



BrightSource

# MATERIALS FOR ENERGY APPLICATIONS WORKSHOP

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# BrightSource Overview

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- **Leading solar thermal technology used in utility-scale electric power plants to deliver cost-competitive, reliable and clean energy**
  - Technology is also used in solar-to-steam plants for industrial applications, such as thermal enhanced oil recovery (EOR)
- **Founded: 2006**
- **Funding to date: >\$530 million**
- **374 employees<sup>1</sup>**
- **Facilities**
  - HQ: Oakland, California
  - R&D and engineering team: Jerusalem, Israel
- **Operating sites**
  - Solar Energy Development Center (SEDC): fully operational 6 MWth solar-to-steam demonstration facility (Israel)
  - Chevron: 29 MWth thermal EOR plant (Coalinga, CA)
  - Ivanpah: 377 MW commercial scale solar project located in the Mojave Desert
- **Pioneered first utility-scale solar thermal energy plants three decades ago**

<sup>1</sup> As of August 25, 2011



# Alignment with Key Strategic Partners & Customers

## Partners & Customers

International  
Business Expansion

**ALSTOM**

Key Electricity Generation  
Customers

 SOUTHERN CALIFORNIA  
**EDISON**  
An EDISON INTERNATIONAL Company



Cornerstone Project  
Equity Investors

Engineering, Procurement  
& Construction



Enhanced Oil Recovery  
Applications



## Proven Access to Growth Capital



VANTAGE POINT  
CAPITAL PARTNERS



alternativenergy



DRAPER FISHER JURVETSON

RIVERWOOD

google.org

**ALSTOM**

Morgan Stanley

CALSTRS

BLACK RIVER™

DBL INVESTORS  
DOUBLE BOTTOM LINE VENTURE CAPITAL



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# Integrating Proprietary Technology with Conventional Components to Deliver a Flexible, Dispatchable Power Plant

## SOLAR RECEIVER / BOILER

Concentrated sunlight converts water in a boiler to high-temperature steam.

## HELIOSTATS

Software-controlled field of mirrors concentrate sunlight on a boiler mounted on a central tower.

## OPTIMIZATION / CONTROL SOFTWARE

Proprietary optimization software and Solar Field Integrated Control System manage heliostat positioning to optimize concentrated sunlight on the boiler.

## TURBINE

Steam powers turbine to produce electricity – then is converted back to water through an air-cooled condenser.

## AIR-COOLED CONDENSER

Environmentally friendly in design, using 95% less water than competitive technologies.

## AUXILIARY GAS-FIRED BOILER

Allows for hybridization, increased output and the enabling of more reliable electricity production.

## STORAGE

When integrated, cost-effective thermal energy storage increases solar electricity production.

# Ivanpah Solar Electric Generating System (SEGS)

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## Groundbreaking October 2010

- Capacity: 377 MW (three units)
- Solar field: 173,500 heliostats
- Location: Ivanpah, CA



***Ivanpah increases the amount of US solar thermal generation capacity currently installed by over 75%***

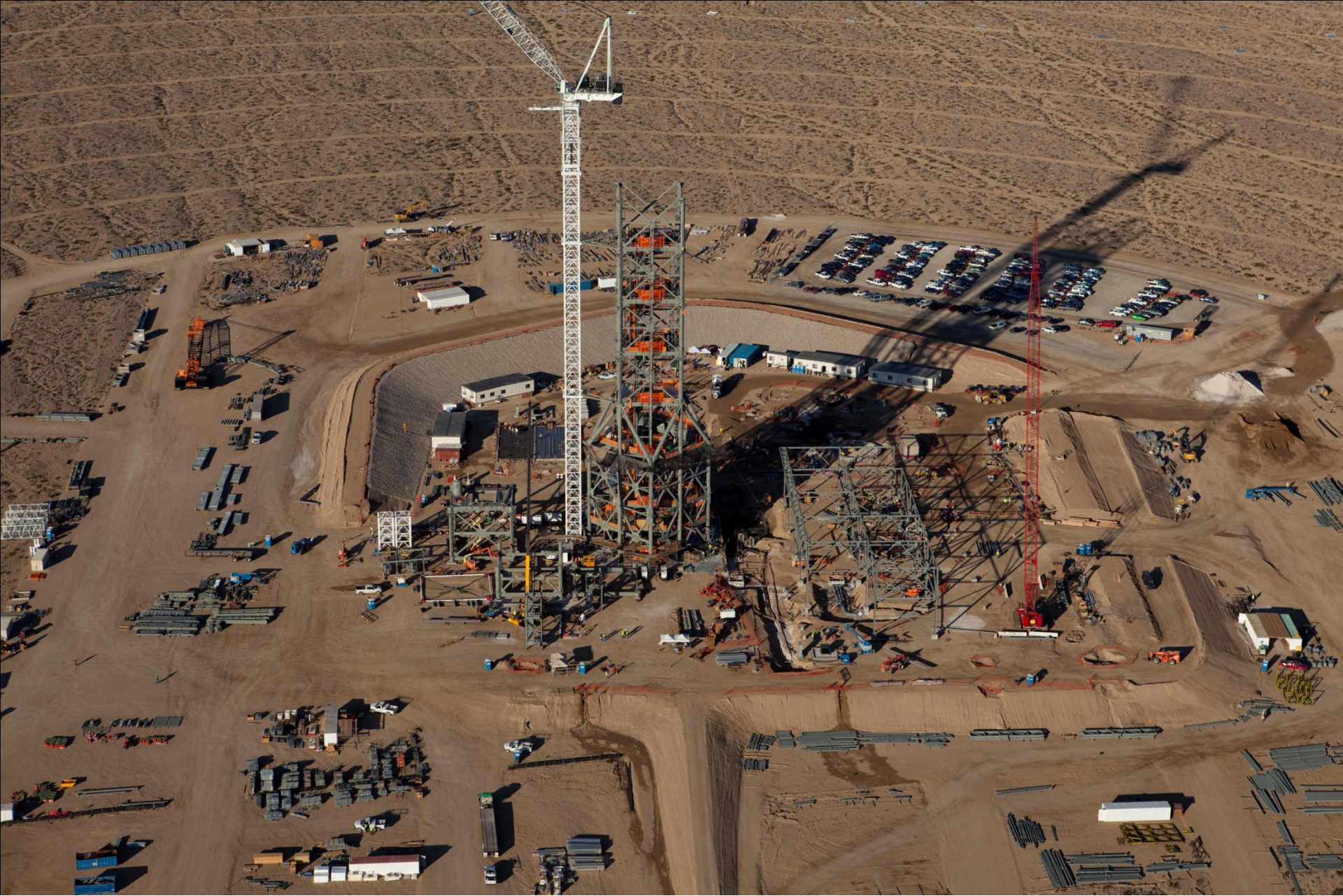
# Ivanpah Solar Electric Generating System (ISEGS)

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- 3 power plants
  - 377 MW of Electricity Generation for PG&E and SCE
- \$2.2B project financing - April 2011
  - Equity Investors: NRG, Google & BrightSource
  - \$1.63B DOE loan guarantee
- Key dates
  - Commenced construction - October 2010
  - Estimated commercial operations - 2013





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# Low Impact Design



## Here now: Chevron Solar-to-Steam for EOR

- Capacity: 29 MWth for thermal EOR
- Solar field: 3,822 heliostats
- Location: Coalinga, CA
- Project delivered to Chevron: October, 2011



# Coalinga

Project Completed



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# Thank You

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