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Viability Study of Photo-Voltaic Systems Added to Terrestrial Electric Vehicles

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SECTION 1

PURPOSE OF STUDY

The purpose of the following computer study is to determine the set of necessary conditions under which the addition of photo-voltaic (PV) cells to electric vehicles provides a net utility or economic benefit. Economic benefits are given the primary focus and are evaluated in terms of a payback period.

SECTION 2

BACKGROUND

The potential benefits of adding PV cells to an electric vehicle (EV) include increased range, reduced recharge frequency, the possibility of independence from recharge power in some cases and reduced operating expense. The range benefit is generally questionable in that it applies only to daytime driving and varies with location, weather, season and use patterns. Specifically, under worst-case conditions (e.g., night driving) the addition of PV will produce a slight range reduction due to added weight (and possibly increased air drag and parasitic power loss). If range is to be estimated under conservative conditions, then the range component of benefit will be negative. Section 6.3 provides a quantitative discussion of nighttime range reduction due to array weight.

While solar insolation is unpredictable at a given moment, over a long period, such as a year, the energy produced is moderately well defined. Accordingly, the long-term economic benefits of PV may be studied with some degree of certainty. The two main components of operating expense impacted by PV are electrical energy and battery replacement costs. As will be shown, reduced battery costs, due to increased life which results from reduced depth-of-discharge is often the major benefit of adding PV.

The economic benefit of adding PV is measured in terms of a payback period -- the time required for battery and energy cost savings to equal the cost of the array and associated hardware. It should be noted that this approach neglects the following considerations:

1. The cost of money (prevailing and future interest rates).
2. Long term trends in energy and battery replacement costs.
3. Long term trends in battery characteristics.
4. Maintenance costs of PV and associated hardware.
5. Indirect vehicle costs due to added weight of PV and associated hardware.

In the study, it is assumed that all utility type battery charging is done after sunset. It should be noted that daytime charging can be viewed as an alternative to PV for depth-of-discharge (DOD) reduction. Thus, in those cases, where on-vehicle PV produces substantial battery life improvements, similar improvements could be achieved through daytime charging. This, however, would require the availability of utility power and power metering while presenting the inconvenience of plugging and unplugging the vehicle.

SECTION 3

METHODOLOGY

One way to evaluate the economic effectiveness of PV would be a single point evaluation dealing with an "average" EV operating under "average" weather and driving conditions using "average" PV hardware. This approach, however, is deficient in several ways:

1. In many cases, we do not know what "average" is.
2. It does not show which combination of circumstances are favorable and which are not.
3. It requires that all parameters and factors be identified at the outset.

A second approach (the one used in this study) is to let all parameters vary over a significant range. For each combination of parameters, the payback period is calculated and tabulated. With this approach, a detailed, functional view can be gained of where PV makes economic sense and where it does not. The user (not the author) selects the actual combination of array, battery, vehicle, vehicle use and vehicle location. To this end, six mathematical models are established and then linked together in a computer program. The individual models are:

1. Solar Insolation Model

This model provides a measure of solar radiation (W/m^2) through a horizontal surface as a function of location, season and time of day. Models for eight locations and four seasons are included. See Section 5 for details.

2. Array Model

Array efficiency and array cost are modelled for three different array types. Weight modelling is not included. See Section 6 for details.

3. Power Converter Model

The switch-mode converter which interfaces between the array and the battery bus is modelled with respect to efficiency and cost. Only one converter is modelled. See Section 7 for details.

4. Vehicle Energy Use Model

This model provides energy use (kWh/km) as a function of characteristic vehicle speed. Three different vehicle types are simulated. See Section 8 for details.

5. Vehicle Use Pattern Model

This model defines vehicle speed versus time of day using simple step functions. Five use patterns are used in the simulation. See Section 9 for details.

6. Battery Model

This model defines battery degradation as a function of battery parameters and DOD. Three battery types are handled in the simulation. See Section 10 for details.

In Section 4, the computer program which links the models is discussed; the computer print-out is included in Appendix A and the program is listed in Appendix B.

Section 11 is dedicated to the use of the Appendix A results. Finally, Section 12 carries out observations and conclusions, while Section 13 identifies areas for future work.

SECTION 4

COMPUTER PROGRAM

Figure 4-1 is a simplified flow diagram of the program. The purpose of this program is to determine payback periods for all combinations of the following:

Locations (8)
Array Type (3)
Vehicle Type (3)
Battery Type (3)
Vehicle Use Pattern (5)
Electricity Rate (3)

A total of $8 \times 3 \times 3 \times 3 \times 5 \times 3 = 3240$ cases are computed and tabulated. In addition, for each case, the following are also computed and tabulated:

1. Up-Front Costs

(This is the sum of the array and converter plus installation costs.)

2. Percent Energy Reduction

(This is the fractional decrease in recharge energy due to the addition of PV.)

3. Maximum Winter Depth of Discharge

(This is the maximum depth of discharge where zero PV energy is assumed.)

4. Percent DOD Reduction

(This is the yearly average reduction of DOD due to the inclusion of PV.)

5. Percent Battery Life Increase

(This is the fraction by which battery life is increased due to the inclusion of PV.)

Referring to the flow diagram of Figure 4-1, blocks 1 through 6 provide an output of power into the battery bus versus time of day and season for each of the eight selected locations. If the battery is fully charged, none of this power is applied to the battery.

Figure 4-1. Data Processing Flow Chart

Blocks 3, 7, 8, 10 and 11 provide an output of power from the battery versus time of day, vehicle type and vehicle use pattern. Block 12 integrates the difference of recharge and discharge power to determine charge state. At the start of each day, full charge (0% DOD) is assumed. During the day, the point of maximum discharge is selected and used for calculation of battery depreciation.

Blocks 13, 14, 16 and 17 provide computation of yearly recharge energy. This calculation is performed twice -- once without PV and once with the PV output of block 6.

Using daily maximum DOD (from block 12), blocks 15, 18 and 19 compute battery depreciation rate and life for both the cases without and with PV. Blocks 22 and 25 serve to compute the up-front costs associated with the PV addition.

Blocks 23 and 24 serve to compute yearly electricity cost and battery depreciation for the cases without and with PV. Finally, block 26 uses the outputs of blocks 23 and 25 to compute the payback period. (Note that no account is given for the cost of money; i.e., a zero interest rate is assumed.)

SECTION 5

SOLAR INSOLATION MODEL

As discussed in Section 4, the purpose of this model is to provide estimates of solar insolation, $S(t)$ (W/m^2 on a horizontal surface) as a function of location, season and time of day. Data are obtained from Ref. 1 which provide total solar energy per horizontal square meter per day as a function of season and location for a so-called "Typical Meteorological Year" (TMY). Using this data and trigonometric considerations, $S(t)$ was obtained for eight US locations for each of the four seasons.

If S_0 is the solar flux through a surface which is normal to the sun's direction, then, by noting the dot product of the sun vector and a vector normal to the Earth's surface, the insolation through a horizontal surface is found for the summer and winter solstices as:

$$S(t) = S_0(\cos \alpha \cos \theta \cos \omega t + \sin \alpha \sin \theta), \quad (5-1)$$

where α is the Earth's inclination relative to the ecliptic plane ($\alpha = 0.4084$ radians for summer solstice; $\alpha = -0.4084$ radians for winter solstice), θ is the latitude of the location in question, ω is the Earth's rotation rate (0.2618 radian/hour) and t is the elapsed time in hours after high noon.

At sunset, $S(t) = 0$. Accordingly, Equation (5-1) gives solstice sunset times as

$$T_s = \frac{1}{\omega} \cos^{-1} [-\tan \alpha \tan \theta] \quad (5-2)$$

The average spring and summer sunset times (T) are taken as a weighted average of the equinox and solstice sunset times:

$$T = \frac{1}{3} T_E + \frac{2}{3} T_s \quad (5-3)$$

As $T_E = 6.00$ hours,

$$T = 2.000 + 2.546 \cos^{-1}(\mp 0.4328 \tan \theta) \quad (5-4)$$

(The minus sign applies for spring and summer and the plus sign applies for fall and winter.)

Equation (5-1) may be written in the form:

$$S_{ij}(t) = A_{ij} \cos \omega t + B_{ij}, \quad (5-5)$$

where i refers to location and j refers to season. Integrating (5-5) over t from sunrise to sunset gives the total energy per day, E_{ij} . In turn, solving for A_{ij} and B_{ij} gives:

$$A_{ij} = \frac{1}{2} E_{ij} / \left(\frac{1}{\omega} \sin \omega T_{ij} - T_{ij} \cos \omega T_{ij} \right) \quad (5-6a)$$

$$B_{ij} = -A_{ij} \cos \omega T_{ij} \quad (5-6b)$$

Values of E_{ij} , θ_i , T_{ij} , A_{ij} and B_{ij} are listed in Table 5-1 for each of eight US locations. E_{ij} and θ_i data are obtained from Ref. 1. Actual locations chosen are such that consecutive E_i increments are approximately equal. Plots of Eqn. (5-5) for each of the eight locations are shown in Figures 5-1 through 5-8. Eqn. (5-5) and computer generated values of A_{ij} and B_{ij} are inputs to the simulation program.

Table 5-1. Insolation Constants

LOCATION	LATITUDE (DEGREES NORTH)	SPRING					SUMMER					FALL					WINTER				
		AV. TEMP.	E	T	A	B	AV. TEMP.	E	T	A	B	AV. TEMP.	E	T	A	B	AV. TEMP.	E	T	A	B
¹ LAS VEGAS	36.1	18.4	7.4	6.81	0.88	0.22	31.0	8.1	6.81	0.96	0.24	19.7	4.9	5.18	0.87	-0.16	7.8	3.4	5.18	0.60	-0.11
² BRYCE CANYON	37.7	3.0	6.7	6.87	0.61	0.16	15.3	7.6	6.87	0.69	0.18	4.9	4.7	5.13	0.85	-0.17	-5.7	3.1	5.13	0.56	-0.11
³ SACRAMENTO	38.5	14.1	6.2	6.89	0.56	0.15	22.1	8.1	6.89	0.73	0.20	16.8	4.3	5.10	0.79	-0.16	8.2	2.2	5.10	0.40	-0.08
⁴ DALLAS-FT. WORTH	32.8	17.1	5.2	6.71	0.50	0.11	28.6	6.8	6.71	0.65	0.14	19.0	4.1	5.28	0.69	-0.11	8.2	2.7	5.28	0.45	-0.07
⁵ ATLANTA	33.7	16.1	5.3	6.74	0.50	0.12	24.3	5.8	6.74	0.55	0.13	16.5	3.7	5.25	0.63	-0.10	5.8	2.4	5.25	0.41	-0.06
⁶ DETROIT	42.4	9.4	4.3	7.03	0.37	0.11	22.2	5.6	7.03	0.48	0.14	12.9	2.8	4.96	0.55	-0.13	-2.2	1.5	4.96	0.43	-0.07
⁷ SEATTLE	47.5	8.7	4.1	7.5	0.33	0.12	16.5	5.7	7.25	0.46	0.17	11.1	2.2	4.75	0.49	-0.14	4.7	1.0	4.75	0.22	-0.06
⁸ FAIRBANKS	64.8	-1.6	3.8	8.97	0.21	0.16	15.2	4.6	8.97	0.25	0.19	-4.5	1.1	3.03	0.80	-0.55	23.5	0.3	3.03	0.22	-0.15

AV. TEMP. = AVERAGE DAILY TEMPERATURE (°C) FOR A GIVEN LOCATION AND SEASON
 E = AVERAGE DAILY kWh/m^2 FOR A GIVEN LOCATION AND SEASON
 T = AVERAGE SUNSET TIME (HOURS AFTER HIGH NOON) FOR A GIVEN LOCATION AND SEASON
 A, B = CONSTANTS PER EQN (5-5) FOR A GIVEN LOCATION AND SEASON (UNITS OF kWh/m^2)

Figure 5-1. Plot of Solar Insolation for Las Vegas. Averages for Summer (A), Fall (B), Winter (C) and Spring (D)

Figure 5-2. Plot of Solar Insolation for Bryce Canyon. Averages for Summer (A), Fall (B), Winter (C), and Spring (D)

Figure 5-3. Plot of Solar Insolation for Sacramento. Averages for Summer (A), Fall (B), Winter (C) and Spring (D)

Figure 5-4. Plot of Solar Insolation for Dallas-Fort Worth. Averages for Summer (A), Fall (B), Winter (C) and Spring (D)

Figure 5-5. Plot of Solar Insolation for Atlanta. Averages for Summer (A), Fall (B), Winter (C) and Spring (D)

Figure 5-6. Plot of Solar Insolation for Detroit. Averages for Summer (A), Fall (B), Winter (C) and Spring (D)

Figure 5-7. Plot of Solar Insolation for Seattle. Averages for Summer (A), Fall (B), Winter (C) and Spring (D)

Figure 5-8. Plot of Solar Insolation for Fairbanks. Averages for Summer (A), Fall (B), Winter (C) and Spring (D)

SECTION 6

ARRAY MODEL

The purpose of the array model is to provide estimates of array efficiency, cost, weight and aerodynamic degradation for candidate array types. Several issues are recognized, but not given account in the simulation due to lack of available data. These include:

1. Efficiency degradation due to aging.
2. Efficiency degradation due to build up of foreign matter.
3. Efficiency degradation due to temperature rise above ambient (which in turn is a function of vehicle speed-time profile and array construction).
4. Efficiency degradation due to shadowing effects -- both while driving and while parked.

Because of the above effects which diminish efficiency and the difficulty in properly quantifying these effects, it was decided that array efficiency be defined on an in situ basis. As such, the above issues must be given account by the user in determining a derated nominal efficiency. This derated efficiency can then be used in the simulation program. Where Appendix A tabulated data is used, data blocks should be selected having array parameters which best approximate the array in question.

6.1 ARRAY TYPES SELECTED FOR TABULATED RESULTS

Three type of arrays were selected for the simulation. For each array type, two cost components are considered -- a fixed cost (C1) associated with installation and a proportional cost (C2) which is proportional to the array area (A). Array efficiency (N1) is in situ. Accordingly, corresponding stand-alone efficiencies must be appropriately higher. Cost and efficiency parameters are listed in Table 6-1 for the three array types. (In all cases, the array area is 2m².)

Table 6-1. Array Parameters

	Type 1	Type 2	Type 3
In situ Efficiency (N1)	0.08	0.25	0.10
Installation Cost* (C1)	\$150	\$250	\$250
Array Cost/m ² * (C2)	\$150	\$500	\$1000
Array Area Assumed (A)	2m ²	2m ²	2m ²

* Cost at retail level, 1990 dollars

Array type 1 represents present single junction silicon technology which is in production. Assuming a nominal stand-alone efficiency of 10% and a peak insolation of 1000 W/m², cost per peak dc watt is \$1.50, excluding installation costs.

Array type 2 represents a future possibility of very high efficiency made possible by multi-junction techniques; the corresponding stand-alone efficiency would be on the order of 30% to 35%. The cost of \$500/m² which again corresponds to about \$1.50 per peak watt is optimistic in that high efficiency technology is expected to have considerably higher cost per watt cost when compared with "conventional efficiency" technology. Note that assumed installation cost for type 2 is higher than for type 1; this is based on the assumption that type 2 technology will be produced in lower volume and may be more sensitive to mechanical stress.

Array type 3 represents conventional single junction silicon technology selected for high efficiency. Like type 1, type 3 technology is presently in production. The high cost of \$8.00 per watt is consistent with limited volume and relatively high efficiency (12% to 15% stand alone).

6.2 TEMPERATURE CORRECTION OF EFFICIENCY

For a given array installation, array temperature will tend to track with ambient temperature. Accordingly, efficiency may be corrected in accordance with the average daily temperature for a given location and season. From Ref. 4, the temperature corrected efficiency, $E(T)$ is given as

$$E(T) = E_0 (1.121 - 0.00433T), \quad (6-1)$$

where E_0 is the nominal efficiency at 28 degrees C and T is the array temperature (degrees C). In the simulation program, Eqn. (6-1) was applied to each of the three array types for each location and for each season, using average daily temperature for the value of T . While this approach suffers from several errors, it is expected to give approximately correct relative results between the different locations.

6.3 ARRAY WEIGHT

The addition of the array adds weight which is proportionate to array area. The added weight is due mainly to support structure and protective covering. Based on experience with experimental vehicles, the added weight factor appears to be in the range of 5 to 10 kg/m² with present technology. In that electric vehicles typically have an energy versus weight sensitivity of about 0.5, depending on the type of driving, it follows that a 1000 kg vehicle will require 0.25% to 0.50% more energy per square meter of array. Accordingly, the nighttime range will be reduced by a similar percentage. In that typical array outputs are on the order of 100 W/m² for peak sunlight, while typical vehicle propulsion power levels are on the order of 10 kW, it follows that the net range increase during daytime will be on the order of one percent per square meter of array. Assuming 30% array efficiencies are possible in the future and assuming that very high-efficiency

vehicle designs are also used (60 W-hr/km), the range benefit could reach 5% per square meter for highway driving and 10% or more per square meter for city driving -- under ideal sun conditions.

On the other hand, it should also be noted that either the vehicle payload must be reduced to accommodate the added weight of the array or vehicle structure must be added. Finally, if acceleration and range are to be preserved when PV is added, then added propulsion and corresponding structure mass are required -- which, in turn, add cost and increase the energy use. From previous experiences with electric vehicles, the above weight and cost multipliers are on the order of 1.4 kg/kg and \$7.00/kg. Thus, with present technology, adding one square meter of array means that the net vehicle mass will increase from 7 kg to 14 kg while the vehicle cost (excluding the array) will increase from \$50 to \$100.

In the simulation, no account was given for array weight, due both to the lack of solid data and the belief that very light weight structures (less than 1 kg/m²) may be realistic in the near future. In any case, the simulation is "optimistic" with respect to the issue of array weight.

6.4 ARRAY AERODYNAMIC DEGRADATION

If the array is carefully integrated with the vehicle body, the increase in aerodynamic drag (C_{DA}) may be negligible. On the other hand, if the array is not integrated with body, as in the case where a flat, non-curved array is used, a significant aerodynamic penalty will occur.

For the simulation, it was assumed that the array would be fully integrated with the vehicle body and that no increase in C_{DA} would result. Accordingly, the simulation may be optimistic in this respect.

SECTION 7

POWER CONVERTER MODEL

The Power Converter (PC) provides an interface between the solar array and the vehicle battery bus. The role of the PC is to present a load line to the solar array such that maximum array power is extracted and applied to the battery bus -- except in cases where battery charge acceptance is limited due to either a high charge state or due to the pressure of recharge power provided by regenerative braking.

Hardware consists of two main circuit blocks -- a power section and a control section. The power section performs the role of a variable ratio dc transformer while the control section provides a control signal to the power section in response to sensed inputs such as array voltage and current and battery voltage. Typically, the power section is a switch-mode buck regulator; this configuration requires that the array voltage be greater than the battery voltage. Alternatively, a boost regulator may be used; this requires that the array voltage be less than the battery voltage. The boost scheme is favored in the case of high voltage battery systems in that lower (and safer) array voltage is utilized. Both the buck and boost schemes have negative grounds which are common to input and output.

The control section is essentially a function generator -- which may be implemented by either analog or digital means. Various algorithms and circuit techniques have been devised which provide the desired control results.

7.1 PARAMETERS

Parameters relevant to the simulation include efficiency, weight and cost. In turn, efficiency is modelled in terms of a "fixed" or "tare" loss (PO) combined with an incremental efficiency (N2).

Control circuit power, magnetic core losses and semiconductor capacitance are physically responsible for the tare loss component while switching and resistive losses are physically responsible for the incremental term. Based on experience with state-of-the-art hardware, the tare loss is estimated at 1.6 W and the incremental efficiency is estimated at 98%. No losses are assumed due to imperfections in the control circuit (i.e., a 100% tracking efficiency is assumed).

Based on demonstrated hardware, power to weight ratios of better than 1 kW/kg are now available. Accordingly, for a high efficiency (25%) array, converter mass will not exceed 250 g per square meter of array. Because of the small mass impact, no account was given in the simulation.

Cost may be resolved into two components -- one fixed (C3) and one which is proportionate to the converter power rating (C4 is proportionality constant). The fixed cost term relates mainly to the controls -- which are not impacted by power level. Conversely, the proportional term relates to the

power section where cost and mass are nearly proportionate to power level. A fixed cost of \$25.00 was assumed based on experience with state-of-the-art hardware. Likewise, a cost of \$300/kW was assumed for the power section. (Note that the converter input power is equal to $N_1 A$, where N_1 is the array efficiency and A is the array area.) Constants for the converter are summarized in Table 7-1.

In the simulation, P_0 is subtracted from the available array power, and N_2 times the remaining power is applied to the battery bus unless the battery is fully charged -- in which case, the converter output power is assumed zero.

Table 7-1. Power Converter Constants

Tare Loss (P_0)	1.6 W
Incr. Eff. (N_2)	98%
Cost Intercept* (C_3)	\$25
Cost Coefficient* (C_4)	\$300/kW

*Cost at retail level, 1990 dollars

SECTION 8

VEHICLE ENERGY USE MODEL

The purpose of this model is to provide measures of energy use (measured at the battery bus) for candidate vehicles as a function of speed. In order to simplify both the vehicle energy use and vehicle use pattern models, it is assumed that the number of starts and stops per km varies inversely with the characteristic driving speed; one start/stop per km is assumed at 40 km/hr. With the assumption, energy use per km may be expressed as

$$E_B = E_o + Av + Bu^2, \quad (8-1)$$

where E_B is the energy in W-h removed from the battery bus per km of driving, v is the steady-state speed and E_o , A and B are constants which characterize the energy use per km for a given vehicle. It should be noted that E_B represents the sum of all losses associated with tires, aerodynamics and the drive system (excluding the battery and battery charger; these losses are separately handled).

In the simulation, three vehicle types were considered. The first is a small four-seat passenger vehicle designed specifically for high efficiency and low weight. Vehicle curb weight is 1200 kg and energy use, E_B , at 97 km/hr (60 mph) is 8900 W. The second vehicle type represents a typical four-seat conversion -- characterized by 1400 kg and an energy use of 18 kW at 97 km/hr. The third vehicle type represents a van conversion having a curb weight of 2300 kg and an energy use of 30 kW at 97 km/hr.

Constants for the three vehicle types are summarized in Table 8-1.

Table 8-1. Vehicle Constants

	Type 1	Type 2	Type 3
Vehicle Curb Weight (kg)	1200	1400	2300
Wh/km @ 97 km/hr.	92	182	310
E_o (Wh/km)	30	55	100
A (Wh ² /km ²)	0.21	0.45	0.71
B (Wh ³ /km ³)	0.0045	0.0090	0.0150

SECTION 9

VEHICLE USE PATTERN

A vehicle use pattern is defined by a speed-time function. "Real-world" use patterns are complex in that the use pattern is a function of the individual driver, his specific needs, the vehicle type, the vehicle age, the time of year, etc. Accordingly, idealized and simplified driving cycles or use patterns are sought -- which capture the important parameters such as total mileage per year and speed versus time of day. Using data from Ref. 2, a total of five use patterns were defined. Each use pattern is characterized by a simple step function which repeats for each day of the year. Each of the five use patterns is defined in Table 9-1 and is shown graphically in the plots of Figures 9-1 through 9-5.

Use patterns one, two and three are associated with commuter driving to and from a place of work. Time of arrival at the work place is 8 a.m. and time of departure is 5 p.m. Each day, at noon, a short trip is made.

With pattern one, the one-way commute distance is 10 km (6 mi) at an average speed of 40 km/hr (24 mph). During lunch, a short drive of 5 km (3 mi) at 30 km/hr (18 mph) is taken. Use patterns two and three are similar to pattern one except that commute speeds and durations are increased.

Use patterns four and five are associated with random daily commuter driving. These use patterns characterize use by such as unemployed parents or delivery services; use is evenly distributed through the day. With pattern four, use is light and total yearly driving is 9125 km (5700 mi) and with pattern five, use is heavy; yearly use is 27,375 km (17,100 mi).

It should be noted that above use patterns are "simplistic" in that the following items are missing:

1. Night driving.
2. Variations with seasons.
3. Variations with weather.
4. "High Frequency" details of speed versus time.

Despite these limitations, it is believed that the five patterns are useful and give meaningful "first-order" results.

Table 9-1. Vehicle Use Patterns

START TIME(S) (hr)	AVERAGE SPEED (km/hr)	FINISH TIME(S) (hr)	START TIME(S) (hr)	AVERAGE SPEED (km/hr)	FINISH TIME(S) (hr)	START TIME(S) (hr)	AVERAGE SPEED (km/hr)	FINISH TIME(S) (hr)
USE PATTERN NO. 1 LOW USE DAILY COMMUTE (25 km/day, 9125 km/yr)								
-4.25	40	-4.00	0.00	30	0.17	5.00	40	5.25
USE PATTERN NO. 2 MODERATE USE DAILY COMMUTE (50 km/day, 18,250 km/yr)								
-4.33	60	-4.00	0.00	30	0.33	5.00	60	5.33
USE PATTERN NO. 3 HIGH USE DAILY COMMUTE (75 km/day 27,375 km/yr)								
-4.38	80	-4.00	0.00	30	0.50	5.00	80	5.50
USE PATTERN NO. 4 LOW USE RANDOM COMMUTE (25 km/day, 9125 km/yr)								
-5.00	40	-4.90	-3.00	40	-2.90	-1.00	40	-0.90
1.00	40	1.10	3.00	40	3.10	5.00	40	5.10
7.00	40	7.03						
USE PATTERN NO. 5 HIGH USE RANDOM COMMUTE (75 km/day, 27,375 km/yr)								
-5.00	60	-4.80	-3.00	60	-2.80	-1.00	60	-0.80
1.00	60	1.20	3.00	60	3.20	5.00	60	5.20
7.00	60	7.05

Figure 9-1. Plot of Vehicle Use Pattern No. 1 (Time of Day Starts at Midnight)

Figure 9-2. Plot of Vehicle Use Pattern No. 2 (Time of Day Starts at Midnight)

Figure 9-3. Plot of Vehicle Use Pattern No. 3 (Time of Day Starts at Midnight)

Figure 9-4. Plot of Vehicle Use Pattern No. 4 (Time of Day Starts at Midnight)

Figure 9-5. Plot of Vehicle Use Pattern
No. 5 (Time of Day Starts at Midnight)

SECTION 10

BATTERY MODEL

The purpose of the battery model is to provide estimates for life and energy efficiency for different types of batteries likely to be used in electric and solar electric vehicles. The life modeling in turn enables estimation of economic depreciation. Three battery types were used in the simulation corresponding to:

1. High Performance Sealed Lead Acid.
2. Low Performance Industrial Type Lead Acid.
3. Traction Type Sodium Sulphur.

10.1 LIFE MODELING

The existence of a "wearout" function, F , is postulated. For a new (healthy) battery, $F = 0$, and at end of life, $F = 1$. It is assumed that three mechanisms contribute to the wearout function, namely:

1. Calendar Effects

(These are effects such as grid corrosion and active material morphology change which are assumed proportionate to the passage of time.)

2. End of Charge Effects

(These are effects such as plate shedding, water loss and grid corrosion which are proportionate to the number of recharges; most of the "damage" takes place during the final portion of recharge when gas evolution takes place.)

3. Cycle Depth Effects

(These are effects such as plate shedding, fatigue corrosion, morphology change and grid-to-active material interface degradation. Damage per cycle is a nonlinear function of cycle depth.)

In that each of the three mechanisms just mentioned tends to weaken common elements, such as grid integrity or the grid to active material interface, it may be assumed that the total damage during a given time interval is proportionate to the sum of the component damages. Thus, on a per day basis,

$$\Delta F = \Delta F_{\text{cal}} + \Delta F_{\text{charge}} + \Delta F_{\text{cycle}}, \quad (10-1)$$

where ΔF_{cal} is the fractional damage due to calendar effects, ΔF_{charge} is the fractional damage due to recharge and ΔF_{cycle} is the fractional damage due to cycle depth effects.

Each of the three subcomponents may be expressed in terms of more conventional variables:

$$\Delta F_{cal} = \frac{1}{T_{cal}}, \quad (10-2)$$

$$\Delta F_{charge} = \frac{1}{N_{charge}}, \quad (10-3)$$

$$\Delta F_{cycle} = \frac{1}{N_{cy}} \cdot \frac{(e^{\alpha x} - 1)}{(e^{\alpha x_0} - 1)}, \quad (10-4)$$

where T_{cal} is the battery life under hypothetical conditions where no stresses due to charging or cycling are present, N_{charge} is the recharge cycles to end of life (one per day) where calendar and cycle depth effects are excluded, N_{cy} is the cycle life at depth of discharge equal x_0 , where calendar and recharge effects are excluded; α is a sensitivity parameter which determines how cycle life varies with depth of discharge. A high value of α means that cycle life falls rapidly as depth of discharge is increased.

Parameters of Equations 10-2 through 10-4 are not generally available. Instead, the usual data express in situ cycle life as a function of depth of discharge (x). Often, life is simply expressed in years of service versus cycle depth. Service life is sometimes given for $x = 0$, $x = 0.3$ and $x = 0.8$. Denoting T_0 , T_{30} and T_{80} as the service life which corresponds respectively to 0%, 30% and 80% depth of discharge, equations may be derived which give T_{cal} , N_{charge} , N_{cy} and α in terms of these variables.

Based on experimental input, the following approximation is assumed

$$T_{cal} = 2T_0, \quad (10-5)$$

where both T_{cal} and T_0 are in years.

Under zero depth of discharge conditions,

$$\frac{1}{T_0} = \frac{1}{T_{cal}} + \frac{365}{N_{charge}} \quad (10-6)$$

From Equations (10-5) and (10-6) it follows that

$$N_{charge} = 720 T_0 \quad (10-7)$$

It can also be shown that

$$N_{cy} = \frac{365 T_0 T_{80}}{T_0 - T_{80}} \quad (10-8)$$

The value of α (as used in Equation 10-4) must be found by an iterative approach

$$\alpha = 1.25 \ln Z$$

$$Z = Q / (Z^{0.375} - 1) + 1 \quad (10-9)$$

$$Q = \frac{(T_0 - T_{30}) T_{80}}{(T_0 - T_{80}) T_{30}} \quad (10-10)$$

Equations (10-1) through (10-4) were used in the simulation for the three battery types. Constants for the three battery types are listed in Table 10-1. Values of T_0 , T_{30} and T_{80} were obtained from References 3 and 4. Values of T_{cal} , N_{charge} , N_{cy} and α were in turn obtained from Equations 10-5 through 10-10.

By reciprocating Equation 10-1, battery life (in days) is obtained. Thus, life (in years) is equal to $1/(365\Delta F)$. Using this definition for life and the constants in Table 10-1, the life versus DOD plot of Figure 10-1 is obtained.

10.2 COST AND EFFICIENCY AND ENERGY STORAGE MODELLING

Battery cost is assumed proportional to the energy storage and battery mass. Cost per kWh (C5) and specific energy (E2) (both with respect to 100% depth of discharge at the 2 hour rate) are listed in Table 10-2 using data from References 3 and 4.

Table 10-1. Battery Life Constants

Battery Type	T_0 (years)	T_{30} (years)	T_{80} (years)	T_{cal} (years)	N_{charge}	N_{cy}	α
Type 1 - High Performance Sealed Lead Acid	5.0	3.0	0.5	10.0	3650	166	4.7
Type 2 - Industrial Lead Acid	10.0	6.0	3.0	20.0	7300	842	1.0
Type 3 - Sodium Sulphur	12.0	8.5	4.0	24.0	8760	1095	2.0

Figure 10-1. Battery Life Versus
Depth of Discharge for Battery
Types 1, 2 and 3 Using Constants
Listed in Table 10-1

Because of energy losses associated with over-charge, a fixed energy loss is assumed with each cycle which is mass proportional and independent of cycle depth. Accordingly, the battery output energy (E_{out}) is given by

$$E_{out} = (E_{in} - K_B M_B) \cdot N3, \quad (10-11)$$

where E_{in} is the energy input and $N3$ is the incremental efficiency, K_B is a constant and M_B is the battery mass.

Values of $C5$, $E2$, K_B , $N3$ and M_B are listed in Table 10-2.

Table 10-2. Miscellaneous Battery Constants

Battery Type	$C5$ (\$/kWh)	$E2$ (Wh/kg)	K_B (W/kg)	$N3$ (%)	M_B (kg)
Sealed Lead Acid	75	37	0.677	90	443
Industrial Lead Acid		22	0.440	83	1136
Sodium Sulphur	200	80	1.83	95	437

SECTION 11

AN APPLICATION GUIDE TO APPENDIX A

Appendix A tabulates payback period and five other parameters for each of 3,240 PV applications. The variables used in the computer simulation, listed in order of print-out nesting, include:

1. Location (8)
2. Use Pattern (5)
3. Energy Cost (3)
4. Battery Type (3)
5. Vehicle Type (3)
6. Array Type (3)

Each page of Appendix A corresponds to one location, one use pattern and one energy cost; each page contains data for all three battery types, all three vehicle types and all three array types. The outputs for each application are:

1. Up-Front Costs

(This is the sum of the array and converter plus installation costs. No provision is included for associated weight and aerodynamic penalties.)

2. Percent Energy Reduction

(This is the fractional decrease in recharge energy due to the addition of PV. No allowance is included for vehicle shadowing by trees and structures.)

3. Maximum Winter Depth of Discharge

(This is the maximum battery depth of discharge (DOD) where zero PV energy is assumed. Applications which exceed 60% to 80% are not considered viable for both economic and "range reliability" reasons.)

4. Percent DOD Reduction

(This is the yearly average reduction of battery DOD due to the inclusion of PV.)

5. Percent Battery Life Increase

(This is the fraction by which battery life is increased due to the inclusion of PV.)

6. Payback Period

(This is the time, in years, for the combined electricity and battery savings to equal the "up-front" cost of the array, converter and installation. No allowance is included for maintenance or the cost of money.)

11.1 ESTIMATION OF PAYBACK TIME FOR CANDIDATE APPLICATIONS

In order to estimate the payback period for a candidate application, select the simulated case whose parameters are closest to those of the candidate application.

Example 1.

Determine the payback period for the case with the following parameters:

Location:	Average Daily Horizontal Insolation = 4.75 kWh/m ² .
Use Pattern:	Mainly to and from work commute, 15,000 km/yr.
Energy Cost:	\$.12/kWh.
Battery Type:	Nickel Iron.
Vehicle Type:	High Efficiency Passenger Vehicle.
Array Type:	\$1.75/peak watt*, 10% in situ efficiency.

Selection of closest simulation parameters:

The nearest location is Dallas-Fort Worth and the closest use pattern is Use Pattern Number 2 (see Table 9-1). The nearest energy cost is \$.10/kWh.

The nearest battery type is Type 3, the Sodium Sulphur (see Tables 10-1 and 10-2). The reason for this selection is that both the Nickel Iron and Sodium Sulphur are fairly expensive in terms of initial cost per kWh. Also both batteries have lives which are relatively insensitive to cycle depth.

Vehicle Type 1 is chosen as this vehicle is an advanced, efficient commuter type vehicle (see Table 8-1). Finally, Array Type 1 is chosen in that cost per watt and efficiency are in the same ballpark (see Table 6-1).

From the above, the closest simulation case is identified on page A51; the payback period is 21.3 years.

11.2 SENSITIVITY ANALYSIS

By noting the change in payback when one parameter is changed (and all others are held constant), it is possible to determine payback sensitivity with respect to the given parameter.

*Based on 1000 W/m² insolation

Example 2.

Determine the parametric sensitivities for Example 1:

1. Location Sensitivity.

Moving from Dallas-Forth Worth (4.49 kWh/m²) to Sacramento (5.04 kWh/m²), the payback period falls from 21.3 to 19.1 years. Accordingly, the sensitivity is

$$\left(\frac{19.1 - 21.3}{19.1} \right) / \left(\frac{5.04 - 4.49}{5.04} \right) = -1.05.$$

Thus, a 1% increase in solar insolation reduces the payback period by about 1%.

2. Use Pattern Sensitivity.

Switching from Use Pattern 2 (18250 km/yr) to Use Pattern 1 (9125 km/yr), the payback period increases from 21.3 to 23.9 years. Accordingly, the sensitivity is

$$\left(\frac{23.9 - 21.3}{23.9} \right) / \left(\frac{9125 - 18250}{9125} \right) = -0.109.$$

Hence, a 1% increase in yearly mileage reduces the payback period by about 0.1%.

3. Energy Cost Sensitivity.

Switching from \$0.10/kWh to \$0.20/kWh electricity cost, the payback period falls from 21.3 to 14.2 years. Accordingly, the sensitivity is

$$\left(\frac{14.2 - 21.3}{14.2} \right) / \left(\frac{0.20 - 0.10}{0.20} \right) = -1.00.$$

Thus, a 1% increase in the cost of electricity reduces the payback period by about 1%.

4. Battery Type Sensitivity.

Switching from a high cost battery whose cycle life is insensitive to DOD (Type 3 Battery) to a moderately expensive battery such as Type 2 which has a greater life sensitivity to DOD reduces the payback period from 21.3 years to 16.8 years. Note, however, that when the low cost, high DOD sensitivity Type 1 battery is substituted, the payback period increases to 21.0 years. This behavior may be expected in that as battery cost falls, payback period will increase, and that as DOD sensitivity increases, payback period will increase.

5. Vehicle Type Sensitivity.

Switching from Vehicle Type 1 to Vehicle Type 2 (which is similar but less efficient), the payback period decreases slightly. (In terms of energy per mile, the sensitivity is about -0.12; i.e., a 1% increase in road-load causes the payback period to fall by about 0.1%.) The negative value is expected in that as road-load increases, DOD must also increase. As DOD increases, the payback period falls because of the enhanced benefits of battery life extension.

6. Array Type Sensitivity.

Changing from Array Type 1 (8% Efficiency, \$150/m²) to Array Type 2 (25% Efficiency, \$500/m²) causes the payback period to fall from 21.3 to 15.3 years. In that Array Types 1 and 2 have roughly the same cost per watt, most of the difference may be attributed to efficiency. The corresponding sensitivity is 0.23; i.e., a 10% improvement in efficiency (same cost per watt) will cause a 2.3% reduction in the payback period.

SECTION 12

OBSERVATIONS

Several observations are in order concerning payback.

1. Payback periods range from a low of 0.5 year (see Pg A15) to a high of 166 years (see Pg A107). Accordingly, the economic viability of PV is dependent on application details. In some cases it may make sense, while in other cases, it may not.
2. The cases where payback is short include:
 - a. High solar insulation.
 - b. High vehicle use.
 - c. Use of low efficiency vehicle.
 - d. High cost energy.
 - e. High cost battery.
 - f. Use of battery with high life sensitivity to DOD.
 - g. Use of low cost array.
 - h. Use of high efficiency array.
3. Cases where payback is very short (e.g., less than 2 years) are due to excessive DOD. In other words, these are cases where a given electric vehicle is being driven to its range limits -- where battery life will be short and reliable range is exceeded.
4. Approximately 10% (or 300 cases) correspond to reasonable payback periods (e.g., less than 10 years) combined with reasonable vehicle use (DOD less than 60%). Examples are (A9, Batt. 1, Veh. 1, Array 1, payback = 8.9 years), (A9, Batt. 2, Veh. 2, Array 2, payback = 9.5 years) and (A39, Batt. 1, Veh. 1, Array 1, payback = 10.0 years).
5. Short payback periods are due mainly to battery DOD sensitivity and not to high electricity costs. Accordingly, as batteries improve, payback periods will probably increase.
6. In the case of high cost energy (e.g., \$0.20/kWh), combined with low cost PV (Type 2) and high solar insolation, payback periods are typically less than 10 years -- independent of battery and vehicle types provided use is at least moderate (greater than 18,000 km/yr).
7. Batteries which have high DOD sensitivity (e.g., Type 1) contribute to long payback times when DOD levels are maintained low.

SECTION 13

RECOMMENDATIONS FOR FUTURE WORK

While it is recognized that the present simulation is lacking in detail and input accuracy, it is none the less believed useful in helping to identify applications where payback periods are acceptable. Accordingly, it is recommended that several such applications be identified and that an effort be extended to implement "PV Assist" -- and to track its economic effectiveness. Assuming that PV Assist gains a measure of acceptance, it would also be worthwhile to refine the present study so that it may become a key tool in the implementation of PV assisted EVs. While numerous recommendations for improvement will become apparent as future experience is gained, several recommendations are presently at hand.

1. Obtain a more extensive data base on battery life versus DOD for major battery types.
2. Obtain more extensive performance and economic data for candidate solar arrays.
3. Provide data and simulation of shading effects caused by trees and structures.
4. Provide data and simulation of PV degradation due to age and foreign matter.
5. Refine calculation of payback time to include effects of:
 - a. Interest rate.
 - b. Energy cost trends.
 - c. PV maintenance costs.
6. Improve vehicle model so that vehicle cost reflects effects of added PV weight and vehicle up-grade required to support added PV weight. (While this effect is small, it is not negligible.)
7. Provide vehicle use patterns which are more detailed than those presently used and correlate these use patterns with present gasoline vehicle use patterns.
8. Expand simulation so that the effects of array size are displayed. Rather than expand data N-fold, a better solution might be that certain "reference cases" (e.g., given battery or use pattern) be thusly expanded.
9. Expand data print-out to include:
 - a. Battery life (years) with and without PV.
 - b. Battery DOD with and without PV.
 - c. Battery depreciation rate with and without PV.
 - d. Electricity use with and without PV.

10. Restrict parametric combinations which are unlikely to be used -- so that print-out does not become excessively large.

References:

1. "Estimates of Available Solar Radiation and Photovoltaic Energy Production for Various Tilted and Tracking Surfaces Throughout the U.S.", Sandia Report SAND85-2775, March 1986, D.F. Menicucci.
2. "Consumption Patterns of Household Vehicles," DOE Report DOE/EIA-0464(85), printed April 1987.
3. "Proceedings of the Fourth Annual Battery Conference on Applications and Advances", California State University, Long Beach, January 1989.
4. "Eighth International Electric Vehicle Symposium," Washington D.C., 1986.

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Appendix A

Printout of Six Parameters Associated With 3240 PV-Assist Simulations

Note: Data entries with ** correspond to cases
where vehicle range (unassisted by PV)
is exceeded.

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)
 Vehicle Use Pattern Number 1 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	55.9	27.8	19.7	53.9	25.7	18.2	57.2	29.4	20.8
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.2	33.3	23.5	60.1	30.7	21.7	60.3	35.1	24.8
% battery life increase	6.3	10.1	12.3	9.6	9.3	8.5	3.9	4.7	4.7
payback period (years)	35.9	23.0	18.1	20.0	16.8	16.2	29.4	22.8	21.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	65.2	60.9	54.7	64.8	59.6	52.7	65.6	61.8	56.0
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	62.4	60.6	60.1	62.1	60.5	60.1	62.6	60.7	60.2
% battery life increase	7.0	21.5	33.6	11.2	23.9	28.3	4.2	10.1	13.2
payback period (years)	55.6	20.1	13.1	30.1	13.0	10.0	46.3	19.5	14.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	59.7	34.9	24.7	58.5	32.2	22.8	60.5	36.9	26.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.5	41.7	29.5	60.3	38.5	27.2	60.4	44.1	31.1
% battery life increase	6.7	12.6	15.4	10.4	12.0	10.9	4.1	6.0	6.0
payback period (years)	91.2	50.4	39.6	49.9	36.3	34.9	75.1	49.2	47.1

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	55.9	27.8	19.7	53.9	25.7	18.2	57.2	29.4	20.8
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.2	33.3	23.5	60.1	30.7	21.7	60.3	35.1	24.8
% battery life increase	6.3	10.1	12.3	9.6	9.3	8.5	3.9	4.7	4.7
payback period (years)	24.8	17.2	14.3	15.9	13.5	13.1	21.6	17.1	16.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	65.2	60.9	54.7	64.8	59.6	52.7	65.6	61.8	56.0
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	62.4	60.6	60.1	62.1	60.5	60.1	62.6	60.7	60.2
% battery life increase	7.0	21.5	33.6	11.2	23.9	28.3	4.2	10.1	13.2
payback period (years)	38.0	14.6	10.0	23.7	10.4	8.0	33.9	14.5	11.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	59.7	34.9	24.7	58.5	32.2	22.8	60.5	36.9	26.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.5	41.7	29.5	60.3	38.5	27.2	60.4	44.1	31.1
% battery life increase	6.7	12.6	15.4	10.4	12.0	10.9	4.1	6.0	6.0
payback period (years)	62.7	37.4	31.1	39.5	29.0	28.1	55.3	36.8	35.6

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)
 Vehicle Use Pattern Number 1 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	55.9	27.8	19.7	53.9	25.7	18.2	57.2	29.4	20.8
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.2	33.3	23.5	60.1	30.7	21.7	60.3	35.1	24.8
% battery life increase	6.3	10.1	12.3	9.6	9.3	8.5	3.9	4.7	4.7
payback period (years)	15.3	11.4	10.0	11.2	9.6	9.4	14.2	11.4	11.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	65.2	60.9	54.7	64.8	59.6	52.7	65.6	61.8	56.0
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	62.4	60.6	60.1	62.1	60.5	60.1	62.6	60.7	60.2
% battery life increase	7.0	21.5	33.6	11.2	23.9	28.3	4.2	10.1	13.2
payback period (years)	23.3	9.5	6.8	16.6	7.4	5.8	22.0	9.6	7.3
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	59.7	34.9	24.7	58.5	32.2	22.8	60.5	36.9	26.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.5	41.7	29.5	60.3	38.5	27.2	60.4	44.1	31.1
% battery life increase	6.7	12.6	15.4	10.4	12.0	10.9	4.1	6.0	6.0
payback period (years)	38.6	24.7	21.8	27.8	20.7	20.3	36.2	24.4	23.9

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	27.1	11.8	8.1	25.0	10.9	7.5	28.6	12.4	8.6
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	32.5	14.1	9.7	30.0	13.0	9.0	34.3	14.9	10.3
% battery life increase	10.4	17.4	21.6	9.3	7.2	6.3	4.8	4.7	4.7
payback period (years)	22.5	9.4	4.1	16.7	14.6	13.1	22.6	19.5	17.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	58.9	37.3	25.7	57.7	34.4	23.7	59.8	39.3	27.1
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.9	44.6	30.7	58.9	41.1	28.3	59.0	47.1	32.4
% battery life increase	21.9	58.5	79.2	23.8	25.9	21.9	10.1	15.8	15.7
payback period (years)	19.7	6.4	2.9	12.9	8.3	7.5	19.3	11.2	9.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	34.0	14.8	10.2	31.3	13.6	9.4	35.9	15.6	10.7
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	40.8	17.7	12.2	37.6	16.3	11.2	43.0	18.7	12.9
% battery life increase	12.9	22.0	27.6	11.9	9.2	7.9	6.0	6.0	6.0
payback period (years)	49.3	20.7	9.1	35.9	31.5	28.3	48.7	42.1	37.2

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)
 Vehicle Use Pattern Number 2 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	27.1	11.8	8.1	25.0	10.9	7.5	28.6	12.4	8.6
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	32.5	14.1	9.7	30.0	13.0	9.0	34.3	14.9	10.3
% battery life increase	10.4	17.4	21.6	9.3	7.2	6.3	4.8	4.7	4.7
payback period (years)	16.9	8.2	3.9	13.4	12.0	11.0	16.9	15.1	13.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	58.9	37.3	25.7	57.7	34.4	23.7	59.8	39.3	27.1
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.9	44.6	30.7	58.9	41.1	28.3	59.0	47.1	32.4
% battery life increase	21.9	58.5	79.2	23.8	25.9	21.9	10.1	15.8	15.7
payback period (years)	14.5	5.4	2.7	10.3	6.8	6.2	14.4	8.6	7.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	34.0	14.8	10.2	31.3	13.6	9.4	35.9	15.6	10.7
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	40.8	17.7	12.2	37.6	16.3	11.2	43.0	18.7	12.9
% battery life increase	12.9	22.0	27.6	11.9	9.2	7.9	6.0	6.0	6.0
payback period (years)	36.7	18.1	8.6	28.8	25.9	23.6	36.5	32.6	29.6

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	27.1	11.8	8.1	25.0	10.9	7.5	28.6	12.4	8.6
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	32.5	14.1	9.7	30.0	13.0	9.0	34.3	14.9	10.3
% battery life increase	10.4	17.4	21.6	9.3	7.2	6.3	4.8	4.7	4.7
payback period (years)	11.2	6.6	3.5	9.6	8.9	8.3	11.3	10.4	9.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	58.9	37.3	25.7	57.7	34.4	23.7	59.8	39.3	27.1
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.9	44.6	30.7	58.9	41.1	28.3	59.0	47.1	32.4
% battery life increase	21.9	58.5	79.2	23.8	25.9	21.9	10.1	15.8	15.7
payback period (years)	9.4	4.2	2.3	7.3	5.0	4.7	9.5	5.9	5.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	34.0	14.8	10.2	31.3	13.6	9.4	35.9	15.6	10.7
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	40.8	17.7	12.2	37.6	16.3	11.2	43.0	18.7	12.9
% battery life increase	12.9	22.0	27.6	11.9	9.2	7.9	6.0	6.0	6.0
payback period (years)	24.4	14.5	7.7	20.6	19.1	17.8	24.2	22.5	21.0

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	12.5	5.6	**	11.5	5.1	3.4	13.2	5.9	3.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	15.1	6.7	**	13.9	6.2	4.2	16.0	7.1	4.8
% battery life increase	16.9	24.7	**	7.4	5.4	4.6	4.8	4.8	4.8
payback period (years)	10.3	1.1	**	14.7	11.0	8.5	19.7	14.1	10.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	39.6	17.6	**	36.5	16.2	10.9	41.2	18.6	12.5
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	47.7	21.2	**	44.0	19.6	13.2	50.1	22.4	15.1
% battery life increase	56.0	96.9	**	26.8	18.5	15.5	15.7	15.8	15.8
payback period (years)	6.9	0.8	**	8.4	6.3	4.8	11.5	8.1	5.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	15.7	7.0	**	14.5	6.4	4.3	16.6	7.4	5.0
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	18.9	8.4	**	17.5	7.8	5.2	20.0	8.9	6.0
% battery life increase	21.3	31.8	**	9.5	6.8	5.8	6.0	6.0	6.0
payback period (years)	22.6	2.5	**	31.7	23.8	18.2	42.5	30.4	22.1

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.10/kWh

		BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1										
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	12.5	5.6	5.6	11.5	5.1	3.4	3.4	5.9	5.9	3.9
Max. Winter DOD (%)	40.2	90.2	90.2	28.6	64.2	95.5	95.5	40.1	40.1	59.6
% DOD reduction	15.1	6.7	6.7	13.9	6.2	4.2	4.2	7.1	7.1	4.8
% battery life increase	16.9	24.7	24.7	7.4	5.4	4.6	4.6	4.8	4.8	4.8
payback period (years)	8.9	1.1	1.1	12.1	9.5	7.5	7.5	11.7	11.7	8.9
ARRAY TYPE = 2										
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	39.6	17.6	17.6	36.5	16.2	10.9	10.9	18.6	18.6	12.5
Max. Winter DOD (%)	40.2	90.2	90.2	28.6	64.2	95.5	95.5	40.1	40.1	59.6
% DOD reduction	47.7	21.2	21.2	44.0	19.6	13.2	13.2	22.4	22.4	15.1
% battery life increase	56.0	96.9	96.9	26.8	18.5	15.5	15.5	15.8	15.8	15.8
payback period (years)	5.9	0.8	0.8	6.9	5.4	4.3	4.3	6.7	6.7	5.1
ARRAY TYPE = 3										
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	15.7	7.0	7.0	14.5	6.4	4.3	4.3	7.4	7.4	5.0
Max. Winter DOD (%)	40.2	90.2	90.2	28.6	64.2	95.5	95.5	40.1	40.1	59.6
% DOD reduction	18.9	8.4	8.4	17.5	7.8	5.2	5.2	8.9	8.9	6.0
% battery life increase	21.3	31.8	31.8	9.5	6.8	5.8	5.8	6.0	6.0	6.0
payback period (years)	19.5	2.5	2.5	26.0	20.4	16.2	16.2	25.1	25.1	19.2

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	12.5	5.6	**	11.5	5.1	3.4	13.2	5.9	3.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	15.1	6.7	**	13.9	6.2	4.2	16.0	7.1	4.8
% battery life increase	16.9	24.7	**	7.4	5.4	4.6	4.8	4.8	4.8
payback period (years)	7.0	1.1	**	8.9	7.4	6.1	10.5	8.7	7.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	39.6	17.6	**	36.5	16.2	10.9	41.2	18.6	12.5
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	47.7	21.2	**	44.0	19.6	13.2	50.1	22.4	15.1
% battery life increase	56.0	96.9	**	26.8	18.5	15.5	15.7	15.8	15.8
payback period (years)	4.5	0.7	**	5.0	4.2	3.5	6.0	4.9	4.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	15.7	7.0	**	14.5	6.4	4.3	16.6	7.4	5.0
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	18.9	8.4	**	17.5	7.8	5.2	20.0	8.9	6.0
% battery life increase	21.3	31.8	**	9.5	6.8	5.8	6.0	6.0	6.0
payback period (years)	15.4	2.4	**	19.1	15.9	13.2	22.6	18.6	15.1

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.05/kWh

		BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1										
Up Front Costs (\$)		1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction		63.7	28.1	19.8	60.9	25.9	18.3	65.5	29.7	20.9
Max. Winter DOD (%)		78.7	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction		78.7	35.0	24.7	76.1	32.3	22.8	79.4	37.0	26.1
% battery life increase		7.5	10.8	13.2	11.5	9.8	9.0	4.7	5.0	5.0
payback period (years)		30.5	21.8	16.9	17.0	16.0	15.4	24.6	21.7	20.8
ARRAY TYPE = 2										
Up Front Costs (\$)		1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction		84.7	73.8	62.2	83.9	71.6	57.9	85.2	74.8	63.9
Max. Winter DOD (%)		7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction		85.4	84.0	78.0	85.3	82.4	72.0	85.5	84.4	78.7
% battery life increase		9.6	27.2	40.0	15.9	31.6	33.4	5.9	13.1	16.0
payback period (years)		41.5	16.3	11.3	22.1	10.4	8.8	34.0	15.5	12.3
ARRAY TYPE = 3										
Up Front Costs (\$)		2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction		72.0	35.3	24.9	68.8	32.5	22.9	73.3	37.2	26.2
Max. Winter DOD (%)		7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction		82.6	43.9	31.0	81.1	40.5	28.6	83.6	46.4	32.7
% battery life increase		8.5	13.4	16.5	13.2	12.6	11.4	5.3	6.3	6.3
payback period (years)		73.2	47.7	37.1	40.5	34.5	33.1	59.3	46.8	44.7

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	63.7	28.1	19.8	60.9	25.9	18.3	65.5	29.7	20.9
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	78.7	35.0	24.7	76.1	32.3	22.8	79.4	37.0	26.1
% battery life increase	7.5	10.8	13.2	11.5	9.8	9.0	4.7	5.0	5.0
payback period (years)	21.1	16.3	13.4	13.5	12.9	12.4	18.2	16.3	15.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	84.7	73.8	62.2	83.9	71.6	57.9	85.2	74.8	63.9
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.4	84.0	78.0	85.3	82.4	72.0	85.5	84.4	73.7
% battery life increase	9.6	27.2	40.0	15.9	31.6	33.4	5.9	13.1	16.0
payback period (years)	28.4	11.9	8.6	17.5	8.3	7.0	25.0	11.5	9.3
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	72.0	35.3	24.9	68.8	32.5	22.9	73.3	37.2	26.2
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	82.6	43.9	31.0	81.1	40.5	28.6	83.6	46.4	32.7
% battery life increase	8.5	13.4	16.5	13.2	12.6	11.4	5.3	6.3	6.3
payback period (years)	50.5	35.6	29.3	32.2	27.7	26.8	43.8	35.1	33.9

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.20/kWh

		BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1										
Up Front Costs (\$)		1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction		63.7	28.1	19.8	60.9	25.9	18.3	65.5	29.7	20.9
Max. Winter DOD (%)		78.7	35.0	26.0	76.1	33.0	22.8	81.1	37.0	26.1
% DOD reduction		7.5	10.8	13.2	11.5	9.8	9.0	4.7	5.0	5.0
% battery life increase		13.0	10.9	9.5	9.6	9.2	9.0	12.0	10.9	10.6
payback period (years)										
ARRAY TYPE = 2										
Up Front Costs (\$)		1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction		84.7	73.8	62.2	83.9	71.6	57.9	85.2	74.8	63.9
Max. Winter DOD (%)		7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction		85.4	84.0	78.0	85.3	82.4	72.0	85.5	84.4	78.7
% battery life increase		9.6	27.2	40.0	15.9	31.6	33.4	5.9	13.1	16.0
payback period (years)		17.4	7.7	5.9	12.3	5.9	5.1	16.3	7.7	6.2
ARRAY TYPE = 3										
Up Front Costs (\$)		2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction		72.0	35.3	24.9	68.8	32.5	22.9	73.3	37.2	26.2
Max. Winter DOD (%)		7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction		82.6	43.9	31.0	81.1	40.5	28.6	83.6	46.4	32.7
% battery life increase		8.5	13.4	16.5	13.2	12.6	11.4	5.3	6.3	6.3
payback period (years)		31.1	23.6	20.7	22.8	19.9	19.4	28.8	23.4	22.9

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)
 Vehicle Use Pattern Number 5 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	17.3	7.5	5.2	15.9	7.0	4.8	18.2	8.0	5.4
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	21.5	9.4	6.4	19.8	8.7	5.9	22.7	9.9	6.8
% battery life increase	14.4	23.7	26.3	8.6	6.3	5.4	5.0	5.0	5.0
payback period (years)	14.7	3.0	0.7	15.0	12.1	10.0	20.3	15.8	12.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.7	23.9	16.3	50.4	22.1	15.1	57.7	25.2	17.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	68.0	29.7	20.3	62.7	27.4	18.7	71.8	31.4	21.5
% battery life increase	45.0	89.2	104.9	31.7	22.1	18.5	16.6	16.6	16.5
payback period (years)	9.8	2.1	0.5	8.6	6.9	5.7	11.6	9.1	7.3
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	21.7	9.5	6.5	20.0	8.7	6.0	22.9	10.0	6.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	27.0	11.8	8.1	24.9	10.9	7.4	28.5	12.5	8.5
% battery life increase	18.1	30.4	33.9	11.0	8.0	6.8	6.3	6.3	6.3
payback period (years)	32.4	6.6	1.5	32.4	26.1	21.6	43.7	34.1	27.4

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	17.3	7.5	5.2	15.9	7.0	4.8	18.2	8.0	5.4
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	21.5	9.4	6.4	19.8	8.7	5.9	22.7	9.9	6.8
% battery life increase	14.4	23.7	26.3	8.6	6.3	5.4	5.0	5.0	5.0
payback period (years)	12.0	2.8	0.7	12.2	10.2	8.7	15.5	12.7	10.6
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.7	23.9	16.3	50.4	22.1	15.1	57.7	25.2	17.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	68.0	29.7	20.3	62.7	27.4	18.7	71.8	31.4	21.5
% battery life increase	45.0	89.2	104.9	31.7	22.1	18.5	16.6	16.6	16.5
payback period (years)	7.7	2.0	0.5	6.9	5.8	5.0	8.8	7.3	6.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	21.7	9.5	6.5	20.0	8.7	6.0	22.9	10.0	6.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	27.0	11.8	8.1	24.9	10.9	7.4	28.5	12.5	8.5
% battery life increase	18.1	30.4	33.9	11.0	8.0	6.8	6.3	6.3	6.3
payback period (years)	26.3	6.3	1.5	26.3	22.0	18.7	33.3	27.5	22.9

LOCATION Las Vegas

North Latitude = 36.1 Av. daily Horizontal Insolation = 5.65 (kWh/m²) Av. Daily Temp. = 19.2 (C)
 Vehicle Use Pattern Number 5 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	17.3	7.5	5.2	15.9	7.0	4.8	18.2	8.0	5.4
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	21.5	9.4	6.4	19.8	8.7	5.9	22.7	9.9	6.8
% battery life increase	14.4	23.7	26.3	8.6	6.3	5.4	5.0	5.0	5.0
payback period (years)	8.8	2.6	0.7	8.9	7.8	6.9	10.5	9.2	8.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.7	23.9	16.3	50.4	22.1	15.1	57.7	25.2	17.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	68.0	29.7	20.3	62.7	27.4	18.7	71.8	31.4	21.5
% battery life increase	45.0	89.2	104.9	31.7	22.1	18.5	16.6	16.6	16.5
payback period (years)	5.4	1.8	0.5	5.0	4.4	3.9	5.9	5.2	4.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	21.7	9.5	6.5	20.0	8.7	6.0	22.9	10.0	6.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	27.0	11.8	8.1	24.9	10.9	7.4	28.5	12.5	8.5
% battery life increase	18.1	30.4	33.9	11.0	8.0	6.8	6.3	6.3	6.3
payback period (years)	19.1	5.8	1.5	19.1	16.8	14.8	22.6	19.7	17.3

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	56.0	27.6	19.5	53.9	25.5	18.0	56.9	29.2	20.6
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.2	32.1	22.7	60.1	29.6	20.9	60.2	33.9	23.9
% battery life increase	6.3	10.0	12.2	9.6	9.3	8.4	3.8	4.7	4.7
payback period (years)	35.9	23.2	18.2	20.0	17.0	16.3	29.6	23.0	22.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	65.3	60.5	54.7	64.9	59.2	52.8	65.6	61.4	56.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	62.2	60.6	60.1	62.0	60.5	60.0	62.4	60.7	60.1
% battery life increase	7.0	21.3	33.6	11.2	23.7	28.3	4.2	10.0	13.2
payback period (years)	55.6	20.2	13.1	30.1	13.1	10.0	46.4	19.6	14.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	59.3	34.7	24.5	58.1	32.0	22.6	60.1	36.6	25.9
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.4	40.2	28.4	60.4	37.1	26.2	60.4	42.5	30.0
% battery life increase	6.6	12.5	15.3	10.3	11.8	10.8	4.0	5.9	5.9
payback period (years)	91.8	50.8	39.9	50.2	36.6	35.2	75.7	49.6	47.5

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)
 Vehicle Use Pattern Number 1 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	56.0	27.6	19.5	53.9	25.5	18.0	56.9	29.2	20.6
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.2	32.1	22.7	60.1	29.6	20.9	60.2	33.9	23.9
% battery life increase	6.3	10.0	12.2	9.6	9.3	8.4	3.8	4.7	4.7
payback period (years)	24.8	17.3	14.4	15.9	13.6	13.2	21.8	17.2	16.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	65.3	60.5	54.7	64.9	59.2	52.8	65.6	61.4	56.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	62.2	60.6	60.1	62.0	60.5	60.0	62.4	60.7	60.1
% battery life increase	7.0	21.3	33.6	11.2	23.7	28.3	4.2	10.0	13.2
payback period (years)	37.9	14.7	10.0	23.7	10.4	8.0	33.9	14.6	10.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	59.3	34.7	24.5	58.1	32.0	22.6	60.1	36.6	25.9
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.4	40.2	28.4	60.4	37.1	26.2	60.4	42.5	30.0
% battery life increase	6.6	12.5	15.3	10.3	11.8	10.8	4.0	5.9	5.9
payback period (years)	63.2	37.7	31.4	39.7	29.3	28.4	55.7	37.1	35.9

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	56.0	27.6	19.5	53.9	25.5	18.0	56.9	29.2	20.6
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.2	32.1	22.7	60.1	29.6	20.9	60.2	33.9	23.9
% battery life increase	6.3	10.0	12.2	9.6	9.3	8.4	3.8	4.7	4.7
payback period (years)	15.3	11.5	10.1	11.2	9.7	9.5	14.3	11.4	11.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	65.3	60.5	54.7	64.9	59.2	52.8	65.6	61.4	56.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	62.2	60.6	60.1	62.0	60.5	60.0	62.4	60.7	60.1
% battery life increase	7.0	21.3	33.6	11.2	23.7	28.3	4.2	10.0	13.2
payback period (years)	23.2	9.6	6.8	16.6	7.4	5.8	22.0	9.6	7.3
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	59.3	34.7	24.5	58.1	32.0	22.6	60.1	36.6	25.9
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.4	40.2	28.4	60.4	37.1	26.2	60.4	42.5	30.0
% battery life increase	6.6	12.5	15.3	10.3	11.8	10.8	4.0	5.9	5.9
payback period (years)	38.9	24.9	22.0	28.0	20.9	20.4	36.4	24.6	24.1

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)
 Vehicle Use Pattern Number 2 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	26.9	11.7	8.0	24.8	10.8	7.4	28.4	12.3	8.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	31.3	13.6	9.4	28.9	12.6	8.6	33.1	14.4	9.9
% battery life increase	10.3	17.2	21.4	9.2	7.2	6.2	4.7	4.7	4.7
payback period (years)	22.7	9.5	4.2	16.8	14.8	13.2	22.8	19.7	17.4
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	58.5	37.0	25.4	57.3	34.1	23.5	59.4	39.0	26.9
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.9	43.0	29.6	58.8	39.7	27.3	59.0	45.4	31.3
% battery life increase	21.8	58.0	78.3	23.6	25.6	21.7	10.0	15.6	15.6
payback period (years)	19.8	6.4	2.9	13.0	8.4	7.5	19.5	11.3	10.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	33.7	14.6	10.1	31.1	13.5	9.3	35.6	15.5	10.6
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	39.3	17.1	11.8	36.2	15.7	10.8	41.5	18.0	12.4
% battery life increase	12.8	21.8	27.3	11.8	9.1	7.9	5.9	5.9	5.9
payback period (years)	49.6	20.8	9.2	36.2	31.8	28.5	49.1	42.4	37.5

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	26.9	11.7	8.0	24.8	10.8	7.4	28.4	12.3	8.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	31.3	13.6	9.4	28.9	12.6	8.6	33.1	14.4	9.9
% battery life increase	10.3	17.2	21.4	9.2	7.2	6.2	4.7	4.7	4.7
payback period (years)	17.0	8.3	3.9	13.5	12.1	11.1	17.1	15.3	13.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	58.5	37.0	25.4	57.3	34.1	23.5	59.4	39.0	26.9
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.9	43.0	29.6	58.8	39.7	27.3	59.0	45.4	31.3
% battery life increase	21.8	58.0	78.3	23.6	25.6	21.7	10.0	15.6	15.6
payback period (years)	14.5	5.5	2.7	10.4	6.9	6.3	14.5	8.7	7.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	33.7	14.6	10.1	31.1	13.5	9.3	35.6	15.5	10.6
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	39.3	17.1	11.8	36.2	15.7	10.8	41.5	18.0	12.4
% battery life increase	12.8	21.8	27.3	11.8	9.1	7.9	5.9	5.9	5.9
payback period (years)	37.0	18.2	8.7	29.0	26.1	23.9	36.8	32.9	29.8

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	26.9	11.7	8.0	24.8	10.8	7.4	28.4	12.3	8.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	31.3	13.6	9.4	28.9	12.6	8.6	33.1	14.4	9.9
% battery life increase	10.3	17.2	21.4	9.2	7.2	6.2	4.7	4.7	4.7
payback period (years)	11.3	6.7	3.5	9.7	8.9	8.4	11.4	10.5	9.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	58.5	37.0	25.4	57.3	34.1	23.5	59.4	39.0	26.9
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.9	43.0	29.6	58.8	39.7	27.3	59.0	45.4	31.3
% battery life increase	21.8	58.0	78.3	23.6	25.6	21.7	10.0	15.6	15.6
payback period (years)	9.5	4.2	2.3	7.4	5.0	4.7	9.6	5.9	5.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	33.7	14.6	10.1	31.1	13.5	9.3	35.6	15.5	10.6
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	39.3	17.1	11.8	36.2	15.7	10.8	41.5	18.0	12.4
% battery life increase	12.8	21.8	27.3	11.8	9.1	7.9	5.9	5.9	5.9
payback period (years)	24.6	14.6	7.7	20.8	19.2	18.0	24.4	22.7	21.2

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	12.4	5.5	**	11.4	5.1	3.4	13.1	5.8	3.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	14.6	6.5	**	13.4	6.0	4.0	15.4	6.8	4.6
% battery life increase	16.7	24.4	**	7.4	5.4	4.6	4.7	4.7	4.7
payback period (years)	10.4	1.1	**	14.9	11.1	8.5	19.9	14.2	10.3
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	39.3	17.5	**	36.2	16.1	10.8	40.9	18.4	12.4
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	46.0	20.5	**	42.4	18.9	12.7	48.6	21.6	14.5
% battery life increase	55.5	95.8	**	26.5	18.3	15.4	15.5	15.7	15.6
payback period (years)	7.0	0.8	**	8.5	6.4	4.9	11.6	8.2	6.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	15.6	6.9	**	14.3	6.4	4.3	16.4	7.3	4.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	18.3	8.1	**	16.8	7.5	5.0	19.3	8.6	5.8
% battery life increase	21.1	31.5	**	9.4	6.8	5.8	6.0	6.0	5.9
payback period (years)	22.8	2.5	**	32.0	24.0	18.4	42.8	30.7	22.3

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)
 Vehicle Use Pattern Number 3 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	12.4	5.5	**	11.4	5.1	3.4	13.1	5.8	3.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	14.6	6.5	**	13.4	6.0	4.0	15.4	6.8	4.6
% battery life increase	16.7	24.4	**	7.4	5.4	4.6	4.7	4.7	4.7
payback period (years)	9.0	1.1	**	12.2	9.6	7.6	15.4	11.8	9.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	39.3	17.5	**	36.2	16.1	10.8	40.9	18.4	12.4
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	46.0	20.5	**	42.4	18.9	12.7	48.6	21.6	14.5
% battery life increase	55.5	95.8	**	26.5	18.3	15.4	15.5	15.7	15.6
payback period (years)	5.9	0.8	**	6.9	5.4	4.3	8.9	6.7	5.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	15.6	6.9	**	14.3	6.4	4.3	16.4	7.3	4.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	18.3	8.1	**	16.8	7.5	5.0	19.3	8.6	5.8
% battery life increase	21.1	31.5	**	9.4	6.8	5.8	6.0	6.0	5.9
payback period (years)	19.7	2.5	**	26.2	20.6	16.3	33.1	25.4	19.3

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	12.4	5.5	**	11.4	5.1	3.4	13.1	5.8	3.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	14.6	6.5	**	13.4	6.0	4.0	15.4	6.8	4.6
% battery life increase	16.7	24.4	**	7.4	5.4	4.6	4.7	4.7	4.7
payback period (years)	7.1	1.1	**	9.0	7.5	6.2	10.6	8.7	7.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	39.3	17.5	**	36.2	16.1	10.8	40.9	18.4	12.4
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	46.0	20.5	**	42.4	18.9	12.7	48.6	21.6	14.5
% battery life increase	55.5	95.8	**	26.5	18.3	15.4	15.5	15.7	15.6
payback period (years)	4.5	0.8	**	5.0	4.2	3.5	6.0	5.0	4.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	15.6	6.9	**	14.3	6.4	4.3	16.4	7.3	4.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	18.3	8.1	**	16.8	7.5	5.0	19.3	8.6	5.8
% battery life increase	21.1	31.5	**	9.4	6.8	5.8	6.0	6.0	5.9
payback period (years)	15.5	2.4	**	19.3	16.1	13.3	22.7	18.8	15.3

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.05/kWh

		BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1										
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	63.7	27.9	19.6	60.3	25.7	18.1	65.5	29.4	20.7	11.6
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6	25.2
% DOD reduction	78.3	33.8	23.8	73.5	31.2	22.0	79.1	35.7	4.9	20.9
% battery life increase	7.5	10.7	13.1	11.4	9.8	8.9	4.7	4.9	21.9	20.9
payback period (years)	30.5	22.0	17.0	17.1	16.1	15.5	24.6	21.9	20.9	20.9
ARRAY TYPE = 2										
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	84.6	73.3	61.6	83.8	71.4	57.4	85.1	74.4	63.8	11.6
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6	25.2
% DOD reduction	85.4	83.6	75.4	85.3	82.0	69.5	85.4	84.4	78.4	16.0
% battery life increase	9.6	27.0	39.6	15.9	31.5	33.1	5.9	13.0	15.5	12.3
payback period (years)	41.6	16.4	11.3	22.2	10.4	8.8	34.1	15.5	12.3	12.3
ARRAY TYPE = 3										
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	71.6	35.0	24.7	68.8	32.3	22.7	72.8	36.9	26.0	11.6
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6	31.6
% DOD reduction	82.1	42.4	29.9	80.6	39.1	27.6	83.2	44.8	6.2	45.1
% battery life increase	8.4	13.3	16.4	13.1	12.5	11.3	5.2	6.2	47.2	45.1
payback period (years)	73.6	48.1	37.4	40.5	34.8	33.3	59.7	47.2	45.1	45.1

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	63.7	27.9	19.6	60.3	25.7	18.1	65.5	29.4	20.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	78.3	33.8	23.8	73.5	31.2	22.0	79.1	35.7	25.2
% battery life increase	7.5	10.7	13.1	11.4	9.8	8.9	4.7	4.9	4.9
payback period (years)	21.1	16.5	13.5	13.6	13.0	12.5	18.2	16.5	15.9
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	84.6	73.3	61.6	83.8	71.4	57.4	85.1	74.4	63.8
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.4	83.6	75.4	85.3	82.0	69.5	85.4	84.4	78.4
% battery life increase	9.6	27.0	39.6	15.9	31.5	33.1	5.9	13.0	16.0
payback period (years)	28.4	12.0	8.7	17.5	8.3	7.1	25.1	11.6	9.3
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	71.6	35.0	24.7	68.8	32.3	22.7	72.8	36.9	26.0
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	82.1	42.4	29.9	80.6	39.1	27.6	83.2	44.8	31.6
% battery life increase	8.4	13.3	16.4	13.1	12.5	11.3	5.2	6.2	6.2
payback period (years)	50.7	35.9	29.6	32.2	27.9	27.0	44.2	35.4	34.2

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)
 Vehicle Use Pattern Number 4 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	63.7	27.9	19.6	60.3	25.7	18.1	65.5	29.4	20.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	78.3	33.8	23.8	73.5	31.2	22.0	79.1	35.7	25.2
% battery life increase	7.5	10.7	13.1	11.4	9.8	8.9	4.7	4.9	4.9
payback period (years)	13.0	11.0	9.6	9.7	9.3	9.1	12.0	11.0	10.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	84.6	73.3	61.6	83.8	71.4	57.4	85.1	74.4	63.8
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.4	83.6	75.4	85.3	82.0	69.5	85.4	84.4	78.4
% battery life increase	9.6	27.0	39.6	15.9	31.5	33.1	5.9	13.0	16.0
payback period (years)	17.4	7.8	5.9	12.3	6.0	5.1	16.4	7.7	6.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	71.6	35.0	24.7	68.8	32.3	22.7	72.8	36.9	26.0
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	82.1	42.4	29.9	80.6	39.1	27.6	83.2	44.8	31.6
% battery life increase	8.4	13.3	16.4	13.1	12.5	11.3	5.2	6.2	6.2
payback period (years)	31.3	23.8	20.9	22.8	20.0	19.5	29.0	23.6	23.1

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	17.1	7.5	5.1	15.8	6.9	4.7	18.1	7.9	5.4
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	20.8	9.1	6.2	19.1	8.4	5.7	21.9	9.6	6.6
% battery life increase	14.3	23.5	26.0	8.5	6.3	5.4	4.9	4.9	4.9
payback period (years)	14.8	3.0	0.7	15.2	12.2	10.1	20.4	16.0	12.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.2	23.7	16.2	50.0	21.9	15.0	57.2	25.0	17.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	65.7	28.7	19.6	60.6	26.5	18.1	69.3	30.3	20.7
% battery life increase	44.6	88.2	103.7	31.4	21.9	18.3	16.5	16.4	16.4
payback period (years)	9.9	2.1	0.5	8.6	7.0	5.8	11.7	9.2	7.4
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	21.5	9.4	6.4	19.8	8.7	5.9	22.7	9.9	6.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	26.0	11.4	7.8	24.0	10.5	7.2	27.5	12.0	8.2
% battery life increase	18.0	30.1	33.5	10.9	7.9	6.8	6.2	6.2	6.2
payback period (years)	32.6	6.6	1.6	32.7	26.3	21.8	44.1	34.4	27.6

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	17.1	7.5	5.1	15.8	6.9	4.7	18.1	7.9	5.4
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	20.8	9.1	6.2	19.1	8.4	5.7	21.9	9.6	6.6
% battery life increase	14.3	23.5	26.0	8.5	6.3	5.4	4.9	4.9	4.9
payback period (years)	12.1	2.9	0.7	12.3	10.3	8.8	15.6	12.9	10.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.2	23.7	16.2	50.0	21.9	15.0	57.2	25.0	17.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	65.7	28.7	19.6	60.6	26.5	18.1	69.3	30.3	20.7
% battery life increase	44.6	88.2	103.7	31.4	21.9	18.3	16.5	16.4	16.4
payback period (years)	7.8	2.0	0.5	7.0	5.9	5.0	8.9	7.3	6.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	21.5	9.4	6.4	19.8	8.7	5.9	22.7	9.9	6.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	26.0	11.4	7.8	24.0	10.5	7.2	27.5	12.0	8.2
% battery life increase	18.0	30.1	33.5	10.9	7.9	6.8	6.2	6.2	6.2
payback period (years)	26.5	6.3	1.5	26.5	22.2	18.9	33.6	27.7	23.1

LOCATION Bryce Canyon

North Latitude = 37.7 Av. daily Horizontal Insolation = 5.61 (kWh/m²) Av. Daily Temp. = 4.4 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	17.1	7.5	5.1	15.8	6.9	4.7	18.1	7.9	5.4
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	20.8	9.1	6.2	19.1	8.4	5.7	21.9	9.6	6.6
% battery life increase	14.3	23.5	26.0	8.5	6.3	5.4	4.9	4.9	4.9
payback period (years)	8.9	2.6	0.7	9.0	7.9	6.9	10.6	9.3	8.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.2	23.7	16.2	50.0	21.9	15.0	57.2	25.0	17.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	65.7	28.7	19.6	60.6	26.5	18.1	69.3	30.3	20.7
% battery life increase	44.6	88.2	103.7	31.4	21.9	18.3	16.5	16.4	16.4
payback period (years)	5.5	1.8	0.5	5.1	4.4	3.9	6.0	5.2	4.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	21.5	9.4	6.4	19.8	8.7	5.9	22.7	9.9	6.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	25.0	11.4	7.8	24.0	10.5	7.2	27.5	12.0	8.2
% battery life increase	18.0	30.1	33.5	10.9	7.9	6.8	6.2	6.2	6.2
payback period (years)	19.3	5.8	1.5	19.3	16.9	14.9	22.8	19.9	17.4

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)
 Vehicle Use Pattern Number 1 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	50.6	24.7	17.4	49.0	22.8	16.1	51.8	26.0	18.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.1	28.2	19.9	60.0	26.0	18.4	60.1	29.8	21.0
% battery life increase	5.7	8.9	10.8	8.6	8.2	7.5	3.5	4.2	4.2
payback period (years)	39.7	25.9	20.3	22.1	19.0	18.3	32.5	25.8	24.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	65.2	56.0	49.7	64.7	55.1	47.7	65.5	56.6	50.8
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	62.0	60.4	60.0	61.8	60.4	58.2	62.0	60.5	60.0
% battery life increase	7.0	19.6	30.1	11.2	21.7	24.9	4.2	9.2	11.8
payback period (years)	55.7	21.7	14.3	30.2	14.1	11.1	46.5	21.2	16.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	55.0	31.0	21.9	54.0	28.6	20.2	55.6	32.7	23.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.3	35.4	25.0	60.1	32.6	23.1	60.3	37.3	26.4
% battery life increase	6.1	11.1	13.5	9.5	10.4	9.5	3.7	5.2	5.2
payback period (years)	98.8	56.7	44.5	54.1	41.0	39.4	81.8	55.5	53.1

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	50.6	24.7	17.4	49.0	22.8	16.1	51.8	26.0	18.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.1	28.2	19.9	60.0	26.0	18.4	60.1	29.8	21.0
% battery life increase	5.7	8.9	10.8	8.6	8.2	7.5	3.5	4.2	4.2
payback period (years)	27.3	19.4	16.1	17.5	15.2	14.8	23.9	19.3	18.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	65.2	56.0	49.7	64.7	55.1	47.7	65.5	56.6	50.8
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	62.0	60.4	60.0	61.8	60.4	58.2	62.0	60.5	60.0
% battery life increase	7.0	19.6	30.1	11.2	21.7	24.9	4.2	9.2	11.8
payback period (years)	38.0	15.9	10.9	23.7	11.2	8.9	33.9	15.8	12.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	55.0	31.0	21.9	54.0	28.6	20.2	55.6	32.7	23.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.3	35.4	25.0	60.1	32.6	23.1	60.3	37.3	26.4
% battery life increase	6.1	11.1	13.5	9.5	10.4	9.5	3.7	5.2	5.2
payback period (years)	68.0	42.1	35.0	42.8	32.8	31.8	60.2	41.5	40.1

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	50.6	24.7	17.4	49.0	22.8	16.1	51.8	26.0	18.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.1	28.2	19.9	60.0	26.0	18.4	60.1	29.8	21.0
% battery life increase	5.7	8.9	10.8	8.6	8.2	7.5	3.5	4.2	4.2
payback period (years)	16.9	12.9	11.3	12.3	10.9	10.6	15.7	12.8	12.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	65.2	56.0	49.7	64.7	55.1	47.7	65.5	56.6	50.8
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	62.0	60.4	60.0	61.8	60.4	58.2	62.0	60.5	60.0
% battery life increase	7.0	19.6	30.1	11.2	21.7	24.9	4.2	9.2	11.8
payback period (years)	23.3	10.3	7.5	16.6	8.0	6.4	22.0	10.4	8.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	55.0	31.0	21.9	54.0	28.6	20.2	55.6	32.7	23.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.3	35.4	25.0	60.1	32.6	23.1	60.3	37.3	26.4
% battery life increase	6.1	11.1	13.5	9.5	10.4	9.5	3.7	5.2	5.2
payback period (years)	41.9	27.8	24.5	30.2	23.4	22.9	39.4	27.6	26.9

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	24.0	10.4	7.2	22.1	9.6	6.6	25.3	11.0	7.6
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	27.5	12.0	8.2	25.4	11.0	7.6	29.1	12.6	8.7
% battery life increase	9.1	15.2	18.7	8.2	6.3	5.5	4.2	4.2	4.2
payback period (years)	25.3	10.6	4.7	18.9	16.5	14.8	25.5	22.0	19.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.1	33.1	22.8	53.3	30.5	21.0	54.7	34.9	24.0
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.7	37.9	26.1	58.6	34.9	24.0	58.8	40.0	27.5
% battery life increase	20.0	50.1	66.5	21.5	22.3	19.0	9.2	13.8	13.7
payback period (years)	21.3	7.1	3.2	14.0	9.4	8.4	21.2	12.6	11.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	30.1	13.1	9.0	27.8	12.1	8.3	31.8	13.8	9.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	34.6	15.0	10.3	31.9	13.8	9.5	36.5	15.8	10.9
% battery life increase	11.4	19.2	23.9	10.4	8.1	7.0	5.3	5.3	5.3
payback period (years)	55.4	23.2	10.3	40.6	35.6	31.9	55.0	47.5	42.0

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	24.0	10.4	7.2	22.1	9.6	6.6	25.3	11.0	7.6
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	27.5	12.0	8.2	25.4	11.0	7.6	29.1	12.6	8.7
% battery life increase	9.1	15.2	18.7	8.2	6.3	5.5	4.2	4.2	4.2
payback period (years)	19.0	9.3	4.4	15.1	13.6	12.4	19.1	17.1	15.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.1	33.1	22.8	53.3	30.5	21.0	54.7	34.9	24.0
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.7	37.9	26.1	58.6	34.9	24.0	58.8	40.0	27.5
% battery life increase	20.0	50.1	66.5	21.5	22.3	19.0	9.2	13.8	13.7
payback period (years)	15.7	6.0	3.0	11.2	7.7	7.0	15.8	9.7	8.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	30.1	13.1	9.0	27.8	12.1	8.3	31.8	13.8	9.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	34.6	15.0	10.3	31.9	13.8	9.5	36.5	15.8	10.9
% battery life increase	11.4	19.2	23.9	10.4	8.1	7.0	5.3	5.3	5.3
payback period (years)	41.3	20.3	9.6	32.5	29.2	26.7	41.1	36.8	33.4

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	24.0	10.4	7.2	22.1	9.6	6.6	25.3	11.0	7.6
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	27.5	12.0	8.2	25.4	11.0	7.6	29.1	12.6	8.7
% battery life increase	9.1	15.2	18.7	8.2	6.3	5.5	4.2	4.2	4.2
payback period (years)	12.7	7.5	3.9	10.8	10.0	9.4	12.7	11.8	11.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.1	33.1	22.8	53.3	30.5	21.0	54.7	34.9	24.0
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.7	37.9	26.1	58.6	34.9	24.0	58.8	40.0	27.5
% battery life increase	20.0	50.1	66.5	21.5	22.3	19.0	9.2	13.8	13.7
payback period (years)	10.2	4.7	2.6	8.0	5.6	5.3	10.4	6.6	6.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	30.1	13.1	9.0	27.8	12.1	8.3	31.8	13.8	9.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	34.6	15.0	10.3	31.9	13.8	9.5	36.5	15.8	10.9
% battery life increase	11.4	19.2	23.9	10.4	8.1	7.0	5.3	5.3	5.3
payback period (years)	27.4	16.3	8.6	23.2	21.5	20.1	27.4	25.4	23.7

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	11.1	4.9	**	10.2	4.5	3.1	11.7	5.2	3.5
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	12.8	5.7	**	11.8	5.3	3.5	13.5	6.0	4.0
% battery life increase	14.7	21.4	**	6.5	4.8	4.1	4.2	4.2	4.2
payback period (years)	11.5	1.3	**	16.7	12.5	9.5	22.3	15.9	11.6
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	34.9	15.6	**	32.4	14.4	9.7	36.1	16.5	11.1
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	40.5	18.0	**	37.4	16.6	11.2	42.8	19.0	12.8
% battery life increase	47.8	80.2	**	23.1	16.1	13.6	13.5	13.8	13.8
payback period (years)	7.7	0.9	**	9.5	7.1	5.4	13.0	9.2	6.7
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	13.9	6.2	**	12.8	5.7	3.8	14.7	6.5	4.4
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	16.1	7.2	**	14.8	6.6	4.4	17.0	7.5	5.1
% battery life increase	18.6	27.4	**	8.3	6.0	5.1	5.3	5.3	5.3
payback period (years)	25.4	2.8	**	35.8	26.9	20.6	47.9	34.4	24.9

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	11.1	4.9	**	10.2	4.5	3.1	11.7	5.2	3.5
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	12.8	5.7	**	11.8	5.3	3.5	13.5	6.0	4.0
% battery life increase	14.7	21.4	**	6.5	4.8	4.1	4.2	4.2	4.2
payback period (years)	10.0	1.3	**	13.7	10.7	8.5	17.2	13.2	10.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	34.9	15.6	**	32.4	14.4	9.7	36.1	16.5	11.1
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	40.5	18.0	**	37.4	16.6	11.2	42.8	19.0	12.8
% battery life increase	47.8	80.2	**	23.1	16.1	13.6	13.5	13.8	13.8
payback period (years)	6.5	0.9	**	7.7	6.1	4.8	10.0	7.5	5.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	13.9	6.2	**	12.8	5.7	3.8	14.7	6.5	4.4
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	16.1	7.2	**	14.8	6.6	4.4	17.0	7.5	5.1
% battery life increase	18.6	27.4	**	8.3	6.0	5.1	5.3	5.3	5.3
payback period (years)	22.0	2.8	**	29.4	23.1	18.3	37.0	28.4	21.6

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	11.1	4.9	**	10.2	4.5	3.1	11.7	5.2	3.5
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	12.8	5.7	**	11.8	5.3	3.5	13.5	6.0	4.0
% battery life increase	14.7	21.4	**	6.5	4.8	4.1	4.2	4.2	4.2
payback period (years)	7.9	1.2	**	10.0	8.4	6.9	11.8	9.8	7.9
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	34.9	15.6	**	32.4	14.4	9.7	36.1	16.5	11.1
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	40.5	18.0	**	37.4	16.6	11.2	42.8	19.0	12.8
% battery life increase	47.8	80.2	**	23.1	16.1	13.6	13.5	13.8	13.8
payback period (years)	5.0	0.8	**	5.6	4.7	3.9	6.8	5.5	4.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	13.9	6.2	**	12.8	5.7	3.8	14.7	6.5	4.4
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	16.1	7.2	**	14.8	6.6	4.4	17.0	7.5	5.1
% battery life increase	18.6	27.4	**	8.3	6.0	5.1	5.3	5.3	5.3
payback period (years)	17.3	2.7	**	21.6	18.0	14.9	25.5	21.0	17.1

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	56.5	24.9	17.6	53.4	23.0	16.2	58.8	26.3	18.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	70.1	29.7	21.0	64.6	27.4	19.3	74.0	31.4	22.1
% battery life increase	6.7	9.5	11.6	9.9	8.6	17.9	4.2	4.4	4.4
payback period (years)	34.3	24.5	19.0	19.4	18.0	17.3	27.4	24.5	23.4
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	83.3	67.3	54.6	82.5	64.8	51.4	83.7	69.0	56.8
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.2	81.2	66.4	85.1	79.9	61.3	85.3	82.3	70.1
% battery life increase	9.5	24.6	34.6	15.6	27.8	28.7	5.8	11.9	14.0
payback period (years)	42.2	17.8	12.6	22.5	11.5	9.8	34.6	16.8	13.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	65.0	31.3	22.1	62.4	28.9	20.3	66.6	33.0	23.3
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	80.0	37.3	26.3	78.6	34.4	24.3	80.8	39.4	27.8
% battery life increase	7.6	11.8	14.5	11.8	11.0	10.0	4.8	5.6	5.6
payback period (years)	80.9	53.5	41.6	44.7	38.8	37.3	65.3	52.8	50.4

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	56.5	24.9	17.6	53.4	23.0	16.2	58.8	26.3	18.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	70.1	29.7	21.0	64.6	27.4	19.3	74.0	31.4	22.1
% battery life increase	6.7	9.5	11.6	9.9	8.6	7.9	4.2	4.4	4.4
payback period (years)	23.7	18.4	15.1	15.4	14.5	14.0	20.3	18.4	17.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	83.3	67.3	54.6	82.5	64.8	51.4	83.7	69.0	56.8
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.2	81.2	66.4	85.1	79.9	61.3	85.3	82.3	70.1
% battery life increase	9.5	24.6	34.6	15.6	27.8	28.7	5.8	11.9	14.0
payback period (years)	28.9	13.0	9.7	17.8	9.2	7.9	25.4	12.5	10.4
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	65.0	31.3	22.1	62.4	28.9	20.3	66.6	33.0	23.3
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	80.0	37.3	26.3	78.6	34.4	24.3	80.8	39.4	27.8
% battery life increase	7.6	11.8	14.5	11.8	11.0	10.0	4.8	5.6	5.6
payback period (years)	55.9	40.0	32.9	35.5	31.2	30.2	48.3	39.6	38.2

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	56.5	24.9	17.6	53.4	23.0	16.2	58.8	26.3	18.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	70.1	29.7	21.0	64.6	27.4	19.3	74.0	31.4	22.1
% battery life increase	6.7	9.5	11.6	9.9	8.6	7.9	4.2	4.4	4.4
payback period (years)	14.6	12.3	10.7	10.9	10.4	10.2	13.3	12.3	12.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	83.3	67.3	54.6	82.5	64.8	51.4	83.7	69.0	56.8
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.2	81.2	66.4	85.1	79.9	61.3	85.3	82.3	70.1
% battery life increase	9.5	24.6	34.6	15.6	27.8	28.7	5.8	11.9	14.0
payback period (years)	17.7	8.4	6.6	12.5	6.6	5.7	16.6	8.3	7.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	65.0	31.3	22.1	62.4	28.9	20.3	66.6	33.0	23.3
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	80.0	37.3	26.3	78.6	34.4	24.3	80.8	39.4	27.8
% battery life increase	7.6	11.8	14.5	11.8	11.0	10.0	4.8	5.6	5.6
payback period (years)	34.4	26.6	23.3	25.1	22.4	21.8	31.7	26.4	25.8

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)
 Vehicle Use Pattern Number 5 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	15.3	6.7	4.6	14.1	6.2	4.2	16.1	7.1	4.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	18.3	8.0	5.5	16.8	7.4	5.0	19.3	8.4	5.8
% battery life increase	12.7	20.6	22.8	7.5	5.6	4.8	4.4	4.4	4.4
payback period (years)	16.5	3.3	0.8	17.0	13.6	11.3	22.8	17.8	14.3
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	48.5	21.2	14.5	44.8	19.6	13.4	51.2	22.4	15.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	57.9	25.3	17.3	53.4	23.3	16.0	61.1	26.7	18.3
% battery life increase	39.1	74.5	96.5	27.3	19.2	16.2	14.5	14.5	14.5
payback period (years)	10.9	2.3	0.5	9.6	7.8	6.4	13.1	10.2	8.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	19.2	8.4	5.7	17.7	7.7	5.3	20.3	8.9	6.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	22.9	10.0	6.9	21.1	9.2	6.3	24.2	10.6	7.2
% battery life increase	15.9	26.3	29.2	9.6	7.1	6.0	5.6	5.5	5.5
payback period (years)	36.3	7.4	1.7	36.5	29.4	24.4	49.2	38.4	30.9

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	15.3	6.7	4.6	14.1	6.2	4.2	16.1	7.1	4.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	18.3	8.0	5.5	16.8	7.4	5.0	19.3	8.4	5.8
% battery life increase	12.7	20.6	22.8	7.5	5.6	4.8	4.4	4.4	4.4
payback period (years)	13.5	3.2	0.8	13.8	11.5	9.8	17.4	14.4	12.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	48.5	21.2	14.5	44.8	19.6	13.4	51.2	22.4	15.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	57.9	25.3	17.3	53.4	23.3	16.0	61.1	26.7	18.3
% battery life increase	39.1	74.5	86.5	27.3	19.2	16.2	14.5	14.5	14.5
payback period (years)	8.6	2.2	0.5	7.8	6.5	5.6	9.9	8.2	6.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	19.2	8.4	5.7	17.7	7.7	5.3	20.3	8.9	6.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	22.9	10.0	6.9	21.1	9.2	6.3	24.2	10.6	7.2
% battery life increase	15.9	26.3	29.2	9.6	7.1	6.0	5.6	5.5	5.5
payback period (years)	29.5	7.0	1.7	29.7	24.8	21.1	37.5	30.9	25.8

LOCATION Sacramento

North Latitude = 38.5 Av. daily Horizontal Insolation = 5.04 (kWh/m²) Av. Daily Temp. = 15.3 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	15.3	6.7	4.6	14.1	6.2	16.1	7.1	7.1	4.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	13.3	30.3	30.3	44.3
% DOD reduction	18.3	8.0	5.5	16.8	7.4	19.3	8.4	8.4	5.8
% battery life increase	12.7	20.6	22.8	7.5	5.6	4.4	4.4	4.4	4.4
payback period (years)	9.9	2.9	0.8	10.0	8.8	11.9	10.3	10.3	9.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	48.5	21.2	14.5	44.8	19.6	51.2	22.4	22.4	15.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	13.3	30.3	30.3	44.3
% DOD reduction	57.9	25.3	17.3	53.4	23.3	61.1	26.7	26.7	18.3
% battery life increase	39.1	74.5	86.5	27.3	19.2	14.5	14.5	14.5	14.5
payback period (years)	6.1	2.0	0.5	5.6	4.9	6.7	5.8	5.8	5.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	19.2	8.4	5.7	17.7	7.7	20.3	8.9	8.9	6.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	13.3	30.3	30.3	44.3
% DOD reduction	22.9	10.0	6.9	21.1	9.2	24.2	10.6	10.6	7.2
% battery life increase	15.9	26.3	29.2	9.6	7.1	5.6	5.5	5.5	5.5
payback period (years)	21.5	6.5	1.7	21.6	18.9	25.5	22.2	22.2	19.5

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	49.7	22.0	15.6	47.0	20.3	14.4	51.7	23.3	16.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	55.6	23.6	16.7	51.3	21.7	15.4	58.7	24.9	17.6
% battery life increase	5.6	8.1	9.8	8.3	7.3	6.7	3.5	3.7	3.7
payback period (years)	40.1	28.6	22.4	22.8	21.2	20.4	32.4	28.7	27.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	63.6	57.3	48.1	63.3	56.1	45.5	63.8	58.0	50.0
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.3	60.2	52.8	61.2	60.2	48.7	61.5	60.3	55.7
% battery life increase	7.0	20.4	29.7	11.1	22.4	23.8	4.2	9.5	11.7
payback period (years)	56.4	21.1	14.5	30.4	13.7	11.5	47.0	20.6	16.3
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	56.2	27.7	19.6	54.2	25.5	18.0	56.9	29.2	20.7
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.0	29.6	20.9	60.0	27.3	19.3	60.1	31.2	22.1
% battery life increase	6.4	10.1	12.3	9.7	9.3	8.5	3.9	4.7	4.7
payback period (years)	96.2	62.3	48.9	53.5	45.6	43.8	79.5	61.7	59.1

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	49.7	22.0	15.6	47.0	20.3	14.4	51.7	23.3	16.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	55.6	23.6	16.7	51.3	21.7	15.4	58.7	24.9	17.6
% battery life increase	5.6	8.1	9.8	8.3	7.3	6.7	3.5	3.7	3.7
payback period (years)	27.7	21.4	17.8	18.1	17.0	16.4	23.9	21.5	20.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	63.6	57.3	48.1	63.3	56.1	45.5	63.8	58.0	50.0
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.3	60.2	52.8	61.2	60.2	48.7	61.5	60.3	55.7
% battery life increase	7.0	20.4	29.7	11.1	22.4	23.8	4.2	9.5	11.7
payback period (years)	38.7	15.5	11.2	24.0	10.9	9.3	34.5	15.3	12.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	56.2	27.7	19.6	54.2	25.5	18.0	56.9	29.2	20.7
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.0	29.6	20.9	60.0	27.3	19.3	60.1	31.2	22.1
% battery life increase	6.4	10.1	12.3	9.7	9.3	8.5	3.9	4.7	4.7
payback period (years)	66.3	46.5	38.6	42.4	36.5	35.3	58.6	46.2	44.7

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	49.7	22.0	15.6	47.0	20.3	14.4	51.7	23.3	16.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	55.6	23.6	16.7	51.3	21.7	15.4	58.7	24.9	17.6
% battery life increase	5.6	8.1	9.8	8.3	7.3	6.7	3.5	3.7	3.7
payback period (years)	17.1	14.3	12.5	12.8	12.2	11.9	15.7	14.3	14.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	63.6	57.3	48.1	63.3	56.1	45.5	63.8	58.0	50.0
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.3	60.2	52.8	61.2	60.2	48.7	61.5	60.3	55.7
% battery life increase	7.0	20.4	29.7	11.1	22.4	23.8	4.2	9.5	11.7
payback period (years)	23.7	10.1	7.7	16.9	7.8	6.7	22.5	10.2	8.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	56.2	27.7	19.6	54.2	25.5	18.0	56.9	29.2	20.7
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.0	29.6	20.9	60.0	27.3	19.3	60.1	31.2	22.1
% battery life increase	6.4	10.1	12.3	9.7	9.3	8.5	3.9	4.7	4.7
payback period (years)	40.9	30.9	27.2	30.0	26.1	25.5	38.4	30.7	30.1

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.05/kWh

BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1								
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	21.4	9.3	6.4	8.6	5.9	22.6	9.8	6.8
Max. Winter DOD (%)	18.5	42.5	61.8	30.3	44.0	8.2	18.9	27.4
% DOD reduction	23.0	10.0	6.9	9.2	6.3	24.3	10.5	7.3
% battery life increase	8.3	13.7	16.9	5.7	4.9	3.8	3.7	3.7
payback period (years)	27.9	11.6	5.1	18.4	16.5	28.4	24.5	21.7
ARRAY TYPE = 2								
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	55.4	29.6	20.4	27.3	18.8	56.1	31.2	21.5
Max. Winter DOD (%)	18.5	42.5	61.8	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.4	31.7	21.8	29.2	20.1	58.5	33.4	23.0
% battery life increase	20.8	45.9	60.4	19.8	16.9	9.5	12.4	12.3
payback period (years)	20.7	7.6	3.4	10.4	9.3	20.5	13.9	12.3
ARRAY TYPE = 3								
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	26.9	11.7	8.1	10.8	7.4	28.4	12.3	8.5
Max. Winter DOD (%)	18.5	42.5	61.8	30.3	44.0	8.2	18.9	27.4
% DOD reduction	28.9	12.5	8.6	11.6	8.0	30.5	13.2	9.1
% battery life increase	10.3	17.3	21.5	7.2	6.2	4.7	4.7	4.7
payback period (years)	60.9	25.4	11.2	39.6	35.5	61.2	52.8	46.6

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)
 Vehicle Use Pattern Number 2 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	21.4	9.3	6.4	19.8	8.6	5.9	22.6	9.8	6.8
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	23.0	10.0	6.9	21.2	9.2	6.3	24.2	10.5	7.3
% battery life increase	8.3	13.7	16.9	7.3	5.7	4.9	3.8	3.7	3.7
payback period (years)	21.0	10.2	4.8	16.8	15.1	13.8	21.3	19.0	17.3
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	55.4	29.6	20.4	54.3	27.3	18.8	56.1	31.2	21.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.4	31.7	21.8	58.3	29.2	20.1	58.5	33.4	23.0
% battery life increase	20.8	45.9	60.4	22.3	19.8	16.9	9.5	12.4	12.3
payback period (years)	15.3	6.5	3.2	10.9	8.5	7.8	15.3	10.8	9.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	26.9	11.7	8.1	24.8	10.8	7.4	28.4	12.3	8.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	28.9	12.5	8.6	26.6	11.6	8.0	30.5	13.2	9.1
% battery life increase	10.3	17.3	21.5	9.3	7.2	6.2	4.7	4.7	4.7
payback period (years)	45.7	22.3	10.5	36.2	32.5	29.7	45.8	41.0	37.1

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	21.4	9.3	6.4	19.8	8.6	5.9	22.6	9.8	6.8
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	23.0	10.0	6.9	21.2	9.2	6.3	24.3	10.5	7.3
% battery life increase	8.3	13.7	16.9	7.3	5.7	4.9	3.8	3.7	3.7
payback period (years)	14.1	8.2	4.3	12.1	11.2	10.4	14.2	13.2	12.3
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	55.4	29.6	20.4	54.3	27.3	18.8	56.1	31.2	21.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.4	31.7	21.8	58.3	29.2	20.1	58.5	33.4	23.0
% battery life increase	20.8	45.9	60.4	22.3	19.8	16.9	9.5	12.4	12.3
payback period (years)	10.0	5.1	2.8	7.8	6.2	5.8	10.1	7.4	6.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	26.9	11.7	8.1	24.8	10.8	7.4	28.4	12.3	8.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	28.9	12.5	8.6	26.6	11.6	8.0	30.5	13.2	9.1
% battery life increase	10.3	17.3	21.5	9.3	7.2	6.2	4.7	4.7	4.7
payback period (years)	30.4	17.9	9.5	25.9	24.0	22.4	30.5	28.3	26.4

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	9.9	4.4	**	9.1	4.1	2.7	10.4	4.6	3.1
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	10.7	4.8	**	9.9	4.4	2.9	11.3	5.0	3.4
% battery life increase	13.3	19.2	**	5.8	4.3	3.6	3.8	3.8	3.8
payback period (years)	12.7	1.4	**	18.5	13.9	10.6	24.8	17.7	12.9
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	31.4	14.0	**	29.0	12.9	8.7	33.2	14.8	9.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	33.9	15.1	**	31.3	13.9	9.3	35.8	15.9	10.7
% battery life increase	44.1	72.3	**	20.5	14.4	12.1	12.4	12.4	12.4
payback period (years)	8.3	0.9	**	10.5	7.9	6.0	14.1	10.1	7.4
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	12.4	5.5	**	11.5	5.1	3.4	13.1	5.8	3.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	13.4	6.0	**	12.4	5.5	3.7	14.2	6.3	4.2
% battery life increase	16.8	24.6	**	7.4	5.4	4.6	4.8	4.7	4.7
payback period (years)	27.8	3.1	**	39.9	29.9	22.9	53.3	38.2	27.7

LOCATION Dallas - Fort Worth

Fort Worth Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	9.9	4.4	**	9.1	4.1	2.7	10.4	4.6	3.1
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	10.7	4.8	**	9.9	4.4	2.9	11.3	5.0	3.4
% battery life increase	13.3	19.2	**	5.8	4.3	3.6	3.8	3.8	3.8
payback period (years)	11.0	1.4	**	15.2	11.9	9.4	19.2	14.7	11.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	31.4	14.0	**	29.0	12.9	8.7	33.2	14.8	9.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	33.9	15.1	**	31.3	13.9	9.3	35.8	15.9	10.7
% battery life increase	44.1	72.3	**	20.5	14.4	12.1	12.4	12.4	12.4
payback period (years)	7.0	0.9	**	8.6	6.7	5.3	10.8	8.3	6.4
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	12.4	5.5	**	11.5	5.1	3.4	13.1	5.8	3.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	13.4	6.0	**	12.4	5.5	3.7	14.2	6.3	4.2
% battery life increase	16.8	24.6	**	7.4	5.4	4.6	4.8	4.7	4.7
payback period (years)	24.1	3.0	**	32.7	25.7	20.3	41.2	31.6	24.0

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	9.9	4.4	**	9.1	4.1	2.7	10.4	4.6	3.1
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	10.7	4.8	**	9.9	4.4	2.9	11.3	5.0	3.4
% battery life increase	13.3	19.2	**	5.8	4.3	3.6	3.8	3.8	3.8
payback period (years)	8.8	1.3	**	11.2	9.3	7.7	13.2	10.9	8.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	31.4	14.0	**	29.0	12.9	8.7	33.2	14.8	9.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	33.9	15.1	**	31.3	13.9	9.3	35.8	15.9	10.7
% battery life increase	44.1	72.3	**	20.5	14.4	12.1	12.4	12.4	12.4
payback period (years)	5.4	0.9	**	6.3	5.2	4.3	7.4	6.1	5.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	12.4	5.5	**	11.5	5.1	3.4	13.1	5.8	3.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	13.4	6.0	**	12.4	5.5	3.7	14.2	6.3	4.2
% battery life increase	16.8	24.6	**	7.4	5.4	4.6	4.8	4.7	4.7
payback period (years)	19.1	2.9	**	24.1	20.0	16.6	28.4	23.4	19.0

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	52.4	22.2	15.7	48.3	20.5	14.5	55.3	23.5	16.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	58.1	24.7	17.4	53.6	22.7	16.0	61.3	26.0	18.3
% battery life increase	6.2	8.6	10.5	8.9	7.7	7.0	3.9	3.9	3.9
payback period (years)	36.7	27.1	20.9	21.3	20.2	19.3	29.1	27.4	26.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	82.4	66.5	49.9	81.8	62.7	46.0	82.8	68.4	52.6
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.0	77.6	55.2	84.9	72.3	50.9	85.0	78.5	58.3
% battery life increase	9.5	24.6	32.5	15.8	26.8	25.2	5.9	11.9	13.0
payback period (years)	42.2	17.9	13.4	22.4	11.8	10.9	34.6	16.9	14.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	63.1	28.0	19.7	59.4	25.8	18.2	65.7	29.5	20.8
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	73.0	31.0	21.8	67.3	28.6	20.1	77.0	32.7	23.0
% battery life increase	7.5	10.7	13.1	11.2	9.8	8.9	4.7	5.0	5.0
payback period (years)	82.9	59.0	45.7	46.9	43.4	41.6	66.1	58.8	56.2

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	52.4	22.2	15.7	48.3	20.5	14.5	55.3	23.5	16.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	58.1	24.7	17.4	53.6	22.7	16.0	61.3	26.0	18.3
% battery life increase	6.2	8.6	10.5	8.9	7.7	7.0	3.9	3.9	3.9
payback period (years)	25.4	20.4	16.7	17.0	16.2	15.7	21.5	20.6	19.9
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	82.4	66.5	49.9	81.8	62.7	46.0	82.8	68.4	52.6
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.0	77.6	55.2	84.9	72.3	50.9	85.0	78.5	58.3
% battery life increase	9.5	24.6	32.5	15.8	26.8	25.2	5.9	11.9	13.0
payback period (years)	29.0	13.1	10.4	17.8	9.5	8.8	25.5	12.6	11.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	63.1	28.0	19.7	59.4	25.8	18.2	65.7	29.5	20.8
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	73.0	31.0	21.8	67.3	28.6	20.1	77.0	32.7	23.0
% battery life increase	7.5	10.7	13.1	11.2	9.8	8.9	4.7	5.0	5.0
payback period (years)	57.3	44.3	36.3	37.2	34.8	33.7	48.9	44.2	42.7

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 4

Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	52.4	22.2	15.7	48.3	20.5	14.5	55.3	23.5	16.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	58.1	24.7	17.4	53.6	22.7	16.0	61.3	26.0	18.3
% battery life increase	6.2	8.6	10.5	8.9	7.7	7.0	3.9	3.9	3.9
payback period (years)	15.7	13.7	11.9	12.0	11.6	11.4	14.2	13.7	13.4
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	82.4	66.5	49.9	81.8	62.7	46.0	82.8	68.4	52.6
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.0	77.6	55.2	84.9	72.3	50.9	85.0	78.5	58.3
% battery life increase	9.5	24.6	32.5	15.8	26.8	25.2	5.9	11.9	13.0
payback period (years)	17.8	8.5	7.1	12.6	6.8	6.4	16.7	8.4	7.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	63.1	28.0	19.7	59.4	25.8	18.2	65.7	29.5	20.8
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	73.0	31.0	21.8	67.3	28.6	20.1	77.0	32.7	23.0
% battery life increase	7.5	10.7	13.1	11.2	9.8	8.9	4.7	5.0	5.0
payback period (years)	35.4	29.5	25.8	26.4	25.0	24.4	32.1	29.5	28.8

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	13.7	6.0	4.1	12.6	5.5	3.8	14.4	6.3	4.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	15.1	6.6	4.5	14.0	6.1	4.2	16.0	7.0	4.8
% battery life increase	11.4	18.4	20.3	6.7	5.0	4.2	3.9	3.9	3.9
payback period (years)	18.2	3.7	0.9	18.9	15.2	12.6	25.5	19.9	16.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	43.4	19.0	13.0	40.0	17.5	12.0	45.8	20.0	13.7
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	48.1	21.0	14.4	44.4	19.4	13.3	50.8	22.2	15.2
% battery life increase	36.1	67.4	77.7	24.0	17.0	14.4	13.0	13.0	12.9
payback period (years)	11.7	2.5	0.6	10.7	8.6	7.2	14.5	11.3	9.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	17.2	7.5	5.1	15.8	6.9	4.7	18.1	7.9	5.4
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	19.0	8.3	5.7	17.5	7.7	5.2	20.1	8.8	6.0
% battery life increase	14.3	23.5	26.1	8.5	6.3	5.4	5.0	4.9	4.9
payback period (years)	39.8	8.1	1.9	40.7	32.8	27.2	54.9	42.9	34.4

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.10/kWh

		BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1										
Up Front Costs (\$)		1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction		13.7	6.0	4.1	12.6	5.5	3.8	14.4	6.3	4.3
Max. Winter DOD (%)		29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction		15.1	6.6	4.5	14.0	6.1	4.2	16.0	7.0	4.8
% battery life increase		11.4	18.4	20.3	6.7	5.0	4.2	3.9	3.9	3.9
payback period (years)		14.9	3.5	0.9	15.4	12.9	11.0	19.5	16.1	13.4
ARRAY TYPE = 2										
Up Front Costs (\$)		1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction		43.4	19.0	13.0	40.0	17.5	12.0	45.8	20.0	13.7
Max. Winter DOD (%)		29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction		48.1	21.0	14.4	44.4	19.4	13.3	50.8	22.2	15.2
% battery life increase		36.1	67.4	77.7	24.0	17.0	14.4	13.0	13.0	12.9
payback period (years)		9.3	2.3	0.6	8.7	7.2	6.2	11.0	9.1	7.6
ARRAY TYPE = 3										
Up Front Costs (\$)		2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction		17.2	7.5	5.1	15.8	6.9	4.7	18.1	7.9	5.4
Max. Winter DOD (%)		29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction		19.0	8.3	5.7	17.5	7.7	5.2	20.1	8.8	6.0
% battery life increase		14.3	23.5	26.1	8.5	6.3	5.4	5.0	4.9	4.9
payback period (years)		32.5	7.7	1.9	33.1	27.7	23.6	41.9	34.5	28.8

LOCATION Dallas - Fort Worth

North Latitude = 32.8 Av. daily Horizontal Insolation = 4.49 (kWh/m²) Av. Daily Temp. = 18.2 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	13.7	6.0	4.1	12.6	5.5	3.8	14.4	6.3	4.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	15.1	6.6	4.5	14.0	6.1	4.2	16.0	7.0	4.8
% battery life increase	11.4	18.4	20.3	6.7	5.0	4.2	3.9	3.9	3.9
payback period (years)	11.0	3.2	0.8	11.2	9.8	8.7	13.3	11.6	10.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	43.4	19.0	13.0	40.0	17.5	12.0	45.8	20.0	13.7
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	48.1	21.0	14.4	44.4	19.4	13.3	50.8	22.2	15.2
% battery life increase	36.1	67.4	77.7	24.0	17.0	14.4	13.0	13.0	12.9
payback period (years)	6.6	2.1	0.6	6.3	5.5	4.9	7.4	6.5	5.7
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	17.2	7.5	5.1	15.8	6.9	4.7	18.1	7.9	5.4
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	19.0	8.3	5.7	17.5	7.7	5.2	20.1	8.8	6.0
% battery life increase	14.3	23.5	26.1	8.5	6.3	5.4	5.0	4.9	4.9
payback period (years)	23.8	7.1	1.8	24.1	21.1	18.6	28.5	24.8	21.7

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	48.1	20.4	14.4	44.4	18.8	13.3	49.9	21.5	15.2
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	56.9	24.1	17.0	52.5	22.2	15.7	59.9	25.4	18.0
% battery life increase	5.5	7.5	9.0	7.8	6.7	6.1	3.4	3.4	3.4
payback period (years)	41.5	30.8	24.1	24.2	22.9	22.0	33.5	31.0	29.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	63.3	55.8	45.8	63.0	53.7	42.3	63.6	56.7	48.3
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.3	60.3	54.0	61.3	60.2	49.8	61.5	60.3	57.0
% battery life increase	7.0	19.8	28.2	11.1	21.3	21.8	4.2	9.3	11.3
payback period (years)	56.6	21.6	15.1	30.5	14.3	12.4	47.1	21.0	16.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	53.8	25.6	18.1	51.9	23.6	16.7	55.2	27.0	19.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.1	30.2	21.4	60.0	27.9	19.7	60.1	31.9	22.6
% battery life increase	6.1	9.3	11.3	9.2	8.6	7.8	3.7	4.3	4.3
payback period (years)	100.3	67.0	52.5	55.8	49.2	47.3	81.9	66.7	63.8

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	48.1	20.4	14.4	44.4	18.8	13.3	49.9	21.5	15.2
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	56.9	24.1	17.0	52.5	22.2	15.7	59.9	25.4	18.0
% battery life increase	5.5	7.5	9.0	7.8	6.7	6.1	3.4	3.4	3.4
payback period (years)	28.7	23.1	19.1	19.2	18.4	17.8	24.7	23.2	22.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	63.3	55.8	45.8	63.0	53.7	42.3	63.6	56.7	48.3
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	51.3	60.3	54.0	61.3	60.2	49.8	61.5	60.3	57.0
% battery life increase	7.0	19.8	28.2	11.1	21.3	21.8	4.2	9.3	11.3
payback period (years)	38.8	15.8	11.7	24.1	11.4	10.0	34.6	15.7	12.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	53.8	25.6	18.1	51.9	23.6	16.7	55.2	27.0	19.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.1	30.2	21.4	60.0	27.9	19.7	60.1	31.9	22.6
% battery life increase	6.1	9.3	11.3	9.2	8.6	7.8	3.7	4.3	4.3
payback period (years)	69.2	50.1	41.5	44.2	39.4	38.2	60.3	49.9	48.3

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	48.1	20.4	14.4	44.4	18.8	13.3	49.9	21.5	15.2
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	56.9	24.1	17.0	52.5	22.2	15.7	59.9	25.4	18.0
% battery life increase	5.5	7.5	9.0	7.8	6.7	6.1	3.4	3.4	3.4
payback period (years)	17.7	15.4	13.5	13.6	13.1	12.8	16.2	15.5	15.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	63.3	55.8	45.8	63.0	53.7	42.3	63.6	56.7	48.3
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.3	60.3	54.0	61.3	60.2	49.8	61.5	60.3	57.0
% battery life increase	7.0	19.8	28.2	11.1	21.3	21.8	4.2	9.3	11.3
payback period (years)	23.8	10.3	8.0	16.9	8.1	7.2	22.5	10.4	8.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	53.8	25.6	18.1	51.9	23.6	16.7	55.2	27.0	19.1
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	60.1	30.2	21.4	60.0	27.9	19.7	60.1	31.9	22.6
% battery life increase	6.1	9.3	11.3	9.2	8.6	7.8	3.7	4.3	4.3
payback period (years)	42.7	33.3	29.3	31.3	28.2	27.6	39.5	33.2	32.5

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	19.8	8.6	5.9	18.3	7.9	5.5	20.9	9.1	6.3
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	23.5	10.2	7.0	21.7	9.4	6.5	24.8	10.8	7.4
% battery life increase	7.6	12.6	15.5	6.7	5.2	4.5	3.5	3.5	3.5
payback period (years)	30.1	12.5	5.5	22.7	19.9	17.8	30.7	26.5	23.4
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.0	27.4	18.9	52.0	25.3	17.4	54.8	28.9	19.9
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.4	32.4	22.3	58.4	29.9	20.6	58.6	34.2	23.5
% battery life increase	20.2	42.3	55.2	21.2	18.1	15.5	9.3	11.4	11.4
payback period (years)	21.2	8.0	3.6	14.2	11.2	10.1	21.0	15.0	13.3
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	24.9	10.8	7.4	23.0	10.0	6.9	26.3	11.4	7.9
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	29.5	12.8	8.8	27.2	11.8	8.1	31.2	13.5	9.3
% battery life increase	9.6	16.0	19.7	8.5	6.6	5.7	4.4	4.4	4.4
payback period (years)	65.4	27.2	12.0	48.8	42.8	38.4	66.1	57.0	50.4

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.10/kWh

		BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1										
Up Front Costs (\$)		1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction		19.8	8.6	5.9	18.3	7.9	5.5	20.9	9.1	6.3
Max. Winter DOD (%)		18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction		23.5	10.2	7.0	21.7	9.4	6.5	24.8	10.8	7.4
% battery life increase		7.6	12.6	15.5	6.7	5.2	4.5	3.5	3.5	3.5
payback period (years)		22.7	11.0	5.2	18.2	16.4	15.0	23.0	20.6	18.7
ARRAY TYPE = 2										
Up Front Costs (\$)		1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction		54.0	27.4	18.9	52.0	25.3	17.4	54.8	28.9	19.9
Max. Winter DOD (%)		18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction		58.4	32.4	22.3	58.4	29.9	20.6	58.6	34.2	23.5
% battery life increase		20.2	42.3	55.2	21.2	18.1	15.5	9.3	11.4	11.4
payback period (years)		15.6	6.9	3.3	11.4	9.2	8.4	15.6	11.6	10.5
ARRAY TYPE = 3										
Up Front Costs (\$)		2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction		24.9	10.8	7.4	23.0	10.0	6.9	26.3	11.4	7.9
Max. Winter DOD (%)		18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction		29.5	12.8	8.8	27.2	11.8	8.1	31.2	13.5	9.3
% battery life increase		9.6	16.0	19.7	8.5	6.6	5.7	4.4	4.4	4.4
payback period (years)		49.2	23.9	11.3	39.1	35.2	32.1	49.5	44.3	40.1

LOCATION Atlanta

North Latitude = 33.7 Av. dail, Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1			VEHICLE TYPE 2			VEHICLE TYPE 3		
	TYPE 1	TYPE 2	TYPE 3	TYPE 1	TYPE 2	TYPE 3	TYPE 1	TYPE 2	TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	19.8	8.6	5.9	18.3	7.9	5.5	20.9	9.1	6.3
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	23.5	10.2	7.0	21.7	9.4	6.5	24.8	10.8	7.4
% battery life increase	7.6	12.6	15.5	6.7	5.2	4.5	3.5	3.5	3.5
payback period (years)	15.2	8.9	4.7	13.1	12.1	11.3	15.4	14.2	13.3
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	54.0	27.4	18.9	52.0	25.3	17.4	54.8	28.9	19.9
Max. Winter DOD (%)	10.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.4	32.4	22.3	58.4	29.9	20.6	58.6	34.2	23.5
% battery life increase	20.2	42.3	55.2	21.2	18.1	15.5	9.3	11.4	11.4
payback period (years)	10.2	5.4	3.0	8.1	6.7	6.3	10.4	8.0	7.4
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	24.9	10.8	7.4	23.0	10.0	6.9	26.3	11.4	7.9
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	29.5	12.8	8.8	27.2	11.8	8.1	31.2	13.5	9.3
% battery life increase	9.6	16.0	19.7	8.5	6.6	5.7	4.4	4.4	4.4
payback period (years)	32.8	19.3	10.2	28.0	25.9	24.2	33.0	30.6	28.5

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)
 Vehicle Use Pattern Number 3 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	9.1	4.1	**	8.4	3.8	9.7	4.3	2.9	2.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	17.8	40.1	59.6	59.6
% DOD reduction	10.9	4.9	**	10.1	4.5	11.5	5.1	3.4	3.4
% battery life increase	12.3	17.6	**	5.4	3.9	3.5	3.5	3.5	3.5
payback period (years)	13.6	1.5	**	20.0	15.0	26.8	19.2	13.9	13.9
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	29.1	12.9	**	26.8	11.9	30.7	13.7	9.2	9.2
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	17.8	40.1	59.6	59.6
% DOD reduction	34.6	15.4	**	31.9	14.2	36.6	16.3	10.9	10.9
% battery life increase	40.7	65.6	**	18.7	13.2	11.5	11.4	11.4	11.4
payback period (years)	8.8	1.0	**	11.3	8.5	15.2	10.9	7.9	7.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	11.5	5.1	**	10.6	4.7	12.1	5.4	3.6	3.6
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	17.8	40.1	59.6	59.6
% DOD reduction	13.7	6.1	**	12.6	5.6	14.5	6.4	4.3	4.3
% battery life increase	15.5	22.5	**	6.8	5.0	4.4	4.4	4.4	4.4
payback period (years)	29.8	3.3	**	43.1	32.3	57.6	41.2	29.9	29.9

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	9.1	4.1	**	8.4	3.8	2.5	9.7	4.3	2.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	10.9	4.9	**	10.1	4.5	3.0	11.5	5.1	3.4
% battery life increase	12.3	17.6	**	5.4	3.9	3.4	3.5	3.5	3.5
payback period (years)	11.9	1.5	**	16.5	12.9	10.2	20.7	15.9	12.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	29.1	12.9	**	26.8	11.9	8.0	30.7	13.7	9.2
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	34.6	15.4	**	31.9	14.2	9.6	36.6	16.3	10.9
% battery life increase	40.7	65.6	**	18.7	13.2	11.2	11.5	11.4	11.4
payback period (years)	7.5	1.0	**	9.2	7.3	5.7	11.7	9.0	6.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	11.5	5.1	**	10.6	4.7	3.2	12.1	5.4	3.6
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	13.7	6.1	**	12.6	5.6	3.8	14.5	6.4	4.3
% battery life increase	15.5	22.5	**	6.8	5.0	4.2	4.4	4.4	4.4
payback period (years)	25.9	3.2	**	35.4	27.7	21.9	44.6	34.1	26.0

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)
 Vehicle Use Pattern Number 3 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	9.1	4.1	**	8.4	3.8	2.5	9.7	4.3	2.9
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	10.9	4.9	**	10.1	4.5	3.0	11.5	5.1	3.4
% battery life increase	12.3	17.6	**	5.4	3.9	3.4	3.5	3.5	3.5
payback period (years)	9.4	1.4	**	12.1	10.1	8.4	14.3	11.8	9.6
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	29.1	12.9	**	26.8	11.9	8.0	30.7	13.7	9.2
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	34.6	15.4	**	31.9	14.2	9.6	36.6	16.3	10.9
% battery life increase	40.7	65.6	**	18.7	13.2	11.2	11.5	11.4	11.4
payback period (years)	5.8	0.9	**	6.8	5.6	4.7	8.0	6.6	5.4
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	11.5	5.1	**	10.6	4.7	3.2	12.1	5.4	3.6
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	13.7	6.1	**	12.6	5.6	3.8	14.5	6.4	4.3
% battery life increase	15.5	22.5	**	6.8	5.0	4.2	4.4	4.4	4.4
payback period (years)	20.5	3.1	**	26.0	21.6	17.9	30.7	25.3	20.6

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	48.4	20.6	14.5	44.7	19.0	13.4	51.1	21.7	15.3
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	59.5	25.2	17.8	54.8	23.3	16.4	62.8	26.6	18.8
% battery life increase	5.8	8.0	9.7	8.2	7.1	6.4	3.6	3.6	3.6
payback period (years)	39.6	29.1	22.5	23.1	21.8	20.9	31.4	29.6	28.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	81.7	63.5	46.2	80.9	60.3	42.6	82.3	65.3	48.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.0	78.1	56.5	85.0	73.9	52.1	85.0	78.9	59.6
% battery life increase	9.5	23.4	30.2	15.6	25.6	23.0	5.8	11.3	12.0
payback period (years)	42.6	18.6	14.3	22.6	12.3	11.8	34.8	17.6	16.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	60.6	25.9	18.2	56.2	23.8	16.8	62.8	27.3	19.2
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	74.7	31.7	22.3	68.9	29.2	20.6	77.7	33.5	23.6
% battery life increase	7.2	9.9	12.1	10.5	9.0	8.2	4.5	4.6	4.6
payback period (years)	86.2	63.4	49.1	49.5	46.8	44.9	69.1	63.5	60.7

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)
 Vehicle Use Pattern Number 4 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	48.4	20.6	14.5	44.7	19.0	13.4	51.1	21.7	15.3
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	59.5	25.2	17.8	54.8	23.3	16.4	62.8	26.6	18.8
% battery life increase	5.8	8.0	9.7	8.2	7.1	6.4	3.6	3.6	3.6
payback period (years)	27.4	22.0	18.0	18.3	17.5	17.0	23.3	22.2	21.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	81.7	53.5	46.2	80.9	60.3	42.6	82.3	65.3	48.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.0	78.1	56.5	85.0	73.9	52.1	85.0	78.9	59.6
% battery life increase	9.5	23.4	30.2	15.6	25.6	23.0	5.8	11.3	12.0
payback period (years)	29.2	13.6	11.1	17.9	9.8	9.5	25.6	13.2	12.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	60.6	25.9	18.2	56.2	23.8	16.8	62.8	27.3	19.2
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	74.7	31.7	22.3	68.9	29.2	20.6	77.7	33.5	23.6
% battery life increase	7.2	9.9	12.1	10.5	9.0	8.2	4.5	4.6	4.6
payback period (years)	59.6	47.6	39.1	39.4	37.6	36.4	51.1	47.7	46.1

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	48.4	20.6	14.5	44.7	19.0	13.4	51.1	21.7	15.3
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	59.5	25.2	17.8	54.8	23.3	16.4	62.8	26.6	18.8
% battery life increase	5.8	8.0	9.7	8.2	7.1	6.4	3.6	3.6	3.6
payback period (years)	17.0	14.7	12.8	13.0	12.6	12.3	15.3	14.8	14.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	81.7	63.5	46.2	80.5	60.3	42.6	82.3	65.3	48.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	85.0	78.1	56.5	85.0	73.9	52.1	85.0	78.9	59.6
% battery life increase	9.5	23.4	30.2	15.6	25.6	23.0	5.8	11.3	12.0
payback period (years)	17.9	8.9	7.6	12.7	7.0	6.9	16.8	8.8	8.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	60.6	25.9	18.2	56.2	23.8	16.8	62.8	27.3	19.2
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	74.7	31.7	22.3	68.9	29.2	20.6	77.7	33.5	23.6
% battery life increase	7.2	9.9	12.1	10.5	9.0	8.2	4.5	4.6	4.6
payback period (years)	36.8	31.8	27.8	27.9	27.0	26.4	33.6	31.9	31.1

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)
 Vehicle Use Pattern Number 5 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	12.6	5.5	3.8	11.6	5.1	3.5	13.3	5.8	4.0
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	15.5	6.8	4.6	14.3	6.3	4.3	16.4	7.2	4.9
% battery life increase	10.5	16.9	18.7	6.2	4.6	3.9	3.6	3.6	3.6
payback period (years)	19.6	3.9	0.9	20.5	16.5	13.7	27.6	21.5	17.3
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	40.2	17.6	12.0	37.1	16.2	11.1	42.4	18.6	12.7
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	49.2	21.5	14.7	45.4	19.9	13.6	51.9	22.7	15.5
% battery life increase	33.5	61.5	70.5	21.9	15.6	13.2	12.0	11.9	11.9
payback period (years)	12.5	2.6	0.6	11.5	9.3	7.7	15.6	12.2	9.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	15.9	6.9	4.7	14.6	6.4	4.4	16.7	7.3	5.0
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	19.5	8.5	5.8	17.9	7.9	5.4	20.5	9.0	6.1
% battery life increase	13.3	21.6	23.9	7.8	5.8	5.0	4.6	4.6	4.6
payback period (years)	42.8	8.6	2.0	44.0	35.4	29.4	59.3	46.3	37.1

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp = 15.7 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	12.6	5.5	3.8	11.6	5.1	3.5	13.3	5.8	4.0
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	30.3	44.3	44.3
% DOD reduction	15.5	6.8	4.6	14.3	6.3	4.3	16.4	7.2	4.9
% battery life increase	10.5	16.9	18.7	6.2	4.6	3.9	3.6	3.6	3.6
payback period (years)	16.1	3.8	0.9	16.7	13.9	11.9	21.1	17.3	14.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	40.2	17.6	12.0	37.1	16.2	11.1	42.4	18.6	12.7
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	30.3	44.3	44.3
% DOD reduction	49.2	21.5	14.7	45.4	19.9	13.6	51.9	22.7	15.5
% battery life increase	33.5	61.5	70.5	21.9	15.6	13.2	12.0	11.9	11.9
payback period (years)	10.0	2.5	0.6	9.3	7.8	6.7	11.9	9.8	8.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	15.9	6.9	4.7	14.6	6.4	4.4	16.7	7.3	5.0
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	30.3	44.3	44.3
% DOD reduction	19.5	8.5	5.8	17.9	7.9	5.4	20.5	9.0	6.1
% battery life increase	13.3	21.6	23.9	7.8	5.8	5.0	4.6	4.6	4.6
payback period (years)	35.0	8.3	2.0	35.8	29.9	25.5	45.3	37.3	31.1

LOCATION Atlanta

North Latitude = 33.7 Av. daily Horizontal Insolation = 4.16 (kWh/m²) Av. Daily Temp. = 15.7 (C)
 Vehicle Use Pattern Number 5 Energy Cost = \$0.20/kWh

BATTERY TYPE 1				BATTERY TYPE 2				BATTERY TYPE 3			
VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	
ARRAY TYPE = 1											
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0		1063.0	1063.0	1063.0	
% energy reduction	12.6	5.5	3.8	11.6	5.1	3.5		13.3	5.8	4.0	
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1		13.3	30.3	44.3	
% DOD reduction	15.5	6.8	4.6	14.3	6.3	4.3		16.4	7.2	4.9	
% battery life increase	10.5	16.9	18.7	6.2	4.6	3.9		3.6	3.6	3.6	
payback period (years)	11.8	3.5	0.9	12.1	10.6	9.4		14.3	12.5	10.9	
ARRAY TYPE = 2											
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0		1863.0	1863.0	1863.0	
% energy reduction	40.2	17.6	12.0	37.1	16.2	11.1		42.4	18.6	12.7	
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1		13.3	30.3	44.3	
% DOD reduction	49.2	21.5	14.7	45.4	19.9	13.6		51.9	22.7	15.5	
% battery life increase	33.5	61.5	70.5	21.9	15.6	13.2		12.0	11.9	11.9	
payback period (years)	7.1	2.2	0.6	6.8	5.9	5.2		8.0	7.0	6.1	
ARRAY TYPE = 3											
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0		2863.0	2863.0	2863.0	
% energy reduction	15.9	6.9	4.7	14.6	6.4	4.4		16.7	7.3	5.0	
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1		13.3	30.3	44.3	
% DOD reduction	19.5	8.5	5.8	17.9	7.9	5.4		20.5	9.0	6.6	
% battery life increase	13.3	21.6	23.9	7.8	5.8	5.0		4.6	4.6	4.6	
payback period (years)	25.6	7.6	2.0	26.1	22.8	20.1		30.8	26.8	23.5	

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	39.8	16.9	11.9	36.7	15.6	11.0	41.9	17.8	12.6
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	46.3	19.6	13.9	42.7	18.1	12.8	48.9	20.7	14.6
% battery life increase	4.5	6.1	7.4	6.3	5.5	5.0	2.8	2.8	2.8
payback period (years)	50.0	37.2	29.1	29.4	27.8	26.7	40.0	37.6	36.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	63.7	49.2	38.1	62.4	47.0	35.1	63.9	50.3	40.2
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.1	60.1	44.1	60.9	57.5	40.6	61.2	60.2	46.5
% battery life increase	7.0	17.2	23.1	10.9	18.0	17.4	4.2	8.1	9.2
payback period (years)	56.5	24.4	17.9	31.0	16.4	14.9	47.1	23.8	20.2
ARRAY TYPE =									
Up Front Co -s (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	47.2	21.2	15.0	44.7	19.6	13.8	48.6	22.4	15.8
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	58.2	24.6	17.4	53.7	22.7	16.1	60.0	26.0	18.4
% battery life increase	5.3	7.7	9.3	7.8	6.9	6.3	3.3	3.6	3.6
payback period (years)	114.5	80.6	63.1	65.2	59.7	57.3	93.2	80.8	77.3

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	39.8	16.9	11.9	36.7	15.6	11.0	41.9	17.8	12.6
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	46.3	19.6	13.9	42.7	18.1	12.8	48.9	20.7	14.6
% battery life increase	4.5	6.1	7.4	6.3	5.5	5.0	2.8	2.8	2.8
payback period (years)	34.5	27.9	23.1	23.3	22.3	21.6	29.5	28.2	27.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	63.7	49.2	38.1	62.4	47.0	35.1	63.9	50.3	40.2
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.1	60.1	44.1	60.9	57.5	40.6	61.2	60.2	46.5
% battery life increase	7.0	17.2	23.1	10.9	18.0	17.4	4.2	8.1	9.2
payback period (years)	38.7	17.9	13.9	24.4	13.1	12.0	34.5	17.7	15.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	47.2	21.2	15.0	44.7	19.6	13.8	48.6	22.4	15.8
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	58.2	24.6	17.4	53.7	22.7	16.1	60.0	26.0	18.4
% battery life increase	5.3	7.7	9.3	7.8	6.9	6.3	3.3	3.6	3.6
payback period (years)	78.9	60.3	50.0	51.6	47.8	46.3	68.7	60.4	58.4

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	39.8	16.9	11.9	36.7	15.6	11.0	41.9	17.8	12.6
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	46.3	19.6	13.9	42.7	18.1	12.8	48.9	20.7	14.6
% battery life increase	4.5	6.1	7.4	6.3	5.5	5.0	2.8	2.8	2.8
payback period (years)	21.4	18.6	16.3	16.4	15.9	15.6	19.3	18.7	18.3
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	63.7	49.2	38.1	62.4	47.0	35.1	63.9	50.3	40.2
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.1	60.1	44.1	60.9	57.5	40.6	61.2	60.2	46.5
% battery life increase	7.0	17.2	23.1	10.9	18.0	17.4	4.2	8.1	9.2
payback period (years)	23.7	11.7	9.6	17.2	9.3	8.6	22.5	11.7	10.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	47.2	21.2	15.0	44.7	19.6	13.8	48.6	22.4	15.8
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	58.2	24.6	17.4	53.7	22.7	16.1	60.0	26.0	18.4
% battery life increase	5.3	7.7	9.3	7.8	6.9	6.3	3.3	3.6	3.6
payback period (years)	48.7	40.1	35.3	36.4	34.2	33.4	45.0	40.2	39.3

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	16.4	7.1	4.9	15.1	6.6	4.5	17.3	7.5	5.2
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	19.2	8.3	5.7	17.7	7.7	5.3	20.2	8.8	6.0
% battery life increase	6.3	10.3	12.5	5.5	4.3	3.7	2.8	2.8	2.8
payback period (years)	36.3	15.0	6.6	27.5	24.2	21.7	37.3	32.2	28.4
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	47.6	22.8	15.7	45.6	21.0	14.4	48.7	24.0	16.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.3	26.5	18.2	56.2	24.4	16.8	58.4	27.9	19.2
% battery life increase	17.6	33.9	43.5	18.0	14.6	12.5	8.1	9.3	9.3
payback period (years)	23.9	9.5	4.2	16.3	13.5	12.1	23.7	18.1	16.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	20.6	9.0	6.2	19.0	8.3	5.7	21.8	9.5	6.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	24.1	10.5	7.2	22.2	9.6	6.6	25.4	11.0	7.6
% battery life increase	7.8	13.0	15.9	6.9	5.4	4.7	3.6	3.6	3.6
payback period (years)	78.7	32.7	14.4	59.1	51.8	46.5	80.0	69.1	61.0

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	16.4	7.1	4.9	15.1	6.6	4.5	17.3	7.5	5.2
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	19.2	8.3	5.7	17.7	7.7	5.3	20.2	8.8	6.0
% battery life increase	6.3	10.3	12.5	5.5	4.3	3.7	2.8	2.8	2.8
payback period (years)	27.4	13.2	6.2	22.1	19.8	18.1	27.9	25.0	22.6
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	47.6	22.8	15.7	45.6	21.0	14.4	48.7	24.0	16.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.3	26.5	18.2	56.2	24.4	16.8	58.4	27.9	19.2
% battery life increase	17.6	33.9	43.5	18.0	14.6	12.5	8.1	9.3	9.3
payback period (years)	17.6	8.2	3.9	13.0	11.1	10.1	17.7	14.0	12.7
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	20.6	9.0	6.2	19.0	8.3	5.7	21.8	9.5	6.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	24.1	10.5	7.2	22.2	9.6	6.6	25.4	11.0	7.6
% battery life increase	7.8	13.0	15.9	6.9	5.4	4.7	3.6	3.6	3.6
payback period (years)	59.2	28.8	13.6	47.4	42.6	38.9	59.9	53.6	48.6

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1			VEHICLE TYPE 2			VEHICLE TYPE 3		
	TYPE 1	TYPE 2	TYPE 3	TYPE 1	TYPE 2	TYPE 3	TYPE 1	TYPE 2	TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	16.4	7.1	4.9	15.1	6.6	4.5	17.3	7.5	5.2
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	19.2	8.3	5.7	17.7	7.7	5.3	20.2	8.8	6.0
% battery life increase	6.3	10.3	12.5	5.5	4.3	3.7	2.8	2.8	2.8
payback period (years)	18.3	10.7	5.6	15.8	14.6	13.7	18.6	17.2	16.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	47.6	22.8	15.7	45.6	21.0	14.4	48.7	24.0	16.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	58.3	26.5	18.2	56.2	24.4	16.8	58.4	27.9	19.2
% battery life increase	17.6	33.9	43.5	18.0	14.6	12.5	8.1	9.3	9.3
payback period (years)	11.6	6.5	3.5	9.3	8.1	7.6	11.7	9.6	9.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	20.6	9.0	6.2	19.0	8.3	5.7	21.8	9.5	6.5
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	24.1	10.5	7.2	22.2	9.6	6.6	25.4	11.0	7.6
% battery life increase	7.8	13.0	15.9	6.9	5.4	4.7	3.6	3.6	3.6
payback period (years)	39.5	23.2	12.2	33.9	31.4	29.3	39.9	37.0	34.5

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	7.6	3.4	**	7.0	3.1	8.0	3.6	2.4	2.4
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	17.8	40.1	59.6	59.6
% DOD reduction	8.9	4.0	**	8.2	3.7	9.4	4.2	2.8	2.8
% battery life increase	10.0	14.2	**	4.4	3.2	2.9	2.8	2.8	2.8
payback period (years)	16.4	1.8	**	24.3	18.2	32.5	23.2	16.9	16.9
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	24.2	10.8	**	22.3	9.9	25.5	11.4	7.6	7.6
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	17.8	40.1	59.6	59.6
% DOD reduction	28.3	12.6	**	26.1	11.6	29.9	13.3	8.9	8.9
% battery life increase	32.7	51.0	**	15.0	10.7	9.3	9.3	9.3	9.3
payback period (years)	10.3	1.2	**	13.6	10.2	18.3	13.1	9.5	9.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	9.5	4.2	**	8.8	3.9	10.0	4.5	3.0	3.0
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	17.8	40.1	59.6	59.6
% DOD reduction	11.2	5.0	**	10.3	4.6	11.8	5.3	3.5	3.5
% battery life increase	12.6	18.1	**	5.6	4.1	3.6	3.6	3.6	3.6
payback period (years)	35.8	3.9	**	52.2	39.1	69.7	49.9	36.2	36.2

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)
 Vehicle Use Pattern Number 3 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	7.6	3.4	**	7.0	3.1	8.0	3.6	2.4	2.4
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	17.8	40.1	59.6	59.6
% DOD reduction	8.9	4.0	**	8.2	3.7	9.4	4.2	2.8	2.8
% battery life increase	10.0	14.2	**	4.4	3.2	2.9	2.8	2.8	2.8
payback period (years)	14.3	1.8	**	20.0	15.7	25.1	19.2	14.6	14.6
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	24.2	10.8	**	22.3	9.9	25.5	11.4	7.6	7.6
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	17.8	40.1	59.6	59.6
% DOD reduction	28.3	12.6	**	26.1	11.6	29.9	13.3	8.9	8.9
% battery life increase	32.7	51.0	**	15.0	10.7	9.3	9.3	9.3	9.3
payback period (years)	8.8	1.1	**	11.1	8.7	14.0	10.8	8.2	8.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	9.5	4.2	**	8.8	3.9	10.0	4.5	3.0	3.0
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	17.8	40.1	59.6	59.6
% DOD reduction	11.2	5.0	**	10.3	4.6	11.8	5.3	3.5	3.5
% battery life increase	12.6	18.1	**	5.6	4.1	3.6	3.6	3.6	3.6
payback period (years)	31.1	3.9	**	42.8	33.6	53.9	41.3	31.4	31.4

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	7.6	3.4	**	3.1	2.1	2.1	3.6	3.6	2.4
Max. Winter DOD (%)	40.2	90.2	100.0	64.2	95.5	95.5	40.1	40.1	59.6
% DOD reduction	8.9	4.0	**	3.7	2.5	2.5	4.2	4.2	2.8
% battery life increase	10.0	14.2	**	3.2	2.7	2.7	2.8	2.8	2.8
payback period (years)	11.4	1.7	**	12.2	10.1	10.1	14.3	14.3	11.6
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	24.2	10.8	**	9.9	6.7	6.7	11.4	11.4	7.6
Max. Winter DOD (%)	40.2	90.2	100.0	64.2	95.5	95.5	40.1	40.1	59.6
% DOD reduction	28.3	12.6	**	11.6	7.8	7.8	13.3	13.3	8.9
% battery life increase	32.7	51.0	**	10.7	9.1	9.1	9.3	9.3	9.3
payback period (years)	6.9	1.1	**	6.8	5.6	5.6	8.0	8.0	6.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	9.5	4.2	**	3.9	2.6	2.6	4.5	4.5	3.0
Max. Winter DOD (%)	40.2	90.2	100.0	64.2	95.5	95.5	40.1	40.1	59.6
% DOD reduction	11.2	5.0	**	4.6	3.1	3.1	5.3	5.3	3.5
% battery life increase	12.6	18.1	**	4.1	3.5	3.5	3.6	3.6	3.6
payback period (years)	24.6	3.7	**	26.2	21.7	21.7	30.6	30.6	24.9

LOCATION Detroit

North Latitude = 42.4° Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5° (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	40.1	17.0	12.0	37.0	15.7	11.1	42.3	18.0	12.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	48.9	20.8	14.6	45.1	19.2	13.5	51.6	21.9	15.4
% battery life increase	4.8	6.6	8.0	6.7	5.8	5.3	3.0	3.0	3.0
payback period (years)	47.5	35.0	27.0	27.9	26.3	25.3	38.0	35.7	34.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	77.2	53.8	32.3	75.6	50.1	35.3	78.5	55.9	40.4
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	84.9	66.2	46.7	84.8	61.1	43.0	85.0	69.9	49.3
% battery life increase	8.9	19.7	24.8	14.3	20.5	18.5	5.5	9.6	9.8
payback period (years)	45.0	21.6	16.8	24.3	14.7	14.1	36.6	20.6	19.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	50.4	21.4	15.1	46.5	19.7	13.9	52.9	22.6	15.9
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	61.5	26.1	18.4	56.7	24.1	17.0	64.9	27.6	19.4
% battery life increase	6.0	8.2	10.0	8.6	7.3	6.7	3.8	3.8	3.8
payback period (years)	103.0	75.9	58.7	59.8	56.5	54.2	82.0	76.6	73.2

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	40.1	17.0	12.0	37.0	15.7	11.1	42.3	18.0	12.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	48.9	20.8	14.6	45.1	19.2	13.5	51.6	21.9	15.4
% battery life increase	4.8	6.6	8.0	6.7	5.8	5.3	3.0	3.0	3.0
payback period (years)	33.0	26.4	21.6	22.2	21.2	20.5	28.1	26.8	25.9
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	77.2	53.8	38.3	75.6	50.1	35.3	78.5	55.9	40.4
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	84.9	66.2	46.7	84.8	61.1	43.0	85.0	69.9	49.3
% battery life increase	8.9	19.7	24.8	14.3	20.5	18.5	5.5	9.6	9.8
payback period (years)	30.9	15.9	13.1	19.3	11.8	11.4	26.9	15.4	14.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	50.4	21.4	15.1	46.5	19.7	13.9	52.9	22.6	15.9
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	61.5	26.1	18.4	56.7	24.1	17.0	64.9	27.6	19.4
% battery life increase	6.0	8.2	10.0	8.6	7.3	6.7	3.8	3.8	3.8
payback period (years)	71.3	57.2	46.8	47.5	45.4	43.9	60.6	57.6	55.6

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	40.1	17.0	12.0	37.0	15.7	11.1	42.3	18.0	12.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	48.9	20.8	14.6	45.1	19.2	13.5	51.6	21.9	15.4
% battery life increase	4.8	6.6	8.0	6.7	5.8	5.3	3.0	3.0	3.0
payback period (years)	20.5	17.8	15.4	15.7	15.2	14.9	18.5	17.9	17.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	77.2	53.8	38.3	75.6	50.1	35.3	78.5	55.9	40.4
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	84.9	66.2	46.7	84.8	61.1	43.0	85.0	69.9	49.3
% battery life increase	8.9	19.7	24.8	14.3	20.5	18.5	5.5	9.6	9.8
payback period (years)	19.0	10.4	9.1	13.6	8.4	8.2	17.6	10.2	9.7
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	50.4	21.4	15.1	46.5	19.7	13.9	52.9	22.6	15.9
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	61.5	26.1	18.4	56.7	24.1	17.0	64.9	27.6	19.4
% battery life increase	6.0	8.2	10.0	8.6	7.3	6.7	3.8	3.8	3.8
payback period (years)	44.1	38.3	33.4	33.7	32.6	31.8	39.9	38.5	37.6

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.05/kWh

		BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1										
Up Front Costs (\$)		1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction		10.4	4.6	3.1	9.6	4.2	2.9	11.0	4.8	3.3
Max. Winter DOD (%)		29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction		12.7	5.6	3.8	11.8	5.1	3.5	13.5	5.9	4.0
% battery life increase		8.7	13.8	15.1	5.1	3.8	3.2	3.0	3.0	3.0
payback period (years)		23.5	4.7	1.1	24.7	19.9	16.5	33.3	26.0	20.6
ARRAY TYPE = 2										
Up Front Costs (\$)		1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction		33.4	14.6	10.0	30.8	13.5	9.2	35.2	15.4	10.5
Max. Winter DOD (%)		29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction		40.6	17.8	12.2	37.5	16.4	11.2	42.9	18.8	12.8
% battery life increase		27.4	48.4	54.8	17.6	12.7	10.8	9.8	9.8	9.8
payback period (years)		14.7	3.0	0.7	13.8	11.1	9.3	18.7	14.6	11.8
ARRAY TYPE = 3										
Up Front Costs (\$)		2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction		13.1	5.7	3.9	12.1	5.3	3.6	13.9	6.1	4.1
Max. Winter DOD (%)		29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction		16.0	7.0	4.8	14.8	6.5	4.4	16.9	7.4	5.1
% battery life increase		10.9	17.5	19.3	6.4	4.8	4.1	3.8	3.8	3.8
payback period (years)		51.1	10.3	2.4	53.1	42.7	35.4	71.5	55.8	44.8

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	10.4	4.6	3.1	9.6	4.2	2.9	11.0	4.8	3.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	12.7	5.6	3.8	11.8	5.1	3.5	13.5	5.9	4.0
% battery life increase	8.7	13.8	15.1	5.1	3.8	3.2	3.0	3.0	3.0
payback period (years)	19.3	4.5	1.1	20.1	16.8	14.3	25.5	20.9	17.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	33.4	14.6	10.0	30.8	13.5	9.2	35.2	15.4	10.5
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	40.6	17.8	12.2	37.5	16.4	11.2	42.9	18.8	12.8
% battery life increase	27.4	48.4	54.8	17.6	12.7	10.8	9.8	9.8	9.8
payback period (years)	11.8	2.9	0.7	11.2	9.4	8.0	14.2	11.7	9.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	13.1	5.7	3.9	12.1	5.3	3.6	13.9	6.1	4.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	16.0	7.0	4.8	14.8	6.5	4.4	16.9	7.4	5.1
% battery life increase	10.9	17.5	19.3	6.4	4.8	4.1	3.8	3.8	3.8
payback period (years)	41.9	9.9	2.4	43.2	36.1	30.7	54.6	45.0	37.5

LOCATION Detroit

North Latitude = 42.4 Av. daily Horizontal Insolation = 3.49 (kWh/m²) Av. Daily Temp. = 10.5 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	10.4	4.6	3.1	9.6	4.2	2.9	11.0	4.8	3.3
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	12.7	5.6	3.8	11.8	5.1	3.5	13.5	5.9	4.0
% battery life increase	8.7	13.8	15.1	5.1	3.8	3.2	3.0	3.0	3.0
payback period (years)	14.2	4.2	1.1	14.7	12.8	11.3	17.3	15.1	13.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	33.4	14.6	10.0	30.8	13.5	9.2	35.2	15.4	10.5
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	40.6	17.8	12.2	37.5	16.4	11.2	42.9	18.8	12.8
% battery life increase	27.4	48.4	54.8	17.6	12.7	10.8	9.8	9.8	9.8
payback period (years)	8.4	2.6	0.7	8.1	7.1	6.3	9.6	8.4	7.4
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	13.1	5.7	3.9	12.1	5.3	3.6	13.9	6.1	4.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	16.0	7.0	4.8	14.8	6.5	4.4	16.9	7.4	5.1
% battery life increase	10.9	17.5	19.3	6.4	4.8	4.1	3.8	3.8	3.8
payback period (years)	30.8	9.1	2.3	31.4	27.5	24.3	37.1	32.4	28.3

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)
 Vehicle Use Pattern Number 1 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	36.3	15.4	10.9	33.4	14.2	10.0	37.8	16.2	11.5
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	43.5	18.4	13.0	40.1	17.0	12.0	45.9	19.4	13.7
% battery life increase	4.0	5.5	6.6	5.7	4.9	4.5	2.5	2.5	2.5
payback period (years)	55.1	41.0	32.1	32.4	30.7	29.5	44.7	41.5	39.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	59.2	44.5	34.7	58.1	42.2	32.0	60.0	45.7	36.7
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.1	58.6	41.5	60.9	54.1	38.2	61.2	60.2	43.8
% battery life increase	6.4	15.3	20.5	9.9	15.8	15.5	3.9	7.3	8.3
payback period (years)	61.1	27.0	19.7	33.6	18.4	16.5	50.6	26.3	22.3
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	42.3	19.3	13.7	40.1	17.8	12.6	43.8	20.4	14.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	54.7	23.2	16.4	50.4	21.3	15.1	57.7	24.4	17.3
% battery life increase	4.7	6.9	8.3	6.9	6.2	5.7	2.9	3.2	3.2
payback period (years)	128.2	88.9	69.7	73.0	65.9	63.3	104.2	89.1	85.3

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	36.3	15.4	10.9	33.4	14.2	10.0	37.8	16.2	11.5
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	43.5	18.4	13.0	40.1	17.0	12.0	45.9	19.4	13.7
% battery life increase	4.0	5.5	6.6	5.7	4.9	4.5	2.5	2.5	2.5
payback period (years)	38.1	30.8	25.5	25.7	24.6	23.8	32.9	31.0	30.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	59.2	44.5	34.7	58.1	42.2	32.0	60.0	45.7	36.7
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.1	58.6	41.5	60.9	54.1	38.2	61.2	60.2	43.8
% battery life increase	6.4	15.3	20.5	9.9	15.8	15.5	3.9	7.3	8.3
payback period (years)	41.7	19.8	15.2	26.4	14.7	13.2	37.0	19.6	16.7
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	42.3	19.3	13.7	40.1	17.8	12.6	43.8	20.4	14.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	54.7	23.2	16.4	50.4	21.3	15.1	57.7	24.4	17.3
% battery life increase	4.7	6.9	8.3	6.9	6.2	5.7	2.9	3.2	3.2
payback period (years)	88.4	66.4	55.1	57.8	52.7	51.0	76.6	66.6	64.4

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	36.3	15.4	10.9	33.4	14.2	10.0	37.8	16.2	11.5
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	43.5	18.4	13.0	40.1	17.0	12.0	45.9	19.4	13.7
% battery life increase	4.0	5.5	6.6	5.7	4.9	4.5	2.5	2.5	2.5
payback period (years)	23.5	20.5	18.0	18.1	17.6	17.2	21.5	20.6	20.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	59.2	44.5	34.7	58.1	42.2	32.0	60.0	45.7	36.7
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.1	58.6	41.5	60.9	54.1	38.2	61.2	60.2	43.8
% battery life increase	6.4	15.3	20.5	9.9	15.8	15.5	3.9	7.3	8.3
payback period (years)	25.6	12.9	10.5	18.5	10.4	9.5	24.0	12.9	11.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	42.3	19.3	13.7	40.1	17.8	12.6	43.8	20.4	14.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	54.7	23.2	16.4	50.4	21.3	15.1	57.7	24.4	17.3
% battery life increase	4.7	6.9	8.3	6.9	6.2	5.7	2.9	3.2	3.2
payback period (years)	54.5	44.1	38.8	40.7	37.6	36.8	50.1	44.2	43.2

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	14.9	6.5	4.5	13.8	6.0	4.1	15.8	6.8	4.7
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	18.0	7.8	5.4	16.6	7.2	5.0	19.0	8.3	5.7
% battery life increase	5.6	9.2	11.2	4.9	3.8	3.3	2.6	2.6	2.5
payback period (years)	40.0	16.6	7.3	30.4	26.7	23.9	41.1	35.5	31.4
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	43.2	20.8	14.3	40.9	19.1	13.2	44.2	21.9	15.1
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	57.3	24.9	17.1	52.9	23.0	15.8	58.4	26.3	18.1
% battery life increase	15.7	29.8	37.9	15.7	13.0	11.2	7.3	8.3	8.3
payback period (years)	26.4	10.4	4.6	18.3	14.9	13.4	26.2	19.9	17.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	18.8	8.2	5.6	17.3	7.5	5.2	19.8	8.6	5.9
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	22.6	9.8	6.8	20.9	9.1	6.2	23.9	10.4	7.1
% battery life increase	7.0	11.6	14.2	6.2	4.9	4.2	3.2	3.2	3.2
payback period (years)	86.8	36.1	15.9	65.3	57.2	51.3	88.2	76.2	67.3

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	14.9	6.5	4.5	13.8	6.0	4.1	15.8	6.8	4.7
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	18.0	7.8	5.4	16.6	7.2	5.0	19.0	8.3	5.7
% battery life increase	5.6	9.2	11.2	4.9	3.8	3.3	2.6	2.6	2.5
payback period (years)	30.2	14.6	6.9	24.4	21.9	20.0	30.8	27.5	25.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	43.2	20.8	14.3	40.9	19.1	13.2	44.2	21.9	15.1
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	57.3	24.9	17.1	52.9	23.0	15.8	58.4	26.3	18.1
% battery life increase	15.7	29.8	37.9	15.7	13.0	11.2	7.3	8.3	8.3
payback period (years)	19.5	9.0	4.3	14.6	12.2	11.1	19.5	15.4	14.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	18.8	8.2	5.6	17.3	7.5	5.2	19.8	8.6	5.9
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	22.6	9.8	6.8	20.9	9.1	6.2	23.9	10.4	7.1
% battery life increase	7.0	11.6	14.2	6.2	4.9	4.2	3.2	3.2	3.2
payback period (years)	65.2	31.7	15.0	52.2	47.0	42.9	66.0	59.0	53.6

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	14.9	6.5	4.5	13.8	6.0	4.1	15.8	6.8	4.7
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	18.0	7.8	5.4	16.6	7.2	5.0	19.0	8.3	5.7
% battery life increase	5.6	9.2	11.2	4.9	3.8	3.3	2.6	2.6	2.5
payback period (years)	20.2	11.8	6.2	17.4	16.1	15.1	20.5	19.0	17.7
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	43.2	20.8	14.3	40.9	19.1	13.2	44.2	21.9	15.1
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	57.3	24.9	17.1	52.9	23.0	15.8	58.4	26.3	18.1
% battery life increase	15.7	29.8	37.9	15.7	13.0	11.2	7.3	8.3	8.3
payback period (years)	12.8	7.1	3.8	10.4	8.9	8.4	12.9	10.5	9.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	18.8	8.2	5.6	17.3	7.5	5.2	19.8	8.6	5.9
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	22.6	9.8	6.8	20.9	9.1	6.2	23.9	10.4	7.1
% battery life increase	7.0	11.6	14.2	6.2	4.9	4.2	3.2	3.2	3.2
payback period (years)	43.5	25.5	13.5	37.3	34.6	32.3	43.9	40.7	38.0

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	6.9	3.1	**	6.4	2.8	1.9	7.3	3.2	2.2
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	8.4	3.7	**	7.7	3.4	2.3	8.8	3.9	2.6
% battery life increase	9.0	12.7	**	3.9	2.9	2.5	2.6	2.6	2.6
payback period (years)	18.1	2.0	**	26.8	20.1	15.4	35.8	25.7	18.6
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	22.1	9.8	**	20.3	9.1	6.1	23.3	10.4	7.0
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	26.7	11.9	**	24.6	10.9	7.4	28.2	12.5	8.4
% battery life increase	28.8	44.3	**	13.4	9.6	8.2	8.4	8.4	8.4
payback period (years)	11.4	1.3	**	15.0	11.3	8.6	20.1	14.4	10.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	8.7	3.9	**	8.0	3.6	2.4	9.2	4.1	2.7
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	10.5	4.7	**	9.7	4.3	2.9	11.1	4.9	3.3
% battery life increase	11.3	16.1	**	5.0	3.7	3.1	3.2	3.2	3.2
payback period (years)	39.5	4.3	**	57.6	43.2	33.0	76.9	55.1	40.0

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	6.9	3.1	**	6.4	2.8	1.9	7.3	3.2	2.2
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	8.4	3.7	**	7.7	3.4	2.3	8.8	3.9	2.6
% battery life increase	9.0	12.7	**	3.9	2.9	2.5	2.6	2.6	2.6
payback period (years)	15.8	2.0	**	22.0	17.3	13.7	27.7	21.2	16.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	22.1	9.8	**	20.3	9.1	6.1	23.3	10.4	7.0
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	26.7	11.9	**	24.6	10.9	7.4	28.2	12.5	8.4
% battery life increase	28.8	44.3	**	13.4	9.6	8.2	8.4	8.4	9.1
payback period (years)	9.7	1.3	**	12.2	9.6	7.6	15.5	11.9	9.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	8.7	3.9	**	8.0	3.6	2.4	9.2	4.1	2.7
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	10.5	4.7	**	9.7	4.3	2.9	11.1	4.9	3.3
% battery life increase	11.3	16.1	**	5.0	3.7	3.1	3.2	3.2	3.2
payback period (years)	34.3	4.3	**	47.2	37.1	29.3	59.4	45.5	34.7

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1			VEHICLE TYPE 2			VEHICLE TYPE 3		
	TYPE 1	TYPE 2	TYPE 3	TYPE 1	TYPE 2	TYPE 3	TYPE 1	TYPE 2	TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	6.9	3.1	**	6.4	2.8	1.9	3.2	2.2	2.2
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	40.1	59.6	59.6
% DOD reduction	8.4	3.7	**	7.7	3.4	2.3	8.8	3.9	2.6
% battery life increase	9.0	12.7	**	3.9	2.9	2.5	2.6	2.6	2.6
payback period (years)	12.5	1.9	**	16.2	13.5	11.2	15.7	12.8	12.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	22.1	9.8	**	20.3	9.1	6.1	10.4	7.0	7.0
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	40.1	59.6	59.6
% DOD reduction	26.7	11.9	**	24.6	10.9	7.4	12.5	8.4	8.4
% battery life increase	28.8	44.3	**	13.4	9.6	8.2	8.4	8.4	8.4
payback period (years)	7.5	1.2	**	9.0	7.5	6.2	8.8	7.1	7.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	8.7	3.9	**	8.0	3.6	2.4	4.1	2.7	2.7
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	40.1	59.6	59.6
% DOD reduction	10.5	4.7	**	9.7	4.3	2.9	11.1	3.3	3.3
% battery life increase	11.3	16.1	**	5.0	3.7	3.1	3.2	3.2	3.2
payback period (years)	27.2	4.1	**	34.7	28.9	23.9	33.7	27.4	27.4

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	36.5	15.5	10.9	33.7	14.3	10.1	38.6	16.4	11.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	46.3	19.7	13.9	42.7	18.1	12.8	48.9	20.8	14.6
% battery life increase	4.3	5.9	7.2	6.1	5.2	4.8	2.7	2.7	2.7
payback period (years)	52.2	38.4	29.7	30.6	28.9	27.7	41.7	39.2	37.4
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	71.7	48.7	35.0	70.5	45.8	32.3	72.7	50.5	36.9
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	84.9	62.8	44.3	84.8	57.9	40.8	84.9	66.3	46.7
% battery life increase	8.2	17.6	22.1	13.1	18.4	16.6	5.0	8.6	8.9
payback period (years)	48.6	23.9	18.4	26.2	16.1	15.5	39.8	22.8	21.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	46.0	19.5	13.8	42.4	18.0	12.7	47.8	20.6	14.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	58.3	24.7	17.4	53.7	22.8	16.1	61.5	26.1	18.4
% battery life increase	5.4	7.4	9.0	7.8	6.7	6.1	3.4	3.4	3.4
payback period (years)	112.9	83.3	64.4	65.5	61.9	59.4	90.7	84.0	80.2

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)
 Vehicle Use Pattern Number 4 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	36.5	15.5	10.9	33.7	14.3	10.1	38.6	16.4	11.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	46.3	19.7	13.9	42.7	18.1	12.8	48.9	20.8	14.6
% battery life increase	4.3	5.9	7.2	6.1	5.2	4.8	2.7	2.7	2.7
payback period (years)	36.2	29.0	23.7	24.3	23.2	22.5	30.8	29.4	28.4
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	71.7	48.7	35.0	70.5	45.8	32.3	72.7	50.5	36.9
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	84.9	62.8	44.3	84.8	57.9	40.8	84.9	66.3	46.7
% battery life increase	8.2	17.6	22.1	13.1	18.4	16.6	5.0	8.6	8.9
payback period (years)	33.3	17.5	14.3	20.8	12.9	12.5	29.2	17.0	15.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	46.0	19.5	13.8	42.4	18.0	12.7	47.8	20.6	14.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	58.3	24.7	17.4	53.7	22.8	16.1	61.5	26.1	18.4
% battery life increase	5.4	7.4	9.0	7.8	6.7	6.1	3.4	3.4	3.4
payback period (years)	78.2	62.7	51.4	52.1	49.8	48.2	67.1	63.1	61.0

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	36.5	15.5	10.9	33.7	14.3	10.1	38.6	16.4	11.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	46.3	19.7	13.9	42.7	18.1	12.8	48.9	20.8	14.6
% battery life increase	4.3	5.9	7.2	6.1	5.2	4.8	2.7	2.7	2.7
payback period (years)	22.5	19.5	16.9	17.2	16.7	16.3	20.3	19.7	19.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	71.7	48.7	35.0	70.5	45.8	32.3	72.7	50.5	36.9
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	84.9	62.8	44.3	84.8	57.9	40.8	84.9	66.3	46.7
% battery life increase	8.2	17.6	22.1	13.1	18.4	16.6	5.0	8.6	8.9
payback period (years)	20.5	11.5	9.9	14.6	9.2	9.0	19.1	11.3	10.7
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	46.0	19.5	13.8	42.4	18.0	12.7	47.8	20.6	14.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	58.3	24.7	17.4	53.7	22.8	16.1	61.5	26.1	18.4
% battery life increase	5.4	7.4	9.0	7.8	6.7	6.1	3.4	3.4	3.4
payback period (years)	48.4	42.0	36.6	36.9	35.8	34.9	44.1	42.2	41.2

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)
 Vehicle Use Pattern Number 5 Energy Cost = \$0.05/kWh

BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1								
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	9.5	4.2	2.8	8.8	3.8	10.0	4.4	3.0
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	13.3	30.3	44.3
% DOD reduction	12.1	5.3	3.6	11.1	4.9	12.7	5.6	3.8
% battery life increase	7.8	12.4	13.6	4.6	3.4	2.7	2.7	2.7
payback period (years)	25.8	5.2	1.2	27.1	21.8	36.5	28.5	22.9
ARRAY TYPE = 2								
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	30.5	13.3	9.1	28.1	12.3	32.2	14.1	9.6
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	13.3	30.3	44.3
% DOD reduction	38.5	16.9	11.5	35.5	15.6	40.7	17.8	12.2
% battery life increase	24.4	42.4	47.7	15.9	11.5	8.9	8.9	8.8
payback period (years)	16.1	3.3	0.8	15.2	12.2	20.5	16.0	12.9
ARRAY TYPE = 3								
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	12.0	5.2	3.6	11.1	4.8	12.7	5.5	3.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	13.3	30.3	44.3
% DOD reduction	15.2	6.6	4.5	14.0	6.1	16.0	7.0	4.8
% battery life increase	9.8	15.7	17.3	5.8	4.3	3.4	3.4	3.4
payback period (years)	56.1	11.3	2.7	58.2	46.8	78.4	61.2	49.1

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	9.5	4.2	2.8	8.8	3.8	2.6	10.0	4.4	3.0
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	12.1	5.3	3.6	11.1	4.9	3.3	12.7	5.6	3.8
% battery life increase	7.8	12.4	13.6	4.6	3.4	2.9	2.7	2.7	2.7
payback period (years)	21.2	5.0	1.2	22.1	18.4	15.7	27.9	23.0	19.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	30.5	13.3	9.1	28.1	12.3	8.4	32.2	14.1	9.6
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	38.5	16.9	11.5	35.5	15.6	10.6	40.7	17.8	12.2
% battery life increase	24.4	42.4	47.7	15.9	11.5	9.7	8.9	8.9	8.8
payback period (years)	12.9	3.2	0.8	12.3	10.3	8.8	15.6	12.9	10.8
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	12.0	5.2	3.6	11.1	4.8	3.3	12.7	5.5	3.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	15.2	6.6	4.5	14.0	6.1	4.2	16.0	7.0	4.8
% battery life increase	9.8	15.7	17.3	5.8	4.3	3.7	3.4	3.4	3.4
payback period (years)	46.0	10.8	2.6	47.3	39.5	33.7	59.9	49.3	41.1

LOCATION Seattle

North Latitude = 47.5 Av. daily Horizontal Insolation = 3.21 (kWh/m²) Av. Daily Temp. = 10.3 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	9.5	4.2	2.8	8.8	3.8	2.6	10.0	4.4	3.0
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	12.1	5.3	3.6	11.1	4.9	3.3	12.7	5.6	3.8
% battery life increase	7.8	12.4	13.6	4.6	3.4	2.9	2.7	2.7	2.7
payback period (years)	15.6	4.6	1.2	16.1	14.1	12.4	19.0	16.6	14.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	30.5	13.3	9.1	28.1	12.3	8.4	32.2	14.1	9.6
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	38.5	16.9	11.5	35.5	15.6	10.6	40.7	17.8	12.2
% battery life increase	24.4	42.4	47.7	15.9	11.5	9.7	8.9	8.9	8.8
payback period (years)	9.2	2.9	0.8	8.9	7.8	6.9	10.5	9.2	8.1
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	12.0	5.2	3.6	11.1	4.8	3.3	12.7	5.5	3.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	15.2	6.6	4.5	14.0	6.1	4.2	16.0	7.0	4.8
% battery life increase	9.8	15.7	17.3	5.8	4.3	3.7	3.4	3.4	3.4
payback period (years)	33.7	10.0	2.6	34.5	30.2	26.6	40.7	35.5	31.1

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1			VEHICLE TYPE 2			VEHICLE TYPE 3		
	TYPE 1	TYPE 2	TYPE 3	TYPE 1	TYPE 2	TYPE 3	TYPE 1	TYPE 2	TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	26.5	11.2	7.9	24.4	10.3	7.3	27.9	11.8	8.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	37.5	15.9	11.2	34.5	14.6	10.3	39.5	16.7	11.8
% battery life increase	2.8	3.8	4.6	3.9	3.4	3.1	1.8	1.8	1.7
payback period (years)	77.1	57.6	45.2	46.1	43.7	42.0	62.3	58.8	56.3
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	52.4	36.1	25.5	50.6	33.3	23.5	53.6	38.1	26.9
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.3	50.6	35.8	61.2	46.7	33.0	61.3	53.4	37.8
% battery life increase	5.2	11.6	14.1	7.9	11.4	10.4	3.2	5.7	5.7
payback period (years)	71.7	34.1	27.0	40.7	24.2	23.2	59.5	32.6	31.2
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	33.4	14.1	10.0	30.8	13.0	9.2	35.2	14.9	10.5
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	47.1	19.9	14.1	43.5	18.4	13.0	49.7	21.1	14.9
% battery life increase	3.5	4.8	5.7	4.9	4.3	3.9	2.2	2.2	2.2
payback period (years)	166.0	124.3	97.6	98.7	93.5	89.9	133.4	125.8	120.5

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)
 Vehicle Use Pattern Number 1 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	26.5	11.2	7.9	24.4	10.3	7.3	27.9	11.8	8.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	37.5	15.9	11.2	34.5	14.6	10.3	39.5	16.7	11.8
% battery life increase	2.8	3.8	4.6	3.9	3.4	3.1	1.8	1.8	1.7
payback period (years)	52.9	42.9	35.6	36.2	34.7	33.6	45.5	43.6	42.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	52.4	36.1	25.5	50.6	33.3	23.5	53.6	38.1	26.9
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.3	50.6	35.8	61.2	46.7	33.0	61.3	53.4	37.8
% battery life increase	5.2	11.6	14.1	7.9	11.4	10.4	3.2	5.7	5.7
payback period (years)	48.4	24.8	20.9	31.6	19.1	18.5	42.9	24.1	23.3
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	33.4	14.1	10.0	30.8	13.0	9.2	35.2	14.9	10.5
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	47.1	19.9	14.1	43.5	18.4	13.0	49.7	21.1	14.9
% battery life increase	3.5	4.8	5.7	4.9	4.3	3.9	2.2	2.2	2.2
payback period (years)	113.6	92.4	76.8	77.4	74.2	71.9	97.3	93.2	90.3

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 1 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	26.5	11.2	7.9	24.4	10.3	7.3	27.9	11.8	8.4
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	37.5	15.9	11.2	34.5	14.6	10.3	39.5	16.7	11.8
% battery life increase	2.8	3.8	4.6	3.9	3.4	3.1	1.8	1.8	1.7
payback period (years)	32.5	28.4	25.0	25.3	24.6	24.0	29.5	28.7	28.1
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	52.4	36.1	25.5	50.6	33.3	23.5	53.6	38.1	26.9
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	61.3	50.6	35.8	61.2	46.7	33.0	61.3	53.4	37.8
% battery life increase	5.2	11.6	14.1	7.9	11.4	10.4	3.2	5.7	5.7
payback period (years)	29.4	16.1	14.3	21.9	13.5	13.2	27.5	15.8	15.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	33.4	14.1	10.0	30.8	13.0	9.2	35.2	14.9	10.5
Max. Winter DOD (%)	7.6	17.9	25.3	5.4	12.7	18.0	3.4	7.9	11.2
% DOD reduction	47.1	19.9	14.1	43.5	18.4	13.0	49.7	21.1	14.9
% battery life increase	3.5	4.8	5.7	4.9	4.3	3.9	2.2	2.2	2.2
payback period (years)	69.7	61.0	53.8	54.1	52.6	51.4	63.2	61.4	60.1

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	10.9	4.7	3.3	10.0	4.4	3.0	11.5	5.0	3.4
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	15.5	6.7	4.6	14.3	6.2	4.3	16.4	7.1	4.9
% battery life increase	3.9	6.3	7.7	3.4	2.6	2.3	1.8	1.8	1.8
payback period (years)	56.1	23.4	10.3	43.2	37.9	34.1	58.1	50.3	44.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	35.1	15.2	10.5	32.4	14.1	9.7	37.0	16.1	11.1
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	49.6	21.5	14.8	45.7	19.9	13.7	52.3	22.7	15.7
% battery life increase	11.9	20.2	25.1	11.4	8.8	7.6	5.7	5.7	5.7
payback period (years)	33.3	14.3	6.4	23.9	21.0	18.9	32.3	27.9	24.7
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	13.7	6.0	4.1	12.7	5.5	3.8	14.5	6.3	4.3
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	19.5	8.5	5.8	18.0	7.8	5.4	20.6	9.0	6.2
% battery life increase	4.9	8.0	9.7	4.3	3.3	2.9	2.2	2.2	2.2
payback period (years)	121.1	50.7	22.4	92.5	81.2	72.9	124.4	107.7	95.3

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	10.9	4.7	3.3	10.0	4.4	3.0	11.5	5.0	3.4
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	15.5	6.7	4.6	14.3	6.2	4.3	16.4	7.1	4.9
% battery life increase	3.9	6.3	7.7	3.4	2.6	2.3	1.8	1.8	1.8
payback period (years)	42.0	20.5	9.7	34.3	30.9	28.3	43.2	38.7	35.2
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	35.1	15.2	10.5	32.4	14.1	9.7	37.0	16.1	11.1
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	49.6	21.5	14.8	45.7	19.9	13.7	52.3	22.7	15.7
% battery life increase	11.9	20.2	25.1	11.4	8.8	7.6	5.7	5.7	5.7
payback period (years)	24.4	12.3	5.9	18.9	17.1	15.6	23.9	21.4	19.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	13.7	6.0	4.1	12.7	5.5	3.8	14.5	6.3	4.3
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	19.5	8.5	5.8	18.0	7.8	5.4	20.6	9.0	6.2
% battery life increase	4.9	8.0	5.7	4.3	3.3	2.9	2.2	2.2	2.2
payback period (years)	90.5	44.4	21.1	73.5	66.2	60.6	92.4	82.8	75.3

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 2 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	10.9	4.7	3.3	10.0	4.4	3.0	11.5	5.0	3.4
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	18.2	18.9	27.4
% DOD reduction	15.5	6.7	4.6	14.3	6.2	4.3	16.4	7.1	4.9
% battery life increase	3.9	6.3	7.7	3.4	2.6	2.3	1.8	1.8	1.8
payback period (years)	28.0	16.5	8.7	24.4	22.6	21.2	28.5	26.5	24.8
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	35.1	15.2	10.5	32.4	14.1	9.7	37.0	16.1	11.1
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	49.6	21.5	14.8	45.7	19.9	13.7	52.3	22.7	15.7
% battery life increase	11.9	20.2	25.1	11.4	8.8	7.6	5.7	5.7	5.7
payback period (years)	15.9	9.7	5.3	13.4	12.4	11.6	15.7	14.6	13.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	13.7	6.0	4.1	12.7	5.5	3.8	14.5	6.3	4.3
Max. Winter DOD (%)	18.5	42.5	61.8	13.1	30.3	44.0	8.2	18.9	27.4
% DOD reduction	19.5	8.5	5.8	18.0	7.8	5.4	20.6	9.0	6.2
% battery life increase	4.9	8.0	9.7	4.3	3.3	2.9	2.2	2.2	2.2
payback period (years)	60.1	35.6	18.9	52.1	48.3	45.3	60.9	56.6	53.0

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	5.0	2.2	**	4.6	2.1	1.4	5.3	2.4	1.6
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	7.2	3.2	**	6.7	3.0	2.0	7.6	3.4	2.3
% battery life increase	6.2	8.7	**	2.7	2.0	1.7	1.8	1.8	1.8
payback period (years)	25.5	2.8	**	38.1	28.6	21.9	50.6	36.4	26.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	16.2	7.2	**	14.9	6.6	4.5	17.1	7.6	5.1
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	23.1	10.3	**	21.3	9.5	6.4	24.4	10.9	7.3
% battery life increase	19.6	29.0	**	9.1	6.6	5.6	5.8	5.8	5.8
payback period (years)	15.5	1.7	**	21.1	15.9	12.2	28.1	20.3	14.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	6.3	2.8	**	5.8	2.6	1.7	6.7	3.0	2.0
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	9.1	4.1	**	8.4	3.7	2.5	9.6	4.3	2.9
% battery life increase	7.8	11.0	**	3.4	2.5	2.2	2.3	2.2	2.2
payback period (years)	55.3	6.1	**	81.5	61.3	47.0	108.3	77.9	56.7

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)
 Vehicle Use Pattern Number 3 Energy Cost = \$0.10/kWh

BATTERY TYPE 1				BATTERY TYPE 2				BATTERY TYPE 3			
VEHICLE TYPE 1				VEHICLE TYPE 2				VEHICLE TYPE 3			
VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3		VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	
ARRAY TYPE = 1											
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0		1063.0	1063.0	1063.0	
% energy reduction	5.0	2.2	**	4.6	2.1	1.4		5.3	2.4	1.6	
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5		17.8	40.1	59.6	
% DOD reduction	7.2	3.2	**	6.7	3.0	2.0		7.6	3.4	2.3	
% battery life increase	6.2	8.7	**	2.7	2.0	1.7		1.8	1.8	1.8	
payback period (years)	22.1	2.8	**	31.0	24.4	19.4		38.8	29.9	22.8	
ARRAY TYPE = 2											
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0		1863.0	1863.0	1863.0	
% energy reduction	16.2	7.2	**	14.9	6.6	4.5		17.1	7.6	5.1	
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5		17.8	40.1	59.6	
% DOD reduction	23.1	10.3	**	21.3	9.5	6.4		24.4	10.9	7.3	
% battery life increase	19.6	29.0	**	9.1	6.6	5.6		5.8	5.8	5.8	
payback period (years)	13.3	1.7	**	17.1	13.5	10.7		21.5	16.6	12.7	
ARRAY TYPE = 3											
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0		2863.0	2863.0	2863.0	
% energy reduction	6.3	2.8	**	5.8	2.6	1.7		6.7	3.0	2.0	
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5		17.8	40.1	59.6	
% DOD reduction	9.1	4.1	**	8.4	3.7	2.5		9.6	4.3	2.9	
% battery life increase	7.8	11.0	**	3.4	2.5	2.2		2.3	2.2	2.2	
payback period (years)	47.9	6.0	**	66.4	52.3	41.5		83.1	64.0	48.9	

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 3 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	5.0	2.2	**	4.6	2.1	1.4	5.3	2.4	1.6
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	7.2	3.2	**	6.7	3.0	2.0	7.6	3.4	2.3
% battery life increase	6.2	8.7	**	2.7	2.0	1.7	1.8	1.8	1.8
payback period (years)	17.5	2.7	**	22.6	18.9	15.7	26.5	22.0	17.9
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	16.2	7.2	**	14.9	6.6	4.5	17.1	7.6	5.1
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	23.1	10.3	**	21.3	9.5	6.4	24.4	10.9	7.3
% battery life increase	19.6	29.0	**	9.1	6.6	5.6	5.8	5.8	5.8
payback period (years)	10.3	1.7	**	12.4	10.4	8.7	14.6	12.2	9.9
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	6.3	2.8	**	5.8	2.6	1.7	6.7	3.0	2.0
Max. Winter DOD (%)	40.2	90.2	100.0	28.6	64.2	95.5	17.8	40.1	59.6
% DOD reduction	9.1	4.1	**	8.4	3.7	2.5	9.6	4.3	2.9
% battery life increase	7.8	11.0	**	3.4	2.5	2.2	2.3	2.2	2.2
payback period (years)	37.7	5.8	**	48.4	40.5	33.7	56.7	47.1	38.4

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	26.8	11.4	8.0	24.7	10.5	7.4	28.3	12.0	8.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	41.5	17.6	12.4	38.3	16.2	11.4	43.8	18.6	13.1
% battery life increase	3.1	4.3	5.2	4.3	3.7	3.4	2.0	2.0	1.9
payback period (years)	71.2	52.4	40.5	42.1	39.8	38.2	57.3	53.9	51.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	61.8	36.7	25.9	60.1	33.8	23.8	63.0	38.7	27.3
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	84.9	56.4	39.7	84.9	52.0	36.6	85.0	59.4	41.9
% battery life increase	6.6	12.8	15.8	10.3	12.7	11.6	4.1	6.3	6.3
payback period (years)	58.1	31.5	24.6	32.0	22.1	21.2	47.6	30.1	28.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	33.8	14.4	10.1	31.2	13.3	9.3	35.7	15.2	10.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	52.2	22.2	15.6	48.2	20.5	14.4	55.1	23.4	16.5
% battery life increase	3.9	5.4	6.5	5.5	4.7	4.3	2.5	2.5	2.5
payback period (years)	153.7	113.3	87.7	90.2	85.2	81.8	122.9	115.4	110.2

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	26.8	11.4	8.0	24.7	10.5	7.4	28.3	12.0	8.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	41.5	17.6	12.4	38.3	16.2	11.4	43.8	18.6	13.1
% battery life increase	3.1	4.3	5.2	4.3	3.7	3.4	2.0	2.0	1.9
payback period (years)	49.5	39.6	32.4	33.4	32.0	30.9	42.3	40.4	39.0
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	61.8	36.7	25.9	60.1	33.8	23.8	63.0	38.7	27.3
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	84.9	56.4	39.7	84.9	52.0	36.6	85.0	59.4	41.9
% battery life increase	6.6	12.8	15.8	10.3	12.7	11.6	4.1	6.3	6.3
payback period (years)	39.5	23.2	19.2	25.1	17.6	17.1	34.7	22.4	21.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	33.8	14.4	10.1	31.2	13.3	9.3	35.7	15.2	10.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	52.2	22.2	15.6	48.2	20.5	14.4	55.1	23.4	16.5
% battery life increase	3.9	5.4	6.5	5.5	4.7	4.3	2.5	2.5	2.5
payback period (years)	106.4	85.3	69.9	71.5	68.4	66.1	90.6	86.5	83.6

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 4 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	26.8	11.4	8.0	24.7	10.5	7.4	28.3	12.0	8.5
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	41.5	17.6	12.4	38.3	16.2	11.4	43.8	18.6	13.1
% battery life increase	3.1	4.3	5.2	4.3	3.7	3.4	2.0	2.0	1.9
payback period (years)	30.7	26.6	23.1	23.6	22.9	22.4	27.8	26.9	26.3
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	61.8	36.7	25.9	60.1	33.8	23.8	63.0	38.7	27.3
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	84.9	56.4	39.7	84.9	52.0	36.6	85.0	59.4	41.9
% battery life increase	6.6	12.8	15.8	10.3	12.7	11.6	4.1	6.3	6.3
payback period (years)	24.0	15.2	13.4	17.6	12.6	12.3	22.4	14.9	14.5
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	33.8	14.4	10.1	31.2	13.3	9.3	35.7	15.2	10.7
Max. Winter DOD (%)	7.8	18.3	26.0	5.5	13.0	18.5	3.5	8.1	11.6
% DOD reduction	52.2	22.2	15.6	48.2	20.5	14.4	55.1	23.4	16.5
% battery life increase	3.9	5.4	6.5	5.5	4.7	4.3	2.5	2.5	2.5
payback period (years)	65.8	57.1	49.8	50.6	49.0	47.8	59.4	57.6	56.3

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.05/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	7.0	3.1	2.1	6.4	2.8	1.9	7.4	3.2	2.2
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	10.8	4.7	3.2	10.0	4.4	3.0	11.4	5.0	3.4
% battery life increase	5.6	8.8	9.6	3.3	2.4	2.1	1.9	1.9	1.9
payback period (years)	35.2	7.1	1.7	37.4	30.1	25.0	50.3	39.3	31.5
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	22.5	9.9	6.7	20.8	9.1	6.2	23.8	10.4	7.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	34.6	15.1	10.4	31.9	14.0	9.5	36.5	16.0	10.9
% battery life increase	17.3	28.9	32.2	11.1	8.1	6.9	6.3	6.3	6.3
payback period (years)	21.5	4.4	1.0	20.7	16.7	13.9	28.0	21.9	17.6
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	8.8	3.9	2.6	8.1	3.6	2.4	9.3	4.1	2.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	13.6	6.0	4.1	12.6	5.5	3.8	14.4	6.3	4.3
% battery life increase	7.0	11.1	12.2	4.2	3.1	2.7	2.5	2.5	2.4
payback period (years)	76.3	15.4	3.6	80.1	64.5	53.5	107.6	84.1	67.5

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.10/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	7.0	3.1	2.1	6.4	2.8	1.9	7.4	3.2	2.2
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	10.8	4.7	3.2	10.0	4.4	3.0	11.4	5.0	3.4
% battery life increase	5.6	8.8	9.6	3.3	2.4	2.1	1.9	1.9	1.9
payback period (years)	28.9	6.8	1.6	30.4	25.4	21.6	38.3	31.6	26.4
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	22.5	9.9	6.7	20.8	9.1	6.2	23.8	10.4	7.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	34.6	15.1	10.4	31.9	14.0	9.5	36.5	16.0	10.9
% battery life increase	17.3	28.9	32.2	11.1	8.1	6.9	6.3	6.3	6.3
payback period (years)	17.3	4.2	1.0	16.8	14.0	12.0	21.2	17.5	14.7
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	8.8	3.9	2.6	8.1	3.6	2.4	9.3	4.1	2.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	13.6	6.0	4.1	12.6	5.5	3.8	14.4	6.3	4.3
% battery life increase	7.0	11.1	12.2	4.2	3.1	2.7	2.5	2.5	2.4
payback period (years)	62.5	14.7	3.6	65.0	54.3	46.3	82.1	67.6	56.5

LOCATION Fairbanks

North Latitude = 64.8 Av. daily Horizontal Insolation = 2.50 (kWh/m²) Av. Daily Temp. = -3.6 (C)

Vehicle Use Pattern Number 5 Energy Cost = \$0.20/kWh

	BATTERY TYPE 1			BATTERY TYPE 2			BATTERY TYPE 3		
	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3	VEHICLE TYPE 1	VEHICLE TYPE 2	VEHICLE TYPE 3
ARRAY TYPE = 1									
Up Front Costs (\$)	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0	1063.0
% energy reduction	7.0	3.1	2.1	6.4	2.8	1.9	7.4	3.2	2.2
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	10.8	4.7	3.2	10.0	4.4	3.0	11.4	5.0	3.4
% battery life increase	5.6	8.8	9.6	3.3	2.4	2.1	1.9	1.9	1.9
payback period (years)	21.3	6.3	1.6	22.1	19.3	17.1	26.0	22.7	19.9
ARRAY TYPE = 2									
Up Front Costs (\$)	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0	1863.0
% energy reduction	22.5	9.9	6.7	20.8	9.1	6.2	23.8	10.4	7.1
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	34.6	15.1	10.4	31.9	14.0	9.5	36.5	16.0	10.9
% battery life increase	17.3	28.9	32.2	11.1	8.1	6.9	6.3	6.3	6.3
payback period (years)	12.4	3.9	1.0	12.1	10.6	9.4	14.3	12.5	11.0
ARRAY TYPE = 3									
Up Front Costs (\$)	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0	2863.0
% energy reduction	8.8	3.9	2.6	8.1	3.6	2.4	9.3	4.1	2.8
Max. Winter DOD (%)	29.9	68.3	99.9	21.3	48.6	71.1	13.3	30.3	44.3
% DOD reduction	13.6	6.0	4.1	12.6	5.5	3.8	14.4	6.3	4.3
% battery life increase	7.0	11.1	12.2	4.2	3.1	2.7	2.5	2.5	2.4
payback period (years)	45.9	13.6	3.5	47.2	41.3	36.5	55.6	48.6	42.6

Appendix B

Listing of Computer Program

(C Language, Format TAR)

Note: A DC 600A Data Cartridge Tape of this program is available. This tape also contains data generated by the program which is printed in Appendix A.


```

#ifndef SOLAR
#define SOLAR
/*****
/*      Solar Array Parameters      */
*****/

double  n1,      /* array efficiency      */

        c1,      /* installation cost of solar array ($) */
        c2,      /* cost per square meter of solar array ($) */
        area,    /* area of solar array (square meters) */

/*****
/*      Converter Parameters      */
*****/

        p0,      /* tane loss of converter (Watts) */
        n2,      /* eff. of converter */
        c3,      /* cost intercept of converter ($) */
        c4,      /* converter cost per m**2 of array ($/m/m) */

/*****
/*      Vehicle Parameters      */
*****/

        e0,      /* vechicle energy intercept (Wh/km) */
        a,      /* linear coefficient in model (Wh/km)**2 */
        b,      /* quartratic coefficient in model (Wh,km)**3 */

/*****
/*      Battery Parameters      */
*****/

        e1,      /* fixed battery loss (Wh) */
        n3,      /* eff. of battery */

/*****
/*      Charger Parameters      */
*****/

        n4;      /* charger eff. */

/*****
/*      Battery Life Parameters      */
*****/

double  c5,      /* replacement cost of battery(includes rebate) ($/kWh) */
        e2,      /* battery energy rating (kWh) */
        Tcal,    /* calendar life of battery (years) */
        Nfc,     /* charge cycle life */
        Ncy,     /* dod life cycle */
        alpha,   /* dod sensitivity constant */
        x0;      /* dod reference value */

/*****
/*      Electricity Cost Parameters      */
*****/

double  c6;      /* electricity cost ($/kWh) */

#endif

```

```
#ifndef GLOBAL_SOLAR
#define GLOBAL_SOLAR

/*****
/*      Declaration of Global Arrays      */
*****/

/*****

double  p_out[50000],    /* power out of battery system      */
        p_in[50000],    /* power in from solar arrays      */
        p_out_SA[50000],/* power out with solar arrays      */
        aas,aaf,aaw,aasp,
        v[20][2],

        coff1[4],coff2[4];          /* insolation coefficents      */
        double es,ew,esp,ef,l,latitude,dtemp;

*****/

/*****
/* Declare global flag used to indicate full charge status.      */
*****/

int      full_charge,current_season,out_of_gas[3][3];
char     location[20];
int      v_type,b_type,a_type,e_type,s_type;
#endif
```

```

#include "global_solar.h"
#include "solar.h"
#include <stdio.h>
#define NO SEASONS 4
/*****

/* This program was developed to determine the feasibility of
/* placing solar arrays on electric vehicles.
/*
/* The simulation will be performed for a total of:
/*      8 locations ( 1 page of data for each season),
/*      5 vehicle speed models,
/*      3 battery types,
/* and 3 vechiles.
*/

*****/

main()
{
/* declare external functions */
extern double S(),V();
extern double battery_dep season();
extern double model_PV_system();
extern double model_charger();
extern double model_vehicle_energy_use();

/*****

/* The use of extensions are used throughout this program
/* distinguish the two systems being monitored.
/* The extension SA is used to describe data associated
/* with the system with the Solar Array (SA) while NSA is used
/* for the system with NO Solar Array (NSA).
/* The values calculated for printing are stored in 3X3
/* arrays until printing.
*/

*****/

double ENSA,ESA,electricity cost SA,electricity cost NSA;
double season cost SA[4],season cost_NSA[4],life_SA[4],life_NSA[4];
double life year SA,life year NSA;
double days[4],season cost year SA,season cost year NSA;
double cost_saved[3][3],battery_cost SA,battery_cost_NSA,payback[3][3];
double dod SA,dod NSA,maxdod SA,maxdod NSA,big;
double speed,input,pos_engy,neg_engy,ETN;
double percent_energy_reduction[3][3],percent_dod_reduction[3][3];
double percent_battery_life_increase[3][3];
double AESA[4],AENSA[4];
double cost_SA[3][3],cost_NSA[3][3],upfrontcost[3][3];
double maxdod_year_SA[3][3],maxdod_year_NSA[3][3];
float time,dt;
int i,j,upper,l,m;
char string1[120],string2[10];

*****/

/* Program initialization.
/* big: the number of time steps to be taken to
/* calculate the integral of the energy curves.
/*
/* dt: delta time = 1/big
/*
/* days[]: number of days in a particular season.
/*
/* full_charge: flag to indicate if battery is at
/* full charge.
*/

```

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```

/*****/

    read_battery(1);
    read_battery_life(1);

    while(read_battery(0) && read_battery_life(0)) {
        read_vehicle(1);
        while(read_vehicle(0)) {

/*****/

/*      For each of the four seasons, read data for S and      */
/* calculate the payback period for the year.                  */
/*****/

/*****/

/* This is the main loop of the procedure. The power curves   */
/* for the propulsion system are generated with and without    */
/* the solar arrays effects.                                    */
/*****/

/*****/
/*****/

    out_of_gas[v_type-1][b_type-1] = 0;
    maxdod_year_NSA[v_type-1][b_type-1] = 0.0;

    for(current_season=0;current_season<NO_SEASONS;current_season++) {
        AESA[current_season] = 0.0;
        AENSA[current_season] = 0.0;

        V(0.0,1);

/*****/

/* Initialize positive and negative energy counters and others. */
/*****/

        full_charge = 1;
        pos_engy = (double) 0.0;
        neg_engy = (double) 0.0;
        EIN = (double) 0.0;
        ESA = (double) 0.0;
        ENSA = (double) 0.0;
        maxdod_SA = (double) 0.0;
        maxdod_NSA = (double) 0.0;

        time = 0.005 ;
        for(i=0;i<=upper;i++) {

/*****/

/* Calculate the power output from the battery system with      */
/* and without the effects of the solar arrays.                  */
/*****/

        speed = V(time,0);
        p_out[i] = model_vehicle_energy_use(speed,a,b,e0,n3);

/*****/

```

```

/* Calculate the power input from the solar arrays. */
/* The Insolation Model returns a value in (kW/m^2), the */
/* value must be converted to (Watts) for use in the program. */
/*****/

    input = S(time,0)*area*1000;

/*****/

/* If the battery is at full charge the input from the solar */
/* arrays it equal to zero. */
/*****/
    if( full_charge || input == 0.0 ) {
        p_in[i] = (double) 0.0;
    }
/*****/

/* Else model the power input by the PVs. */
/*****/

    else p_in[i] = model_PV_system(input,n1,p0,n2);

    p_out_SA[i] = p_out[i] - p_in[i];
    if ( p_out_SA[i] < 0.0 ) pos_engy = pos_engy + p_out_SA[i]*dt;
    else neg_engy = neg_engy + p_out_SA[i]*dt;
/*****/

/* The amount of energy input by the solar arrays can not */
/* exceed the energy output by the propulsion system. If */
/* the solar arrays input all the energy thus taken out, */
/* the battery is at full charge and the flag set. */
/*****/

    if ( (pos_engy + neg_engy) < 0.0 ) full_charge = 1;
/*****/

/* Calculate the integrals of the power curves to obtain the */
/* energy used by the propulsion system with and without */
/* the effects of the solar panels. The energy delivered by */
/* the solar panels is also calculated. */
/*****/

    ESA = ESA + p_out_SA[i]*dt;
    ENSA = ENSA + p_out[i]*dt;
    EIN = EIN + p_in[i]*dt;
/*****/

/* If the energy taken out of the battery is equal or greater */
/* than the initial battery energy we have effectively */
/* run out of gas and the data is invalid. */
/*****/

    if( ENSA >= 1000*e2 ) out_of_gas[v_type-1][b_type-1] = 1;
/*****/

/* Calculate the depth of discharge for the battery and save */
/* the maximum value to be used in the Battery Depreciation */
/* Model. */

```

```

/*****/
    dod_SA = ESA / (e2*1000);
    dod_NSA = ENSA / (e2*1000);
    if(dod_SA > maxdod_SA) maxdod_SA = dod_SA;
    if(dod_NSA > maxdod_NSA) maxdod_NSA = dod_NSA;

    time = time + dt;

} /* end of time loop */

/*****/
/*****/

/* Store a running total of the energy used per season */
/* to obtain an average at the end of the year. */
/*****/

    AESA[current_season] = AESA[current_season] + ESA;
    AENSA[current_season] = AENSA[current_season] + ENSA;

/*****/

/* Use the charger model to account for fixed battery loss */
/* and charger efficiency. */
/*****/

    ESA = model_charger(ESA,e1,n4);
    ENSA = model_charger(ENSA,e1,n4);

/*****/

/* Compute the electricity cost for the season and keep a */
/* running total for the year. */
/*****/

    electricity_cost_SA = (ESA/1000)*c6;
    electricity_cost_NSA = (ENSA/1000)*c6;
    season_cost_SA[current_season] = electricity_cost_SA *
days[current_season];
    season_cost_NSA[current_season] = electricity_cost_NSA *
days[current_season];

/*****/

/* Calculate the depreciation of the batteries for each season */
/* note: The variable life_SA(NSA) being used is misleading. */
/* The model returns the depreciation of the battery but */
/* must be summed and inverted at the end of the year to */
/* compute the battery life for cost analysis. */
/*****/

    life_SA[current_season] = battery_dep_season(Tcal,Nfc,Ncy,x0,maxdod_SA,
alpha,(double)1.0,days[current_season],1);
    life_NSA[current_season] = battery_dep_season(Tcal,Nfc,Ncy,x0,
maxdod_NSA,alpha,(double)1.0,days[current_season],1);

    if(maxdod_SA > maxdod_year_SA[v_type-1][b_type-1])
maxdod_year_SA[v_type-1][b_type-1] = maxdod_SA;
    if(maxdod_NSA > maxdod_year_NSA[v_type-1][b_type-1])
maxdod_year_NSA[v_type-1][b_type-1] = maxdod_NSA;

```

```

_ }
/*****
/*      If the vehicle has depleted the energy of the battery, */
/* the data is considered invalid and no further computations */
/* are performed and the simulation aborted.                  */
*****/

        if (out_of_gas[v_type-1][b_type-1]) goto LABEL;
/*****
/*      Sum the totals for the entire year to calculate yearly */
/* totals.                                                       */
*****/

        life_year_SA = (double) 0.0;
        life_year_NSA = (double) 0.0;
        season_cost_year_SA = (double) 0.0;
        season_cost_year_NSA = (double) 0.0;
        ESA = 0.0;
        ENSA = 0.0;
        for(j=0;j<NO_SEASONS;j++) {
                life_year_SA = life_year_SA + life_SA[j];
                life_year_NSA = life_year_NSA + life_NSA[j];

                season_cost_year_SA = season_cost_year_SA + season_cost_SA[j];
                season_cost_year_NSA = season_cost_year_NSA +
season_cost_NSA[j];
                ESA = ESA + AESA[j];
                ENSA = ENSA + AENSA[j];
        }
/*****
/*      Calculate the average energy use for the year, with and */
/* without the use of solar arrays.                               */
*****/

        ENSA = ENSA / (double) NO_SEASONS;
        ESA = ESA / (double) NO_SEASONS;
/*****
/*      Compute battery life for the year.                        */
*****/

        life_year_SA = 1/life_year_SA;
        life_year_NSA = 1/life_year_NSA;
/*****
/*      Calculate the percent difference of:                      */
/*      battery life increase:                                     */
/*      energy reduction:                                          */
/*      DOD reduction:                                             */
/* These valuse will be printed out later.                        */
*****/

        percent_battery_life_increase[v_type-1][b_type-1] = ((life_year_SA -
life_year_NSA)/life_year_NSA)*100;
        percent_energy_reduction[v_type-1][b_type-1] = ((ENSA -
ESA)/ENSA)*100.0;

```



```

percent_dod_reduction[v_type-1][b_type-1] = ((maxdod_NSA -
maxdod_SA)/maxdod_NSA)*100.0;
/*****/

/*      Calculate the cost of the battery due to DoD effects      */
/* with (battery_cost_SA) and without (battery_cost_NSA) the     */
/* effects of solar panels.                                       */
/*****/

battery_cost_SA = (c5*e2)/(life_year_SA);
battery_cost_NSA = (c5*e2)/(life_year_NSA);
/*****/

/* Compute the cost saved per year on battery life and energy    */
/* costs and compute the payback period.                          */
/*****/

cost_NSA[v_type-1][b_type-1] = (season_cost_year_NSA +
battery_cost_NSA);
cost_SA[v_type-1][b_type-1] = (season_cost_year_SA + battery_cost_SA);
cost_saved[v_type-1][b_type-1] = cost_NSA[v_type-1][b_type-1] -
cost_SA[v_type-1][b_type-1];

LABEL: ;
upfrontcost[v_type-1][b_type-1] = (c1 + c2*area) + (c3 + c4*area*n2);
if( !out_of_gas[v_type-1][b_type-1] )
    payback[v_type-1][b_type-1] = upfrontcost[v_type-1][b_type-1] /
cost_saved[v_type-1][b_type-1];
}
}

/*****/

/*      Print the data      */
/*****/

strcpy(string1," | Up Front Costs ($)      |");
for(l=0;l<3;l++) {
    for(m=0;m<3;m++) {
        sprintf(string2,"%6.11f |",upfrontcost[m][l]);
        strcat(string1,string2);
    }
    strcat(string1,"\n");
    printf("%s",string1);

    strcpy(string1," | % energy reduction      |");
    for(l=0;l<3;l++) {
        for(m=0;m<3;m++) {
            if (out_of_gas[m][l])
                sprintf(string2,"%s", " ** |");
            else
                sprintf(string2,"%6.11f |",
percent_energy_reduction[m][l]);
            strcat(string1,string2);
        }
        strcat(string1,"\n");
        printf("%s",string1);

        strcpy(string1," | Max. Winter DOD (%)      |");
        for(l=0;l<3;l++) {
            for(m=0;m<3;m++) {
                if (out_of_gas[m][l])
                    sprintf(string2,"%6.11f |",100.0);

```

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```

double model_vehicle_energy_use(speed, linear_term, quad_term, intercept,
battery_eff)
double speed, linear_term, quad_term, intercept, battery_eff;
{
    double tmp;

    tmp = intercept + linear_term*speed + quad_term*(speed*speed);
quad_term*(speed*speed); /* (Wh/km) */
    tmp = tmp * speed; /* (Watts) */

    /* Account for blinear_term battery efficiency */
    efficiency
    /* Account for blinear_term battery efficiency */

    tmp = tmp / battery_eff;
    return(tmp);
}

/* The PV system is modeled by accounting for the PV cell
/* efficiency and the converter efficiency and tare loss.
/* It is possible for the tare loss of the converter to exceed
/* the energy input by the PV. It is assumed that proper
/* circuitry exists to disable the system to avoid negative
/* energy flow from the PV system.

double model_PV_system(input, cell_eff, tare_loss, convert_eff)
double input, cell_eff, tare_loss, convert_eff;
{
    double tmp;

    tmp = ((input*cell_eff)-tare_loss) * convert_eff;
    if ( tmp < 0.0 ) tmp = 0.0;
    return(tmp);
}

/* The charger model determines the amount of energy that must
/* be replaced during the charging of the batteries. The fixed
/* battery loss and converter efficiency are accounted for.

double model_charger(energy, fixed_loss, charger_eff)
double energy, fixed_loss, charger_eff;
{
    return( ( energy + fixed_loss ) / charger_eff );
}

/* Routine to print the header of each page of data.

print_head()
{
    printf("\f\n\n\n\n\n\n\n\t\t\t\t\tLOCATION  %s\n\n", location);

```

```

    printf("      North Latitude = %3.1lf Av. daily Horizontal
Insolation = %4.2lf (kWh/m^2) Av. Daily Temp. = %4.1lf (C)\n",
          latitude, ((es+esp+ew+ef)/4.0), dtemp);
    printf("\n      Vehicle Use Pattern Number %d\t\t", s_type);
    printf("      Energy Cost = $$4.2lf/kWh\n\n", c6);
    printf("

```

```

-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
    printf("\n");
    printf(" |                                     |                                     |
BATTERY TYPE 2 | BATTERY TYPE 3 |                                     | BATTERY TYPE 1 |
    printf("
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
    printf("\n");
    printf(" |                                     |                                     |
VEHICLE|VEHICLE VEHICLE|VEHICLE VEHICLE VEHICLE VEHICLE|VEHICLE VEHICLE
    printf(" |
|TYPE 1 |TYPE 2 |TYPE 3 |TYPE 1 |TYPE 2 |TYPE 3 |\n");
    printf("
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
    printf("\n");
}

```

```

#include <stdio.h>
#include "global_solar.h"
#include "solar.h"
#include <math.h>
#define PI 3.141659
#define R_TO_D(a) ((360/(2.0*PI))*(a))
#define D_TO_R(a) ((2.0*PI)/360)*(a)

/*****
/* returns the value of the insolation model
/* inputs:
/* t - time (in hours),
/* flag - flag = 1 when new data is to be used
*****/

double S(t,flag)
float t;
int flag;
{
/*****
/* convert from real time to time after 12 o'clock none
*****/

t = t - 12.0;

switch (current_season) {
case(0): /* summer */
if ( (t < -aas) || (t > aas) ) return ((double)0.0);
break;
case (1): /* fall */
if( (t < -aaf) || (t > aaf) ) return((double)0.0);
break;
case (2): /* winter */
if( (t < -aaw) || (t > aaw) ) return((double)0.0);
break;
case (3): /* spring */
if( (t < -aasp) || (t > aasp) ) return((double)0.0);
break;
default:
break;
}
return (coff1[current_season]*cos(0.2618*t) + coff2[current_season]);
}
/*****
/* returns the value of the vehicle speed model
/* inputs:
/* t - time (in hours),
/* flag - flag = 1 when new data is to be used
*****/

double V(t,flag)
float t;
int flag;
{
static int i;

if(flag) i = 0;
if( t < v[i+1][0] ) {;}
else {
if (i == 0 || ((full_charge == 1) & (v[i+1][1] > 0.0)))
full_charge = 0;
i++;
}
return (v[i][1]);
}

```

```

}

/*****
/* reads the data file 'data/S.dat' to read in current
/* values of the insolation model.
/* inputs:
/*   area - the area of the solar panels. read from
/*           'data/array.dat' by read_array()
/*   flag - flag = 1 means that this call is the
/*           initial call to the routine.
*****/

read S(flag)
int flag;
{
    static FILE *fp;

    if(flag) {
        fp = fopen("data/S.dat","r");
        if (!fp) syserr("file not found: s_data.dat\n");
        return(1);
    }
    if(fscanf(fp,"%[^\\t]\\t%lf\\t%lf\\t%lf\\t%lf\\t%lf\\t%lf\\n",location,&es,&ew,
&esp,&ef,&latitude,&dtemp) == EOF) return(0);
    l = D TO R(latitude);
    /*
    aas = 1.5+2.864*acos(-0.432 * tan(l));
    aaw = 1.5+2.864*acos(0.432 * tan(l));
    aasp = 6.0;
    aaf = 6.0;
    */

    aas = 2.00 + 2.546*acos(-0.4328*tan(l));
    aaw = 2.00 + 2.546*acos(0.4328*tan(l));
    aasp = aas;
    aaf = aaw;

    coff1[0] = es/(7.639*sin(.2618*aas)-2*aas*cos(.2618*aas));
    coff2[0] = -coff1[0] *cos(.2618*aas);

    coff1[1] = ef/(7.639*sin(.2618*aaf)-2*aaf*cos(.2618*aaf));
    coff2[1] = -coff1[1] *cos(.2618*aaf);

    coff1[2] = ew/(7.639*sin(.2618*aaw)-2*aaw*cos(.2618*aaw));
    coff2[2] = -coff1[2] *cos(.2618*aaw);

    coff1[3] = esp/(7.639*sin(.2618*aasp)-2*aas*cos(.2618*aasp));
    coff2[3] = -coff1[3] *cos(.2618*aasp);
    return(1);
}

/*****
/* reads the data file 'data/V.dat' to read in current
/* values of the vechile speed model.
/* inputs:
/*   flag - flag = 1 means that this call is the
/*           initial call to the routine.
*****/

int read V(flag)
int flag;
{
    static FILE *fp;
    int n,i;
    if(flag) {
        fp = fopen("data/V.dat","r");

```

```

        s_type = 0;
        return(1);
    }

    if(fscanf(fp,"%d",&n)== EOF) return(0);
    for( i = 0; i < n; i++ ) {
        fscanf(fp,"%lf\t%lf",&v[i][0],&v[i][1]);
    }
    s_type++;
    return(n);
}

/*****
/*      Calculates the battery depreciation (in days) the given */
/*      season and battery parameters in question.                */
/*      Input:                                                       */
/*      Tcal:   calendar life of the battery.                      */
/*      Nfc:    charge life cycle.                                  */
/*      Ncy:    depth of discharge life cycle.                     */
/*      x0:     DoD reference constant.                              */
/*      dod:    the maximum depth of discharge for this season.    */
/*      a:      DoD sensitivity constant.                            */
/*      Fch:    Recharge frequency per day. (i.e. once a day)      */
/*      days:   The number of days in this season.                  */
/*      Outputs:                                                    */
/*      tmp:    damage done to battery for this season             */
/*      */
/*****/

double battery_dep_season(Tcal,Nfc,Ncy,x0,dod,a,Fch,days,flag)
double dod,Tcal,Nfc,Ncy,a,Fch,x0,days;
int flag;
{
    double tmp2;
    double tmp1;
    /* convert from life value in years to life value in days */
    Tcal = Tcal * 365.0;

    tmp2 = (double) ((exp(a*dod) - 1) / (exp(a*x0) - 1));
    tmp1 = days * ( (1/Tcal) + (1/Nfc) + (1/Ncy)*tmp2);
    return (tmp1);
}

/*****
/*      This function reads the values of the array parameters.    */
/*      Inputs:                                                       */
/*      flag:   indicates initial entry into the procedure.        */
/*      */
/*      Outputs:                                                    */
/*      */
/*      returns:   1 when valid data is read in                    */
/*                 0 when EOF is detected                          */
/*      */
/*****/

read_array(flag)
int flag;
{
    static FILE *fp;
    if (flag) {
        if(fp) fclose(fp);
        fp = fopen("data/array.dat","r");
        a_type = 0;
    }
}

```

```
        return(1);
    }
    a type++;
    if(fscanf(fp,"%lf\t%lf\t%lf\t%lf",&n1,&c1,&c2,&area) == EOF ) return(0);
    else return(1);
}

/*****
/* This function reads the values of the converter parameters. */
/* Inputs: */
/*   flag:   indicates initial entry into the procedure. */
/* Outputs: */
/*   returns:      1 when valid data is read in */
/*                 0 when EOF is detected */
*****/

read_convert(flag)
int flag;
{
    static FILE *fp;
    if (flag) {
        if(fp) fclose(fp);
        fp = fopen("data/converter.dat","r");
        return(1);
    }

    if(fscanf(fp,"%lf\t%lf\t%lf\t%lf",&p0,&n2,&c3,&c4) == EOF ) return(0);
    else return(1);
}

/*****
/* This function reads the values of the charger parameters. */
/* Inputs: */
/*   flag:   indicates initial entry into the procedure. */
/* Outputs: */
/*   returns:      1 when valid data is read in */
/*                 0 when EOF is detected */
*****/

read_charger(flag)
int flag;
{
    static FILE *fp;
    if (flag) {
        if(fp) fclose(fp);
        fp = fopen("data/charger.dat","r");
        return(1);
    }

    if(fscanf(fp,"%lf",&n4) == EOF ) return(0);
    else return(1);
}

/*****
/* This function reads the values of the vehicle parameters. */
/* Inputs: */
/*   flag:   indicates initial entry into the procedure. */
/* Outputs: */
/*   returns:      1 when valid data is read in */
/*                 0 when EOF is detected */
*****/
```



```

/*****/
read_vehicle(flag)
int flag;
{
    static FILE *fp;
    if (flag) {
        if(fp) fclose(fp);
        fp = fopen("data/vehicle.dat", "r");
        v_type = 0;
        return(1);
    }

    v_type++;
    if(fscanf(fp, "%lf\t%lf\t%lf", &e0, &a, &b) == EOF ) return(0);
    else return(1);
}

/*****/
/* This function reads the values of the battery parameters. */
/* Inputs: */
/* flag: indicates initial entry into the procedure. */
/* Outputs: */
/* returns: 1 when valid data is read in */
/*          0 when EOF is detected */
/*****/

read_battery(flag)
int flag;
{
    static FILE *fp;
    if (flag) {
        if(fp) fclose(fp);
        fp = fopen("data/battery.dat", "r");
        return(1);
    }

    if(fscanf(fp, "%lf\t%lf", &e1, &n3) == EOF ) return(0);
    else return(1);
}

/*****/
/* This function reads the values of the battery life */
/* parameters. */
/* Inputs: */
/* flag: indicates initial entry into the procedure. */
/* Outputs: */
/* returns: 1 when valid data is read in */
/*          0 when EOF is detected */
/*****/

read_battery_life(flag)
int flag;
{
    static FILE *fp;
    if(flag) {
        if(fp) fclose(fp);
        fp = fopen("data/battery_life.dat", "r");
        b_type = 0;
        return(1);
    }

    b_type++;
}
```

```
    if(fscanf(fp,"%lf\t%lf\t%lf\t%lf\t%lf\t%lf",&c5,&e2,&Tcal,&Nfc,
    &Ncy,&alpha,&x0) == EOF ) return(0);
    else return(1);
}
```

```
/******
```

```
/* This function reads the values of the cost parameters. */
/* Inputs: */
/* flag: indicates initial entry into the procedure. */
/* Outputs: */
/* returns: 1 when valid data is read in */
/*          0 when EOF is detected */
/******
```

```
read cost(flag)
```

```
int Flag;
```

```
{
    static FILE *fp;
    if(flag) {
        if(fp) fclose(fp);
        fp = fopen("data/cost.dat","r");
        e_type = 0;
        return(1);
    }

    e_type++;
    if(fscanf(fp,"%lf",&c6) == EOF) return(0);
    else return(1);
}
```

```
/* *****  
/*      This routine is used to produce error messages      */  
/* *****  
#include <stdio.h>  
#include <errno.h>  
void syserr(msg)  
char *msg;  
{  
    extern int errno, sys_nerr;  
    extern char *sys_errlist[];  
    fprintf(stderr, "ERROR: %s( %d", msg, errno);  
    if(errno > 0 && errno < sys_nerr)  
        printf(") %s", sys_errlist[errno]);  
    else fprintf(stderr, ")\n");  
    exit(1);  
}
```

END

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