Docket	:	A.06-08-010
Exhibit Number	:	
Commissioner	:	Dian Grueneich
Admin. Law Judge	:	Steven Weissman
DRA Witness	:	House

DIVISION OF RATEPAYER ADVOCATES
CALIFORNIA PUBLIC UTILITIES COMMISSION

A.06-08-010

REPORT ON THE SUNRISE POWERLINK

San Diego Gas & Electric Company (SDG&E)

Phase 1 Direct Testimony
Volume 5 of 5

San Francisco, California
May 18, 2007

TABLE OF CONTENTS

1. INTRODUCTION

I am Lon W. House, Ph. D., Founder and President of Water and Energy Consulting. My resume is included as Appendix A to this Volume. I am addressing issues related to the availability of renewable resources in the Imperial Valley.

Access to the substantial renewable potential in the Imperial Valley is stated as one of rationales for the Sunrise Powerlink by SDG&E. It is also the reason for the policy recommendations of the state's Integrated Energy Policy Report:

> "To address ongoing transmission barriers to renewable development, the Energy Commission recommends:
> • The California Public Utilities Commission should expedite processing of Certification of Public Convenience and Necessity applications for renewable transmission projects including the Antelope Transmission Project and Sunrise Powerlink project."[1]

There are substantial renewable resources in the area, thousands of MWs of geothermal and solar, but current access to these resources is limited:

> "Achieving these goals requires new and upgraded transmission infrastructure capable of delivering power from major renewable resource areas, including the Imperial Valley…"[2]

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[1] California Energy Commission, *2006 Integrated Energy Policy Report Update*, CEC-100-2006-001-CMF, January 2007, pg e-4.

[2] Report of the Imperial Valley Study Group, D*evelopment Plan for the Phased Expansion of Transmission to Access Renewable Resources in the Imperial Valley*, September 30, 2005, p. 8.

2. GEOTHERMAL ANALYSIS

An Energy Commission PIER Report estimates the amount of "economic" geothermal resources in the Salton Sea area at nearly 1,700 MW[3], whereas another CEC report estimates that the "most likely" geothermal development potential to be 1,950 MW[4]. Similarly, the Governors Task Force Report identifies 1,300 MW in the Salton Sea/Brawley/Niland area[5].

There has been significant development of the geothermal resource in this area. As Table 3-1[6] shows, over one-quarter of the resource potential has already been developed. There has not been voiced a credible criticism in this proceeding that the geothermal resource is not there, that the technology to utilize the resource does not exist, or that the resource will not be developed provided that there is a way to get the electricity from the Imperial Valley area to the load centers.

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3 California Energy Commission, *New Geothermal Site Identification And Qualification*, CEC-P500-04-051, April 2004.

4 California Energy Commission, *Renewable Resources Development Report*, P500-03-080F, November 2003, Appendix C-12.

5 Western Governors Association Geothermal Task Force Report, Clean and Diversified Energy Initiative, January 2006.

6 California Energy Commission, *California Geothermal Resources*, Staff Paper, CEC-500-2005-070, April 2005, page 8.

TABLE 2-1

Estimates of Most Likely Geothermal Resource Capacity

Table 2: Most-Likely (MLK) Geothermal Resource Capacity

Geothermal Resource Area	County	MLK MW	Existing Gross MW	MLK-Existing MW
Brawley (North)	Imperial	135	0	135
Brawley (East)	Imperial	129	0	129
Brawley (South)	Imperial	62	0	62
Dunes	Imperial	11	0	11
East Mesa	Imperial	148	73.2	74.8
Glamis	Imperial	6.4	0	6.4
Heber	Imperial	142	100	42
Mount Signal	Imperial	19	0	19
Niland	Imperial	76	0	76
Salton Sea (including Westmoreland)	Imperial	1750	350	1400
Superstition Mountain	Imperial	9.5	0	9.5
	Imperial Total:	2487.9	523.2	1964.7

3. SOLAR ANALYSIS

The Imperial Valley Study Group notes that Imperial County is estimated to have one-quarter of the state's entire solar generation potential[7]. The PRE analysis lists potential solar in the area of 29,000 MW[8], and substantial amounts of the solar resource in the area are already in the ISO analysis queue[9].

The value of access to the solar resource in the Imperial Valley, in particular to the solar generation provided by Stirling Energy Systems, Inc. (SES)[10], is not accepted by all experts in this proceeding: *"Stirling Solar project is "bait and switch" - contract will fail and SDG&E will have a scapegoat"*[11]. If this is true, then much of the proposed benefit of Sunrise will disappear. Accordingly, an investigation of the commercial viability of the SES Project was undertaken.

3.1 Contract Terms and Provisions

The Power Purchase Agreement between SDG&E and SES was executed in September 2005 and approved by the CPUC in Resolution E-3965 on December 1, 2005[12]. The contract calls for an initial phase of 300 MW with SDG&E options for two additional 300 MW phases for a

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7 Report of the Imperial Valley Study Group, D*evelopment Plan for the Phased Expansion of Transmission to Access Renewable Resources in the Imperial Valley,* September 30, 2005, p.8

8 San Diego Regional Renewable Energy Group, *Potential for Renewable Energy in the San Diego Region,* August 2005.

9 In addition to the 850 MW SCE contract and 900 MW SDG&E contract, SES is currently in the CAISO transmission queue for additional 3,150 MW (1,950 MW future expansion at Pisgah and 1,200 MW at Mohave) for a total of 4,900 MW in queue.

10 There can be some confusion in nomenclature. "Stirling" is the technical name for the type of engine used in this technology, as well as in the name of the company that produces these solar generators.

11 Presentation by Bill Powers, Border Power Plant Working Group, *Sempra's Strategy and Alternatives to Sempra/SDG&E Sunrise Powerlink,* November 13, 2006, pg. 29.

12 SES also has a CPUC approved contract with Southern California Edison (CPUC Resolutions E-3957, October 27, 2005). This contract has two phases, an initial 500 MW phase with an additional 350 MW phase. The SCE/SES contract is not linked to the SDG&E/SES contract – what happens with one of the contracts does not have any impact on the other contract.

total of up to 900 MW. The contract is a 20 year contract and *"(D)eliveries from the power purchase agreements (PPAs) are priced below the 2004 market price referent (MPR) and thus do not require supplemental energy payments (SEPs) from the California Energy Commission (CEC)."*[13]

3.2 Experience

The Stirling solar dish technology has over 20+ years of research and development. The current SES power conversion unit (PCU) has over 158,000 hours (48 years equivalent) on-sun testing. The dish concentrator assembly has over 100,000 hours (30 years) on-sun experience. The complete system as an integrated unit has over 33,000 hours (10 years) on-sun experience.

Sandia National Laboratories, through the Department of Energy, has provided technical support to the development of the dish-Stirling system since the late 1980s. There is currently an operating model power plant comprised of six SES dishes located at the National Solar Thermal Test Facilities at Sandia National Laboratories in New Mexico.

3.3 Progress/Milestones

Construction of the first phase of 300 MW is anticipated from 2008 to 2010, with approximate two year construction periods thereafter for each additional 300 MW Phase. The first solar units are expected to start generating by 2010.

The CAISO System Impact Study has been completed and indicates that 300 MW are available for this solar generation without new lines with implementation of a Special Protection Scheme for loss of a transformer bank at Miguel Substation. Access to the transmission system will be an approximately 8 mile gentie to Imperial Substation to be built by SES.

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[13] California Public Utilities Commission, *Resolution E-3965*, December 1, 2005, page 1.

SES has signed agreements with suppliers of their various components and has a financial team, headed by Citigroup, in place. Appropriate land for the project has been identified and reserved and environmental reviews and permitting is ongoing.

Based upon project schedule review, the SES project is on track for deliveries of power from the first phase of their project by 2010. While it is always possible that something unexpected could happen, there have been no significant impediments identified to date.

3.4 Issues

Seals have historically been one of the technical challenges of the Stirling engine and design and leakage through the seals has been posited as a critical flaw in this system[14]. SES states that Kockums -- the people who developed the engine used in the SES system -- have spent a substantial amount of effort and money over the past 30 years improving the seals currently used. The seals in the SES system have an expected average service life in excess of 7,000 hours, which is about 2 years in a solar operating mode. SES has assumed 6,000 hours between seal changes in their O&M assumptions, and claim that based on sensitivity studies, SES can stay within their total O&M cost budget with a replacement every 4,500 hours.

14 Presentation by Bill Powers, Border Power Plant Working Group, *Sempra's Strategy and Alternatives to Sempra/SDG&E Sunrise Powerlink,* November 13, 2006.

4 LEARNING CURVE ANALYSIS

Since project milestones are currently being met, supplier agreements are in place, and there is significant experience with this technology, the question becomes: Will SES be able to meet their production quotas at their anticipated cost? For such an analysis, we turn to learning curve theory[15].

Learning curves, also known as experience curves, cost curves, efficiency curves, and productivity curves, illustrate how the cost per unit of output decreases over time as the result of increased volume of production. As cumulative output increases, learning and economies of scale cause the cost per unit to decrease. Learning curves are standardly used by businesses in production planning, cost forecasting, setting delivery schedules, and other applications.

A learning curve is an industrial tool or formula representing the expected reduction of unit costs for large quantity production of components. The learning curve concept for industry states that the input cost (or time) per unit produced decreases by a set percentage every time the cumulative production output doubles. While the concept has been known since the 1800's, this price/quantity relationship was probably quantitatively used in the aerospace industry in 1936 at Wright Patterson Airforce Base, where it was determined that every time that aircraft production doubled, the required labor time decreased by 10 to 15 percent. Subsequent empirical studies from other industries have yielded different values but have found that each time cumulative volume doubles, costs fall by a constant and predictable percentage. In the late 1970s Bruce Henderson of the Boston Consulting Group Research recorded experience curve effects for various industries that ranged from 10 to 25 percent reductions[16].

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15 Purists in the field often differentiate between learning curves (to represent the reduction in the time and labor it takes to produce a product) and experience (or price experience) curves. Experience curves are broader in scope than the learning curve effect, encompassing far more than just labor time, and are used to represent the reduction in costs associated with greater production. However, for this discussion I will stick with the more common vernacular – learning curve – to represent both.

16 Boston Consulting Group, *Perspectives on Experience*, 1972.

The most common form of the relationship between input per product is a power law function - a log-linear model in the form of:

$Y=AX^b$ Y equals A times X to the power of b

where:

Y = cost for the x^{th} unit

X = cumulative number of units produced

A= input cost for the first unit

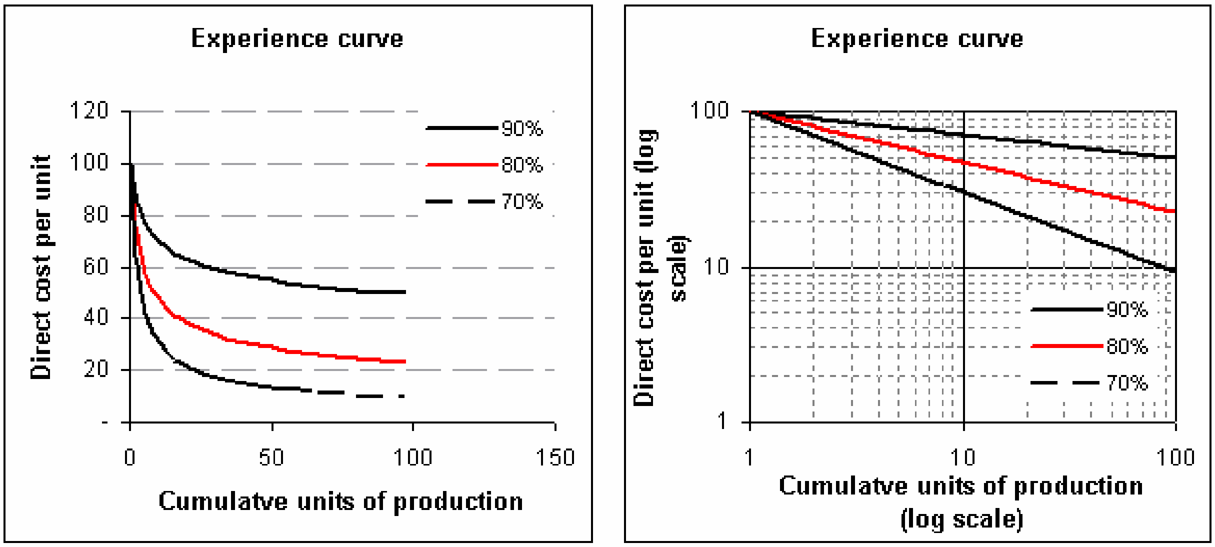
b = progress rate (defined the natural logarithm of the learning curve improvement percentage divided by the natural logarithm of 2)

= (ln (“learning curve percent”) / ln(2))

The curve starts with a high cost per unit at the beginning of output, decreases quickly with increased volume, then levels out as cumulative output increases. As output doubles from one unit to two units to four units, etc., the learning curve descends quite sharply as costs decrease dramatically. As output increases, it takes longer to double previous output, and the learning curve flattens out. Thus, costs decrease at a slower pace when cumulative output is higher. The slope of the learning curve is an indication of the rate at which volume becomes transformed into cost savings.

FIGURES 4-1 and 4-2

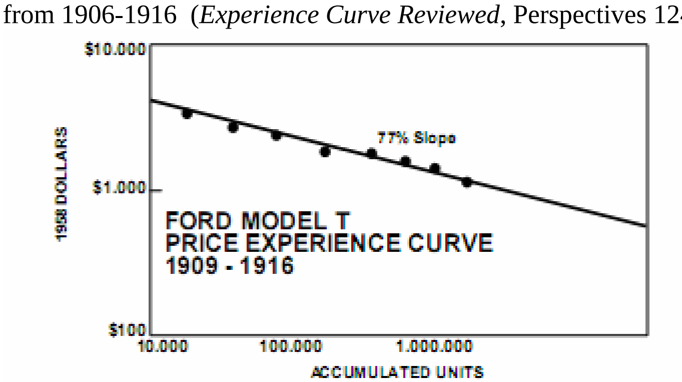
Sample Learning Curves



Source: http://en.wikipedia.org/wiki/Experience_curve_effects

An 80 percent learning curve (a 20 percent reduction in costs per doubling in cumulative production) has been used as a standard rule of thumb in many industries, and is sometimes used as an average in cost forecasting and production planning[17]. An 80 percent learning curve means that, for every doubling of output, the cost of new output is 80 percent of prior output.

[17] As a point of reference, Henry Ford experienced a learning curve of 77 percent on his Model T production from 1906-1916 (*Experience Curve Reviewed*, Perspectives 124, Boston Consulting Group, 1974).



Source: Automobile Manufacturers' Association

Although it should be cautioned that this can differ even for similar industries, within companies and for subsequent runs of the same product in the same plant, an 80 percent learning curve is often used as a default value.

5. SES LEARNING CURVE ANALYSIS

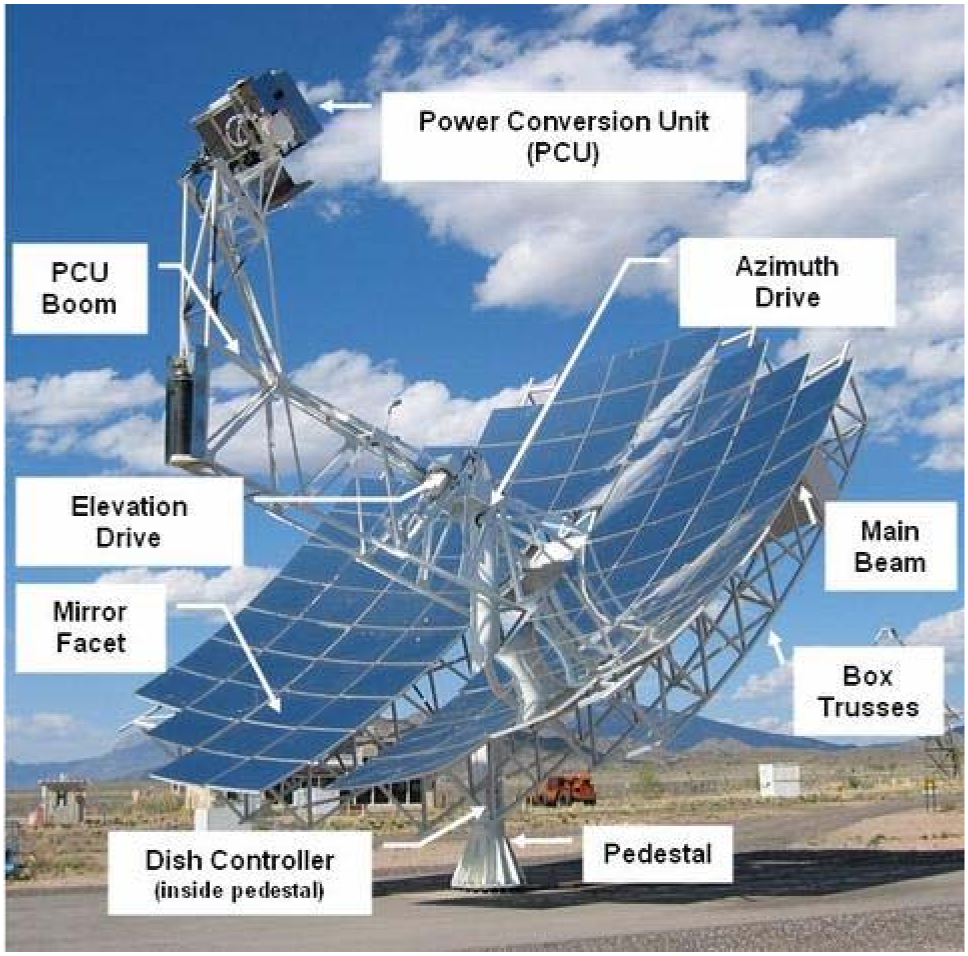
There are two types of learning curve analyses: a Unit Model and a Cumulative Average Model. The Unit Model approach does a learning curve analysis for each of the individual components of the system, whereas the Cumulative Average Model does a learning curve for the entire system. For this analysis both models were used – a Unit Model analysis was performed on major components of the SES system, and a Cumulative Average Model analysis was performed on the combination of these significant components[18].

A picture of the Stirling Solar Generator with its components is provided in the following figure. The dishes are approximately 37 feet in diameter. Each dish generator produces 25 kW of power, tracking the sun throughout the day. The sunlight is reflected to the power conversion unit, which is a Stirling engine (closed cycle regenerative gas engine – also called external heat engine) that drives a 480-volt induction generator. The Stirling engine is a closed-cycle piston heat engine ("closed-cycle" means that the working gas is permanently contained within the engine, unlike the "open-cycle" internal combustion engines which exhaust to the atmosphere). A Stirling engine operates through the use of an external heat source and an external heat sink. The Stirling engine uses the potential energy difference between its hot end and cold end to establish a cycle of a gas expanding and contracting within the engine, thus converting a temperature difference across the machine into mechanical power, which is used to drive an electrical generator.

[18] Learning curve analysis could not be conducted on the entire apparatus due to confidentially issues.

FIGURE 5-1

SES Solar Generator



The support structure is composed of a main (box) beam with 10 supporting trusses per dish. To these are mounted the mirrored surface. SES has contracted the entire dish system to Schuff Steel – America's largest steel fabricator.

A learning curve analysis was conducted on SES volume and price estimates for the major components of the dish support system: the structural components (the pedestal, main beam, trusses, and boom that supports the power conversion unit) and the mirror facets. The results are shown below.

FIGURE 5-2

SES Solar Generator Dish Structure Components Learning Curve

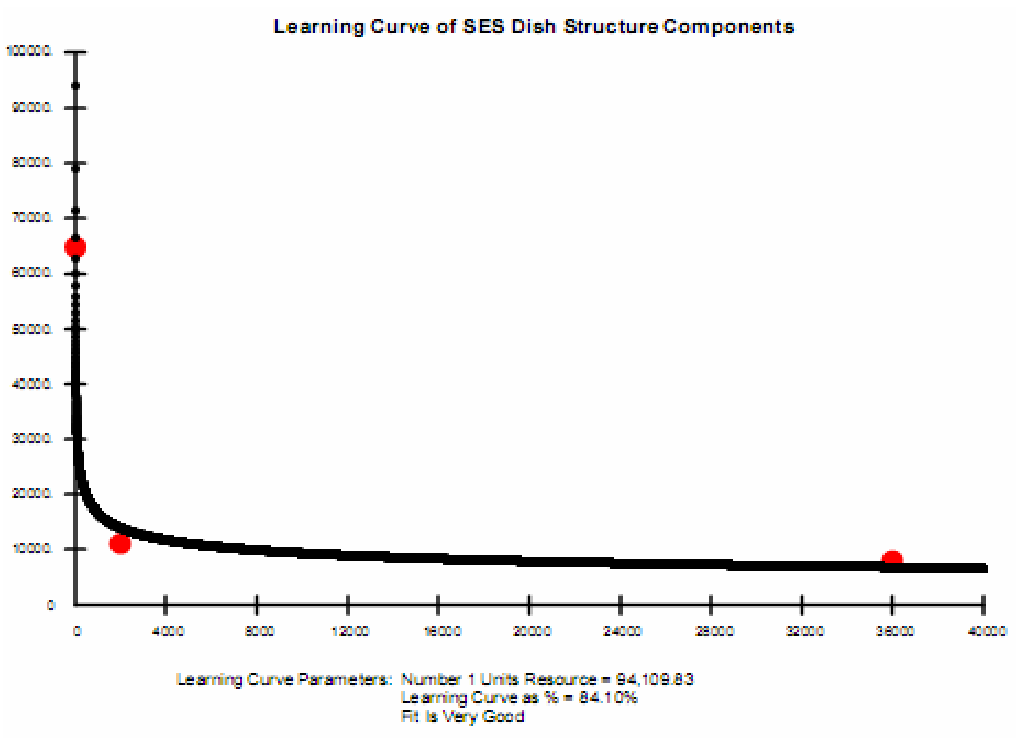
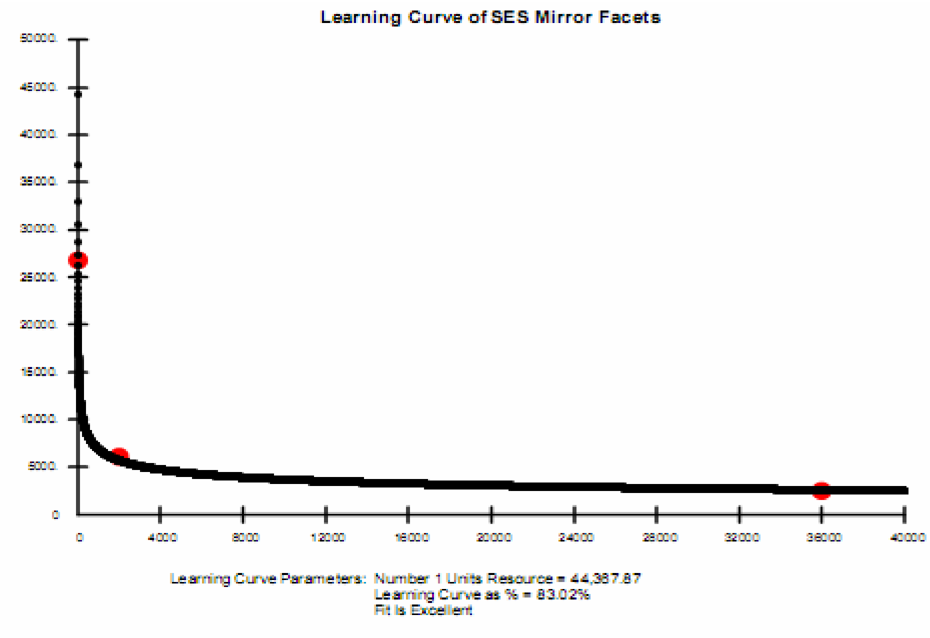


FIGURE 5-3

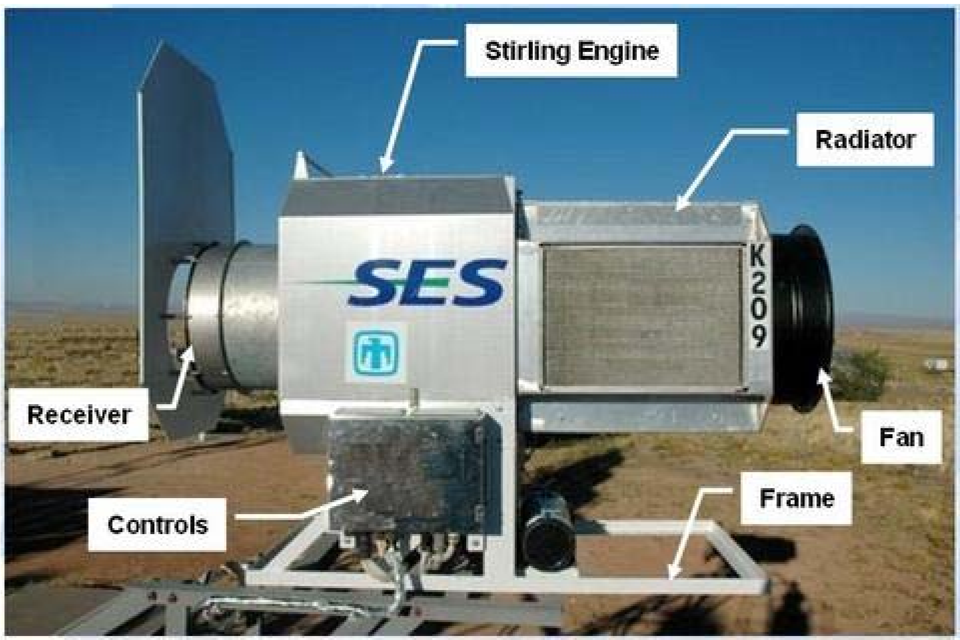
SES Solar Generator Mirror Facets Learning Curve



A picture of the power assembly can be seen in the following figure. The reflected sunlight is concentrated on the receiver. The internal side of the receiver (heater heads) heats hydrogen gas which expands inside the Stirling engine. The pressure created by the expanding gas drives a piston, crank shaft, and drive shaft assembly much like those found in internal combustion engines.

FIGURE 5-4

SES Power Conversion Unit



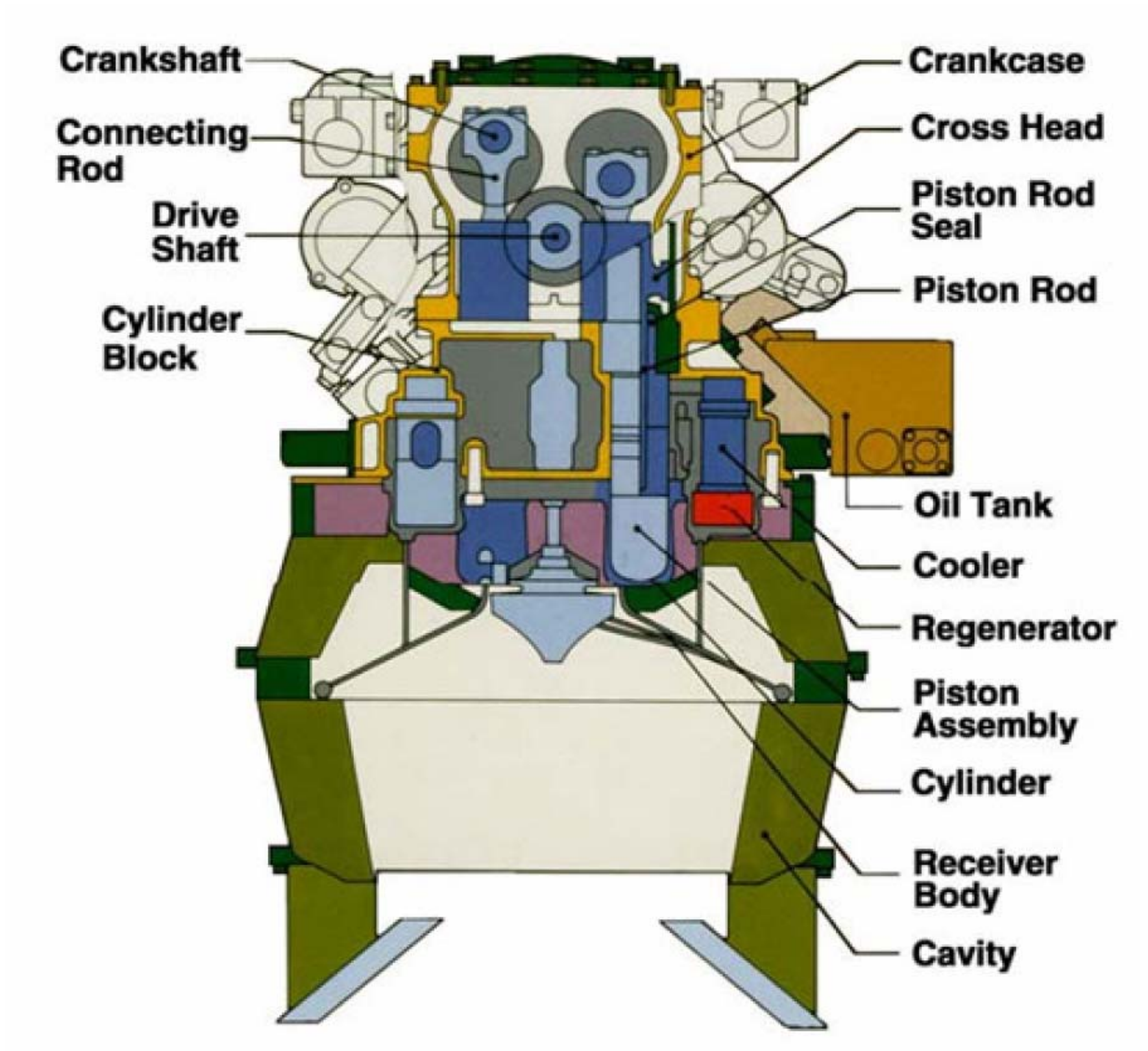
As the following diagram shows, the engine is very similar to a standard automobile engine. The engine used in the SES system is a 35 hp (horsepower) engine. SES has been working with a major engine supplier to the Detroit auto industry, Linamar, since 1999 on these engines and has an agreement with them to produce the entire power conversion unit (including the Stirling engine, a generator, radiator cooling system, controls, etc).

A learning curve analysis was conducted on the major components of the power conversion unit that were unique to the Stirling engine: the heater head (4 quadrants of heat exchangers just behind the receiver), the regenerators (eight per dish)[19], and the 480V electrical generator[20]. These learning curves are presented below.

19 Regenerators capture residual heat from the hydrogen gas that has been heated and expanded (pushing pistons down) prior to the gas being actively cooled by the radiator system. On the next cycle, cooled hydrogen gas is compressed and then passed through the regenerator on its way to the heater head and pre-heated.

FIGURE 5-5

SES Stirling Engine Diagram



[20] The generator is a fairly standardized component, but the SES had reduced the tolerances allowed and reduced the size of the usual generator.

FIGURE 5-6

SES Solar Generator Heater Head Learning Curve

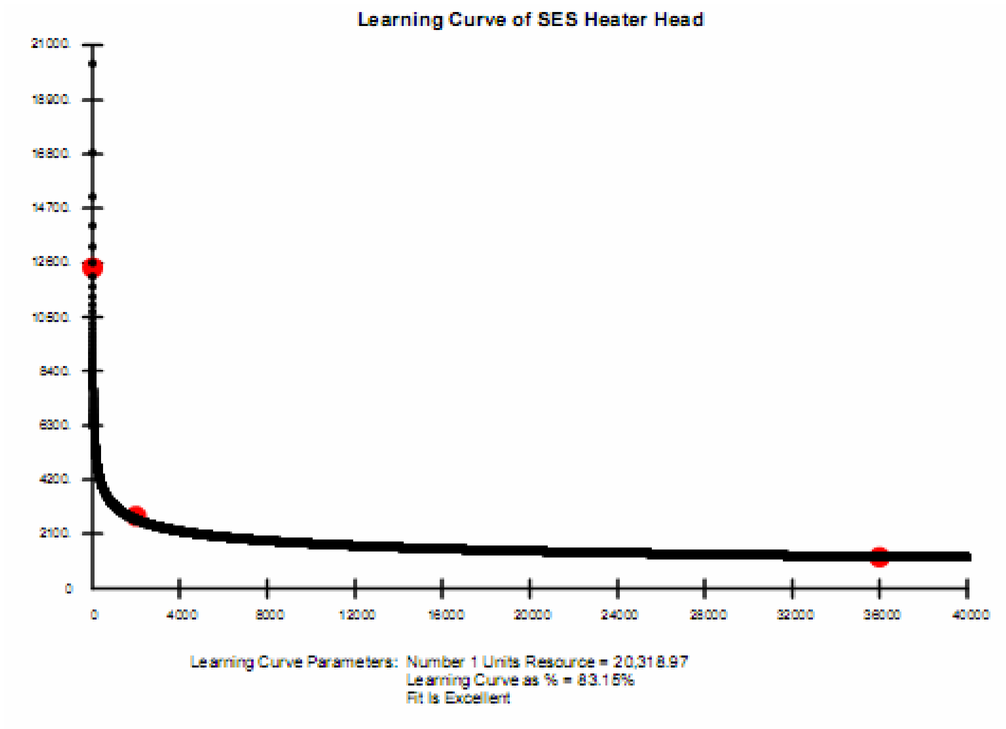


FIGURE 5-7

SES Solar Generator Regenerators Learning Curve

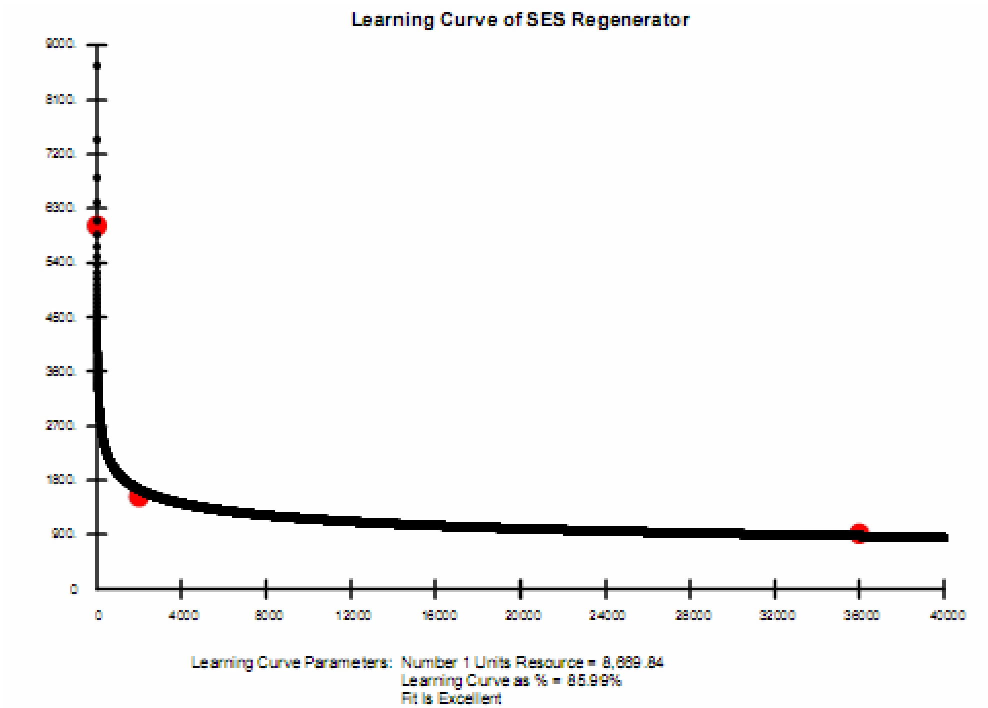
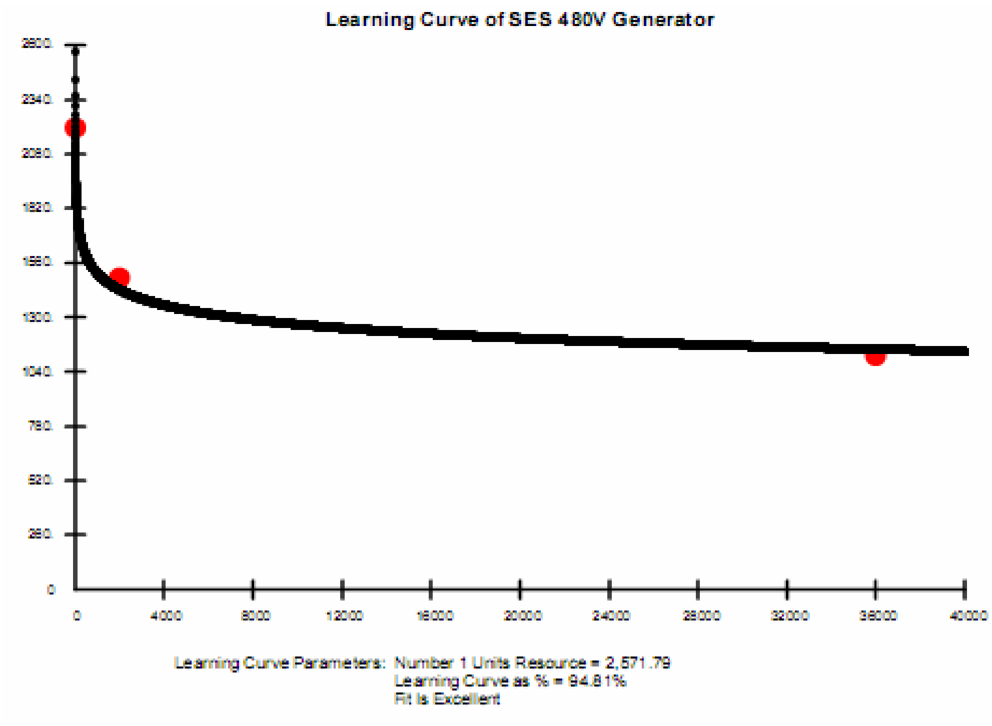


FIGURE 5-8

SES Solar Generator 480 V Generator Learning Curve



The balance of the SES generator consists of the various controls and drivers necessary to make the solar generator operate. A learning curve analysis was conducted on the major balance of system components: the two drives (azimuth and elevation) and the electrical controls (PCU and dish controls, wiring harnesses, and sensors). The results are shown below.

FIGURE 5-9

SES Solar Generator Drives Learning Curve

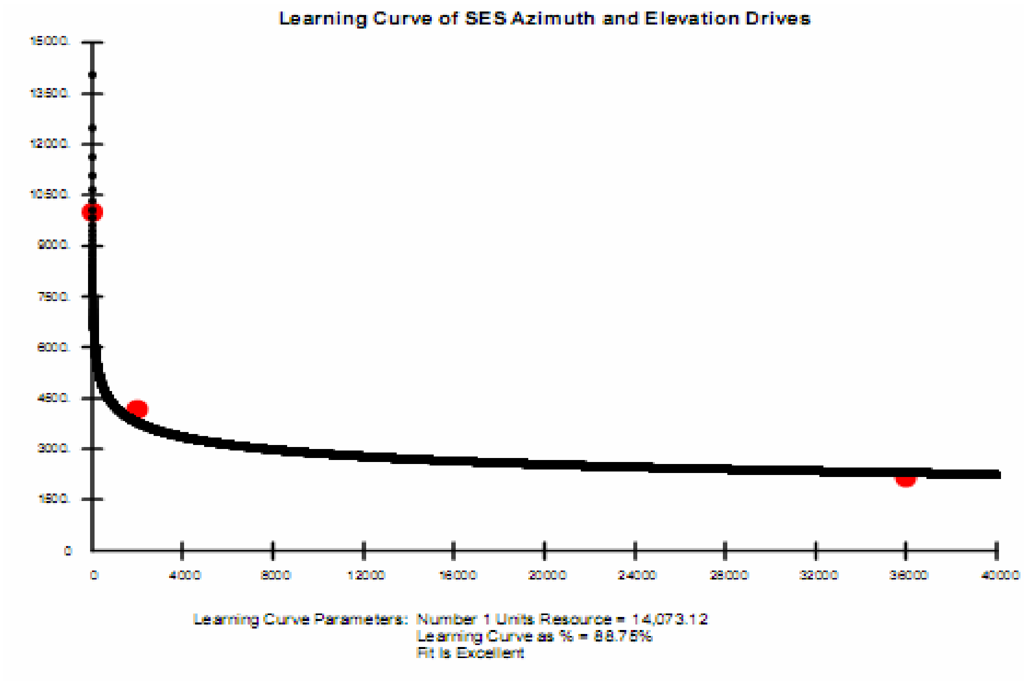
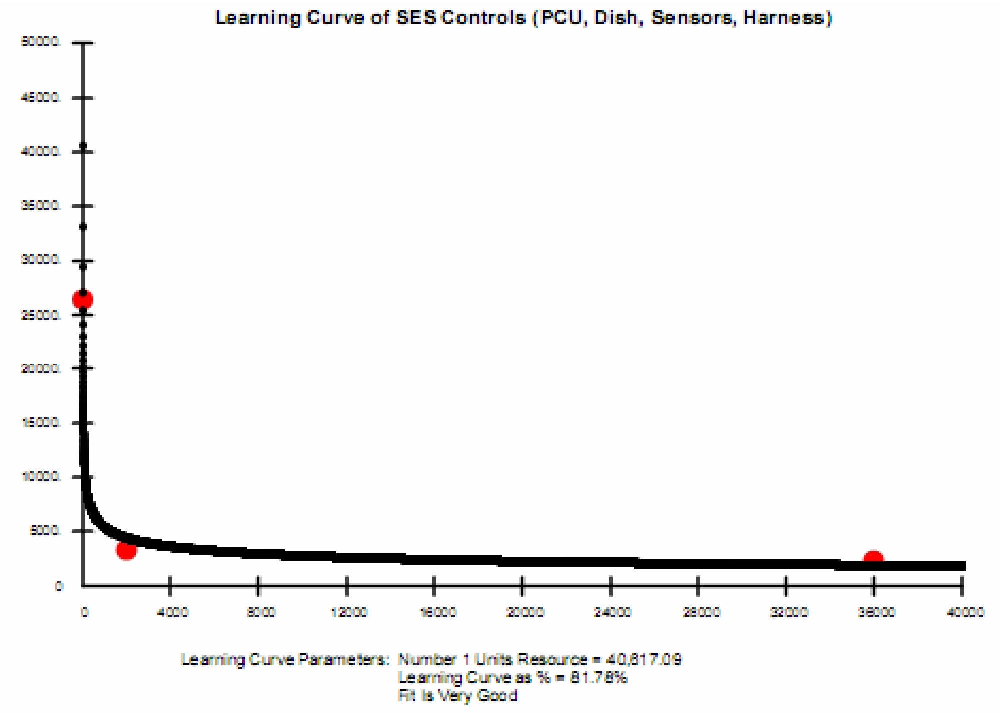


FIGURE 5-10

SES Solar Generator Controls Learning Curve



A comparison of the learning curve values for various components of the SES technology, as well as a Cumulative Average Model of these components is compared with values found in other industries in the Table 3-2 below. Note that the SES values are well within (and are actually more conservative than) the range of learning curve values from other industries. A Cumulative Average learning curve value of 84 percent means SES is projecting that costs will decrease an average of 16 percent for every doubling in output, a conservative estimate compared with experience in other industries.

FIGURE 5-11

Selected SES Solar Generator Components
Cumulative Average Learning Curve

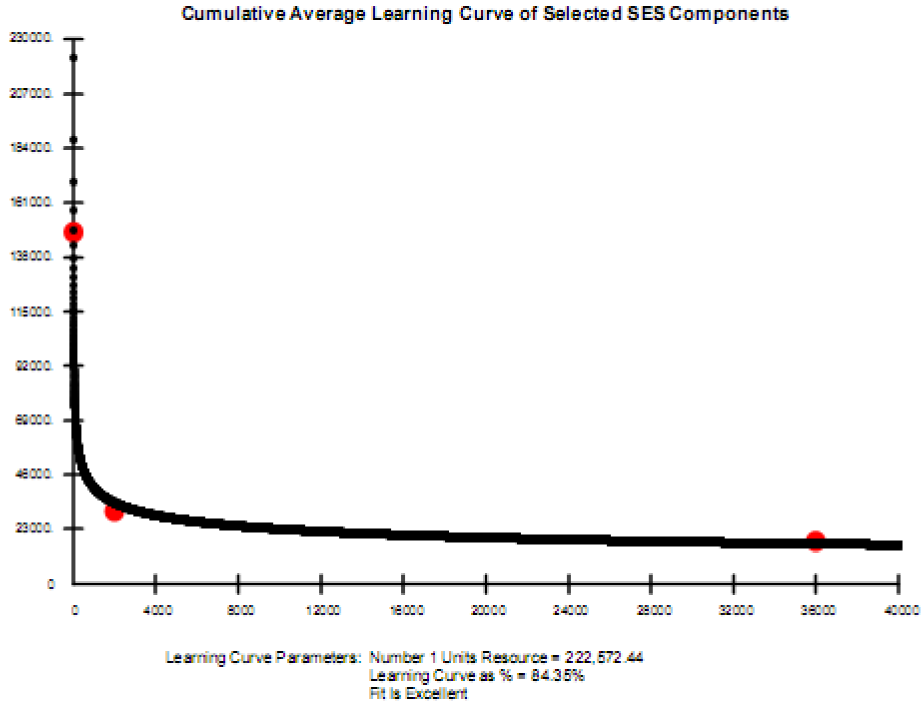


TABLE 5-1

Comparison of SES Learning Curve Values
with Other Industry Values

Table 3. Comparison of SES Learning Curve Values With Other Industry Values

Industry	Learning Curve Value (1)	Industry	Learning Curve Value
Aerospace	85%	Photovoltaics (2)	80%
Ship building	80-85%	Wind generators (2)	80%
Complex Machine	75-85%	Gas turbines (2)	80%
Machining / Punch Press	90-95%	FGD (fluidised gas desulfurisation) (3)	79%
Electrical Operations	75-85%	SCR (selective catalytic reduction) (3)	75%
Welding Operations	90%	Fluorescent lighting (4)	80%
Raw Materials	93-96%		
Purchased parts	85-88%		
Sources:		**SES Assumptions (5)**	
(1) *NASA Cost Estimating Book*, April 2002		Dish Structure (Pedestal, trusses, boom)	84%
		Dish Mirrors (82/generator)	83%
(2) Robert Williams, *Facilitiating Widespread Development of Wind and Photovoltaic Technologies*, Princeton Environmental Institute, February 2002		Drives (Azimuth and elevation)	89%
		Controls (PCU, dish, sensors, harness)	82%
(3) "*Experience curves for power plant emission control technologies*", Int. J. Energy Technology and Policy, Vol. 2, Nos. 1/2, 2004.		Heater head (4 quadrants/engine)	83%
		Regenerator (8 per dish)	86%
(4) Daniel M. Kammen, *Clean Energy & Leadership at the University of California*, Renewable and Appropriate Energy Laboratory (RAEL), 2/24/2003		AC Generator (1/generator)	95%
(5) calculated		Cumulative Average Model	84%

6. SES PROJECT CONCLUSION

The analysis for the Stirling Energy Systems solar project in the Imperial valley shows they are within their milestone/progress schedule, the technology has had significant testing and exposure, they have agreements with the major component suppliers, and their expectations for costs for future components is well within industry standards. There is no reason, at this date, to expect that SES will not be able to obtain necessary permits and land access and supply sufficient quantities of solar generators at expected costs to meet their contract obligations with SDG&E.

APPENDIX A

Qualifications of Lon W. House, Ph. D.

LON W. HOUSE, Ph.D.
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SUMMARY

Dr. House has extensive experience in utility negotiations and planning, energy procurement, resource planning, economic analysis, and with regulatory agencies. He has routinely provided policy directives and expert witness testimony. Dr. House has testified numerous times before the California Public Utilities Commission, California Energy Commission, California State Legislature, State Water Resources Control Board, State Board of Equalization, the California Power Authority, the California Independent System Operator, and the Federal Energy Regulatory Commission, as well as in numerous court cases. He has been the Association of California Water Agencies (ACWA) energy consultant since 1992, representing 500 water agencies which are responsible for over 90 percent of the water delivered in California; the Regional Council of Rural Counties (RCRC) energy advisor, representing 30 rural California counties encompassing over one-half of the land area of California; and has been an energy consultant to the Attorney General of the State of California. Dr. House also works for the California Public Utilities Commission as an expert witness, and for the California Energy Commission as a researcher.

Dr. House has a Bachelors, two Masters, and a Ph.D. in Human Ecology (Engineering and Economics) from U.C.Davis. He also has a CEM (Certified Energy Manager) certification and a Certified Sustainable Development Professional (CSDP) certification with the Association of Energy Engineers.

EDUCATION

Ph.D. Human Ecology/ Engineering & Economics	University of California at Davis, 1982
M.S. Biology/ Environmental Science	Portland State University, 1978
M.A. Education/Science	University of New Mexico, 1976
B.S. Biology/Geography	University of New Mexico, 1974

CERTIFICATION

Certified Energy Manager (CEM)
Certified Sustainable Development Professional (CSDP)

EMPLOYMENT HISTORY

1993 - present	Founder and President Water and Energy Consulting

Dr. House provides expert witness testimony, regulatory representation, economic evaluations, policy directives, and planning functions for selected clients. Dr. House's clients include public agencies, trade organizations, regulatory agencies, and independent power producers. Dr. House is the energy consultant for the Association of California Water Agencies, representing 450 public water agencies and 50 mutual water companies in the areas of legislation, representation before regulatory agencies, and energy and economic analyses; is the energy advisor to the Regional Council of Rural Counties, representing 30 rural counties in California; and has been an energy consultant to the Attorney General of the State of California since 2004 and works for the California Public Utilities Commission as an expert witness, and for the California Energy Commission as a researcher

1990 - 1993	Principal Consultant HES, Inc.

Dr. House was responsible for projects involving utility planning and analysis, energy regulation, economic assessments and modeling, rate design, and regulatory representation. Dr. House was also responsible for energy efficiency compliance analysis and was the lead technical person for Integrated Resource Planning and the evaluation and assessment of DSM (demand side management) in utility resource plans.

1986 - 1990	Utility Resource Planner California Public Utilities Commission

While at the CPUC, Dr. House held the lead technical position for special projects.
He was responsible for developing and coordinating team projects that involved modelers, engineers, economists, attorneys, and rate specialists. This assignment involved recommending policy positions to Commission management, preparing Commission reports, and presenting public testimony.

1983 - 1985 — Adjunct Lecturer - Department of Applied Science
College of Engineering
University of California at Davis

Dr. House taught upper division and graduate level courses in energy planning, energy modeling, energy generation technologies and options, energy policy, energy economics, and energy project financing.

1984-1986 — Public Utility Regulatory Program Specialist I
California Public Utilities Commission

While holding this position at the CPUC, Dr. House was responsible for detailed analysis of California investor-owned utilities' planning and operation. He was an operations and planning witness in general rate cases, energy cost adjustment clauses, certificates for public convenience and necessity, and special projects.

1981-1984 — Electric Generation Systems Specialist
California Energy Commission

While at the CEC, Dr. House performed analysis of utility production cost, system reliability, resource planning and finances. His efforts were concentrated in the areas of assessment of utility resource plans, evaluation of resource alternatives, utility operations, and financial evaluations.

1980-1981 — Energy Analyst
Technology Assessments Office
California Energy Commission

Dr. House analyzed economic, environmental, political and technical aspects of energy generation and conservation options while holding this position. This assignment included developing an analytical methodology for assessing energy conservation options and comparing them with generating resource options.

1979-1980 — Staff Scientist
Lawrence Berkeley Laboratory

Dr. House was responsible for the development of a macro-economic model that assessed the health and financial impacts of investments in utility generation and conservation technologies.

EXPERT TESTIMONY

Federal Energy Regulatory Commission

- "Motion To Intervene And Comments Of Water And Energy Consulting On Behalf Of Black Mesa Trust And To'Nizhoni Ani'" Docket No. ER04-316-000, January 14, 2004.

- "Regional Council of Rural Counties (RCRC) Comments on the FERC Hydroelectric Licensing Notice of Proposed Rulemaking RM02-16-000" Docket No. RM02-16-000, April, 2003.

- "Association of California Water Agencies (ACWA) Comments on the FERC Hydroelectric Licensing Notice of Proposed Rulemaking RM02-16-000" Docket No. RM02-16-000, April, 2003.

- "ACWA Comments on Standard Market Design" Docket Project No. RM01-12-000, November, 2002.

- "Motion to Intervene and Comments of the Regional Council of Rural Counties" Docket Project No. 77 et al., January, 2002.

- "Association of California Water Agencies (ACWA) Comments on Market Order Proposing Remedies for California Wholesale Electric System" Docket No. EL00-95-000, November 21, 2000.

- "Regional Council of Rural Counties (RCRC) Comments on Market Order Proposing Remedies for California Wholesale Electric System" Docket No. EL00-95-000, November 21, 2000.

- "The Association of California Water Agencies (ACWA) Motion to Intervene and Comments", Palm Springs Request for Wheeling, Docket No. TX96-7-000, March 27, 1996.

- "The Association of California Water Agencies (ACWA) Reply to PG&E Supplemental Comments", Stranded Cost NOPR, Docket No. RM94-7-001, February 27, 1996.

- "The Association of California Water Agencies (ACWA) Comments in RM 95-16-000", Hydro Relicensing NOPR, Docket No. RM95-16-000, January 5, 1996.

- "The Association of California Water Agencies (ACWA) Reply Comments in RM 95-8-000", Transmission NOPR, Docket No. RM 95-8-000, October 4, 1995.

- "The Association of California Water Agencies (ACWA) Comments in RM 95-8-000", Transmission NOPR, Docket No. RM 95-8-000, August 7, 1995.

- "Response to Proposed Rulemaking on Charges and Fees for Hydroelectric Projects", Docket No. RM 93-7-000, April 4, 1994.

State Water Resources Control Board

- "Testimony of Dr. Lon W. House"- Reconsideration of D.1644, Yuba River Water Rights Decision, June 5, 2003.

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Northern California Power Agency - Integrated DSM/Supply-side Bid; Evaluation of DSM Programs
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REPRESENTATIVE PRIVATE CLIENTS

Attorney General: State of California – Energy Expert in Antitrust Cases Against Generators
Regional Council of Rural Counties - Energy Advisor, Regulatory Representation
Association of California Water Agencies (ACWA) - Energy Consultant, Regulatory

Representation, Advisor to the ACWA Utility Service Agency
California Public Utilities Commission - Evaluation of Utility Generation Options, expert witness
California Energy Commission - researcher
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