PISD SOLAR INITIATIVE

Shaun Owen
Sam Rayburn High School
Project Helios

It all started a few years ago…

PISD Schools with solar

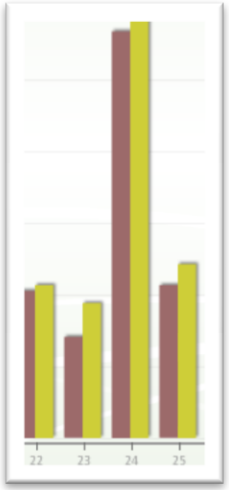
Sam Rayburn TEXANS

TROJANS SHS

Project Objectives

Renewable energy education

Data collection and analysis



Reduction in electric cost

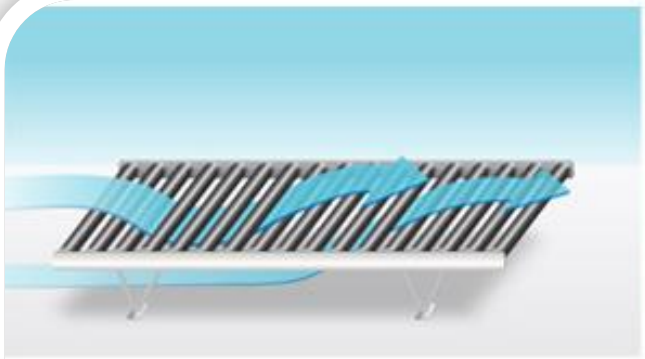
Real world lab activities and application

Project Highlights

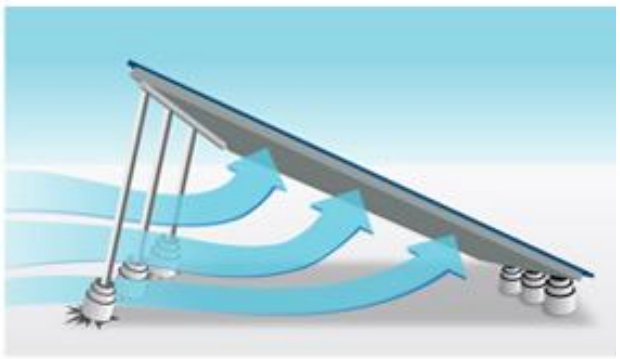
- 156 kW system for PISD; largest solar energy system for a public school in the state of TX.
- 4 different types of solar panels.
- 8 different configurations.
- The only roof top tracker in Texas.
- Real time monitoring of each configuration for data comparisons.

Solar Partners

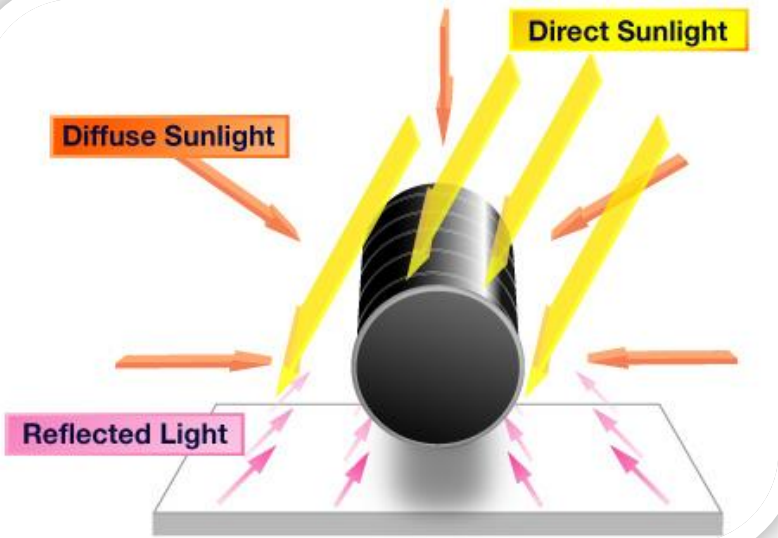
Solyndra® Cylindrical Panels



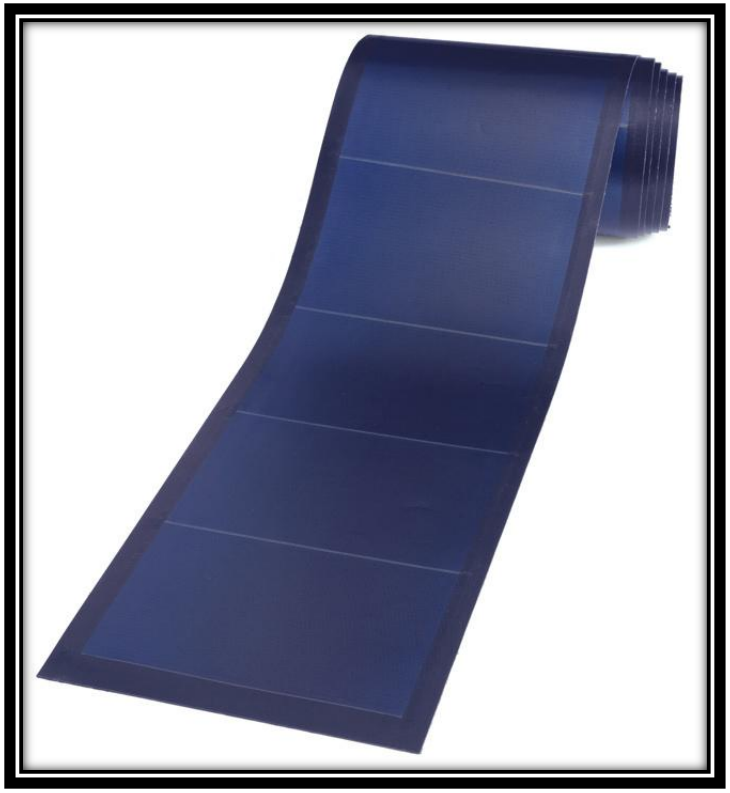
SOLYNDRA



CONVENTIONAL



Uni-Solar® Thin Film Panels



Sam Rayburn HS (flat)

Moser Baer® Crystalline Panels

Solar Trackers (SRHS)

East to West tracking

Lumeta® Panels (SRHS)

Kiosk

Touch screen computer with real time solar data display

Sunny Boy ® Inverters

Ignite Solar LLC

Installation Obstacles

Peter Mathey

IGNITE SOLAR

Solyndra Rooftop Install

IGNITE SOLAR

Crystalline Rooftop Install

IGNITE SOLAR

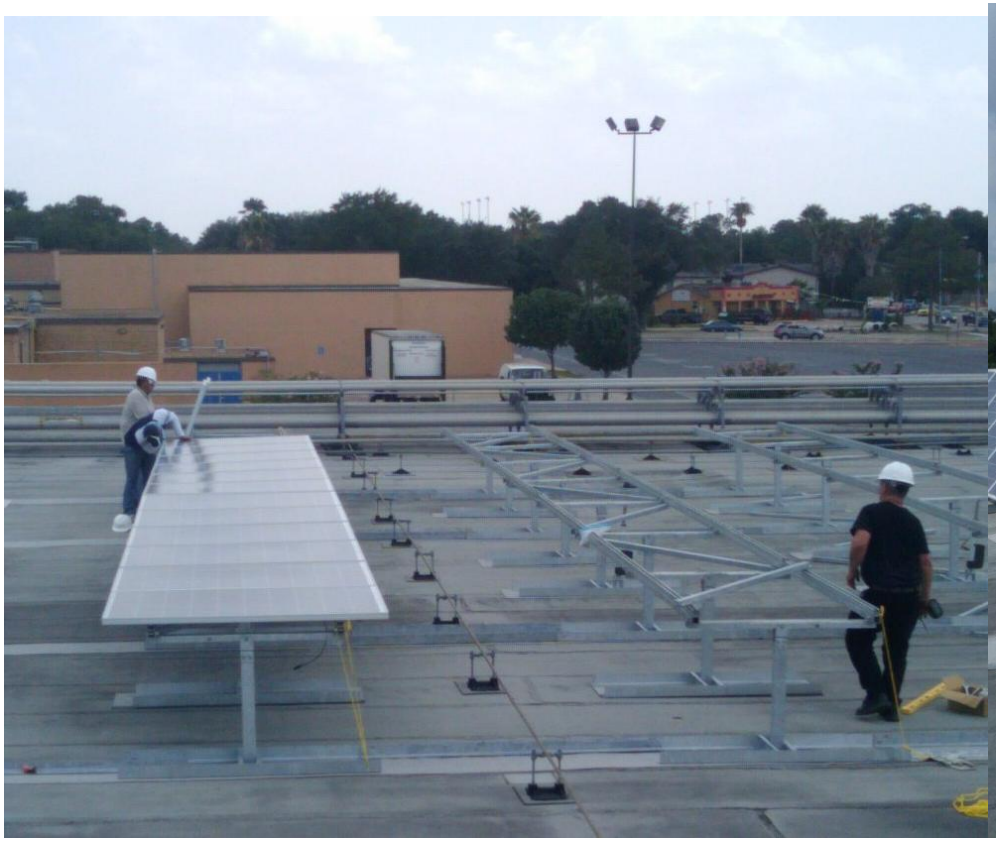
Uni-solar Metal Roof Install

IGNITE SOLAR

Crystalline Awning Install

IGNITE SOLAR

Ignite Rooftop Tracker



IGNITE SOLAR

Lumeta Rooftop Install

IGNITE SOLAR


adena ISD Solar Initiative
IGNITE
SIERRA CLUB
Pasadena ISD

PISD Schools with solar

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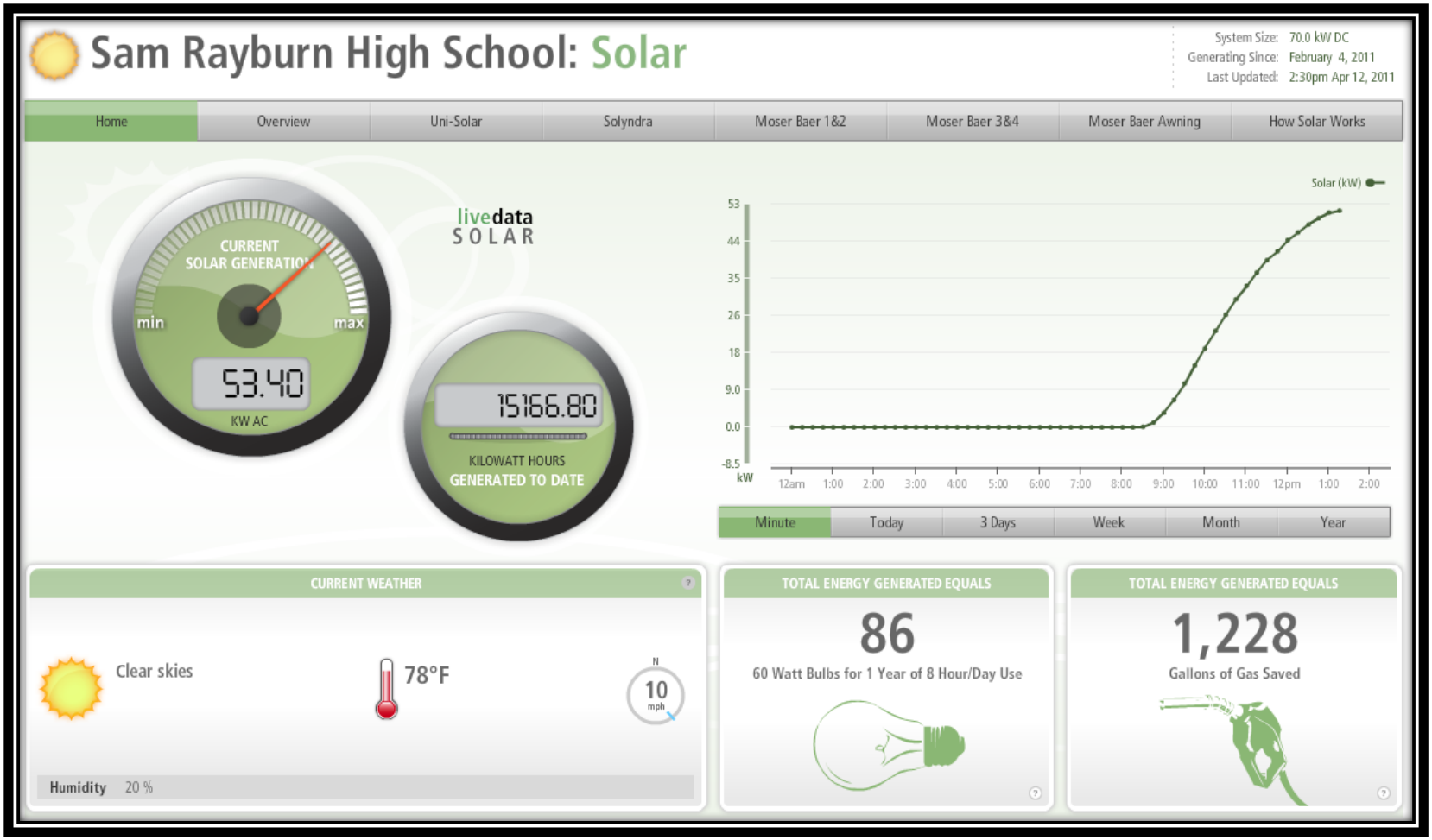
TROJANS SHS

Solar Data Website



http://live.deckmonitoring.com/?id=sam_rayburn_high_school

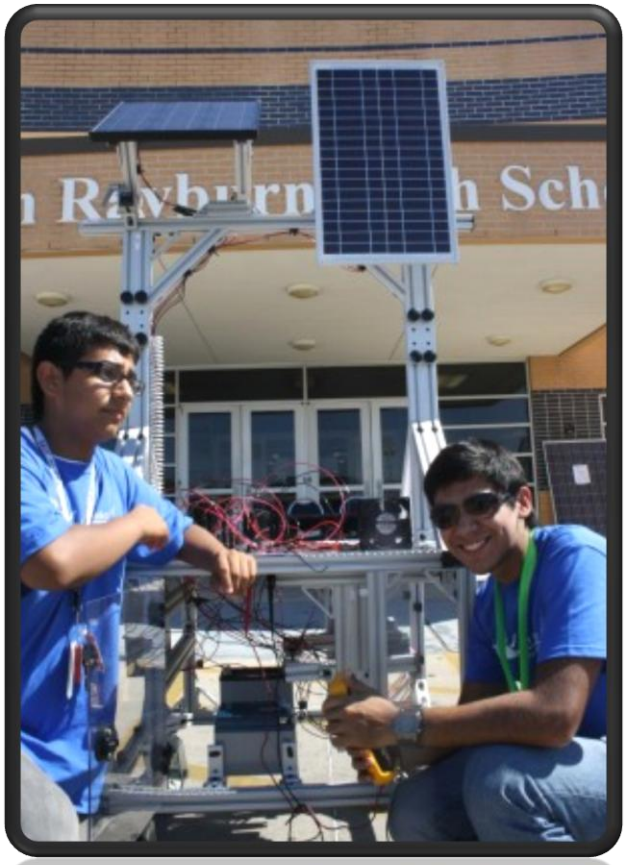
http://pisd-data.harc.edu/

Date	Time	Array Name	Array Size	E	CO2	Iac	Vac	Ipc	Vpv	Temp	ExtSolIrr	IntSolIrr	TmpAmb	TmpMdl
Oct 31 2011	07:30:17	Uni-Solar 2	7.2	0	0	0	206.38	0	256.33	65.3	0	4.47	57.87	42.19
Oct 31 2011	07:30:17	Uni-Solar 1	7.2	0	0	0	208.6	0	234	68.18	0	4.47	57.87	42.19
Oct 31 2011	07:45:19	Uni-Solar 2	7.2	0	0	0.06	206.63	0.12	273.7	66.07	0	12.57	58.1	40.67
Oct 31 2011	07:45:19	Uni-Solar 1	7.2	0	0	0.04	209.08	0.09	271.46	68.67	0	12.57	58.1	40.67
Oct 31 2011	08:00:19	Uni-Solar 2	7.2	0.01	0.02	0.44	206.61	0.44	292.08	67.5	0	27.08	58.21	42.01
Oct 31 2011	08:00:19	Uni-Solar 1	7.2	0.01	0.02	0.42	209.07	0.45	279.83	70.42	0	27.08	58.21	42.01
Oct 31 2011	08:15:20	Uni-Solar 2	7.2	0.04	0.07	1.1	205.71	0.86	315.33	69.44	0	45.08	59.9	46.78
Oct 31 2011	08:15:20	Uni-Solar 1	7.2	0.04	0.07	1.13	207.9	0.96	287.67	72.41	0	45.08	59.9	46.78
Oct 31 2011	08:30:20	Uni-Solar 2	7.2	0.08	0.15	2.23	204.93	1.6	315.72	72.28	0	65.25	62.93	54.28
Oct 31 2011	08:30:20	Uni-Solar 1	7.2	0.09	0.15	2.25	207.23	1.74	293.46	75.05	0	65.25	62.93	54.28
Oct 31 2011	08:45:20	Uni-Solar 2	7.2	0.15	0.27	3.72	204.89	2.57	317	76.41	0	90.33	64.79	61.53
Oct 31 2011	08:45:20	Uni-Solar 1	7.2	0.15	0.26	3.63	207.03	2.61	306.67	78.98	0	90.33	64.79	61.53
Oct 31 2011	09:00:20	Uni-Solar 2	7.2	0.23	0.39	5.28	204.85	3.5	326.08	81	0	126.04	66.4	67.97

Student Participation

- Engineering
  - Built a demonstration module with two different types of panels.
  - Roll away.

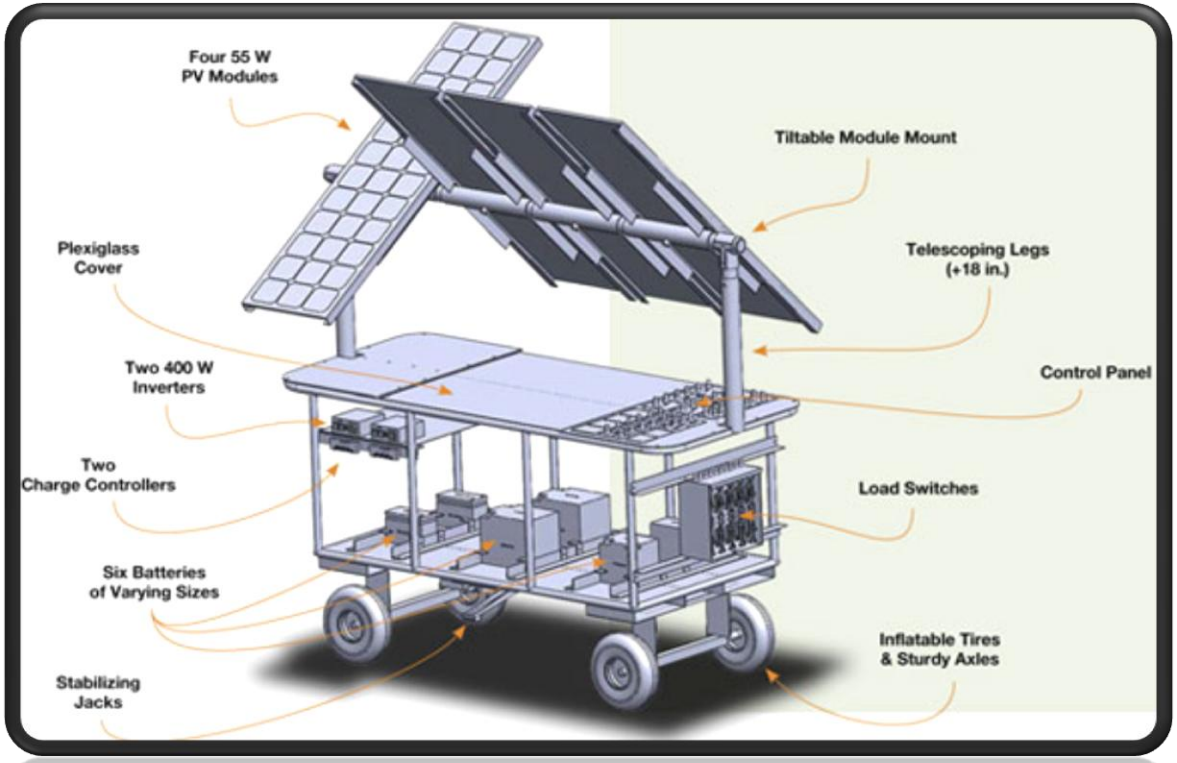
Mario Cisneros, senior
Sam Rayburn High School



Educational Outreach

- Mae Smythe Elementary
  - High School students conducted lessons
  - Renewables (solar focus)
  - Non renewables

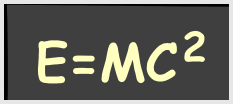
Solar Road Show



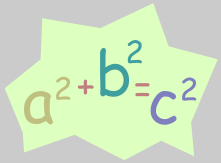
Current Educational Project

- Advance Placement students conducting research.
  - Data analysis
  - Research Methods
  - Project Based Learning
    - Allows for student development of a problem.
    - Creates a real world experience.
    - Typically students enjoy it more.

Cross Curricular Lessons

Course	Curriculum Integration	Projects
 AP Environ. Sci.	Environmental Lessons Ecology and the environment	Grant writing RFP writing Presentations
Environmental Science 	Environmental Lessons Ecology and the environment	Watering system Compost bins
 Engineering	Energy investigations Solar energy lessons Energy calculations	Solar Cars Water fountain Solar panel installation
Physics 	Energy investigations Solar energy lessons Experiments/calculations	Solar Cars Solar lab activities Presentations
Chemistry 	Solar panel construction	Lab activities
 Biology	Biological effects of the sun	Reading/writing assign Posters/presentations

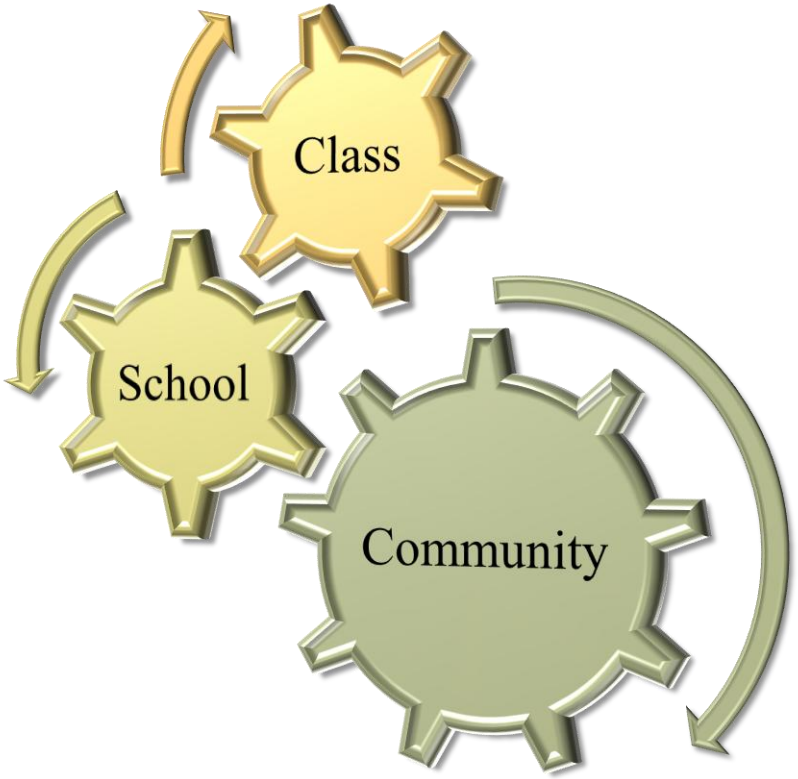
Cross Curricular Lessons

Subject	Curriculum Integration	Lesson Type
 Math	Energy Use calculations Prediction of energy output Graphs/charts of energy output	Calculations Reading/writing assign Graphs/charts/posters
 Geography	Solar Production world wide Alternative renewable resources Geography of Pasadena, Tx	Reading/writing assign Interpreting graphs/charts Interpreting maps
 History	Energy development Historical background of energy Solar development	Reading/writing assign Interpreting graphs/charts Presentations/posters
 Government	US Energy Legislation TX Energy Legislation EPA/Environmental laws	Reading/wring assign Interpreting graphs/charts Research presentations

Cross Curricular Lessons

Subject	Curriculum Integration	Lesson Type
 Economics	Fossil Fuel cost Solar Energy cost Financial incentive programs Market Analysis	Reading/writing assign Interpreting graphs/charts Research presentations Stock market games
 Newspaper	Media coverage & write ups Photography Video production	Reading/writing assign Publications Public relation activities
 CTE	Energy industry careers Manufacturing processes Consumer careers	Reading/writing assign Research presentations Job Shadowing/interns

PISD Solar Initiative



Questions?

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