AUGUSTINE BAND OF CAHUILLA INDIANS

Energy Conservation and Alternative Energy Resources Development

October, 2007

AUGUSTINE BAND OF CAHUILLA INDIANS

- Eight-member tribe with flat, developable 540 acre reservation in rapidly urbanizing area. Limited management resources.
- Reservation undeveloped except for small casino and temporary Tribal offices.
- Tribal Chairperson is highly motivated to make the Reservation a model of energy use planning and conservation.
- This effort will be assisted by future independence from external lenders and development partners.

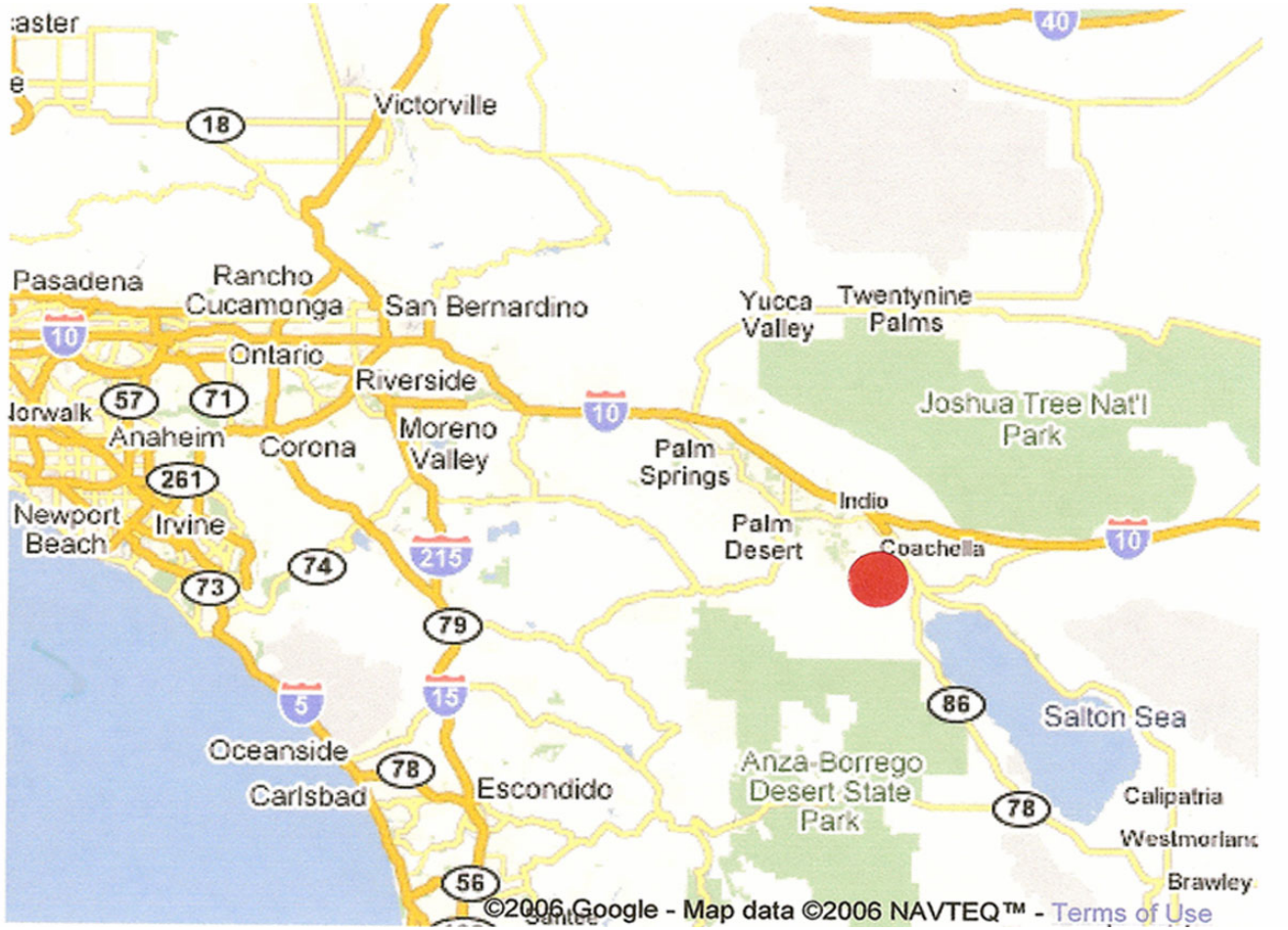
PROJECT OVERVIEW

- Conservation is highest priority
  - Market driven
  - Incentives
  - Regulation
- Alternative Energy Resource Development
  - Photovoltaics
  - Solar thermal applications
  - Wind
  - Other (geo-thermal, biomass, co-generation)

PROJECT LOCATION

- Eastern Coachella Valley, approx. 25 miles east of Palm Springs,CA.

Project Location



PROJECT LOCATION/CONTEXT

- Topography and Other Factors
  - Essentially flat and developable
  - Seismic hazards-highly fractured geology with multi-directional faults.
  - Environmental constraints-blowing sand and dust
- Geography and Weather
  - Temperature extremes (20°F to 120°)
  - Solar exposure
  - Wind velocity and duration
  - Risk of local and global climate change
- Development patterns
  - Proximity to airport
  - Increasing residential development
  - Uncertainties (economic and policy)

PROJECT PARTICIPANTS

- Augustine Band of Cahuilla Indians
  - Mary Ann Martin, Tribal Chairperson
  - Karen Kupcha, Tribal Administrator
- Doug Price, Syska Hennesey Engineering Consultants
- Paul Turner, Economic Development Advisor
- Technical Assistance (Sandia and/or NREL)

Mean monthly temperatures

THERMAL AIRPORT, CALIFORNIA (Source: U.S. Weather Service)
Period of Record : 6/ 1/1950 to 7/31/2003

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temp. (˚F)	70.5	74.8	79.6	86.7	93.9	102.5	106.7	105.4	101.0	91.2	78.8	70.8	88.5
Average Min. Temp. (˚F)	38.6	42.8	48.3	55.0	62.8	69.3	75.8	75.1	68.7	57.2	44.7	37.9	56.4

Temperature/Rainfall data

	Avg. High	Avg. Low	Mean	Avg. Precip	Record High	Record Low
Jan	71°F	39°F	55°F	0.72 in	92°F (1971)	17°F (1972)
Feb	76°F	43°F	60°F	0.63 in	100°F (1986)	20°F (1990)
Mar	81°F	48°F	65°F	0.43 in	102°F (1988)	26°F (1971)
Apr	88°F	55°F	72°F	0.06 in	110°F (1989)	32°F (1999)
May	95°F	62°F	79°F	0.06 in	116°F (1983)	41°F (1951)
Jun	104°F	69°F	87°F	0.02 in	122°F (1990)	53°F (1971)
Jul	108°F	75°F	91°F	0.19 in	126°F (1995)	57°F (1994)
Aug	106°F	75°F	90°F	0.37 in	121°F (1997)	52°F (1993)
Sep	101°F	68°F	85°F	0.41 in	123°F (1950)	48°F (1993)
Oct	90°F	57°F	73°F	0.14 in	114°F (1980)	28°F (1971)
Nov	78°F	44°F	61°F	0.21 in	98°F (1997)	24°F (1994)
Dec	71°F	37°F	54°F	0.29 in	93°F (1958)	14°F (1990)

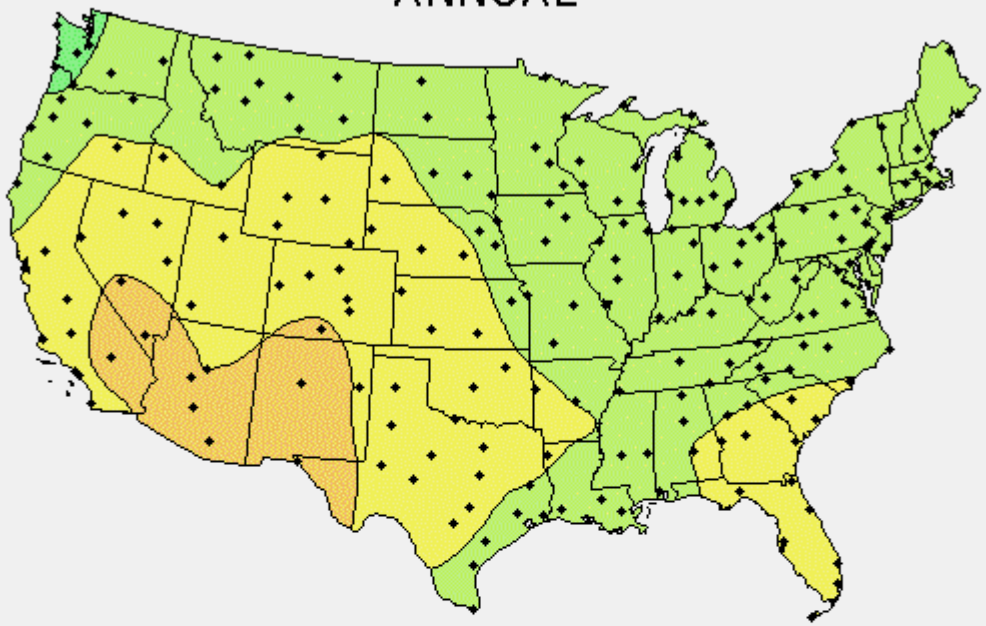
SOLAR DATA

Units: KWh/m²

	City	High	Low	Mean
CA	Riverside	6.35	5.35	5.87
AZ	Phoenix	7.13	5.78	6.58

Average Daily Solar Radiation Per Month

ANNUAL



Flat Plate Tilted South at Latitude

This map shows the general trends in the amount of solar radiation received in the United States and its territories. It is a spatial interpolation of solar radiation values derived from the 1961-1990 National Solar Radiation Data Base (NSRDB). The dots on the map represent the 239 sites of the NSRDB.

Maps of average values are produced by averaging all 30 years of data for each site. Maps of maximum and minimum values are composites of specific months and years for which each site achieved its maximum or minimum amounts of solar radiation.

Though useful for identifying general trends, this map should be used with caution for site-specific resource evaluations because variations in solar radiation not reflected in the maps can exist, introducing uncertainty into resource estimates.

Maps are not drawn to scale.

NREL

National Renewable Energy Laboratory
Resource Assessment Program

kWh/m^2/day

	10 to 14
	8 to 10
	7 to 8
	6 to 7
	5 to 6
	4 to 5
	3 to 4
	2 to 3
	0 to 2
	none

FLATA13-

Wind Data

9 Months, 2003-2004:

Mean wind speed 2.9 meters/sec. at 20 meters above grade.

PROJECT GOALS OF THE AUGUSTINE BAND

- Harmonize economic development and environmental, including energy conservation, objectives of the Augustine Band.
- Place primary reliance on conservation and secondary focus on alternative energy resources development.
- Develop the most complete possible economic characterization of technically feasible conservation and alternative energy production options.

PROJECT OBJECTIVES

- Develop integrated energy, economic development and land use strategy.
- Develop policies to require and encourage conservation.
- Estimate the capital and operating costs and payback periods for selected alternative energy sources.
- Estimate the extent to which future energy demand can be reduced through conservation measures and the cost of such measures.
- Clarify the extent, if any, to which the Tribe is willing to subsidize energy efficiency and environmental responsibility.
- Design and prepare bid packages for alternative energy development project.

INITIAL QUESTIONS AND ISSUES

- What are the detailed energy objectives of the Tribe?
- To what extent, if any, is energy conservation consistent with economic development in general and the economic development objectives of the Tribe in particular?
- To what extent can conservation reduce the future energy consumption of the Tribe compared with prevailing standards for similar land uses?
- How should we forecast and measure the energy and other environmental effects of policies and projects. To what extent are these measures a function of public policy as opposed to market prices?
- To what extent, if any, is the Tribe willing to absorb an increase in delivered energy costs in order to reduce its consumption of grid-provided electricity?

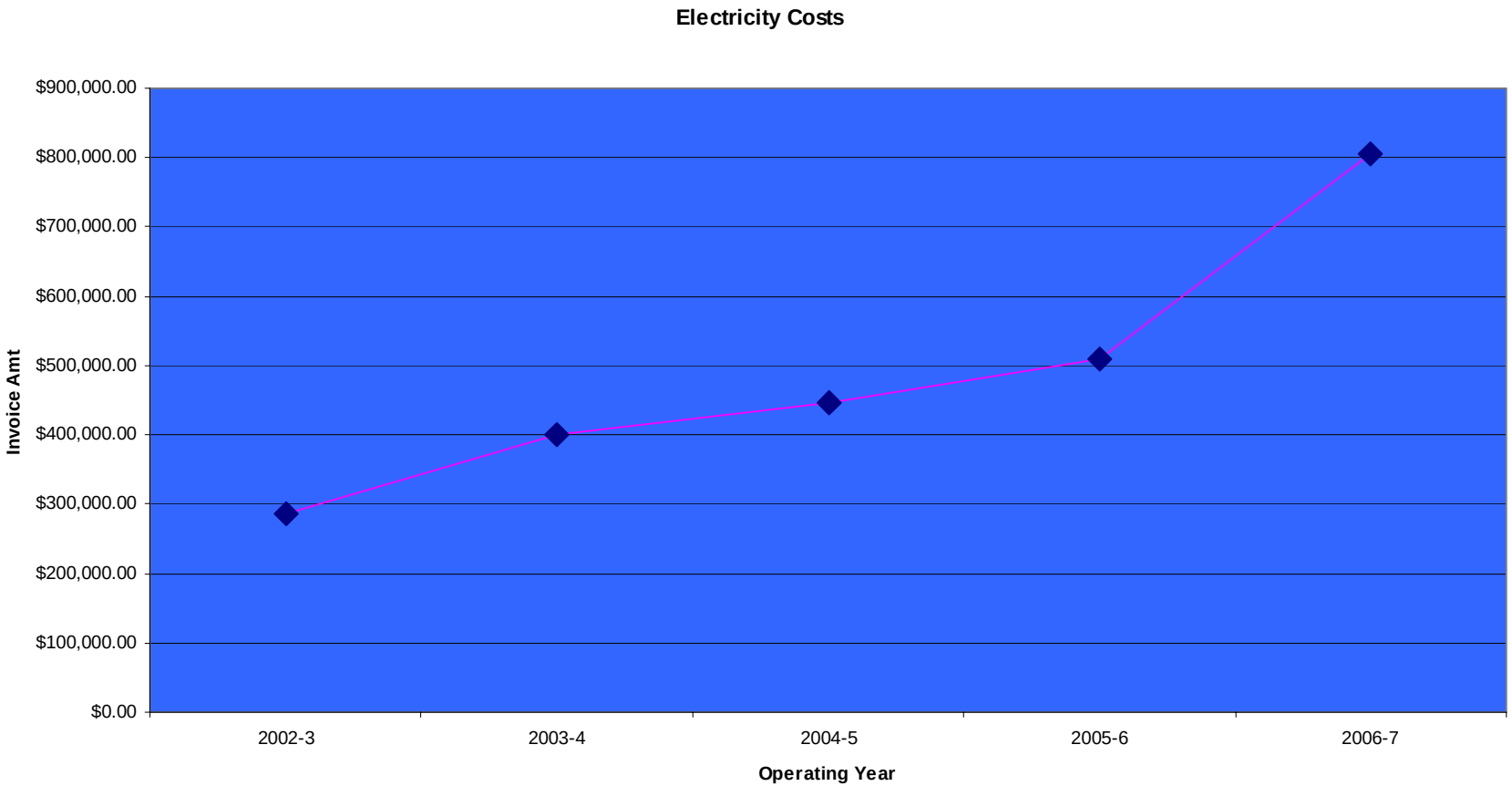
MORE ISSUES AND QUESTIONS

- What forms of alternative energy production make the most economic sense based on current costs of equipment, installation and maintenance? Making various plausible assumptions about future energy cost increases, how will the economic feasibility of such alternatives change over the planning period?
- What would be the estimated capital investment cost of the most feasible conservation and alternative energy production alternatives?
- As among developers, end users and the Tribe, how should the cost of energy conservation and alternative energy production be shared?
- Should conservation measures be based on performance standards or construction prescriptions?

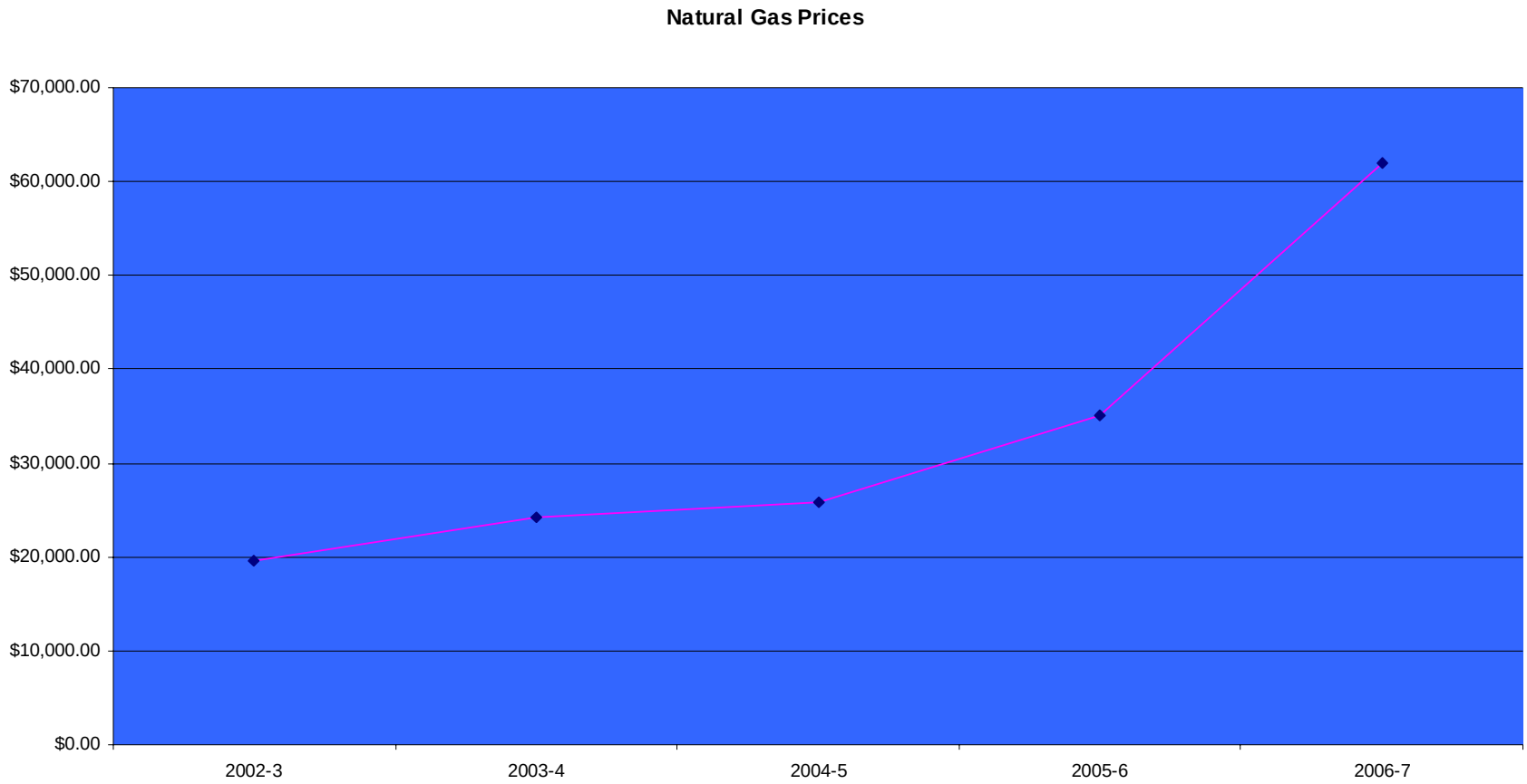
CURRENT ENERGY USAGE

- Casino Electricity consumption
  - Current 571,500 KWh/mo. (8/2006)
  - Projected 4,228,000 KWh/yr (2004) to 7,242,000 KWh/yr (2024)
- Electricity cost-recent trends (next slide)

Augustine Casino Electricity Cost



Augustine Casino Natural Gas Cost



CPI Inflation

Total increase in the consumer price index during this period (8/2002 thru 7/2006) was 12.67%.

Total increase in casino electricity cost during this period was 78.5%.

Of the electricity cost increase, 45 percent was the result of rate increases, nearly 4 times the CPI increase.

The first 2 months of the 2006-7 operating year show a further YTD increase of 59.7%!

FUTURE ENERGY NEEDS

- Street lighting
- Water supply
- Tribal government center
- Community center
- Residences
- Retail development
- Casino
- Surplus capacity

ENERGY COST PROJECTION METHODOLOGY

- Uncertainties
  - Length of utility company fuel purchase contracts
  - Prices of oil and natural gas
  - Public policies
    - Energy cost subsidies
    - Allocation of environmental costs
    - Geo-political effects: terrorism, nationalism
    - Withdrawals and deposits into National Strategic Petroleum Reserve
    - Environmental restrictions on exploitation of U.S. petroleum and Natural gas deposits

ENERGY COST PROJECTIONS (2)

- Effect of conventional energy prices on demand—elasticity
- Elasticity of Supply
  - Political considerations (terrorism, cartelization, etc.)
  - Geological considerations (natural reserves)
  - Technological considerations (extraction innovations, nuclear, etc.)
  - Environmental considerations (will price of environmental damage be added to cost to consumer?)
  - Economic considerations (substitution and conservation effects).

- Syska Hennessy was directed to assume 3% per annum energy cost inflation during the 20-year study period. Most people would probably consider this to be conservative. In any case, it is subject to great uncertainty.

Note:

From January, 1946 through December 2005, the average rate of annual consumer price inflation in the United States was 3.98 percent.

Alternative Energy Feasibility Study

- Objectives
- Scope of study
- Conclusions

Scope of Study

Compare pro forma feasibility of PV, Solar hot water, wind, geothermal, cogeneration and biomass energy sources for future development of Reservation.

Evaluate payback period of most promising alternative technologies.

Study Findings

- Most promising technologies are cogeneration, solar hot water and PV.
- Cogeneration payback: 4.4 years
- Hot water payback: 5.9 years
- PV payback: 16.2 years

ENERGY CONSERVATION

- Codes v. incentives
  - Comparative administrative burden/cost (negative economies of scale with very small organization)
  - Anticipated effectiveness
  - Value of freedom for regulated parties to innovate
  - Hybrid approaches (prescription and performance)
  - Cost and availability of products to meet prescriptive standards and training of labor force in prescribed techniques.
- If Code, which model should we follow?
  - International code
  - California code
  - Others

Regulatory issues

- What do we want to regulate: construction, operation, materials?
- How to keep up with innovation
- Sanctions and enforcement
- Exemptions
  - Pre-existing buildings (casino)?
  - Temporary buildings?
  - Emergencies?

Advantages of International Code

- Consistent with other codes already adopted by Tribe.
- Similar to UBC, therefore familiar to contractors, architects, engineers and labor force.

Disadvantages of International Code

- Not very aggressive in its standards.
- No solar radiation easements.

REQUESTED TECHNICAL SUPPORT

- Review Syska Hennesy preliminary feasibility study, including the economic model derived from it.
- Suggest areas for further study.
- Provide advice on energy conservation measures, including identification of model solutions.
- Review plans and specifications for alternative energy development project.