot rock to heat the water to temperatures of 300 degrees Fahrenheit or more. The heated water then ascends toward the surface of the earth where, if geological conditions are suitable for its commercial extraction, it can be extracted by drilling geothermal wells. Geothermal production wells are normally located within several miles of the power plant, as it is not economically viable to transport geothermal fluids over longer distances due to heat and pressure loss. The geothermal reservoir is a renewable source of energy if: (i) natural ground water sources and reinjection of extracted geothermal fluids are adequate over the long-term to replenish the geothermal reservoir following the withdrawal of geothermal fluids and (ii) the well field is properly operated. Geothermal energy power plants typically have higher capital costs (primarily because of the costs attributable to well field development) but tend to have significantly lower variable operating costs (principally consisting of maintenance expenditures) than fossil fuel-fired power plants that require ongoing fuel expenses.

EGS — An EGS is a subsurface system that may be artificially created to extract heat from hot rock where the permeability and aquifers required for a hydrothermal system are insufficient or non-existent. A geothermal power plant that uses EGS techniques recovers the thermal energy from the subsurface rocks by creating or accessing a system of open fractures in the rock through which water can be injected, heated through contact with the hot rock, returned to the surface in production wells and transferred to a power unit.

Co-produced geothermal from oil and gas fields, geo-pressurized resources — Another source of geothermal energy is hot water produced as a by-product of oil and gas extraction. When oil and gas wells are deep, the extracted fluids are often at high temperatures and if the water volume associated with the extracted fluids is significant, the hot water can be used for power generation in equipment similar to a geothermal power plant.

Geothermal Power Plant Technologies

Geothermal power plants generally employ either binary systems or conventional flash design systems, as briefly described below. In our geothermal power plants, we also employ our proprietary technology of combined geothermal cycle systems.

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Binary System

In a geothermal power plant using a binary system, geothermal fluid (either hot water (also called brine) or steam or both) is extracted from the underground reservoir and flows from the wellhead through a gathering system of insulated steel pipelines to a vaporizer that heats a secondary working fluid. This is typically an organic fluid, such as pentane or butane, which is vaporized and is used to drive the turbine. The organic fluid is then condensed in a condenser, which may be cooled directly by air or by water from a cooling tower and sent back to the vaporizer through a pump. The cooled geothermal fluid is then reinjected back into the reservoir. The operation of our air-cooled binary geothermal power plant is depicted in the diagram below.

Flash Design System

In a geothermal power plant using flash design, geothermal fluid is extracted from the underground reservoir and flows from the wellhead through a gathering system of insulated steel pipelines to flash tanks and/or separators. There, the steam is separated from the brine and is sent to a demister, where any remaining water droplets are removed. This produces a stream of dry saturated steam, which drives a steam turbine generator to produce electricity. In some cases, the brine at the outlet of the separator is flashed a second time (dual flash), providing additional steam at lower pressure used in the low-pressure section of the steam turbine to produce additional electricity. Steam exhausted from the steam turbine is condensed in a surface or direct contact condenser cooled by cold water from a cooling tower. The non-condensable gases (such as carbon dioxide) are removed by means of a vacuum system in order to maintain the performance of the steam condenser. The resulting condensate is used to provide make-up water for the cooling tower. The hot brine remaining after separation of steam is injected (either directly or after passing through a binary plant to produce additional power from the residual heat remaining in the brine) back into the geothermal resource through a series of injection wells. The flash technology is depicted in the diagram below.

In some instances, the wells directly produce dry steam and the steam is fed directly to the steam turbine with the rest of the system similar to the flash technology described above.

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Our Proprietary Technology

Our proprietary technology may be used either in power plants operating according to the ORC alone or in combination with various other commonly used thermodynamic technologies that convert heat to mechanical power, such as gas and steam turbines. It can be used with a variety of thermal energy sources, such as geothermal, recovered energy, biomass, solar energy and fossil fuels. Specifically, our technology involves original designs of turbines, pumps, and heat exchangers, as well as formulation of organic motive fluids (all of which are non-ozone-depleting substances). By using advanced computational fluid dynamics techniques and other computer aided design software as well as our test facilities, we continuously seek to improve power plant components, reduce operations and maintenance costs, and increase the range of our equipment and applications. We are always examining ways to increase the output of our plants by utilizing evaporative cooling, cold reinjection, configuration optimization, and topping turbines. In the geothermal as well as the recovered energy (waste heat) areas, we are examining two-level and three-level energy systems and other thermodynamic cycle alternations along with new motive fluids.

We also developed, patented and constructed GCCU power plants in which the steam first produces power in a backpressure steam turbine and is subsequently condensed in a vaporizer of a binary plant, which produces additional power. Our Geothermal Combined Cycle technology is depicted in the diagram below.

In the conversion of geothermal energy into electricity, our technology has a number of advantages over conventional geothermal steam turbine plants. A conventional geothermal steam turbine plant consumes significant quantities of water, causing depletion of the aquifer and requiring cooling water treatment with chemicals and consequently a need for the disposal of such chemicals. A conventional geothermal steam turbine plant also creates a significant visual impact in the form of an emitted plume from the cooling towers, especially during cold weather. By contrast, our binary and combined cycle geothermal power plants have a low profile with minimal visual impact and do not emit a plume when they use air-cooled condensers. Our binary and combined cycle geothermal power plants reinject all of the geothermal fluids utilized in the respective processes into the geothermal reservoir. Consequently, such processes generally have no emissions.

Other advantages of our technology include simplicity of operation and maintenance and higher yearly availability. For instance, the OEC employs a low speed and high efficiency organic vapor turbine directly coupled to the generator, eliminating the need for reduction gear. In addition, with our binary design, there is no contact between the turbine blade and geothermal fluids, which can often be very erosive and corrosive. Instead, the geothermal fluids pass through a heat exchanger, which is less susceptible to erosion and can adapt much better to corrosive fluids. In addition, with the organic vapor condensed above atmospheric pressure, no vacuum system is required.

We use the same elements of our technology in our recovered energy products. The heat source may be exhaust gases from a Brayton cycle gas turbine, low-pressure steam, or medium temperature liquid found in the process industries such as oil refining and cement manufacturing. In most cases, we attach an additional heat exchanger in which we circulate thermal oil or water to transfer the heat into the OEC's own vaporizer in order to provide greater operational flexibility and control. Once this stage of each recovery is completed, the rest of the operation is identical to that of the OECs used in our geothermal power plants and enjoys the same advantages of using the ORC. In addition, our technology allows for better load following than conventional steam turbines, requires no water treatment (since it is air cooled and organic fluid motivated), and does not require the continuous presence of a licensed steam boiler operator on site.

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Our REG technology is depicted in the diagram below.

Patents

We have 77 U.S. patents that are in force (and have nine U.S. patents pending). These patents and patent applications cover our products (mainly power units based on the ORC) and systems (mainly geothermal power plants and industrial waste heat recovery plants for electricity production). The products-related patents cover components that include turbines, heat exchangers, seals and controls as well as control of operation of geothermal production well pumps. The system-related patents cover not only particular components but also the overall energy conversion system from the “fuel supply” (e.g., geothermal fluid, waste heat, biomass or solar) to electricity production.

The system-related patents also cover subjects such as waste heat recovery related to gas pipeline compressors and industrial waste heat, solar power systems, disposal of non-condensable gases present in geothermal fluids, reinjection of other geothermal fluids ensuring geothermal resource sustainability, power plants for very high-pressure geothermal resources, two-phase fluids, low temperature geothermal brine as well as processes related to EGS. A number of our patents cover combined cycle geothermal power plants, in which the steam first produces power in a backpressure steam turbine and is subsequently condensed in a vaporizer of a binary plant, which produces additional power. The remaining terms of our patents range from one year to 16 years. The loss of any single patent would not have a material effect on our business or results of operations.

Research and Development

We conduct research and development activities intended to improve plant performance, reduce costs, and increase the breadth of our product offerings. The primary focus of our research and development efforts is targeting power plant conceptual thermodynamic cycle and major equipment including continued performance, cost and land usage improvements to our condensing equipment, and development of new higher efficiency and higher power output turbines.

Our Viridity business continues to develop new optimization algorithms to optimize the life of a battery energy storage system (BESS), to optimize our and our customers’ economic return and to forecast the trends surrounding our customers’ electricity consumption and the electric grid including times of peak demands and the usage of ancillary services.

We have also focused our development efforts on the engineering and design of improved energy storage systems. These development efforts include, among others, building of an energy storage lab for testing of various batteries, inverters and the integration of both. Further development of the control hardware and software for energy storage systems to follow electric grid and market signals and to optimize their delivery of energy into the markets using our VPowerTM software and SCADA platform to accelerate system optimization through cloud base algorithms.

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We have developed, and continue to develop, system integration capabilities that match the appropriate system and system sizing with the appropriate battery chemistry, electrical and physical components to accommodate our needs or needs of the customers that will own such energy storage systems in light of the markets in which they will operate. We are searching for alternative chemistries, products and combinations of hybrid solutions to best address our energy storage product customers' needs.

Additionally, we are continuing to evaluate investment opportunities in new companies with technology and/or product offerings for renewable energy and energy storage solutions.

Market Opportunities

Geothermal Market Opportunities

Renewable energy in general provides a sustainable alternative to the existing solutions to two major global issues: global warming and diminishing fossil fuel reserves. Renewable energy is sustainable and clean, as it emits no or negligible amounts of CO2. These environmental benefits have led major countries to focus their efforts on the development of renewable energy sources in general and geothermal specifically.

Today, based on an announcement by the IGA on February 2019, geothermal power is generated in 27 countries with a total installed power generation capacity of 14,600 MW at the end of 2018. The leading countries are the U.S., Indonesia, Philippines, Turkey and New Zealand. The IGA expects that 4,100 MW will be added by 2023.

Having realized the importance of renewable energy including geothermal alternatives, various governments have been preparing regulatory frameworks and policies, and providing incentives to develop the sector.

United States

RPSs or quota obligations, and FITs are the two most prominent support mechanisms that have been aiding the development of the renewable energy market in the U.S. With the identification of these mechanisms, most of the countries have framed their policies incorporating these measures.

Interest in geothermal energy in the U.S. remains strong for numerous reasons, including the legislative support, RPS goals (as described below), coal and nuclear base-load retirements, and an increasing awareness of the positive value of geothermal characteristics as compared to intermittent renewable technologies.

Today, electricity generation from geothermal resources is concentrated mainly in California, Nevada, Hawaii, Idaho, Oregon, and Utah, and we believe there are opportunities for development in other states such as New Mexico due to the potential of their geothermal resources.

Geothermal energy provides numerous benefits to the U.S. grid and economy, according to a GEA report issued in January 2017. Geothermal development and operation bring economic benefits in the form of taxes and long term high-paying jobs, and it currently has one of the lowest LCOE of all power sources in the U.S. Additionally, improvements in geothermal production make it possible to provide ancillary and on-demand services. This helps load serving entities avoid additional costs from purchasing and then balancing intermittent resources with storage or new transmission.

Federal tax initiatives

The U.S. federal government encourages production of electricity from geothermal resources or solar energy through certain tax subsidies:

- PTC - the PTC provides per kWh credit on tax paid by power producers for power produced from geothermal resources and certain other renewable energy sources and sold to an unrelated person during a taxable year. The PTC was first introduced in 1992 and has since been revised a number of times. The ARRA, which came into effect in February 2009, contains a number of important measures related to the US renewable energy industry aimed at encouraging continued growth. The PTC, which in 2018 was 2.4 cents per kWh, is adjusted annually for inflation and may be claimed for 10 years on the net electricity output sold to third parties after the project is first placed in service. Any project that started construction by December 31, 2018 must ordinarily be put in service within four years after the end of the year in which construction started or show continued construction to qualify for tax credits at these rates. The PTC is not available for power produced from geothermal resources for projects that started construction on or after January 1, 2018.

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- ITC - the ITC has been amended a number of times. For a new geothermal power plant in the United States that started construction after 2017, we are permitted to claim an ITC of 10 percent of the project cost. New solar projects that are under construction by December 2019 will qualify for a 30 percent ITC. The credit will fall to 26 percent for Solar PV projects starting construction in 2020 and 22 percent for Solar PV projects starting construction in 2021. Projects that are under construction before these deadlines must be placed in service by December 31, 2023 to qualify for an investment tax credit at these rates. Solar projects placed in service after December 31, 2023 will only qualify for a 10 percent ITC. Under current tax rules, any unused tax credit has a one-year carry back and a twenty-year carry forward.

- On December 22, 2017, the U.S. President signed into law the Tax Act, which made changes that have some impact on the renewable energy industry. Some of the key changes are as follows:

  - The U.S. corporate income tax rate was reduced from 35% to 21% beginning in 2018.

  - Bonus depreciation was increased from 40% expensing of qualified projects in year one to 100% beginning in on September 27, 2017. The 100% expensing is valid through 2022 and then declines through 2026.

  - The BEAT provision is a new tax intended to apply to companies that significantly reduce their U.S. tax liability by making cross-border payments to affiliates. The provision aims to circumvent earnings stripping by imposing a minimum tax of 10% of taxable income. ITC and PTC can be used to offset approximately 80% BEAT. See the discussion under Item 1A — “Risk Factors”.

State level legislation

State governments have embarked on a program called RPS, under which utilities are required to include renewable energy sources as part of their energy generation. Under the RPS, participating states have set targets for the production of their energy from renewable sources by specified dates. Related to the RPS program is the REC initiative, under which utilities can support renewable energy generation and obtain certificates, which can be used to achieve the mandate prescribed by the RPS.

In the U.S., 37 states plus the District of Colombia and four territories have enacted an RPS, renewable portfolio goals, or similar laws requiring or encouraging utilities in such states to generate or buy a certain percentage of their electricity from renewable energy or recovered heat sources.

According to the National Conference of State Legislatures, 29 states, three territories, and the District of Columbia have set renewable energy goals. The vast majority of Ormat’s geothermal projects can be found in California, Nevada, and Hawaii which have some of the highest RPS standards in the country.

We see the impact of RPS and climate legislation as the most significant driver for us to expand existing power plants and to build new renewable projects.

Below are RPS targets in the states in which we are operating in:

State	Share	Year	Remarks
California	60%	2030	RPS targets set for future years: 33% – 2020, 40% – 2024, and 45% – 2027. 100% zero carbon by 2045.
Nevada	40%	2030	For solar power, there is a 6% of annual requirement for 2016–2025, 25%-2030
Hawaii	100%	2045	RPS targets set for future years: 30% – 2020, 40% – 2030, and 70% – 2040
Oregon	25%	2025	This as well as an Increased RPS of 50% by 2040 applies to IOU who have a share of more than 3% of the state's load; for utilities with a load-share of 1.5% – 3%, requirement is 10% in 2025, and for utilities with a load share of less than 1.5%, it is 5% in 2025
Utah	20%	2025	

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Global

We believe the global markets continue to present growth and expansion opportunities in both established and emerging markets.

Operations outside of the United States may be subject to and/or benefit from increasing efforts by governments and businesses around the world to fight climate change and move towards a low carbon, resilient and sustainable future. According to a 2017 report by the International Renewable Energy Agency entitled Rethinking Energy, more than 170 countries to date have established renewable energy targets, and nearly 150 have enacted policies to catalyze investments in renewable energy technologies.

We believe that several global initiatives will create business opportunities and support global growth of the renewable sector such as the historic agreement at the COP21 UN Climate Change Conference held in Paris, which, for the first time, created a commitment by 127 parties to setting nationally determined climate targets and reporting on their progress. Following this agreement, the EIB and other multilateral institutions have committed to provide $100 billion of new financing for climate action projects over the next five years to assist countries in reaching their targets.

In addition, in 2015, a group of 20 countries, including the United States, United Kingdom, France, China and India, pledged to double their respective budgets for renewable energy technology over five years as part of a separate initiative called Mission Innovation. At the same time, the Breakthrough Energy Coalition was launched by a group of 28 private investors with the objective of bringing companies with the potential to deliver affordable, reliable and carbon free power from the research lab to the market.

On June 1, 2017, President Donald J. Trump announced that the United States will withdraw from the Paris Climate Accord and begin negotiations to either re-enter or negotiate an entirely new agreement with more favorable terms for the U.S.

We believe that these developments and governmental plans will create for us growth and expansion opportunities internationally.

Outside of the U.S., the majority of power generating capacity has historically been owned and controlled by governments. Since the early 1990s, however, many foreign governments have privatized their power generation industries through sales to third parties encouraging new capacity development and/or refurbishment of existing assets by independent power developers. These foreign governments have taken a variety of approaches to encourage the development of competitive power markets, including awarding long-term contracts for energy and capacity to independent power generators and creating competitive wholesale markets for selling and trading energy, capacity, and related products. Some foreign regions and countries have also adopted active government programs designed to encourage clean renewable energy power generation such as the following countries in which we operate, sell products and/or are conducting business development activities:

Europe

Turkey

Until recently, Turkey was the fastest growing geothermal market worldwide with the theoretical potential for 31 GW of geothermal capacity and with a proven geothermal capacity of 4.5 GW, according to the Turkish Mineral Technical Exploration Agency. Due to economic developments in this region, there has been a slowdown.

Since 2004, we have established strong business relationships in the Turkish market and provided our range of solutions including our binary systems to 40 geothermal power plants with a total capacity of nearly 855 MW, of which six power plants are currently under construction.

In Turkey, the “National Renewable Energy Action Plan” proposes to increase the country's renewable energy generation capacity to 61 GW by 2023, including 1.5 GW of electricity generation from geothermal resources. This plan is supported by the European Bank for Reconstruction and Development. The plan aims to increase Turkish energy security by diversifying its energy supply, making greater use of domestic resources, protecting the environment by relying on clean, renewable and low carbon technologies and fostering energy market efficiency through private sector investment and integration.

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Iceland

Iceland has gone through several legislative and regulatory changes in recent years and the tariff for geothermal energy is no longer linked to the price of aluminum as it used to be, but rather is regulated independently. As a result, we anticipate growth in demand for geothermal power solutions in the country.

Latin America

Guatemala

In Guatemala, where our Zunil and Amatitlan power plants are located, the government approved and adopted the Energy Policy 2013-2027 that secure, among other things, a supply of electricity at competitive prices by diversifying the energy mix with an 80% renewable energy share target for 2027.

Honduras

In Honduras, where we operate our Platanares power plant, the government set a target to reach at least 80% renewable energy production by 2034.

Mexico

In Mexico, where we see long-term potential, the Mexican Congress passed, in December 2013, a constitutional reform in an attempt to increase the participation of private investors in the generation and commercialization of electric energy. We have not yet seen yet a notable progress in the development of new geothermal projects.

Ecuador

In Ecuador, which does not have any geothermal power plants online yet, aims to reach 90% clean energy and its National Energy Agenda estimates a local geothermal potential of 1,000 MW.

Caribbean

Many island nations in general and specifically the Caribbean nations, depend almost entirely on petroleum to meet their electricity needs. Caribbean nations have quite significant renewable energy potential, yet most have relatively small demand. Other than in Guadeloupe, where the geothermal power plant that we acquired has been operating since 1985, there are no other operating geothermal projects in the Caribbean region. Although few, we believe there are geothermal opportunities for us in the Caribbean islands of St. Kitts, Nevis, St. Lucia, Dominica, and Montserrat.

New Zealand

In New Zealand, where we have been actively providing geothermal power plant solutions since 1988, the government's policies to fight climate change include a GHG emissions reduction target of between 10% and 20% below 1990 levels by 2020 and a renewable electricity generation target of 90% of New Zealand's total electricity generation by 2025. We continue selling power plant equipment to our New Zealand customers, secured two projects in the last two years and intensified our cooperation with other potential customers for adding more geothermal power generation capacity within the coming years.

Asia

Indonesia

In Indonesia**,** where we hold a 12.75% equity interest in the Sarulla project, the government intends to increase the share of renewable energy sources in the energy mix, aiming to meet a target of 23% of domestic energy demand by 2025 and announced its intention to reduce the country's carbon dioxide emissions by 26% by 2020. Under the local regulation, the tariff policy for geothermal PPAs is mainly determined based on the location of the relevant power plant.

In addition to project development, we are also pursuing various supply opportunities in Indonesia and in other countries in Southeast Asia, including several optimization projects.

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China

In China, where we recently supplied our equipment to one of our clients' geothermal projects, the National Energy Administration adopted the 13th Renewable Energy Development Five Year Plan that establishes targets for renewable energy deployment until 2020. Key objectives under the plan include, among others, to increase the share of non-fossil fuel energy in total primary energy consumption to 15% by 2020 and to 20% by 2030, and to increase installed renewable power capacity to 680 GW by 2020.

East Africa

In East Africa the geothermal potential along the Rift Valley is estimated at several thousand MW. The different countries along the Rift Valley are at different stages of development of their respective geothermal potentials.

Kenya

In Kenya, there are already several geothermal power plants, including the only geothermal IPP in Africa, our 150 MW Olkaria III complex. The Kenyan government has identified the country's untapped geothermal potential as the most suitable indigenous source of electricity, and it aspires to reach 5 GW of geothermal power generation by 2030.

The Kenyan government is aiming to reach 22.7GW of power generating capacity by 2033, under the Least-Cost Power Development Plan 2013-33 with a target of 42% of such capacity generated from renewable energy sources (including large hydro but excluding solar).

Other Countries

The governments of Djibouti, Eritrea, Ethiopia, Tanzania, Uganda, Rwanda and Zambia are exploring ways to develop geothermal resources in their countries, mostly through the help of international development organizations such as the World Bank.

Ethiopia electrification targets for 2025 require additional investment in generation capacities. Such growth in demand will be principally met with the Grand Ethiopian Renaissance Dam (GERD). However, IPP's are encouraged to participate directly into the renewable development in order to meet expected local growth. Moreover, the current government sees electricity export to neighboring countries as a strategic asset. The country recently completed an interconnection with Kenya and plan to further increase connections to Djibouti, Sudan, South Sudan, Rwanda, Burundi. These exports will improve foreign exchange reserves in Ethiopia while reducing exposure to fossil fuel imports. We hold rights for four geothermal concessions in Ethiopia, for which we have completed initial exploration studies.

In January 2014, energy ministers and delegates from 19 countries committed to the creation of the Africa Clean Energy Corridor Initiative (Corridor), at a meeting in Abu Dhabi convened by the International Renewable Energy Agency. The Corridor will boost the deployment of renewable energy and aim to help meet Africa's rising energy demand with clean, indigenous, cost-effective power from sources including hydro, geothermal, biomass, wind and solar.

Other Opportunities

Recovered Energy Generation

In addition to our geothermal power generation activities, we are pursuing recovered energy-based power generation opportunities in North America and the rest of the world. We believe recovered energy-based power generation will ultimately benefit from the efforts to reduce GHG emissions. We have built 23 power plants which generate electricity utilizing "waste heat" from gas turbine-driven compressor stations along interstate natural gas pipelines, from midstream and gas processing facilities, and from other applications.

Several states, and to some extent, the federal government, have recognized the environmental benefits of recovered energy-based power generation. For example, 18 states currently allow electric utilities to include recovered energy-based power generation in calculating such utilities' compliance with their mandatory or voluntary RPS and/or Energy Efficient Resources Standards. In addition, California modified the Self Generation Incentive Program to allow recovered energy-based power generation to qualify for a per watt incentive.

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Recovery of waste heat is also considered “environmentally friendly” in the western Canadian provinces. On November 22, 2015, the Alberta Government released the Clean Leadership Plan that includes (a) phasing out of coal-fired electricity generation by 2030; (b) a commitment to generate 30 percent of Alberta’s electricity from renewable sources by 2030; (c) new financing for energy efficiency; and (d) an economy-wide price on carbon pollution. The plan also mandates that Alberta reduce methane emissions from oil and gas operations by 45% by 2025. In 2016, the Canadian government ratified its commitments in the Paris Agreement, which features a commitment to reduce emissions by 30% from 2005 levels by 2030. The federal government announced that Canadian provinces must have an emission reduction plan in place or be subject to a federal carbon tax in 2018. This comprehensive set of climate policies, once fully implemented, will encourage the development of renewable energy technologies, including waste heat recovery, in Alberta and other provinces. We believe that Europe and other markets worldwide may offer similar opportunities in recovered energy-based power generation.

In summary, the market for the recovery of waste heat converted into electricity exists either when already available electricity is expensive or where the regulatory environment facilitates construction and marketing of power generated from recovered waste heat. However, such projects tend to be smaller than 9 MW and we expect any growth to be relatively slow and geographically scattered.

Energy Storage

Globally, there is an increase in the use of renewable energy due to the continued decline in Solar PV prices. In the United States and Europe, this increase is placing strains on the electric grid because adding Solar PV power creates situations where a significant amount of power plant capacity must be available to ramp up and down to accommodate Solar PV daily output cycles and variations due to atmospheric conditions. Furthermore, the output from Solar PV power plants can change significantly over short periods of time due to environmental conditions like cloud movement and fog burn off and cause instability on the electric grid.

As a result, energy management, especially energy storage is becoming a key component of the future grid. In parallel, we also see movement of C&I and communities toward direct purchases of electricity and an increased focus on reliability of electricity supply.

Energy storage systems utilize surplus, available electricity that enables utilities to optimize the operation of the grid, run generators closer to full capacity for longer periods, and operate the grid more efficiently and effectively. As penetration of wind and solar resources increases, so does the need for services that energy storage systems can provide to “balance the grid”, such as local capacity, frequency regulation, ramping, reactive power, black start and movement of energy from times of excess supply to times of high demand. Common applications for energy storage systems include ancillary services, wind/solar smoothing, Peaker replacement, and transmission & distribution deferral.

The global energy storage market continues to evolve, with specific applications and geographies leading the market. According to Greentech Media, approximately 4.5 GWh of new energy storage projects were installed in 2018 and this number is expected to almost double in 2019 to approximately 8 GWh.

Significant growth in BESS deployment is already taking place and is expected to continue for both grid-connected (also referred to as “in front of the meter”) applications, as well as for “behind the meter” applications, where end-users benefit from savings through demand charge reductions and create revenues through active market participation, through demand response programs. Many power systems are also undergoing significant changes such as grid aging, grid congestion, retirement of aging generators, implementation of greenhouse gas emission reduction rules and increasing penetration of variable renewable energy resources.

According to the December 2018 U.S. energy storage monitor by Wood Mackenzie Power & Renewables and Energy Storage Association, the behind-the-meter segment has grown significantly in 2018 and now accounts for roughly half of the annual U.S. market. This is driven by many factors including improved system economics, economic incentives provided by some states, net-energy metering reform, changes to utility rate structures, increasing viability of demand-charge management for non-residential customers, and increased interest in reliability and resiliency. Similar trends to those currently seen in selected U.S. markets are expected to be prevalent in other global markets in Europe and Asia.

We plan to use our Viridity software platform and services to expand our market presence in the energy storage market and further develop our VPower™ software platform to be utilized in optimizing and generating revenues from demand response including ownership and supply of BESS systems. We expect that the eco system we have created, combining our Viridity business’s capabilities with our global presence, experience in technology and system integration, EPC capabilities, flexible business models and reputation and experience in the geothermal and recovered energy sectors, will enable us to expand into this growing sector.

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Grid-Connected BESS

We own and operate several grid-connected BESS facilities, where revenues come from selling energy, capacity and/or ancillary services in merchant markets like PJM Interconnect. We are pursuing the development of additional grid-connected BESS projects in multiple regions, with expected revenues coming from providing energy, capacity and/or ancillary services on a merchant basis, and/or through bilateral contracts with load serving entities, e.g. investor owned utilities, publicly owned utilities and community choice aggregators.

C&I

The electricity industry continues to shift from a purely centralized topology where electricity flows only in one direction from centralized power plants to consumers, into a more distributed architecture, that includes distributed energy resources and consumers selling excess electricity generated on-site to the grid. Many C&I companies are motivated to purchase renewable energy to meet sustainability goals and reduce costs. We see the C&I segment as a natural expansion of our customer base.

Solar PV

The Solar PV market continues to grow, driven by constant decline in equipment prices and an increasing desire to replace conventional generation with renewable resources, commonly supported by favorable regulatory policies. We are monitoring market drivers with the potential to develop Solar PV power plants in locations where we can offer competitively priced power generation. Our current focus is in adding Solar PV systems in some of our operating geothermal power plants to reduce internal consumption loads, developing standalone Solar PV projects in targeted regions where economics are favorable as well as developing combined Solar PV and BESS projects. We are currently constructing a Solar PV augmentation system at our Tungsten Mountain geothermal power plant in Churchill County, Nevada. We are also developing the 20 MW/AC Wister Solar PV project in Imperial County, California, for which a power purchase agreement with San Diego Gas & Electric was executed and received regulatory approval in 2018. Additional potential projects are undergoing feasibility analysis, and some are in earlier phases of development.

Recent Developments

The most significant recent developments in our company and business are described below.

- On December 20, 2018, we announced that the third phase of the McGinness Hills geothermal complex located in Lander County, Nevada had begun commercial operation. The 48-megawatt (net capacity) power plant started selling electricity to SCPPA under the Ormat Northern Nevada Geothermal Portfolio Power Purchase Agreement. SCPPA resells the entire output of the plant to the LADWP. The third phase is expected to generate approximately $30 million in average annual revenue.

- On October 31, 2018, we announced the completion of the closing of the finance agreement totaling $124.7 million in the aggregate for the 35 MW Platanares geothermal power plant in Honduras, with OPIC, the United States government's development finance institution, as the sole lender. Following the closing we received a disbursement of $114.7 million representing the full amount of Tranche I of the OPIC non-recourse project finance loan that carries a fixed interest rate of 7.02% per annum with a maturity of approximately 14 years. The second tranche of up to $10 million is expected during the first half of 2019.

- On September 30, 2018, we signed the termination of the Galena 2 Power PPA with NV Energy and agreed to pay a termination fee of approximately $5 million. The Galena 2 geothermal power plant was designated as a facility under the portfolio PPA that we signed with SCPPA in October 2016 and it is expected to start selling electricity to SCPPA in March 2019.

- In July 2018 we received a full notice to proceed for the $36 million EPC contract with Cyrq Energy Inc. for their Soda Lake 3 geothermal project in Nevada. This contract contributed part of its revenues to the Product segment in 2018.

- On June 27, 2018, we announced that the 11 MW Plant 1 expansion project in the Olkaria III complex in Kenya successfully completed its tests and commenced commercial operation on June 2, 2018. Between 2000 and 2018, the Company developed and expanded the Olkaria III complex in phases and increased its generating capacity from 13 MW to 150 MW.

- On May 17, 2018, one of our wholly-owned subsidiaries that indirectly owns the 26 MW Tungsten Mountain Geothermal power plant entered into a partnership agreement with a private investor. This private investor acquired membership interests in the Tungsten Mountain Geothermal power plant project for an initial purchase price of approximately $33.4 million and for which it will pay additional installments that are expected to amount to approximately $13 million. We will continue to operate and maintain the power plant and will receive substantially all the distributable cash flow generated by the power plant.

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- On May 8, 2018, we announced that NIL 2, the third unit of the Sarulla geothermal power plant, commenced commercial operation on May 4, 2018, and the Sarulla power plant reached its full capacity of 330 MW. SIL, the first unit of the power plant commenced commercial operation in March 2017 and NIL 1, the second unit, commenced commercial operation in October 2017.

- On May 3, 2018, the Kilauea volcano located in close proximity to our Puna 38 MW geothermal power plant in the Puna district of Hawaii's Big Island erupted following a significant increase in seismic activity in the area. Before it recently stopped flowing, the lava covered the wellheads of three geothermal wells, monitoring wells and the substation of the Puna complex and an adjacent warehouse that stored a drilling rig that was also consumed by the lava. The insurance policy coverage for property and business interruption is provided by a consortium of insurers. All the insurers accepted and started paying for the costs to rebuild the destroyed substation, and as of December 31, 2018 we received $3.3 million. However, only some of the insurers accepted that the business interruption coverage started in May 2018 and as of December 31, 2018, we recorded $12.1 million of such proceeds. We are still in discussions to reach an understanding with all insurers to start paying for the business interruption as of May 2018. The Company is still assessing the damages in the Puna facilities and continue to coordinate with HELCO and local authorities to bring the power plant back to operation. The Company continues to assess the accounting implications of this event on the assets and liabilities on its balance sheet and whether an impairment will be required. Any significant physical damage to the geothermal resource or continued shut-down following the recent stop of the lava of the Puna facilities could have an adverse impact on the power plant's electricity generation and availability, which in turn could have a material adverse impact on our business and results of operations.

- On April 24, 2018, we completed our acquisition of USG. The total cash consideration (exclusive of transaction expenses) was approximately $110 million, comprised of approximately $106 million funded from available cash of Ormat Nevada (to acquire the outstanding shares of common stock of USG) and approximately $4 million funded from available cash of USG (to cash-settle outstanding in-the-money options for common stock of USG). As a result of the acquisition, USG became an indirect wholly owned subsidiary of the Company, and the Company indirectly acquired, among other things, interests held by USG and its subsidiaries in:

  - three operating power plants at Neal Hot Springs, Oregon, San Emidio, Nevada and Raft River, Idaho with a total net generating capacity of approximately 38 MW (the USG Operating Projects); and

  - development assets at the Geysers, California; a second phase project at San Emidio, Nevada; a greenfield project in Crescent Valley, Nevada; and the El Ceibillo project located near Guatemala City, Guatemala (the “USG Development Projects”)

- On April 16, 2018, we announced that our Viridity subsidiary expected to start construction of two 20MW/20MWh utility scale, in-front-of-the-meter battery energy storage systems (BESS) located in Plumsted Township and Alpha, New Jersey. The two system started operation during the first quarter of 2019. Through Viridity, we will finance, construct, own and operate the projects. The BESS will be utilized to provide ancillary services to assist PJM Interconnection, a regional transmission organization, in balancing the electric grid, and will also be available as a capacity asset. The two projects together are expected to generate, in 2019, average revenues of between $7 million and $8 million, mainly from ancillary services. The projects derive revenue from the PJM ancillary service and electricity market which is a merchant market and subject to fluctuation.

- On March 22, 2018, we entered into a loan agreement with affiliates of the Migdal Group, one of Israel's leading insurance companies and institutional investors, to provide us with a $100.0 million senior unsecured loan. The loan will be repaid in 15 semi-annual payments of $4.2 million each, commencing on September 15, 2021, with a final payment of $37 million on March 15, 2029. The average duration of the loan is 7 years. The loan bears interest at a fixed rate of 4.8% per annum, payable semi-annually, subject to adjustments in certain cases.

Operations of our Electricity Segment

How We Own Our Power Plants

We customarily establish a separate subsidiary to own interests in each of our power plants. This ensures that the power plant, and the revenues generated by it, will be the only source for repaying indebtedness, if any, incurred to finance the construction or the acquisition (or to refinance the construction or acquisition) of the relevant power plant. If we do not own all of the interest in a power plant, we enter into a shareholders' agreement or a partnership agreement that governs the management of the specific subsidiary and our relationship with our partner in connection with the specific power plant. Our ability to transfer or sell our interests in certain power plants may be restricted by certain purchase options or rights of first refusal in favor of our power plant partners or the power plant's power purchasers and/or certain change of control and assignment restrictions in the underlying power plant and financing documents. All of our domestic geothermal and REG power plants are Qualifying Facilities under the PURPA and are eligible for regulatory exemptions from most provisions of the FPA and certain state laws and regulations.

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How We Explore and Evaluate Geothermal Resources

Since 2006, we have expanded our exploration activities, initially in the United States and in the last few years with an increasing focus internationally. It generally takes two to three years from the time we start active exploration of a particular geothermal resource to the time we have an operating production well, assuming we conclude the resource is commercially viable and determine to pursue its development. Exploration activities generally involve the phases described below.

Initial Evaluation

We identify and evaluate potential geothermal resources by sampling and studying new areas combined with information available from public and private sources. We generally adhere to the following process, although our process can vary from site to site depending on geological circumstances and prior evaluation:

- We evaluate historic, geologic and geothermal information available from public and private databases, including geothermal, mining, petroleum and academic sources.

- We visit sites, sampling fluids for chemistry if necessary, to evaluate geologic conditions.

- We evaluate available data, and rank prospects in a database according to estimated size and perceived risk. For example, pre-drilled sites with extensive data are considered lower risk than “green field” sites. Both prospect types are considered critical for our continued growth.

- We generally create a digital, spatial geographic information systems (GIS) database and 3D geologic model containing all pertinent information, including thermal water temperature gradients derived from historic drilling, geologic mapping information (e.g., formations, structure, alteration, and topography), and any available archival information about the geophysical properties of the potential resource.

- We assess other relevant information, such as infrastructure (e.g., roads and electric transmission lines), natural features (e.g., springs and lakes), and man-made features (e.g., old mines and wells).

Our initial evaluation is usually conducted by our own staff, although we might engage outside service providers for some tasks from time to time. The costs associated with an initial evaluation vary from site to site, based on various factors, including the acreage involved and the costs, if any, of obtaining information from private databases or other sources. On average, our expenses for an initial evaluation range from approximately $10,000 to $50,000 including

travel, chemical analyses, and data acquisition.

If we conclude, based on the information considered in the initial evaluation, that the geothermal resource could support a commercially viable power plant, taking into account various factors described below, we proceed to land rights acquisition.

Land Acquisition

We acquire land rights to any geothermal resources our initial evaluation indicates could potentially support a commercially viable power plant. For domestic power plants, we either lease or own the sites on which our power plants are located. For our foreign power plants, our lease rights for the power plant site are generally contained in the terms of a concession agreement or other contract with the host government or an agency thereof. In certain cases, we also enter into one or more geothermal resource leases (or subleases) or a concession or an option agreement or other agreement granting us the exclusive right to extract geothermal resources from specified areas of land, with the owners (or sublessors) of such land. In some cases, we first obtain the exploration license and once certain investment requirements are met, we can obtain the geothermal exploitation rights. This usually gives us the right to explore, develop, operate, and maintain the geothermal field, including, among other things, the right to drill wells (and if there are existing wells in the area, to alter them) and build pipelines for transmitting geothermal fluid. In certain cases, the holder of rights in the geothermal resource is a governmental entity and in other cases a private entity. Usually the duration of the lease (or sublease) and concession agreement corresponds to the duration of the relevant PPA, if any. In certain other cases, we own the land where the geothermal resource is located, in which case there are no restrictions on its utilization. The BLM and the Minerals Management Service regulate leasehold interests in federal land in the United States. These agencies have rules governing the geothermal leasing process as discussed below under “Description of Our Leases and Lands”.

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For most of our current exploration sites in the U.S., we acquire rights to use the geothermal resource through land leases with the BLM, with various states, or through private leases. Under these leases, we typically pay an up-front non-refundable bonus payment, which is a component of the competitive lease process. In addition, we undertake to pay nominal, fixed annual rent payments for the period from the commencement of the lease through the completion of construction. Upon the commencement of power generation, we begin to pay to the lessors long-term royalty payments based on the use of the geothermal resources as defined in the respective agreements. These payments are contingent on the power plant's revenues. A summary of our typical lease terms is provided below under "Description of our Leases and Lands". The up-front bonus and royalty payments vary from site to site and are based on, among other things, current market conditions.

Surveys

We conduct geological, geochemical, and/or geophysical surveys on the site we acquire. Following the acquisition of land rights for a potential geothermal resource, we conduct additional surface water analyses, soil surveys, and geologic mapping to determine proximity to possible heat flow anomalies and up-flow/permeable zones. We augment our digital database with the results of those analyses and create conceptual and digital geologic models to describe geothermal system controls. We then initiate a suite of geophysical surveys (e.g., gravity, magnetics, resistivity, magnetotellurics, reflection seismic, LiDAR, and spectral surveys) to assess surface and sub-surface structure (e.g., faults and fractures) and improve the geologic model of fluid-flow conduits and permeability controls. All pertinent geological and geophysical data are used to create three-dimensional geologic models to identify drill locations. These surveys are conducted incrementally considering relative impact and cost, and the geologic model is updated continuously.

We make a further determination of the commercial viability of the geothermal resource based on the results of this process, particularly the results of the geochemical surveys estimating temperature and the overall geologic model, including potential resource size. If the results from the geochemical surveys are poor (i.e., low derived resource temperatures or poor permeability) or the geologic model indicates small or deep resource, we re-evaluate the commercial viability of the geothermal resource and may not proceed to exploratory drilling. We generally only move forward with those sites that we believe have a high probability of successful development.

Exploratory Drilling

We drill one or more exploratory wells on the high priority, relatively low risk sites to confirm and/or define the geothermal resource. If we proceed to exploratory drilling, we generally use outside contractors to create access roads to drilling sites and related activities. We have continued efforts to reduce exploration costs and therefore, after obtaining drilling permits, we generally drill temperature gradient holes and/or core holes that are lower cost than slim holes (used in the past) using either our own drilling equipment, whenever possible, or outside contractors. If the obtained data supports a conclusion that the geothermal resource can support a commercially viable power plant, it

will be used as an observation well to monitor and define the geothermal resource. If the core hole indicates low temperatures or does not support the geologic model of anticipated permeability, it may be plugged, and the area reclaimed. In undrilled sites, we typically step up from shallow (500-1000 feet) to deeper (2000-4000 feet) wells as confidence improves. Following proven temperature in core wells, we typically move to slim and/or full- size wells to quantify permeability.

Each year we determine and approve an exploration budget for the entire exploration activity in such year. We prioritize budget allocation between the various geothermal sites based on commercial and geological factors. The costs we incur for exploratory drilling vary from site to site based on various factors, including the accessibility of the drill site, the geology of the site, and the depth of the resource. However, on average, exploration costs, prior to drilling of a full-size well are approximately $1.0 million to $3.0 million for each site, not including land acquisition. We only reach such spending levels for sites that proved to be successful in the early stages of exploration.

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At various points during our exploration activities, we re-assess whether the geothermal resource involved will support a commercially viable power plant based on information available at that time. Among other things, we consider the following factors:

- New data and interpretations obtained concerning the geothermal resource as our exploration activities proceed, and particularly the expected MW capacity power plant the resource can be expected to support. The MW capacity can be estimated using analogous systems and/or quantitative heat in place estimates until results from drilling and flow tests quantify temperature, permeability, and resulting resource size.

- Current and expected market conditions and rates for contracted and merchant electric power in the market(s) to be serviced.

- Availability of transmission capacity.

- Anticipated costs associated with further exploration activities and the relative risk of failure.

- Anticipated costs for design and construction of a power plant at the site.

- Anticipated costs for operation of a power plant at the site, particularly taking into account the ability to share certain types of costs (such as control rooms) with one or more other power plants that are, or are expected to be, operating near the site.

If we conclude that the geothermal resource involved will support a commercially viable power plant, we proceed to constructing a power plant at the site.

How We Construct Our Power Plants.

The principal phases involved in constructing one of our geothermal power plants are as follows:

- Drilling production and injection wells.

- Designing the well field, power plant, equipment, controls, and transmission facilities.

- Obtaining any required permits, electrical interconnection and transmission agreements.

- Manufacturing (or in the case of equipment we do not manufacture ourselves, purchasing) the equipment required for the power plant.

- Assembling and constructing the well field, power plant, transmission facilities, and related facilities.

In recent years, it has taken us two to three years from the time we drill a production well until the power plant becomes operational.

Drilling Production and Injection Wells

We consider completing the drilling of the first production well to be the beginning of our construction phase for a power plant. However, this is not always sufficient for a full release for construction. The number of production wells varies from plant to plant depending on, among other things, the geothermal resource, the projected capacity of the power plant, the power generation equipment to be used and the way geothermal fluids will be re-injected through injection wells to maintain the geothermal resource and surface conditions. We generally drill the wells ourselves although in some cases we use outside contractors.

The cost for each production and injection well varies depending on, among other things, the depth and size of the well and market conditions affecting the supply and demand for drilling equipment, labor and operators. In the last five years, our typical cost for each production and injection well is approximately $3.3 million with a range of $1.0 million to $8.5 million.

Design

We use our own employees to design the well field and the power plant, including equipment that we manufacture and that will be needed for the power plant. The designs vary based on various factors, including local laws, required permits, the geothermal resource, the expected capacity of the power plant and the way geothermal fluids will be re-injected to maintain the geothermal resource and surface conditions.

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Permits

We use our own employees and outside consultants to obtain any required permits and licenses for our power plants that are not already covered by the terms of our site leases. The permits and licenses required vary from site to site and are described below under “Environmental Permits”.

Manufacturing

Generally, we manufacture most of the power generating unit equipment we use at our power plants. Multiple sources of supply are generally available for all other equipment we do not manufacture.

Construction

We use our own employees to manage the construction work. For site grading, civil, mechanical, and electrical work we use subcontractors.

During fiscal year 2018, in the Electricity segment, we focused on the commencement of operations at McGinness Hills phase 3 in Nevada and at the Olkaria III plant expansion in Kenya. We began with construction of Steamboat Hills enhancement and Tungsten Solar in Nevada as well as with enhancement work in some of our operating power plants. During fiscal year 2017, we focused on the commencement of operations at Platanares power plant in Honduras and Tungsten Mountain in Nevada. We began with construction of the Olkaria III plant expansion in Kenya and enhancement work in some of our operating power plants. During fiscal year 2016, we focused on the commencement of operations at Olkaria III plant 4.

When deciding whether to continue holding lease rights and/or to pursue exploration activity, we diligently prioritize our prospective investments, taking into account resource and probability assessments in order to make informed decisions about whether a particular project will support commercial operation. As a result, during fiscal year 2018 we decided to discontinue our holding in the lease at one prospective site: Ruby Valley in Nevada. During fiscal year 2017 we discontinued exploration activities at four prospective sites: the Ungaran region in Indonesia, Glass Buttes - Midnight Point in Oregon and Tuscarora - phase 2 and Don A. Campbell - phase 3, in Nevada. During fiscal year 2016, we discontinued exploration activities at three future prospective sites, in the Kula region in Hawaii and the Aqua Quieta and Sollipulli regions in Chile.

After conducting exploratory studies at those sites, we concluded that the respective geothermal resources would not support commercial operations. Costs associated with exploration activities at these sites were expensed accordingly (see “Write-off of Unsuccessful Exploration Activities” under Item 7 — “Management’s Discussion and Analysis of Financial Condition and Results of Operations”).

We added to our exploration inventory six prospective sites in 2018 two prospective sites in 2017 and 10 prospective sites in the year ended 2016.

How We Operate and Maintain Our Power Plants

Our operations and maintenance practices are designed to minimize operating costs without compromising safety or environmental standards while maximizing plant flexibility and maintaining high reliability. Our operations and maintenance practices for geothermal power plants seek to preserve the sustainable characteristics of the geothermal resources we use to produce electricity and maintain steady-state operations within the constraints of those resources reflected in our relevant geologic and hydrologic studies. Our approach to plant management emphasizes the operational autonomy of our individual plant or complex managers and staff to identify and resolve operations and maintenance issues at their respective power plants; however, each power plant or complex draws upon our available collective resources and experience, and that of our subsidiaries. We have organized our operations such that inventories, maintenance, backup, and other operational functions are pooled within each power plant complex and provided by one operation and maintenance provider. This approach enables us to realize cost savings and enhances our ability to meet our power plant availability goals.

Safety is a key area of concern to us. We believe that the most efficient and profitable performance of our power plants can only be accomplished within a safe working environment for our employees. Our compensation and incentive program include safety as a factor in evaluating our employees, and we have a well-developed reporting system to track safety and environmental incidents, if any, at our power plants.

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How We Sell Electricity

In the U.S., the purchasers of power from our power plants are typically investor-owned electric utility companies or electric cooperatives including public owned utilities. Outside of the U.S., our purchasers are either state-owned utilities or a privately-owned-entities and we typically operate our facilities under rights granted to us by a governmental agency pursuant to a concession agreement. In each case, we enter into long-term contracts (typically, PPAs) for the sale of electricity or the conversion of geothermal resources into electricity. Although previously our power plants' revenues under a PPA generally consisted of two payments, energy payments and capacity payments, our recent PPAs provide for energy payments only. Energy payments are normally based on a power plant's electrical output actually delivered to the purchaser measured in kWh, with payment rates either fixed or indexed to the power purchaser's "avoided" power costs (i.e., the costs the power purchaser would have incurred itself had it produced the power it is purchasing from third parties) or rates that escalate at a predetermined percentage each year. Capacity payments are normally calculated based on the generating capacity or the declared capacity of a power plant available for delivery to the purchaser, regardless of the amount of electrical output actually produced or delivered. In addition, we have six domestic power plants located in California, Nevada and Hawaii that are eligible for capacity bonus payments under the respective PPAs upon reaching certain levels of generation, or subject to a capacity payment reduction if certain levels of generation are not reached.

How We Finance Our Power Plants

Historically we have funded our power plants with different sources of liquidity such as a non-recourse or limited recourse debt, lease financing, tax monetization transactions, internally generated cash, which includes funds from operation, as well as proceeds from loans under corporate credit facilities and the sale of equity interests and other securities. Such leveraged financing permits the development of power plants with a limited amount of equity contributions, but also increases the risk that a reduction in revenues could adversely affect a particular power plant's ability to meet its debt obligations. Leveraged financing also means that distributions of dividends or other distributions by our power plant subsidiaries to us are contingent on compliance with financial and other covenants contained in the applicable financing documents.

Non-recourse debt or lease financing refers to debt or lease arrangements involving debt repayments or lease payments that are made solely from the power plant's revenues (rather than our revenues or revenues of any other power plant) and generally are secured by the power plant's physical assets, major contracts and agreements, cash accounts and, in many cases, our ownership interest in our affiliate that owns that power plant. These forms of financing are referred to as "project financing".

In the event of a foreclosure after a default, our affiliate that owns the power plant would only retain an interest in the power plant assets, if any, remaining after all debts and obligations have been paid in full. In addition, incurrence of debt by a power plant may reduce the liquidity of our equity interest in that power plant because the equity interest is

typically subject both to a pledge in favor of the power plant's lenders securing the power plant's debt and to transfer and change of control restrictions set forth in the relevant financing agreements.

Limited recourse debt refers to project financing as described above with the addition of our agreement to undertake limited financial support for our affiliate that owns the power plant in the form of certain limited obligations and contingent liabilities. These obligations and contingent liabilities may take the form of guarantees of certain specified obligations, indemnities, capital infusions and agreements to pay certain debt service deficiencies. Creditors of a project financing of a particular power plant may have direct recourse to us to the extent of these limited recourse obligations.

We have used financing structures to monetize PTCs and depreciation, such as our recent tax equity partnership transaction involving Tungsten, and an operating lease arrangement for our Puna complex power plants.

We have also used a sale of equity interests in three of our geothermal assets and nine of our REG facilities to fund corporate needs including funding for the construction of new projects. We may use some of the same financing structures in the future.

How We Mitigate International Political Risk.

We generally purchase insurance policies to cover our exposure to certain political risks involved in operating in developing countries, as described below under "Insurance".

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Description of Our Leases and Lands

We have domestic leases on approximately 365,988 acres of federal, state, and private land in California, Hawaii, Nevada, New Mexico, Utah Idaho and Oregon. The approximate breakdown between federal, state and private leases and owned land is as follows:

- 80% of the acreage under our control is leased from the U.S. government, acting mainly through the BLM;
- 16% is leased or subleased from private landowners and/or leaseholders;
- 3% is owned by us; and
- 1% is leased from various states.

Each of the leases within each of the categories above has standard terms and requirements, as summarized below. Internationally, our land position includes approximately 60,903 acres.

BLM Geothermal Leases

Certain of our domestic project subsidiaries have entered into geothermal resources leases with the U.S. government, pursuant to which they have obtained the right to conduct their geothermal development and operations on federally-owned land. These leases are made pursuant to the Geothermal Steam Act and the lessor under such leases is the U.S. government, acting through the BLM.

BLM geothermal leases grant the geothermal lessee the right and privilege to drill for, extract, produce, remove, utilize, sell, and dispose of geothermal resources on certain lands, together with the right to build and maintain necessary improvements thereon. The actual ownership of the geothermal resources and other minerals beneath the land is retained in the federal mineral estate. The geothermal lease does not grant to the geothermal lessee the exclusive right to develop the lands, although the geothermal lessee does hold the exclusive right to develop geothermal resources within the lands. Since BLM leases do not grant to the geothermal lessee the exclusive right to use the surface of the land, BLM may grant rights to others for activities that do not unreasonably interfere with the geothermal lessee’s uses of the same land, including use, off-road vehicles, and/or wind or solar energy developments.

Typical BLM leases issued to geothermal lessees before August 8, 2005 have a primary term of ten years and will renew so long as geothermal resources are being produced or utilized in commercial quantities but cannot exceed a period of forty years after the end of the primary term. If at the end of the forty-year period geothermal steam is still being produced or utilized in commercial quantities and the lands are not needed for other purposes, the geothermal lessee will have a preferential right to renew the lease for a second forty-year term, under terms and conditions as the BLM deems appropriate.

BLM leases issued after August 8, 2005 have a primary term of ten years. If the geothermal lessee does not reach commercial production within the primary term, the BLM may grant two five-year extensions. If the lessee is drilling a well for the purposes of commercial production, the lease may be extended for five years and thereafter as long as steam is being produced and used in commercial quantities the lease may be extended for up to thirty-five years. If, at the end of the extended thirty-five-year term, geothermal steam is still being produced or utilized in commercial quantities and the lands are not needed for other purposes, the geothermal lessee will have a preferential right to renew the lease under terms and conditions as the BLM deems appropriate.

For BLM leases issued before August 8, 2005, the geothermal lessee is required to pay an annual rental fee (on a per acre basis), which escalates according to a schedule described therein, until production of geothermal steam in commercial quantities has commenced. After such production has commenced, the geothermal lessee is required to pay royalties (on a monthly basis) on the amount or value of (i) steam, (ii) by-products derived from production, and (iii) commercially de-mineralized water sold or utilized by the project (or reasonably susceptible to such sale or use).

For BLM leases issued after August 8, 2005, (i) a geothermal lessee who has obtained a lease through a non-competitive bidding process will pay an annual rental fee equal to $1.00 per acre for the first ten years and $5.00 per acre each year thereafter; and (ii) a geothermal lessee who has obtained a lease through a competitive process will pay a rental equal to $2.00 per acre for the first year, $3.00 per acre for the second through tenth year and $5.00 per acre each year thereafter. Rental fees paid before the first day of the year for which the rental is owed will be credited towards royalty payments for that year. For BLM leases issued, effective, or pending on August 5, 2005 or thereafter, royalty rates are fixed between 1.0-2.5% of the gross proceeds from the sale of electricity during the first ten years of production under the lease. The royalty rate set by the BLM for geothermal resources produced for the commercial generation of electricity but not sold in an arm’s length transaction is 1.75% for the first ten years of production and 3.5% thereafter. The royalty rate for geothermal resources sold by the geothermal lessee or an affiliate in an arm’s length transaction is 10.0% of the gross proceeds from the arm’s length sale.

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In the event of a default under any BLM lease, or the failure to comply with any of the provisions of the Geothermal Steam Act or regulations issued under the Geothermal Steam Act or the terms or stipulations of the lease, the BLM may, 30 days after notice of default is provided to the relevant project, (i) suspend operations until the requested action is taken, or (ii) cancel the lease.

Private Geothermal Leases

Certain of our domestic project subsidiaries have entered into geothermal resources leases with private parties, pursuant to which they have obtained the right to conduct their geothermal development and operations on privately owned land. In many cases, the lessor under these private geothermal leases owns only the geothermal resource and not the surface of the land.

Typically, the leases grant our project subsidiaries the exclusive right and privilege to drill for, produce, extract, take and remove from the leased land water, brine, steam, steam power, minerals (other than oil), salts, chemicals, gases (other than gases associated with oil), and other products produced or extracted by such project subsidiary. The project subsidiaries are also granted certain non-exclusive rights pertaining to the construction and operation of plants, structures, and facilities on the leased land. Additionally, the project subsidiaries are granted the right to dispose geothermal fluid as well as the right to re-inject into the leased land water, brine, steam, and gases in a well or wells for the purpose of maintaining or restoring pressure in the productive zones beneath the leased land or other land in the vicinity. Because the private geothermal leases do not grant to the lessee the exclusive right to use the surface of the land, the lessor reserves the right to conduct other activities on the leased land in a manner that does not unreasonably interfere with the geothermal lessee’s uses of the same land, which other activities may include agricultural use (farming or grazing), recreational use and hunting, and/or wind or solar energy developments.

The leases provide for a term consisting of a primary term in the range of five to 30 years, depending on the lease, and so long thereafter as lease products are being produced or the project subsidiary is engaged in drilling, extraction, processing, or reworking operations on the leased land.

As consideration under most of our project subsidiaries’ private leases, the project subsidiary must pay to the lessor a certain specified percentage of the value “at the well” (which is not attributable to the enhanced value of electricity generation), gross proceeds, or gross revenues of all lease products produced, saved, and sold on a monthly basis. In certain of our project subsidiaries’ private leases, royalties payable to the lessor by the project subsidiary are based on the gross revenues received by the lessee from the sale or use of the geothermal substances, either from electricity production or the value of the geothermal resource “at the well”.

In addition, pursuant to the leases, the project subsidiary typically agrees to commence drilling, extraction or processing operations on the leased land within the primary term, and to conduct such operations with reasonable diligence until lease products have been found, extracted and processed in quantities deemed “paying quantities” by the project subsidiary, or until further operations would, in such project subsidiary’s judgment, be unprofitable or impracticable. The project subsidiary has the right at any time within the primary term to terminate the lease and surrender the relevant land. If the project subsidiary has not commenced any such operations on said land (or on the unit area, if the lease has been unitized), or terminated the lease within the primary term, the project subsidiary must pay to the lessor, in order to maintain its lease position, annually in advance, a rental fee until operations are commenced on the leased land.

If the project subsidiary fails to pay any installment of royalty or rental when due and if such default continues for a period of fifteen days specified in the lease, for example, after its receipt of written notice thereof from the lessor, then at the option of the lessor, the lease will terminate as to the portion or portions thereof as to which the project subsidiary is in default. If the project subsidiary defaults in the performance of any obligations under the lease, other than a payment default, and if, for a period of 90 days after written notice is given to it by the lessor of such default, the project subsidiary fails to commence and thereafter diligently and in good faith take remedial measures to remedy such default, the lessor may terminate the lease.

We do not regard any property that we lease as material unless and until we begin construction of a power plant on the property, that is, until we drill a production well on the property.

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Description of Our Power Plants

Domestic Operating Power Plants

The following descriptions summarize certain industry metrics for our domestic operating power plants:

Brady Complex

Location	Churchill County, Nevada
Generating Capacity	26 MW
Number of Power Plants	Two (Brady and Desert Peak 2 power plants).
Technology	The Brady complex utilizes binary systems. The complex uses air and water-cooled systems.
Subsurface Improvements	12 production wells and nine injection wells are connected to the plants through a gathering system.
Major Equipment	Four OECs along with the Balance of Plant equipment.
Age	The Brady power plant commenced commercial operation in 1992 and a new OEC was added in 2004. In 2018, additional new OEC was added and three old steam turbines and associated systems were decommissioned. The Desert Peak 2 power plant commenced commercial operation in 2007.
Land and Mineral Rights	The Brady complex is comprised mainly of BLM leases that are held by production. The scheduled expiration dates for all of these leases are after the end of the expected useful life of the power plants in the Brady complex. The complex's rights to use the geothermal and surface rights under the leases are subject to various conditions, as described in "Description of Our Leases and Lands".

Access to Property	Direct access to public roads from the leased property and access across the leased property are provided under surface rights granted pursuant to the leases, and the Brady power plant holds rights of way from the BLM and from a private owner that allows access to and from the plant.
Resource Information	The resource temperatures at the Brady and Desert Peak 2 power plants are 266 degrees Fahrenheit and 332 degrees Fahrenheit, respectively. The Brady and Desert Peak geothermal systems are located within the Hot Springs Mountains, approximately 60 miles northeast of Reno, Nevada, in northwestern Churchill County. The dominant geological feature of the Brady area is a linear north-northeast-trending band of hot ground that extends two miles. The Desert Peak geothermal field is located within the Hot Springs Mountains, which form part of the western boundary of the Carson Sink. The structure is characterized by east-titled fault blocks and north-northeast-trending folds. The geologic structure in the area is dominated by high-angle normal faults of varying displacement.
Resource Cooling	During the last four years, the cooling at the Brady power plant has levelled off to a rate of 2.6 degrees Fahrenheit per year. The temperature decline at the Desert Peak 2 power plant is approximately two degrees Fahrenheit per year.
Sources of Makeup Water	Condensed steam is used for makeup water.

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Power Purchaser	The Sierra Pacific Power Company and Nevada Power Company purchase power generated by the Brady power plant and Desert Peak 2 power plant, respectively.
PPA Expiration Date	Brady power plant — 2022. Desert Peak 2 power plant — 2027.
Financing	The prior financing transactions covering the Brady complex have been fully paid off.
Supplemental Information	Construction of new OEC was completed and on-line since the first quarter of 2018.

Brawley Complex

Location	Imperial County, California
Generating Capacity	13 MW (See supplemental information below)
Number of Power Plants	One
Technology	The Brawley power plant utilizes a water-cooled binary system.
Subsurface Improvements	37 wells have been drilled and are connected to the Brawley power plant through its gathering system. As we improved our knowledge of the geothermal resource, we changed some of the wells from production to injection (and vice versa) and left others idle. Currently, we have 14 wells connected to the production header and 23 wells, connected to the injection header.
Major Equipment	Five OECs together with the Balance of Plant equipment.
Age	The Brawley power plant commenced commercial operation on March 31, 2011.
Land and Mineral Rights	The Brawley area is comprised entirely of private leases. The leases are held by production. The scheduled expiration date for all of these leases is after the end of the expected useful life of the power plant.

	The plant's rights to use the geothermal and surface rights under the leases are subject to various conditions, as described above in "Description of Our Leases and Lands".
Access to Property	Direct access to public roads from the leased property and access across the leased property are provided under surface rights granted pursuant to the leases.
Resource Information	Brawley production is from deltaic and marine sedimentary sands and sandstones deposited in the subsiding Salton Trough of the Imperial Valley. Based on seismic refraction surveys the total thickness of these sediments in the Brawley area is over 15,000 feet. The shallow production reservoir (from depths of 1,500 to 4,500 feet) that was developed is fed by fractures and matrix permeability and is conductively heated from the underlying fractured reservoir, which convectively circulates magmatically heated fluid. Produced fluid salinity ranges from 20,000 to 50,000 ppm, and the moderate scaling and corrosion potential is chemically inhibited. The temperature of the deeper fractured reservoir fluids exceed 525 degrees Fahrenheit, but the fluid is not yet developed because of severe scaling and corrosion potential. The deep reservoir is not dedicated to the Brawley power plant. The average produced fluid resource temperature is 323 degrees Fahrenheit.

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Resource Cooling	The temperature of the geothermal resource depends on the mix of operating production wells that we use.
Sources of Makeup Water	Water is provided by the IID.
Power Purchaser	Southern California Edison.
PPA Expiration Date	2031.
Financing	Corporate funds and ITC cash grant from the U.S. Treasury.
Supplemental Information	With a new chemical supply system, we plan to activate several idle wells. New production well was drilled and added to the production header in 2018 and as a result, we expect to see an increase in generation.

Don A. Campbell Complex

Location	Mineral County, Nevada
Generating Capacity	39 MW
Number of Power Plants	Two (phase 1 and phase 2)
Technology	The Don A. Campbell power plants utilize an air-cooled binary system
Subsurface Improvements	Nine production wells and five injection wells are connected to the plants
Major Equipment	Two air-cooled OECs with the Balance of Plant equipment
Age	The phase 1 power plant commenced commercial operation on January 1, 2014 and the phase 2 power plant commenced commercial operation on September 27, 2015

The Don A. Campbell area is comprised of BLM leases.

Land and Mineral Rights

The complex's rights to use the geothermal and surface rights under the leases are subject to various conditions, as described above in "Description of Our Leases and Lands"