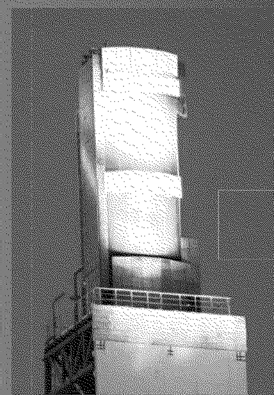
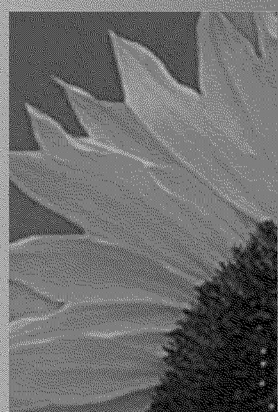
BrightSourceEnergy™



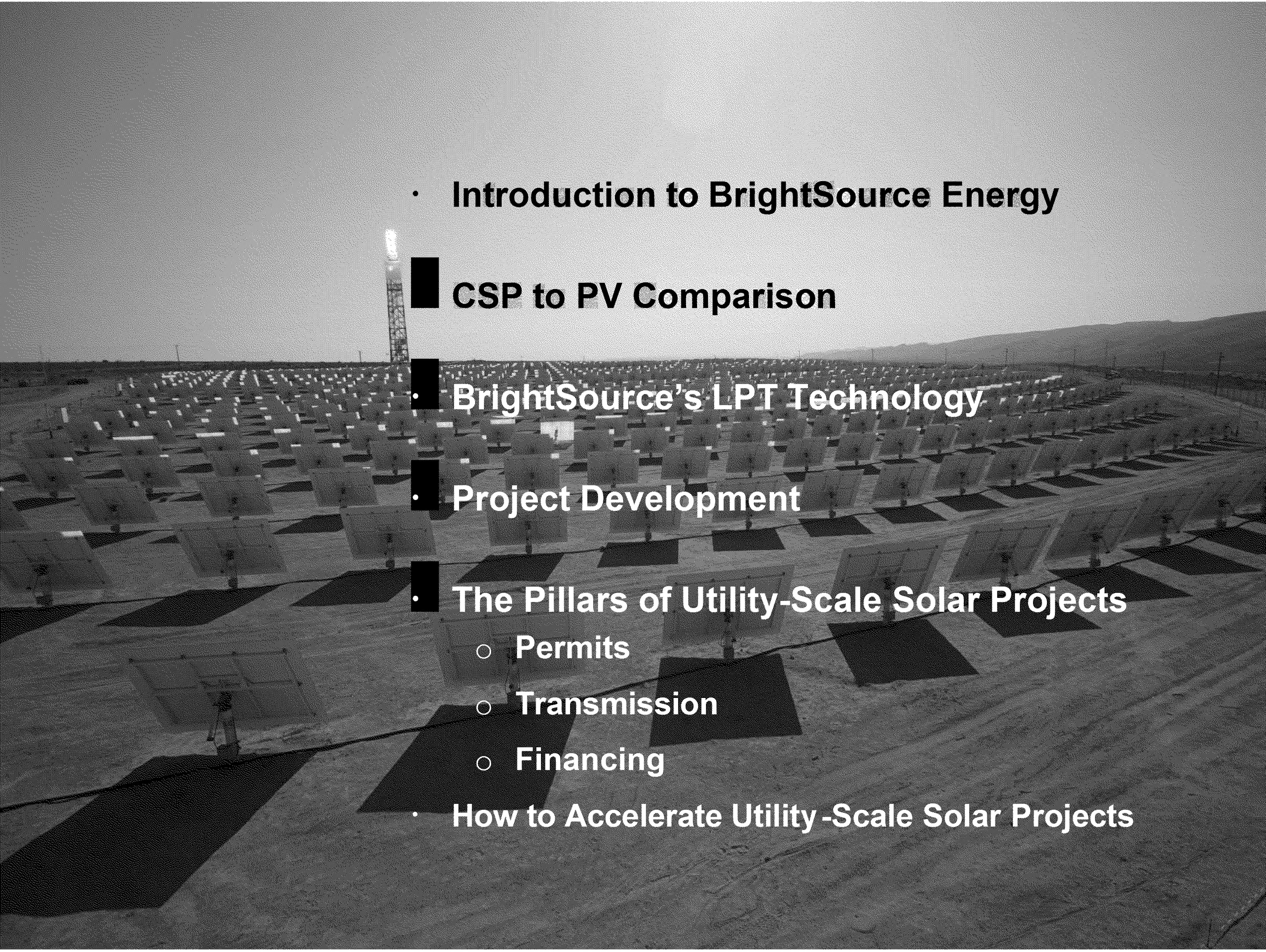
Implementation Challenges for Utility-Scale Solar Generation

Power Association of Northern California



July 1[illegible], 2010

Confidential


· Introduction to BrightSource Energy
CSP to PV Comparison
· BrightSource's LPT Technology
· Project Development
· The Pillars of Utility-Scale Solar Projects
o Permits
o Transmission
o Financing
· How to Accelerate Utility-Scale Solar Projects

BrightSource's Northern California Connection

- Headquarters - Oakland
- First Investor and Largest stockholder – VantagePoint Venture Partners, San Bruno
- First and Largest Customer – Pacific Gas & Electric, San Francisco

BrightSource Energy Snapshot

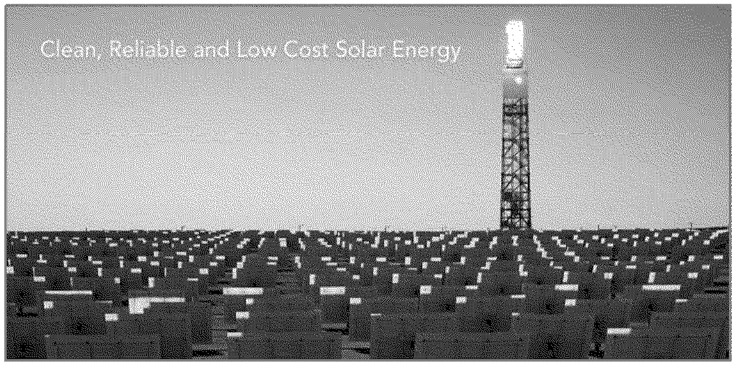
Mission: Make solar energy cost competitive with fossil fuels by developing, building, owning and operating the world's most cost-effective, environmentally-responsible and reliable large-scale solar energy projects.

- **Business Model:**
  - Develop and build large-scale solar power generation plants for utilities at prices that compete with fossil-fuel plants, using proprietary technology
  - Develop and build solar-to-steam plants for industrial applications
- **Financial Strength:**
  - Secured over $300M in corporate financing from key investors including: VantagePoint Venture Partners, Morgan Stanley, Chevron Technology Ventures, Draper Fisher Jurvetson, DBL Investors, Google.org, Black River, StatoilHydro Ventures, **Alstom**, **California State Teacher's Retirement System**, and others.
- **Team:**
  - Includes all of the key senior managers of Luz International, which designed and built more than 350 MW of solar thermal plants built in the 1980's
  - World class project development team with over 20GW of power projects developed, constructed, and managed
- **Locations:**
  - Headquarters in Oakland, California, 52 full-time employees
  - Subsidiary BrightSource Industries (Israel) located in Jerusalem, 115 full-time employees

BrightSource Energy Highlights

Proven Technology:

- SEDC generating highest temperature and pressure solar steam in the world
- Commissioned in June 2008

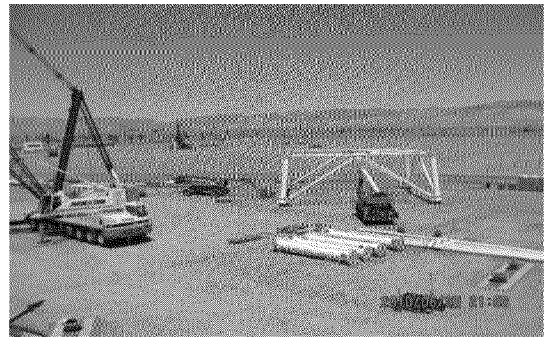


Largest Backlog in Industry:

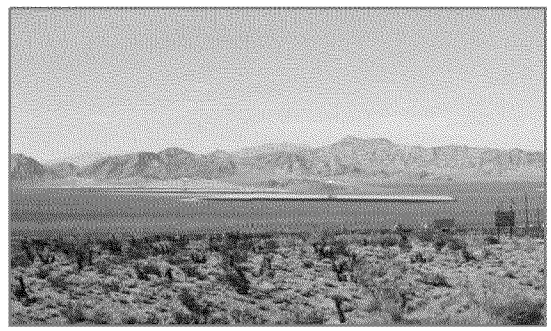
- 2.6GWs of signed Power Purchase Agreements (PPAs) with PG&E, SCE
- Over one-third of world's total of PPAs
- >$10 billion of total project value
- Shortlisted for a project in Israel

Projects Under Development:

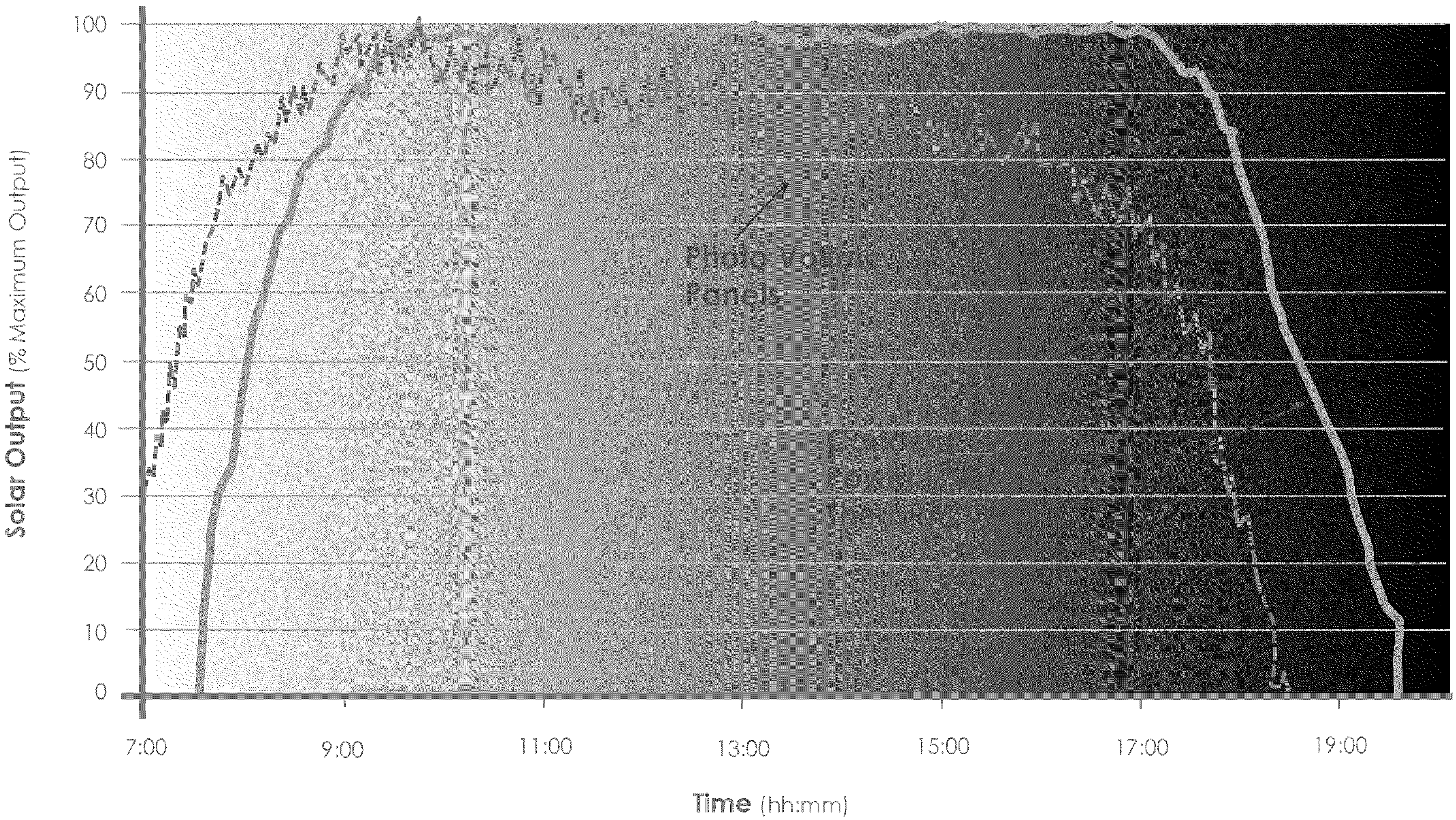
- Chevron – Industry's First Solar-to-Steam for EOR



- Ivanpah 392MW of Electric Generation for PG&E, SCE
  - Will be the world's largest solar power complex
  - Multi-billion project with $1.37 Billion Federal loan guarantee – largest ever granted
  - Bechtel will be the EPC Contractor and an investor

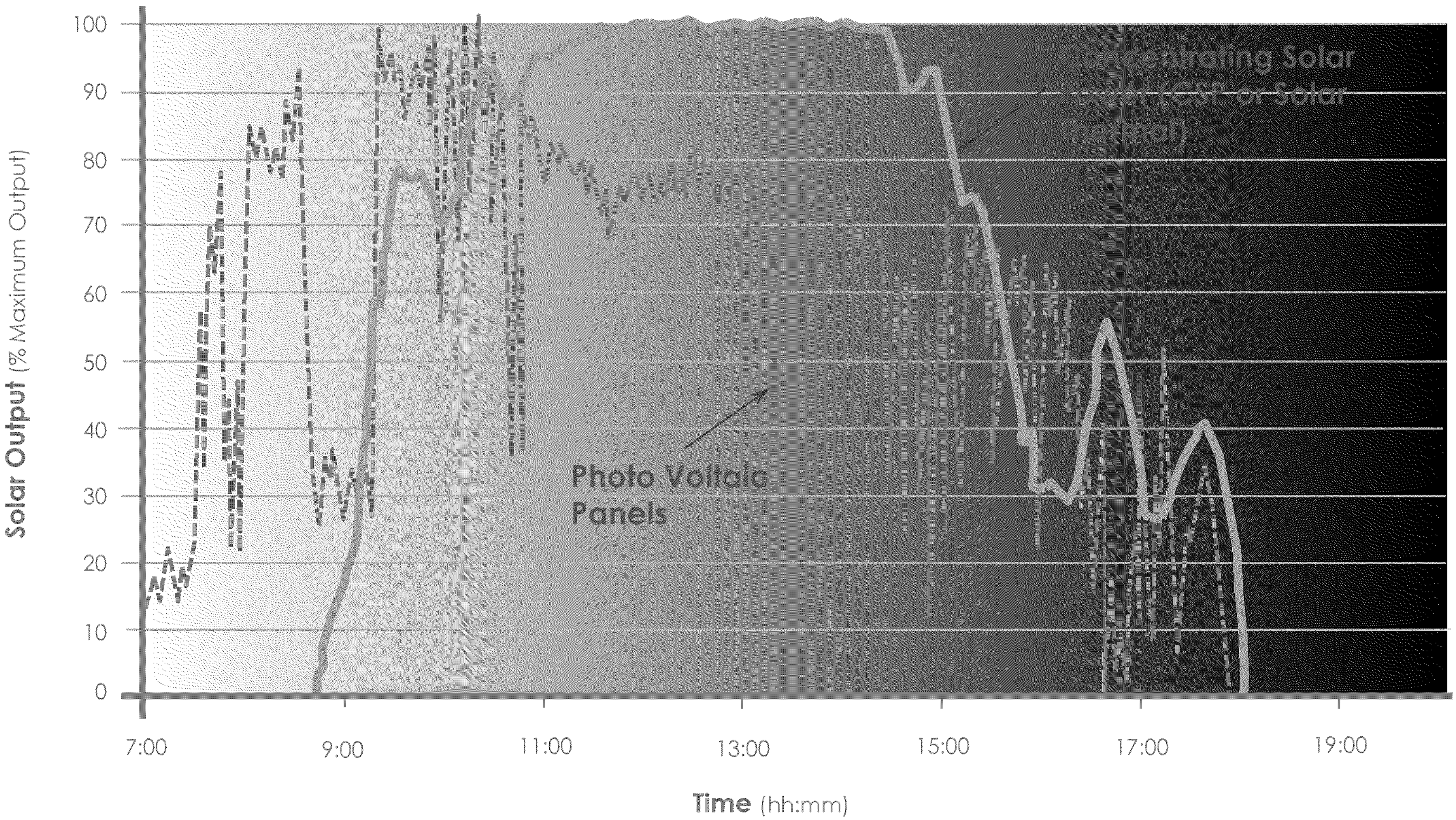


Solar PV vs CSP on a Sunny Day



Source: Larry Stoddard, Black & Veatch

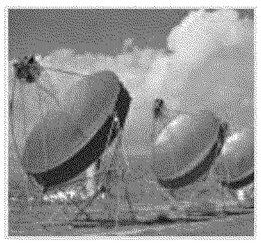
Solar PV vs CSP on a Cloudy Day



Source: Larry Stoddard, Black & Veatch

Alternative CSP Technologies

Technology landscape

	Technology type	Description	Pros	Cons	Players
Power tower		· Fixed centralized receiver tower surrounded by field of heliostats · Dual-axis control · Receiver contains water or molten salt · Storage potential	· Higher efficiency · Minimal piping · Fixed receiver unit · Flat mirrors · Proof of concept at first gen sites · Ideal for hybrid plants · Field set-up flexibility	· No commercial-scale operating track record	BrightSource Energy ABENGOA SOLAR SOLARRESERVE eSolar Torresol Energy
Trough		· Field of long rows of parabolic mirrors · Mirrors concentrate sunlight onto movable receiver · Receiver contains oil or water	· Proven development and operational track record · Employs single-axis trackers · "Off-the-shelf" systems available	· Relatively low thermal to electric conversion · Expensive curved mirrors · Significant parasitic losses · Durability of piping/ball joints · Environmental issues of oil-based platforms	ABENGOA SOLAR acciona SCHOTT solar Solar Millennium STARWOOD / LOCKHEED MARTIN SOLEL ZYTECH SOLAR
Dish		· Parabolic dish concentrates sunlight onto mounted stirling engine · Smaller unit format · Not targeting utility market; Utility-scale facilities contain multiple dish units	· Promises highest thermal-to-electricity conversion rate · Suited for distributed or remote generation applications	· Small scale results in higher cost per MW and expensive maintenance · Reliability needs to be improved · Not configured to provide hybrid capability	EDTEK INFINIA SES

CLFR[1]		· Fixed receiver unit heated by low rows of flat mirrors
		· Receiver contains oil or water
			· Less complex technology
			  · Single-axis trackers
			  · Flat mirrors
			  · Fixed receiver unit
				· Low efficiency
				· Distributing piping system
				· No commercial-scale operating track record
				· Few developers of the technology
					ausra
					SkyFuel

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Luz Power Tower (LPT) Technology

- 2 Years of Proven Operation
- Direct Solar-to-Steam
- Dual Axis Tracking
- High Temp. – 550^0 C
- High Pressure – 165 BAR
- Low Parasitic Load
- Higher Operating Efficiency
- Lower Capital Cost
- Uses Commodity Materials:
  - Small, Flat Glass Mirrors
  - Minimum Concrete
  - Minimum Steel
- Air Cooled Power Block

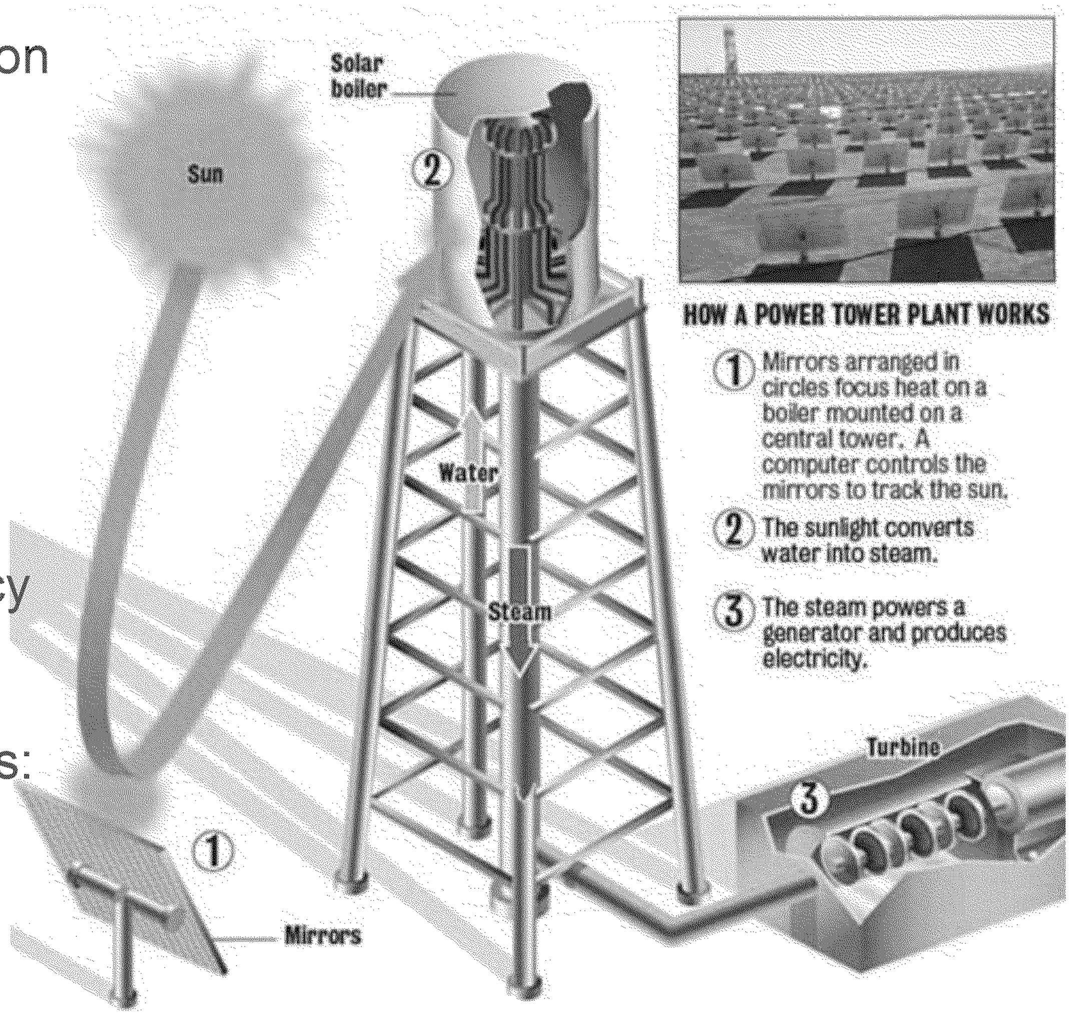
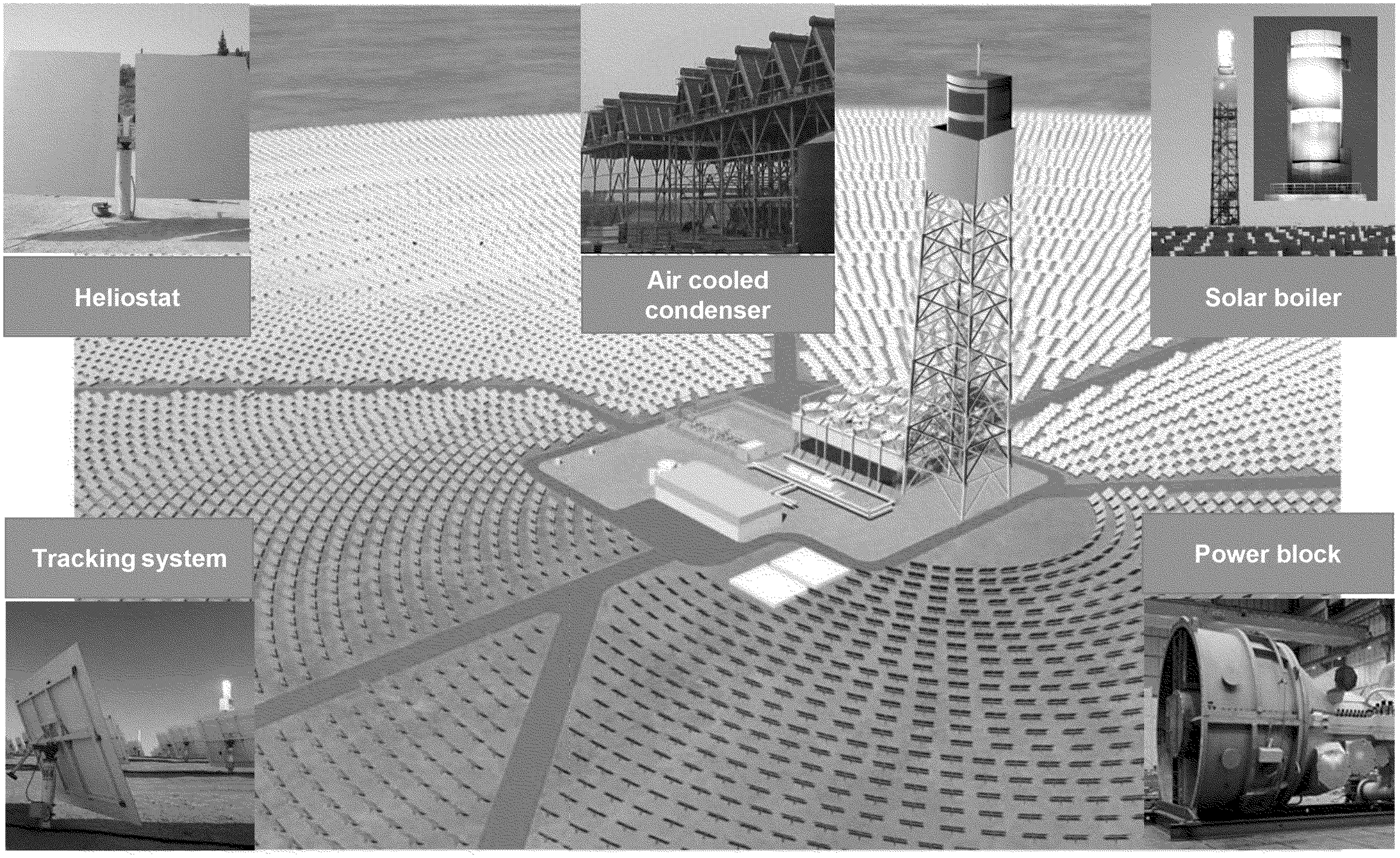


Diagram: San Bernardino Press Enterprise

Typical LPT Plant Layout



Performance Comparison: LPT vs. Troughs

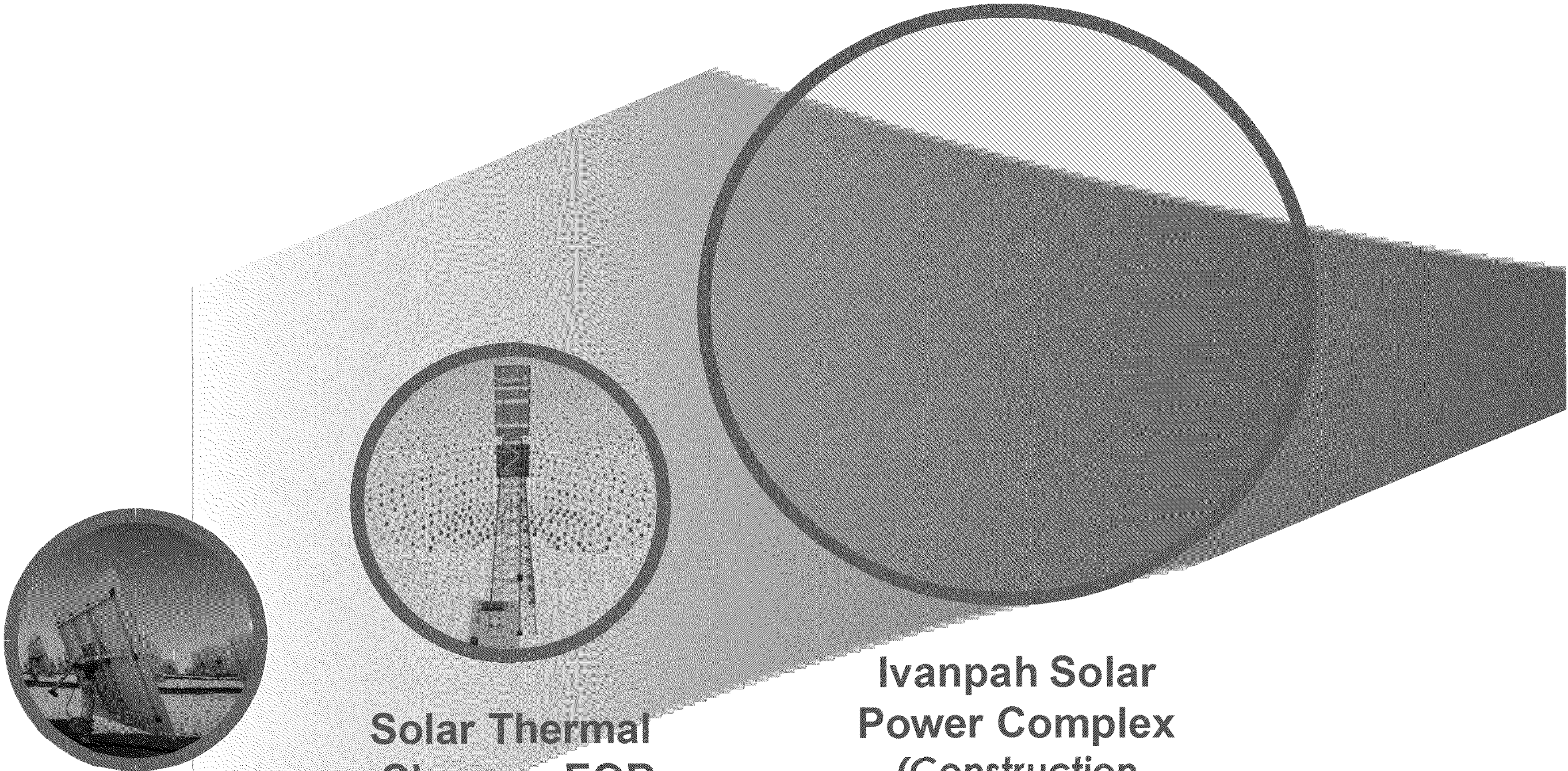
Factor	SEGS VI (Trough)	Optimum Trough	BrightSource LPT 550	BrightSource LPT 650[1]
Temperature (°C)	370	400	550	620
Solar to thermal efficiency	35%	40%	45%	50%
Gross thermal to electrical efficiency	37%	39%	43%	46%
Parasitic loss	14%	12%	5%	6%
Solar to electrical efficiency	11%	14%	18%	22%
Relative cost per kWh	100%	90%	75%	63%

[1] Future generation of LPT technology, operating at more than 600°C
Source: Management estimates

Commentary

- BrightSource's proprietary LPT technology platform demonstrates a substantial solar-to-electrical efficiency advantage compared to traditional trough technology
- First generation LPT 550 platform is 64% more efficient than the SEGS VI trough technology
- Trough's high parasitic load requirements and use of synthetic oil limit efficiency
  - The long receiver network requires significant pumping of the heat transfer medium (synthetic oil)
  - Materials limitations of the synthetic oil as heat transfer fluid results in lower operating temperature
- LPT technology minimizes pumping requirements by concentrating the heat transfer medium (steam) in a single tower unit
  - Use of steam avoids materials limitations of synthetic oil

LPT Technology Scale-Up



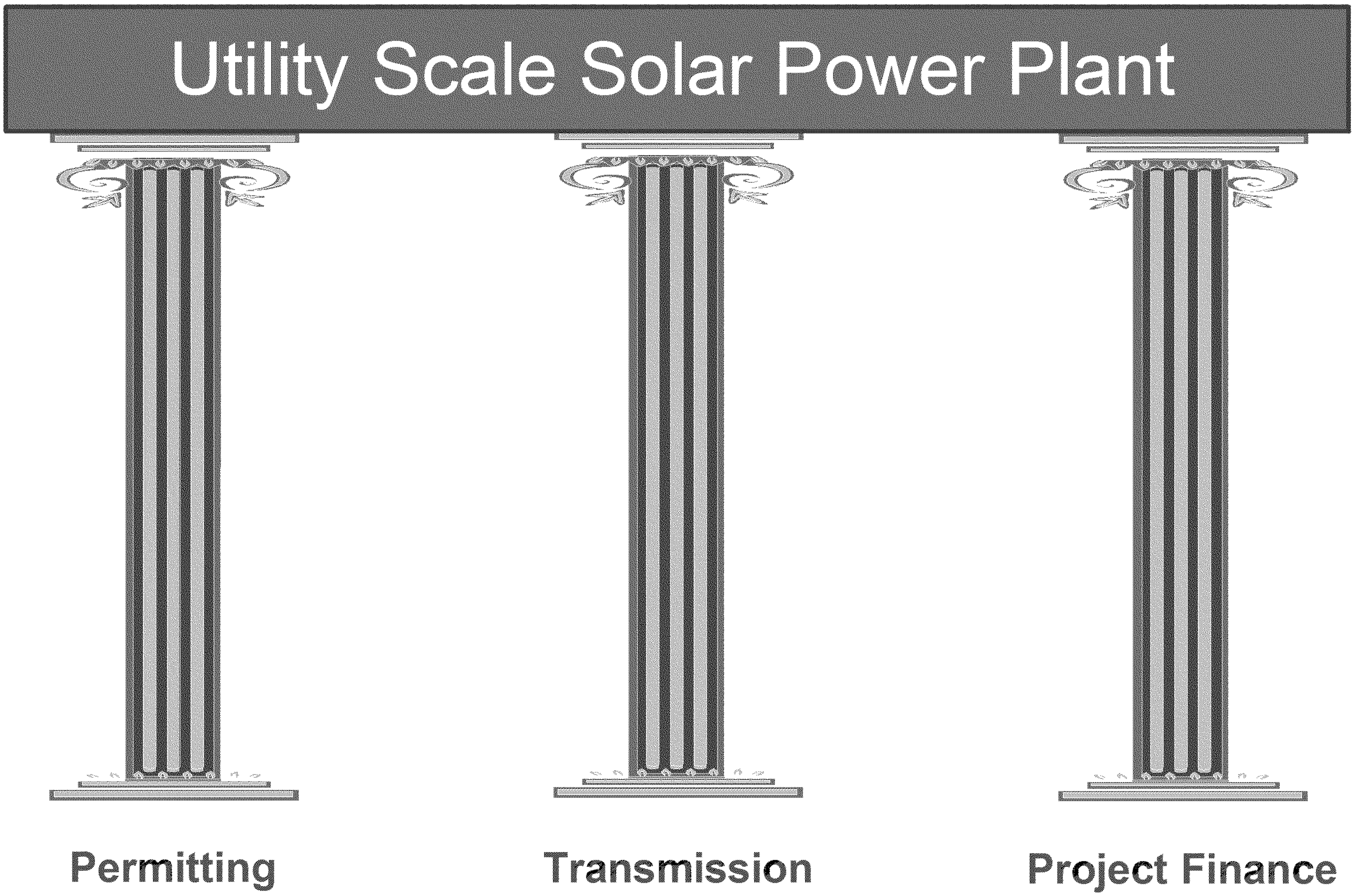
Solar Energy Development Center
(Operational)

Solar Thermal Chevron EOR Demo Plant
(Under Construction)

Ivanpah Solar Power Complex
(Construction Start 4Q2010)

BrightSourceEnergy

The Pillars of Utility-Scale Solar Projects



Permitting – Regulatory Oversight

- Permitting power generation facilities, especially those utilizing large tracks of public land, is complex – with jurisdictions by multiple, tiered and oftentimes agencies with conflicting oversight:
    - Federal Agencies:
        - Lead Agency – Bureau of Land Management ("BLM")
        - Ancillary Agencies –
          EPA, DOI, USFWS, USACE, DOD, FAA , others…
- State Agencies:
    - Lead Agency –
      CA; California Energy Commission ("CEC")
      AZ; Arizona Corporations Commission ("ACC")
      NV; Public Utilities Commission ("PUC")
    - Ancillary Agencies
- Local Agencies:
    - County, City, Water/Wastewater Districts, Fire Protection Districts, others…

Permitting – Environmental Issues

- Water vs Air Cooling
- Endangered Species Act : (Federal)
  - Protected Species: Desert Flora / Fauna:
    Desert Tortoise, Burrowing Owls
    Joshua Tree, annual grasses, other flora
- Designated, Protected Areas: ("No-Go")
  - ACEC – "Area of Critical Environmental Concern"
  - DWMA – "Desert Wildlife Management Area"
  - WSA – "Wildlife Study Area"
  - Designated "Wilderness" Areas
  - National & State Parks
- Mitigation Requirements:
  - Avoidance of environmentally sensitive regions.
  - "Critical Habitat" – Compensation, Replacement
  - Negotiating conflicting Fed & State Mitigation reqs.
  - Stakeholder Involvement / Management – NRDC, Sierra Club, Defenders of Wildlife, Audubon, Big Horn Sheep Society, many, many others.

Transmission – The Generation IR Queue

ILLUMINATING FACT: In the past decade California has built 10,000 miles of intrastate pipelines but only 700 miles of intrastate transmission lines. Why?

- **"Queue":** Generators file Interconnection Requests ("IR") and are placed into an ISO or Utility Queue.
- **Transmission Demand:** Demand for new Transmission by all parties throughout the US Southwest is dramatic. IR's far exceed supply. Refer to the adjacent table.
- **Administration:** Lengthy Queue process, Multiple system and facilities studies.
- **Cost Exposure:** A sponsor's position in the Queue can significantly affect the transmission congestion mitigation, upgrade and related costs (+/-) exposure.
- **Who's Real?:** ISO's are now attempting to 'purge' speculative or faltering IR filings.

Interconnection Requests

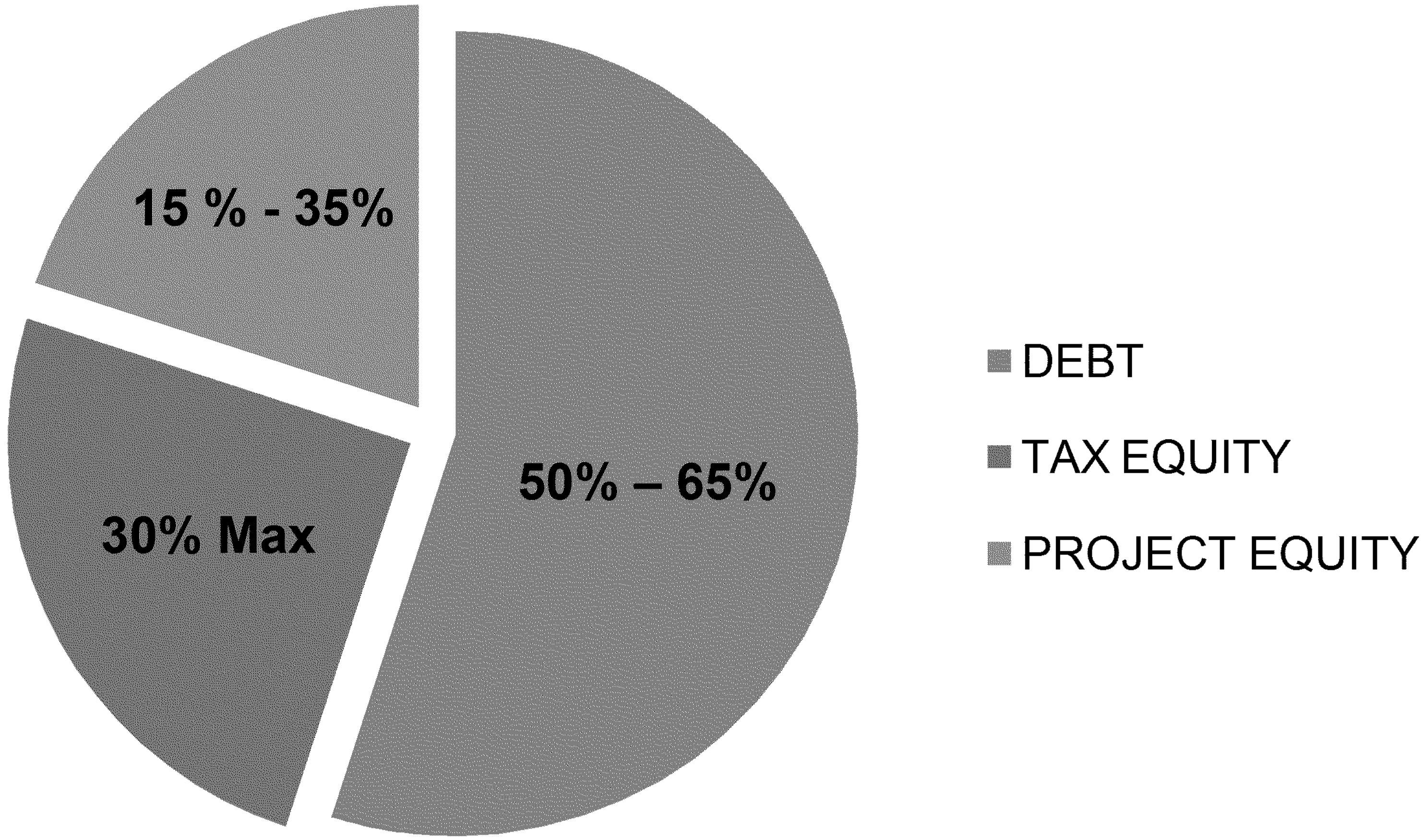
State	All Generation Interconnect (MW)	Solar Generation Interconnect (MW)
CAISO	69,433	30,398
Arizona	27,394	10,415
New Mexico	5,629	715
Nevada	8,656	3,706
Total	**111,112**	**45,234**

Fun Fact: CAISO summer peak demand = 45GW

Transmission – Varying Approaches

- California ISO ("CAISO"):
  - Existing "Serial" interconnect process had failed.
    - "GIPR" - Generation Interconnection Process Reform Introduced.
    - New process creates "Transition Clusters" – 2 IR Application windows per year. As implied, Clusters to be evaluated, and costs assigned, in groups.
    - Serial queue must be cleared first – Ivanpah "Grandfathered".
  - Timing: Concerns re time to complete transition clusters & coordination with Transmission Planning Process to provide optimal grid solutions.
- Arizona, Nevada, Other Utilities or ISO's:
  - Pro-forma FERC "LGIP – Attachment A" Process
  - Feasibility, System Impact and Facility Studies
    - Seek maximum feasible MW as practical for IR
    - Must Demonstrate Site Control
  - Timing: Up to 2 year analysis / evaluation process or longer…
- **Texas: Build to anticipated requirements**

Project Financing Components



Project Financing – The Issues

- Very Large CapEx Requirements - $4,000 - $5,000 / kW, including reserves, bonds, ITC, cost of financing, sales tax, etc.
- Debt Availability and Terms
  - Tenor / Rate / Availability / Market Liquidity
  - Commercial Debt or DOE Loan Guarantee Program Debt (1703 or 1705)
- Tax Equity
  - Investment Tax Credit
  - Grant in lieu of ITC – Deadline looming
- Project Equity
  - Players
    - Strategic, including utilities
    - Stakeholders, including customers and supply chain
    - Investors
  - IRR Requirements
- Risk Analysis
  - Plant productivity and solar variability
  - Technology

Accelerating Utility-Scale Solar Projects

Utility scale solar thermal power is commercially ready to become the backbone of California's renewable energy program by providing many gigawatts of clean, reliable peak power, along with tens of thousands of jobs, but this will take too long, and may not even happen, unless:

- The permitting process is made more timely, realistic, and predictable.
- A simpler, faster way is found to provide transmission access from good solar regions – transmission needs must be met in an anticipatory manner as has been done in Texas.
- Project financing is made available with long tenors at reasonable rates.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