

# United States Energy Association

GLOBAL WORKSHOP ON GRID CONNECTED RENEWABLE ENERGY



## GE Solar Overview

Ronald J Brzezinski:  
Commercial Manager  
GE Energy  
September, 2009



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# Market



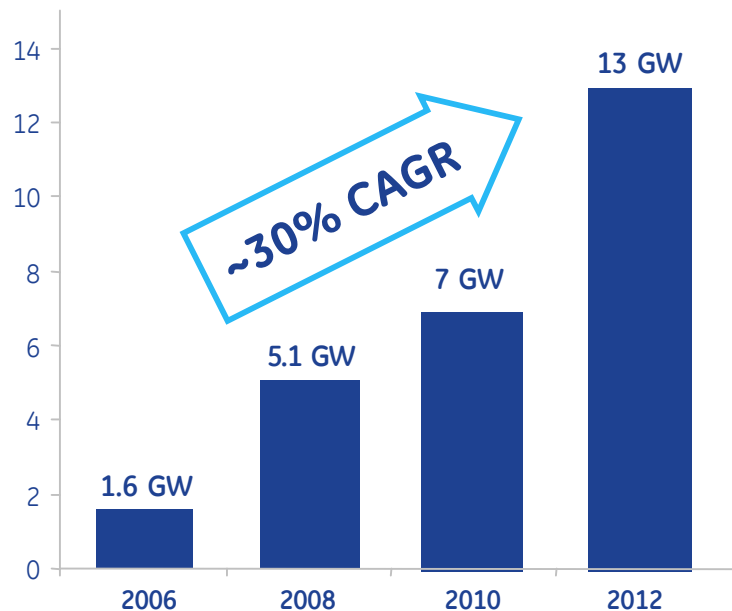
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# Solar ... fastest growing renewable



## Industry installation forecast

(GWs)



Source: Navigant Consulting 2009

## Key Highlights

### 2008

- Majority installs in Europe

### Today

- Overall costs declining with increased Si capacity
- Lack of project financing impacts growth in '09

### Tomorrow

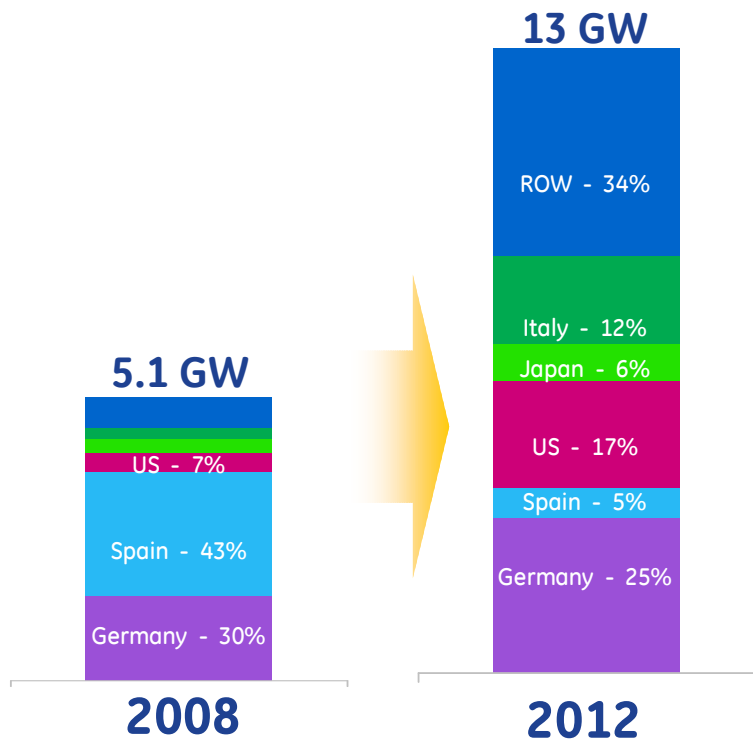
- Recovery projected '10+
- Technology advancements continue to drive down cost
- US gaining in next 3+ years



**>80% of demand subsidy-driven**

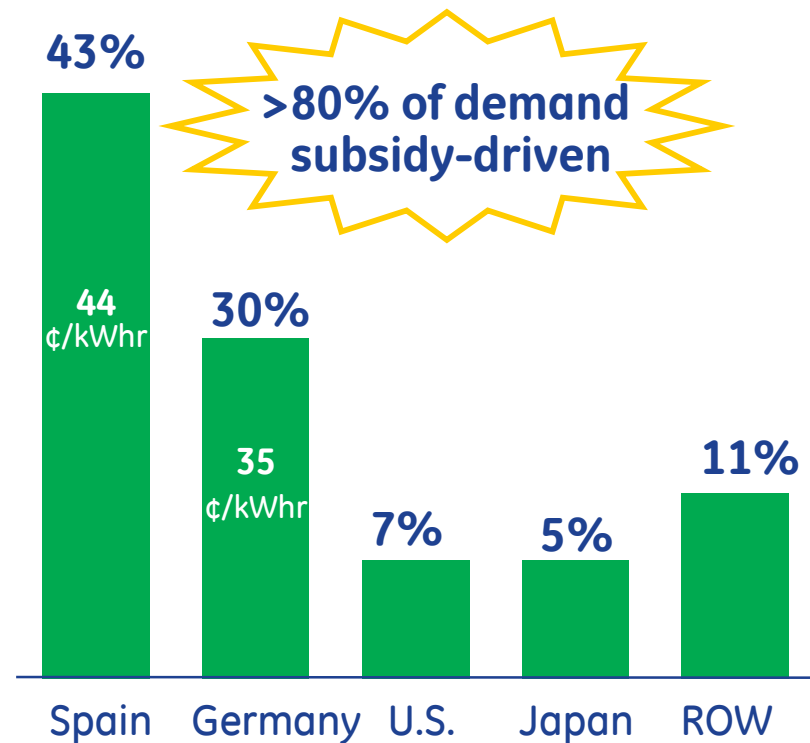
# Policy drives European, US leadership

## Regional installations



Source: Navigant Consulting 2009

## 2008 regional installs



**Incentives & cost-out drives growth**

# Policy drives project economics

## United States

- + ITC extension – 8yrs. Utilities eligible
- + Accelerated 5yr Depreciation (MACRS)
- Tax appetite limited ...
- + Renewable Portfolio Standards (RPS) ... Solar Requirements in 11 states ...~3 GW '08-13... 10 GW '25
- + Other State incentives (Rebates, RECs...)

## Europe

- + Attractive Feed In Tariffs (FIT) of \$.40 - \$.75/kwh. eg. France, Germany, Italy, Spain
- FIT amounts declining annually with MW Caps
- Gov't agency approval
- + Dependable revenue stream = largest market

## Asia

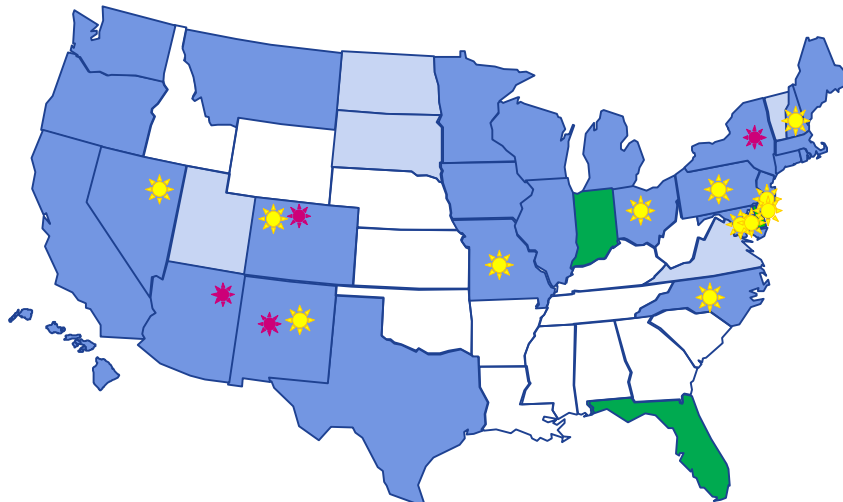
- FIT < Europe (S. Korea, India)... difficult project economics
- Japan.. incentive ended '05
- China... 1.8 GW '20 target... no supports

**Europe most attractive to date... US improving**

# Renewables policy...

Many States driving solar / renewable requirements

## Many Policies....



### Renewable Portfolio Standard (RPS)

- States with RPS Solar Carveouts (11 + DC)
- States with RPS DG Carveouts (4)
- Mandatory RPS (28 + DC)
- Voluntary RPS (5)
- Considering RPS (2)

## Recent legislation

- 30% ITC with utility eligibility
- Option to take Treasury grant
- 5yr Accelerated depreciation

## Proposed legislation

- Federal RES... 25% by 2021 ...
- 3x DG multiplier

**Fed & State Government advocating Green Energy**



# Economics



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# Solar Technology Overview

## Silicon (cSi) – 80% of installs

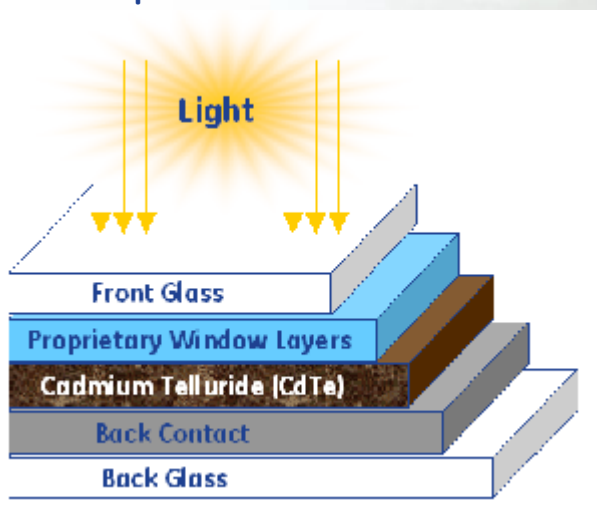


- Raw material volatility
- Significant price drop since 2008

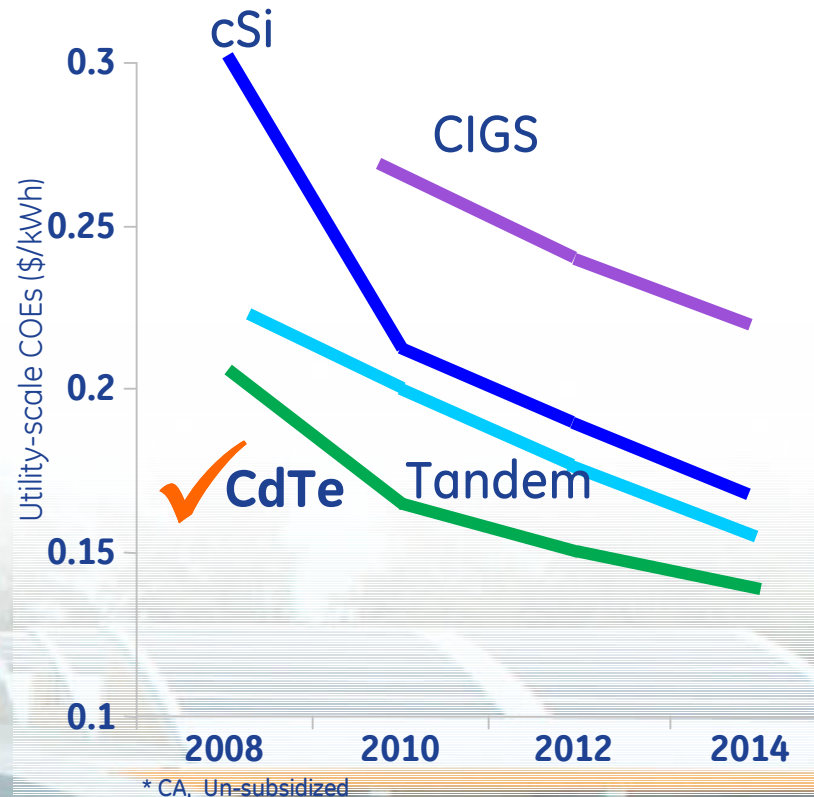
## Thin Film s– fastest growing segment



- CdTe – best eff. & cost combination
- Tandem - low tech. barriers, but ↑ Cap-Ex



## COE by Technology\*



**CdTe thin film is the low cost leader**



# GE Products



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# GE Solar ... meet your needs today

Products

## Si Modules



200W



Pioneers of First  
Roof Integrated

66W

## Inverters



2.5 - 3.8kw  
5 Models

## Brilliance™ Systems



Complete Systems ...  
Modules, inverter & racking

## Optimized Systems Engineering and On-Site Training

Installations

### Residential



Ladera Ranch, CA  
3kW

### Commercial



Premier Power - Pomplona, Spain  
18kW

### Utility



Iberinco - Cáceres Project, Spain  
10MW

# ... and tomorrow

*Investing in multiple growth platforms*

## Modules



### Thin Film Leadership

- CdTe PrimeStar ramp
- Tandem - Si
- CIGS R&D

## Inverters



### Power Conversion

- GE 600 kW Inverter
- Utilizing wind controls tech & volume
- Grid friendly differentiation

## Solar Systems



### Utility Scale Power Plant

- Standardized & scalable
- Integrated grid controls
- Modular design ... cost ↓

**Differentiating through low cost module & grid capabilities**



# Developing a world class PV Inverter

*Addressing the weak link in the chain...reliability*

## Leveraging design of 1.5MW wind converter

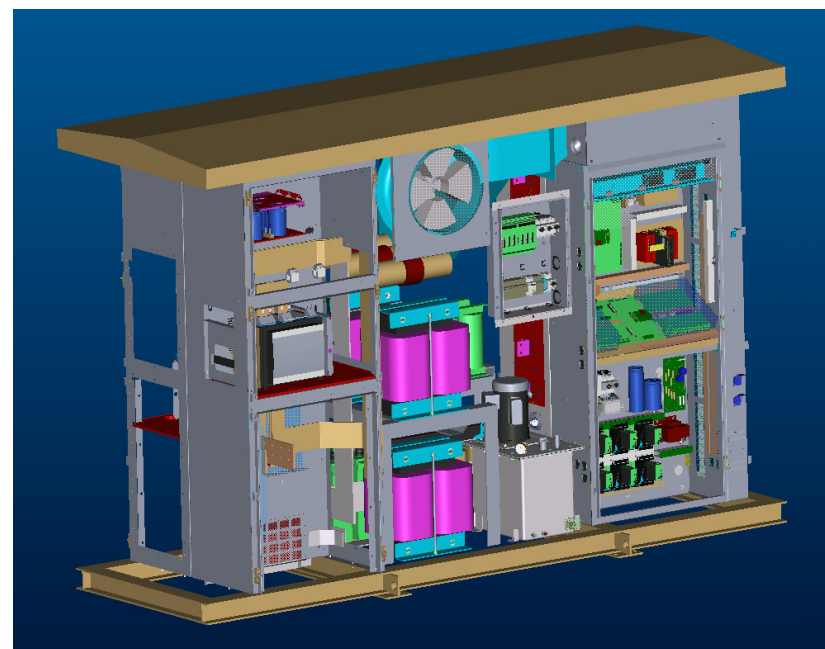
- 10,000+ units in the field
- 75+ million operating hours

## Bringing grid friendly features from Wind to PV

- LVHT/ZVRT
- Voltage and power regulation
- VAR support
- SCADA

## Development status

- Customer Testing currently underway
- Product introduction 4Q '09





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Thank you for your attention

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