



• August 15-18, 2010 • Dallas, Texas •
• Dallas Convention Center •



RENEWABLE ENERGY SCREENING TOOLS

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Introduction

- 
- Federal Regulations & RE requirements

- Technologies

- Steps to Renewable Energy Projects

- Tools

Federal Regulations & Renewable Energy

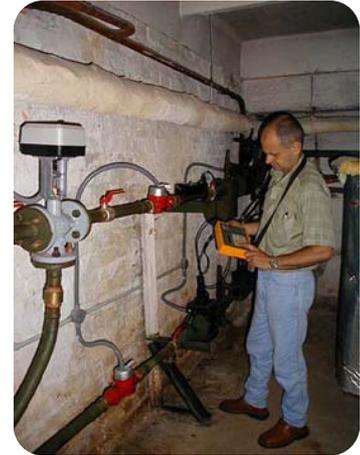
Source of Requirement	Level	Agencies
Energy Policy Act of 2005 Federal Use Goal	3% FY07-09 5% FY10-12 7.5% FY13 and beyond	All
Executive Order 13423	½ of EPA Act Federal Goal from “New” Sources	All
DoD National Defense Reauthorization Act of 2007	25% of electricity by 2025	DoD
EISA 2007 SWH Requirement	30% of hot water needs in all new buildings or major renovations if LCC effective	All
Executive Order 13514	GHG inventory and goals	All

Where to begin?

- Efficiency & conservation

- How much energy is being used?
- How much does it cost?
- Where does it go?
 - Which buildings, submeter data
- What is it used for?
 - Space Heating
 - Ventilation
 - Lighting
 - Hot water: temperature, gallons/day
 - Equipment

•REDUCE!



Renewable Energy Screening

- Identify which RE technologies fit site needs
 - Consider site energy costs, energy needs, site characteristics, RE resources, and available incentives



Screening Levels

- **Level 1: Preliminary Screening**

- Basic check to determine 'go or no-go', simple payback and possible SIR, etc.
- Uses maps, user-friendly tools (e.g. IMBY, RETScreen)

- **Level 2: RE Expert (no site visit)**

- Identify dead-ends and opportunities, develop RFPs, budget and conduct engineering studies
- Uses calculations by hand or sophisticated analysis software

- **Level 3: RE Expert site visit**

- Identifies dead ends and good opportunities, develops RFPs, budget, engineering studies and direct appropriations decisions with likely SIR
- Calculations by hand and confirmed by 'ground truthing' and integration with actual site, buildings, etc.

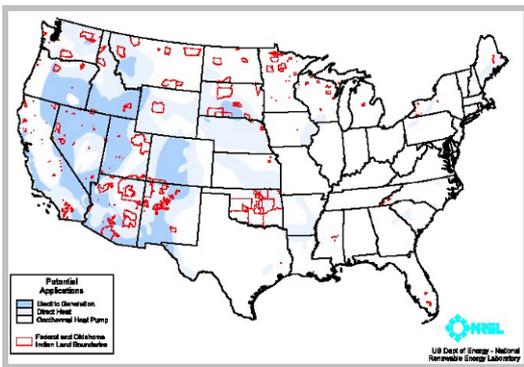
Renewable Energy Technologies

Renewable Energy technologies that satisfy EPA Act 2005 and EO13423 requirements include:

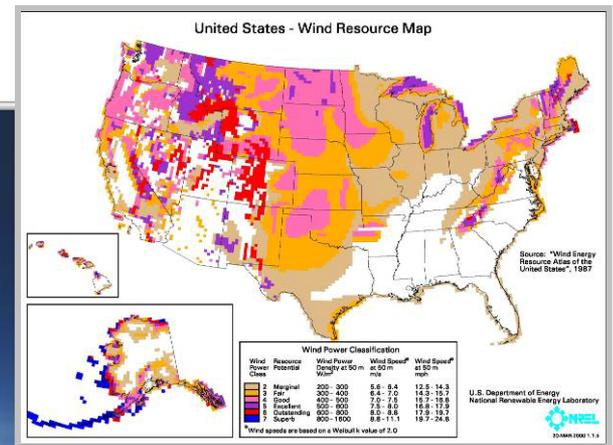
- Solar ventilation pre-heat systems
- Solar Photovoltaics (PV)
- Solar thermal (SWH or SHW)
- Ground source heat pumps
- Biomass heating and cooling
- Geothermal (heat and electricity)
- Hydrokinetic power
- Ocean resources
- Wind power
- Qualified hydro resources
- Daylighting
- Biomass
- Waste to Energy
- Landfill Gas



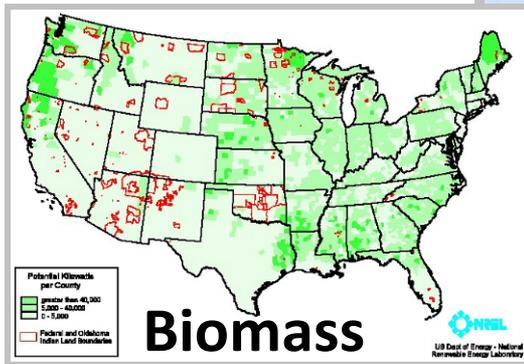
Resource Maps



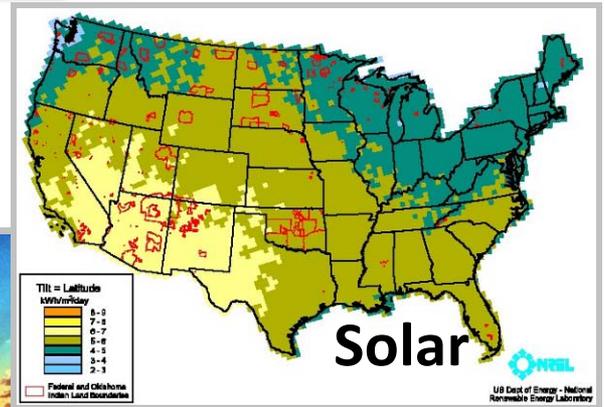
Geothermal



Wind



Biomass



Solar

RENEWABLE ENERGY ASSESSMENT TOOLS

Resource	Tool	Where to Find It	Summary
Wind	Wind Energy Project Model	www.retscreen.net	Evaluates energy production, life-cycle costs and GHG emissions reduction for grid-connected and off-grid wind energy systems.
	IMBY	www.nrel.gov/eis/imby	Estimates the electricity production with a wind turbine at a home or business using available space with interactive mapping.
Solar	PV Watts	www.pvwatts.org	Generates performance estimates for grid-connected PV systems.
	PV Project Model	www.retscreen.net	Same as Wind Energy Project Model, but for Solar PV.
	Solar Estimate	www.solar-estimate.org	Estimates the price, savings, and system size of solar energy systems to produce electricity and hot water.
	IMBY	www.nrel.gov/eis/imby	Same as Wind, but for Solar PV.
Biomass	Theoretical Ethanol Yield Calculator	www1.eere.energy.gov/biomass/ethanol_yield_calculator.html	Calculates theoretical yield of ethanol from a feedstock for biomass ethanol production.
Microhydro	Hydropower Resource Assessment	hydropower.id.doe.gov/resourceassessment/software	Evaluation software and resource assessment reports.
ALL	Homer	www.nrel.gov/homer	Design system options for off-grid and grid-connected RE power systems (wind, solar, etc).

IMBY

SOLAR
In My

Solar Simulation Results

Summary | PV Generation Profile | Load & Generation | **Utility Bill**

Average Electric Rate (\$/kW)

The electric rate defined below represents the average rate of electricity for residential customers in your area. This value is used to determine an estimated monthly electric bill, and amount by which that bill would be reduced after installing this PV system. You can change the value and select the "Re-calculate" button to recompute the monthly estimates in the graph below.

Electric Rate:

Buy-back Rate:

Monthly Bill Reduction (\$)

Month	Before PV (\$)	After PV (\$)
Jan	0	-6,000
Feb	0	-8,000
Mar	0	-11,000
Apr	0	-14,000
May	0	-12,000
Jun	0	-10,000
Jul	0	-12,000
Aug	0	-11,000
Sep	0	-10,000
Oct	0	-9,000
Nov	0	-7,000
Dec	0	-8,000

Load

Now compare your estimated solar electricity production with your electricity consumption.

Step 1. Select a load profile.

You may select a sample profile or upload your own custom load profile.

(A) Use a sample load profile.

Choose a city from the drop-down box below.

Sample Profile:

or

(B) Upload a load profile.

Click the Upload File button below. Then browse to locate your load profile document. For help click [here](#)

Step 2. Run load profile

Using sample load for Ft. Worth

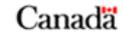
RETScreen



Natural
Canada

Power project

Unit



RETS

RETS
Propose
Base
Techn



Base case power system

Grid type	Isolated-grid & internal load
Peak load - isolated-grid	kW
Minimum load - isolated-grid	kW

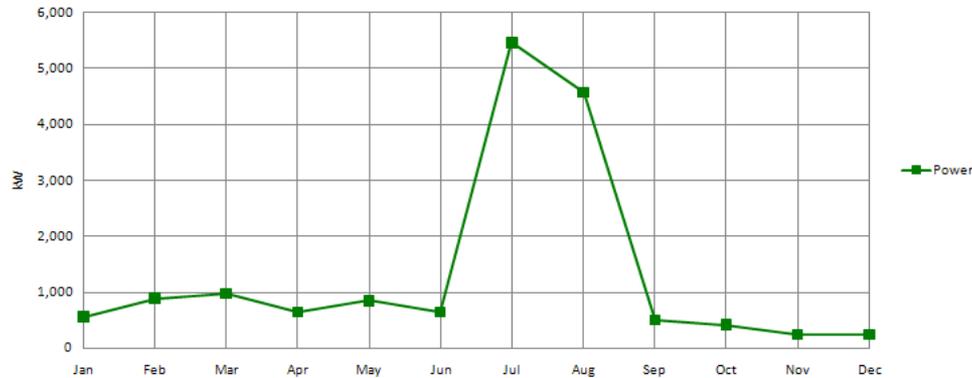
Base case load characteristics

Month	Power gross average load kW
January	564
February	895
March	985
April	645
May	856
June	650
July	5,465
August	4,568
September	506
October	423
November	250
December	250

System peak electricity load over max monthly average
Peak load - annual 5,465

Electricity MWh 12,422
Electricity rate - base case \$/kWh
Total electricity cost \$ -

Base case system load characteristics graph



Proposed case energy efficiency measures

End-use energy efficiency measures %
Net peak electricity load kW 5,465
Net electricity MWh 12,422

RETScreen4.2



Canada

an/CanmetENERGY

Homer

HOMER - [Lanal_2008 Case 2 PVac-Batt.hmr *]

File View Inputs Outputs Window Help

Equipment to consider: Add/Remove... Calculate Simulations: 41 of 41 Progress: Completed in 2 seconds.
Sensitivities: 1 of 1

Double click on a system below for simulation results.

	PV (kW)	LL8 (kW)	LL4 (kW)	NaS Mo.	Conv. (kW)	Initial Capital	Operating Cost (\$/yr)	Total NPC	CDE (\$/kWh)	Ren. Frac.	Diesel (L)	LL8 (hrs)	LL4 (hrs)
	4400	1000	100	6000	\$ 19,740,000	5,524,199	\$ 90,357,808	0.311	0.00	5,952,613	8,745	136	
	1000	4400	1000	6000	\$ 26,740,000	5,359,834	\$ 95,256,664	0.328	0.07	5,563,922	8,744	136	

Simulation Results

System Architecture: 1,000 kW PV 100 NGK Sodium-Sulfur R/Load Following Total NPC: \$ 95,256,664
 4,400 kW 4.4 MW 6,000 kW Inverter Levelized CDE: \$ 0.328/kWh
 1,000 kW 1 MW 6,000 kW Rectifier Operating Cost: \$ 5,359,834/yr

Cost Summary | Cash Flow | Electrical | PV | LL8 | LL4 | Battery | Converter | Emissions | Hourly Data

Cost type:
 Net present
 Annualized
 Reverse sign

Categorize:
 By component
 By cost type
 Show details

Compare...

Component	Capital (\$)	Replacement (\$)	O&M (\$)	Fuel (\$)	Salvage (\$)	Total (\$)
PV	7,000,000	2,182,636	319,584	0	-1,223,245	8,278,976
4.4 MW	0	9,083,135	1,906,928	48,297,760	-28,706	59,265,144
1 MW	0	0	275	67,658	-77,356	-9,423
NGK Sodium-Sulfur R/1	15,000,000	6,258,981	1,278,336	0	-1,164,995	21,372,324
Converter	4,740,000	1,377,838	0	0	-368,138	6,349,700
System	26,740,000	19,508,586	3,505,123	48,365,432	-2,862,439	95,256,728

Completed in 2 seconds.

XML Report HTML Report Help Close

Renewable Energy Technologies

Photovoltaics



Wind Power



Solar Water Heating



Solar Vent Air Preheat



Concentrating Solar Heat/Power



Biomass Heat/Power



Daylighting



Ground Source Heat Pump

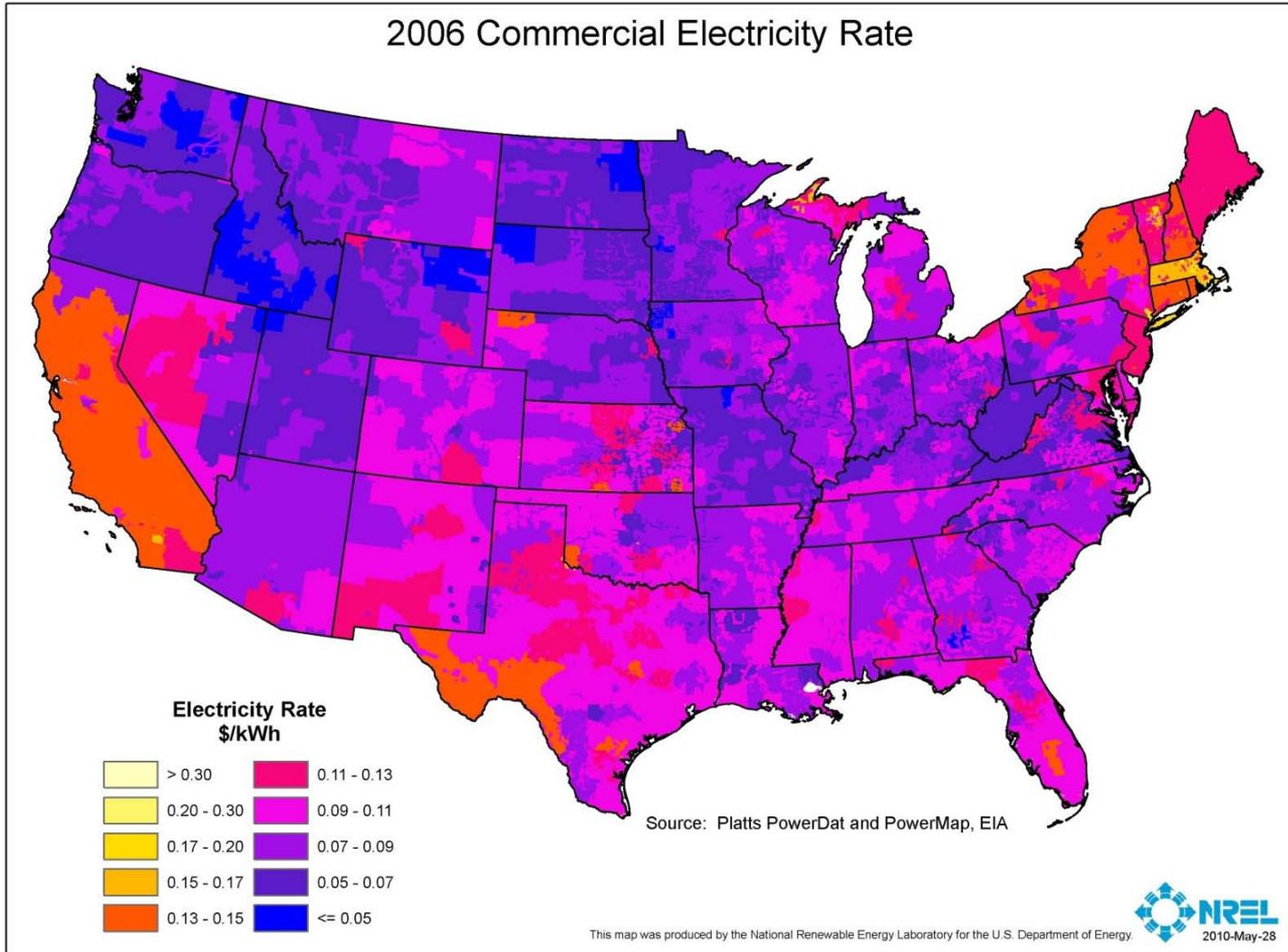


Landfill Gas



Financing

2006 Commercial Electricity Rate



Incentives

DSIRE™
Database of State Incentives for Renewables & Efficiency

U.S. DEPARTMENT OF ENERGY Energy Efficiency & Renewable Energy
North Carolina Solar Center
IREC

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DSIRE SOLAR
solar policy information

DSIRE is a comprehensive source of information on state, local, utility and federal incentives and policies that promote renewable energy and energy efficiency. Established in 1995 and funded by the U.S. Department of Energy, DSIRE is an ongoing project of the N.C. Solar Center and the Interstate Renewable Energy Council.

Choose one or both databases:
 Renewable Energy Energy Efficiency **Federal Incentives**

Resources
Summary Maps
Summary Tables
Library
Search
What's New?

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customize DSIRE for your organization

U.S. Territories

DSIRE:
Database for
State Incentives
for Renewables
and Efficiency

www.dsireusa.org

Summary

- Federal regulations require the use of renewable energy technologies
- Focus on energy conservation measures BEFORE installing RE technologies
- There are many options for RE technologies: at least one might work at your site
- Free tools and resources are available for Level 1 screening
- Incentives exist which may make it easier for RE project implementation

Additional Resources

In addition to the tools in this presentation, visit:

National Renewable Energy Laboratory Tools

www.nrel.gov/analysis/analysis_tools.htm

Department of Energy (EERE) RE Calculators

www1.eere.energy.gov/calculators/renewable_energy_systems.html

Federal Energy Management Program (FEMP) home page:

<http://www1.eere.energy.gov/femp/>

Renewable home page:

http://www1.eere.energy.gov/femp/technologies/renewable_energy.html

RE contacts:

http://www1.eere.energy.gov/femp/technologies/renewable_contacts.html

Database of State Incentives for Renewables and Efficiency:

<http://www.dsireusa.org/>

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(RE/EE assistance)



THANK YOU!