

## PROJECT SUMMARY

### ALTERNATIVE ENERGY TECHNOLOGY OPPORTUNITY STUDY MULTI-SITE, GEOGRAPHICALLY DISPERSED CLIENT

#### PROJECT SUMMARY

A detailed technology and market opportunity study was performed to assess the viability and suitability of alternative energy technologies for a client with facilities throughout the United States. The purpose of the study was to review each of the selected alternative energy technologies and their applicability to each of the client's facilities, and then develop and identify a target list and ranking of facilities by suitable technology for further development and implementation. The alternative technologies evaluated and included in the study were solar photovoltaic, wind, fuel cells, and geothermal (geothermal electricity generation and geothermal heating/cooling). Client facilities were located throughout the US with a wide range of building sizes, land availability, and surrounding environments.



#### PROJECT STATISTICS

Client:	Confidential
Project Type:	Detailed technology and market assessment
Facility Types:	Commercial and light industrial
Facility Sizes:	Buildings - 2,500 to 1.2 million sq ft; Property – 2,500 to 4.5 million sq ft
Total Facilities:	Buildings – 250+ million sq ft; Property – 1.5+ billion sq ft
Number of Facilities:	10,000+
Facility Locations:	Throughout the United States
Technologies Evaluated:	Solar photovoltaic (solar pv); wind, fuel cells, geothermal electric, and geothermal heating/cooling (ground source heat pumps).



#### PROJECT DESCRIPTION

The study performed included an evaluation of the primary alternative energy technologies that could be applicable to the client's facilities. This evaluation included reviewing technology trends (e.g.

equipment types, equipment efficiencies, etc.), operations and maintenance requirements, equipment warranties, capital and operating costs, and the overall costs of production. The facility-by-facility assessment included an evaluation of the available space (roof space and ground space) at each location; site ownership (whether the property and building were leased or owned); the facility’s location and the wind, solar and geothermal resource potential in that location. Based on the available space (roof and ground), an estimate was developed for the potential maximum capacity of solar and wind generation that could be installed in the space available.

Because all of the proposed technologies were to be used primarily to displace existing energy use (“inside-the-fence” facilities) and not sell externally, the applicable retail electric rates were identified. These costs were used to rank facilities by their electric rate and their cost per square foot. Solar, wind and geothermal potential were identified on a macro level (i.e. using available solar and wind maps rather than micro siting data) and also used to rank facilities. Market factors including the ability to sell Renewable Energy Credits (RECs) and Solar Renewable Energy Credits (SRECs) and their value, the availability of net metering and its applicable maximum capacity, and the availability of local and regional incentives were all evaluated and ranked.



**EXAMPLE - Solar Suitability – Top 20 States by Solar PV Performance and Electricity Prices**

Rank	State	Estimated Solar PV Capacity Factor	Historical Commercial Electricity Prices (Nominal \$/kWh)	Capacity Factor Rank (high rank for high performance)	Energy Price Rank (high rank for high prices)	Capacity Factor Score (1 to 10)	Electricity Price Score (1 to 10)	Weighted Average Score (1 to 10)
1	HI	16%	0.22	13	1	6.6	10.0	8.6
2	CA	17%	0.13	6	9	8.0	4.5	5.9
3	CT	14%	0.17	42	2	4.1	6.7	5.7
4	MA	15%	0.15	36	4	4.8	5.8	5.4
5	NV	18%	0.11	3	16	8.9	2.7	5.2
6	NH	15%	0.15	33	5	4.9	5.2	5.1
7	AZ	19%	0.09	2	24	10.0	1.9	5.1
8	NY	14%	0.16	47	3	3.6	5.9	4.9
9	RI	15%	0.14	30	8	5.0	4.7	4.8
10	NM	19%	0.08	1	29	10.0	1.2	4.7
11	NJ	15%	0.14	39	7	4.6	4.8	4.7
12	DC	15%	0.13	27	10	5.4	4.2	4.7
13	ME	15%	0.13	35	12	4.8	3.9	4.3
14	FL	16%	0.11	16	15	6.2	2.8	4.2
15	CO	18%	0.08	4	32	8.8	1.1	4.2
16	DE	15%	0.12	31	13	5.0	3.6	4.1
17	VT	14%	0.13	44	11	4.0	4.2	4.1
18	MD	15%	0.12	34	14	4.8	3.6	4.1
19	TX	17%	0.10	10	18	7.0	2.1	4.1
20	AL	15%	0.10	24	17	5.5	2.3	3.6



Each of the primary influencing factors was then given a weighting and that weighting then applied to each factor of a site-by-site basis in order to develop and identify a ranking of all facilities for each of the alternative energy technologies. This ranking provided the target list for the client to proceed with further detailed micro siting evaluation and project development.

**EXAMPLE: Rooftop Solar PV Suitability – Top 20 Client Facilities**

Rank	Facility Address		Supportable System Capacity (Rooftop pv)		Capacity Factor	Annual Electricity Price	Weighted Average Solar Suitability
	State	Street and City	kW	Score (1-10)	Score (1-10)	Score (1-10)	Score (1-10)
1	CA	Confidential	1,781	6.3	7.2	6.7	6.8
2	MA	Confidential	2,815	10.0	3.0	8.6	6.6
3	CA	Confidential	1,476	5.2	7.2	6.7	6.6
4	CA	Confidential	1,149	4.0	7.2	6.7	6.4
5	CA	Confidential	853	3.0	7.2	6.7	6.2
6	CA	Confidential	722	2.5	7.2	6.7	6.1
7	AZ	Confidential	1,264	4.5	10.0	2.8	6.0
8	CA	Confidential	509	1.8	7.2	6.7	5.9
9	CA	Confidential	370	1.3	7.2	6.7	5.8
10	CA	Confidential	58	0.1	7.2	6.7	5.6
11	CT	Confidential	1,072	3.8	2.0	10.0	5.6
12	MA	Confidential	750	2.6	3.0	8.6	5.1
13	NV	Confidential	59	0.2	8.5	4.0	5.0
14	MA	Confidential	565	2.0	3.0	8.6	5.0
15	MA	Confidential	557	1.9	3.0	8.6	5.0
16	MA	Confidential	544	1.9	3.0	8.6	5.0
17	NY	Confidential	1,300	4.6	1.3	8.7	4.9
18	NH	Confidential	739	2.6	3.2	7.8	4.9
19	CT	Confidential	72	0.2	2.0	10.0	4.9
20	CT	Confidential	56	0.1	2.0	10.0	4.8