



# Emerging Technologies Work Group ERCOT

APRIL 25, 2011



## First SOLAR WORKSHOP



**Hala N. Ballouz,**

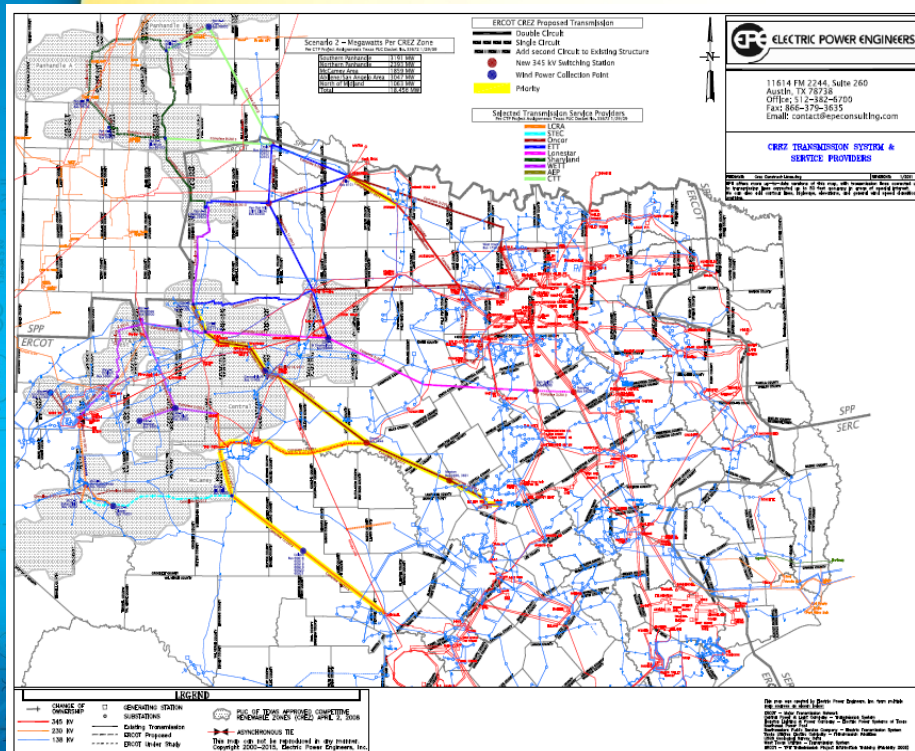
B.Sc., M.Sc.TAMU , P.E.

President , Electric Power Engineers, Inc.

Partner & Director, Int'l IGM

Vice President – Texas Renewable Energy Industries Association (TREIA)







# Purpose of the Workshop

- *Prepare for the GRID INTEGRATION of upcoming large scale Solar Generation Development*
- *Bring Together:*
  - *Transmission Grid Planners (ERCOT & Transmission Grid Operators)*
  - *Manufacturers*
  - *Integrators*
  - *Consultants*
  - *Resource Forecasters*
- **We have learned so much from Wind Integration. We want to apply what we learned for a “swift” (..as swift as possible!) Integration of Solar Generation.**

# ERCOT GRID REQUIREMENTS

1. Zero Voltage Ride Through
2. Over Voltage Requirement
3. Under Frequency Relaying Requirement
4. Reactive Power Support Requirement  $\pm 95\%$
5. Ramp-Up Rate Requirement
6. Governor Frequency Response
7. Sub Synchronous Interference (SSI)

# Agenda

## Morning

**9:15 to 10:15**

**John Adams, P.E.**

Principal Engineer – Resource Planning

**Electric Reliability Council of Texas (ERCOT)**

*Planning and Operations Standards for Solar*

**10:30 to 11:15**

**William Peter, PhD. ,**

Systems Engineer, Grid Integration

**SunPower Corporation**

*Utility Scale Solar PV Project Experience*

**11:15 to 12:15**

**John Diaz de Leon II, P.E.,**

Senior Consulting Engineer, Network Planning

**American Superconductor Corp**

*PV Grid Integration with AMSC SolarTie™ Solution*

## Afternoon

**1:30 to 2:30**

**Dr. John Zack**, Principal and Director of  
Forecasting

**AWS Truepower**

*Current Status and Challenges of Solar Energy  
Forecasting*

**2:30 to 3:30**

**Elie Nasr**, Business Development – Utility Projects

**SMA America, LLC**

*SMA Inverters: Grid Integration Features*

**3:30 to 4:00**

**Tony Daye**, Senior Manager

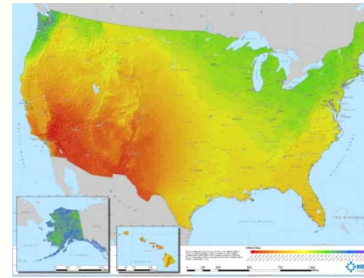
**Green Power Labs Inc.**

*Managing Intermittency: Standards and  
Recommended Practices in Solar Power  
Forecasting*



# Texas Solar Resource

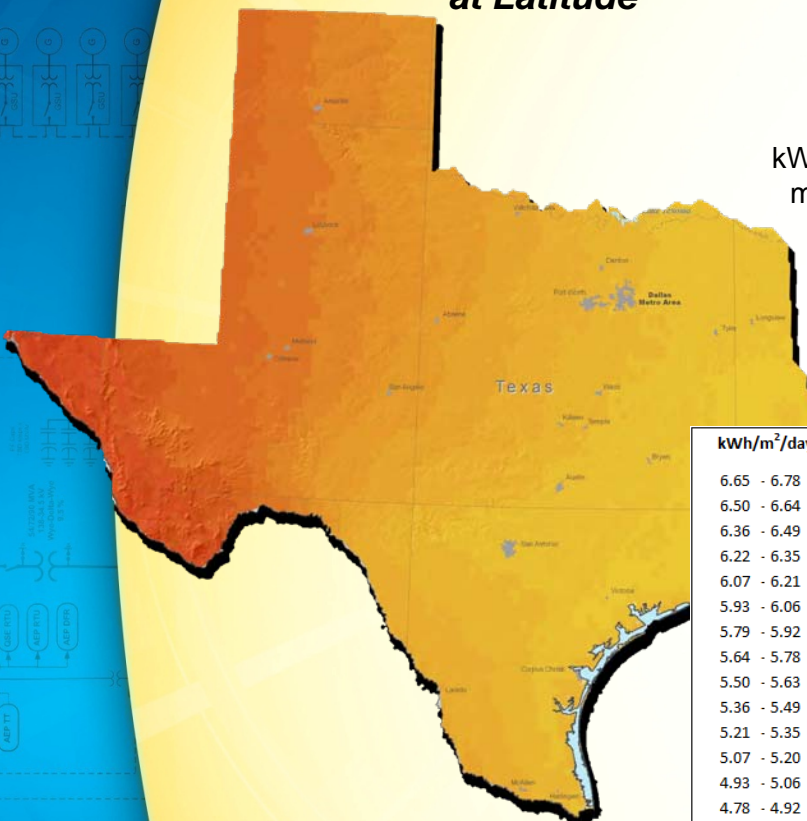
**Photovoltaic  
Flat Plate tilted  
at Latitude**



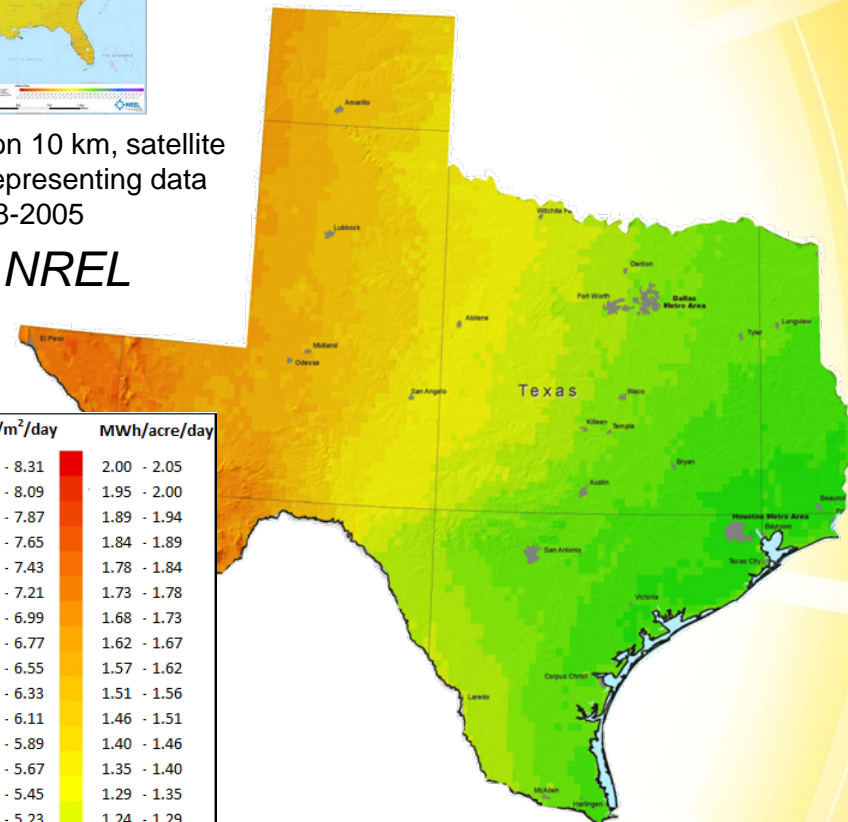
**Concentrating Solar  
Direct Normal**

kWh/m<sup>2</sup>/day based on 10 km, satellite  
modeled dataset representing data  
from 1998-2005

*Source: NREL*



kWh/m <sup>2</sup> /day	MWh/acre/day	kWh/m <sup>2</sup> /day	MWh/acre/day
6.65 - 6.78	1.64 - 1.68	8.10 - 8.31	2.00 - 2.05
6.50 - 6.64	1.61 - 1.64	7.88 - 8.09	1.95 - 2.00
6.36 - 6.49	1.57 - 1.60	7.66 - 7.87	1.89 - 1.94
6.22 - 6.35	1.54 - 1.57	7.44 - 7.65	1.84 - 1.89
6.07 - 6.21	1.50 - 1.53	7.22 - 7.43	1.78 - 1.84
5.93 - 6.06	1.47 - 1.50	7.00 - 7.21	1.73 - 1.78
5.79 - 5.92	1.43 - 1.46	6.78 - 6.99	1.68 - 1.73
5.64 - 5.78	1.39 - 1.43	6.56 - 6.77	1.62 - 1.67
5.50 - 5.63	1.36 - 1.39	6.34 - 6.55	1.57 - 1.62
5.36 - 5.49	1.32 - 1.36	6.12 - 6.33	1.51 - 1.56
5.21 - 5.35	1.29 - 1.32	5.90 - 6.11	1.46 - 1.51
5.07 - 5.20	1.25 - 1.28	5.68 - 5.89	1.40 - 1.46
4.93 - 5.06	1.22 - 1.25	5.46 - 5.67	1.35 - 1.40
4.78 - 4.92	1.18 - 1.22	5.24 - 5.45	1.29 - 1.35
4.64 - 4.77	1.15 - 1.18	5.02 - 5.23	1.24 - 1.29
4.50 - 4.63	1.11 - 1.14	4.80 - 5.01	1.19 - 1.24
4.35 - 4.49	1.07 - 1.11	4.57 - 4.79	1.13 - 1.18
4.21 - 4.34	1.04 - 1.07	4.35 - 4.56	1.07 - 1.13
4.06 - 4.20	1.00 - 1.04	4.13 - 4.34	1.02 - 1.07
3.92 - 4.05	0.97 - 1.00	3.91 - 4.12	0.97 - 1.02
3.78 - 3.91	0.93 - 0.97	3.69 - 3.90	0.91 - 0.96



# Texas Legislative Bill Summary on Solar

April 21, 2011

Provided by TREIA

[www.treia.org](http://www.treia.org)



## RPS Bills:

- HB 3259 (Strama) + SB 1539 (Watson) + SB 330 + HB 774 (Anchia) – Increase to 1,500 MW and/or reaffirm the state's current 500 MW target for renewable resources other than wind as mandatory.

## Incentive Bills:

- HB 2961 (Darby) – Creation of a statewide incentive program for distributed and grid-scale solar.
- HB 3532 (Strama) – Creation of a competitive solar schools incentive program to increase distributed solar generation installed at schools.

## Market Rule Bills:

- HB 340 (Gallego) – Clarifies third party ownership rules for distributed renewable generation and minimum payments for surplus electricity.
- SB 238 (West) + HB 362 (Solomons) – Creates guidelines for solar policy in HOAs and creates basic solar rights from homeowners.
- SB 981 (Carona) + HB 2288 (Crownover) – Clarifies that third party owners of distributed renewable generation are not electric utilities, power generation companies, or retail electric providers

## Other

- SB 1590 (Ogden) – Removes local control from school district property tax options (Chapter 313) that have otherwise been helpful for wind (and solar) development.
- SB 0015 (Fraser) – Authorizes creation of a 20-year horizon state energy plan, which potentially narrows renewable energy policy implementation options.

## November 6, 2011: Utility Scale Solar Workshop 2

Chaired by Hala N. Ballouz, P.E., *Electric Power Engineers, Inc.*

**TEXAS RENEWABLES 2011 Conference & Exhibition, Corpus Christi Convention Center**



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# Q&As

**Hala N. Ballouz, President**

**[contact@epeconsulting.com](mailto:contact@epeconsulting.com)**

