

THE NEW VALUE FRONTIER



# Distributed Solar Energy

## Opportunities for the U.S. Border Region

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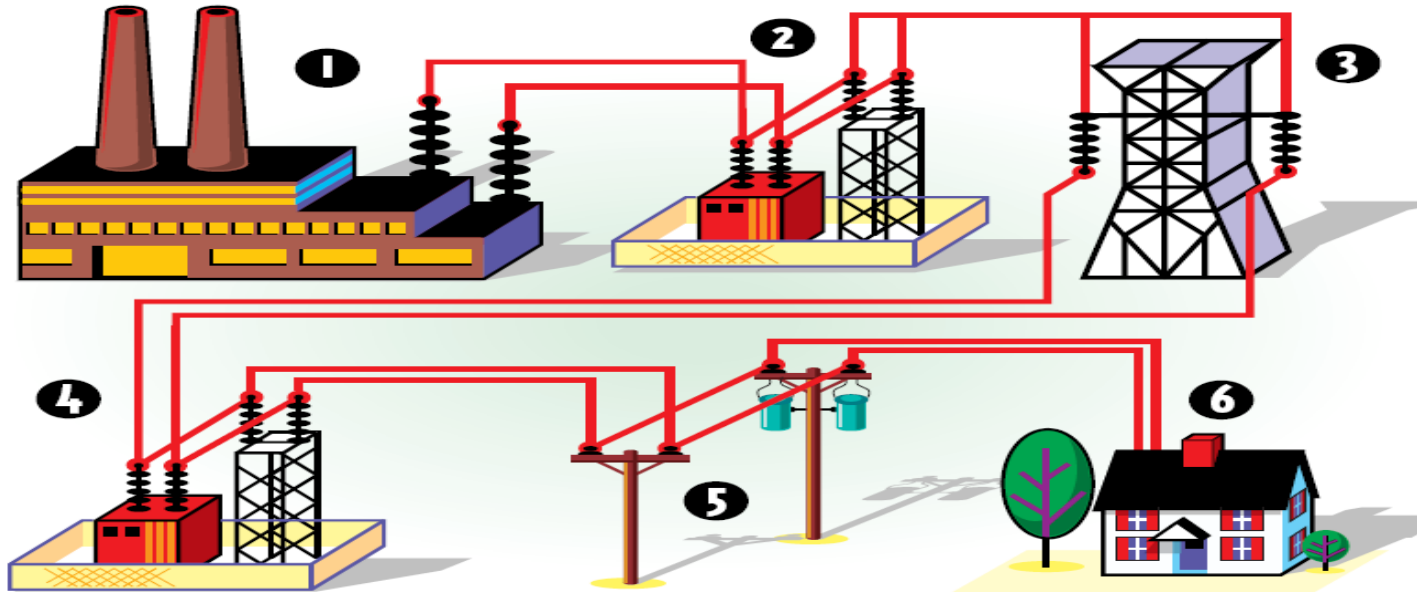


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# Layout of the Power Grid: Distributed PV Provides Customer Power Without Stages 1 to 5

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**When electricity leaves a power plant (1), its voltage is increased at a “step-up” substation (2). Next, the energy travels along a transmission line to the area where the power is needed (3). Once there, the voltage is decreased or “stepped-down,” at another substation (4), and a distribution power line (5) carries the electricity until it reaches a home or business (6).**

Source: Edison Electric Institute, *Key Facts: A Look at the Electric Power Industry*, Section 3, available online at:  
[http://www.eei.org/industry\\_issues/industry\\_overview\\_and\\_statistics/nonav\\_key\\_facts/index.htm](http://www.eei.org/industry_issues/industry_overview_and_statistics/nonav_key_facts/index.htm)

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# Benefits of Distributed Solar Energy

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- Provides Clean Energy
- Provides Peak Shaving Power Reducing Investment Needed for Peaking Plants
- Reduces Cost Volatility
- Reduces Dependence on Imported Fuels
- Alleviates Grid Congestion
- Ratepayers Monies Assigned to the subsidies are Leveraged
- Creates Local High-Tech Industries
- Improves Energy Security (De-Centralization)

# Economic Benefits of Distributed Generation

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- Creates Jobs  
(Manufacturing, Distribution, Installation, and Service)
- Generates Tax Revenues
- Decreases Spending on Procuring Energy or Fuel from Outside the Local Economy
- Monies Saved on Electricity Go Back into Local Economy



DarMar Residence by Carlson Solar

# Policies Needed to Support Solar D.G.

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- Net Metering
- Financial Incentives
- Solar Friendly Electricity Tariffs
- Long term contracts for Renewable Energy Credits and/or electricity + credits
- Renewable Portfolio Standards with solar carve outs



New Jersey Solar

## Financial Incentives

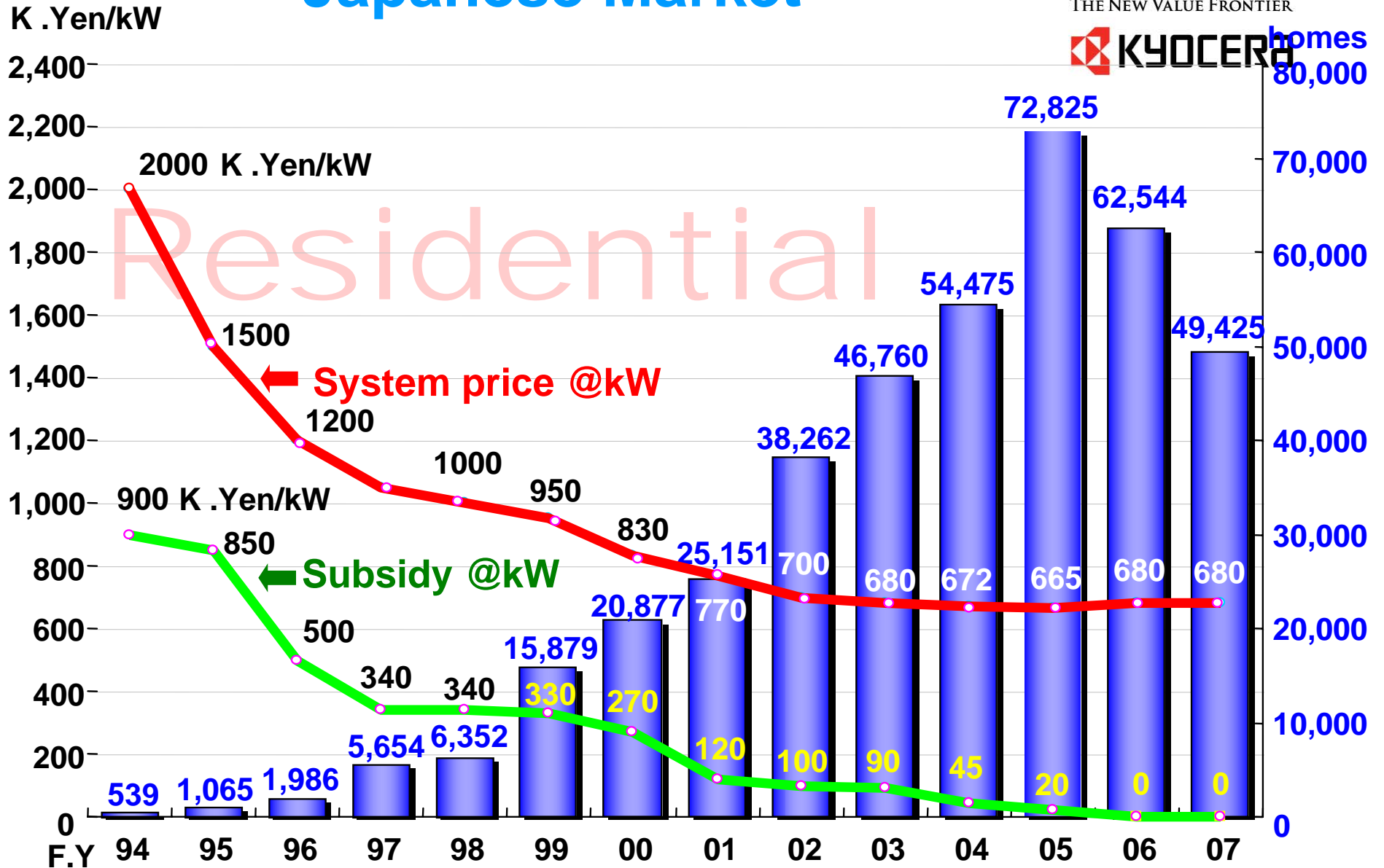
- Tax Credits
- Tax Exemptions
- Rebates based on system cost
- Rebates based on expected output
- Payment stream based on output - \$/kWh
  - Performance Based Incentives (PBI)
  - Feed-in Tariffs (FIT)

## Japanese Model

- Based on yen/DC Watts
- Residential program limited to 3kWts per household
- Net metering + utility purchase of solar kWhs at retail prices
- Solar tariff available
- Federal program ended in 2005
- 1GW + installed in Japan
- PV prices reduced by 70% within 10 years

# Japanese Market

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■ homes   
 ● subsidy K.Yen/kW   
 ● system price K.Yen/kW  
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# Residential Development in Japan, On-Grid



Courtesy : PanaHome

# European Markets

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4,500  
MW

4,000

3,500

3,000

2,500

2,000

1,500

1,000

500

0

		Cumulative Installed(MW)	Share
1	GERMAN	3,862	49.3%
2	JAPAN	1,919	24.5%
3	USA	831	10.6%
4	SPAIN	655	8.4%
5	ITALY	120	1.5%
6	AUSTRALIA	83	1.1%
7	KOREA	78	1.0%
8	FRANCE	75	1.0%
9	NETHERLANDS	53	0.7%
10	SWITZERLAND	36	0.5%

Germany  
3.8GW

Total 7.8GW

1.9GW  
Japan

USA

831

655

Spain

120

Italy

Addition to the above:

India 110 MW, China 100 MW

1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007

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Source: Trend in PV Applications: IEA PVPS 26 Aug. 2008 up dated. For China, Current Status PV in China : Beijing Corona 31 July 2008. For India : 2nd APP India-Japan

## European Models

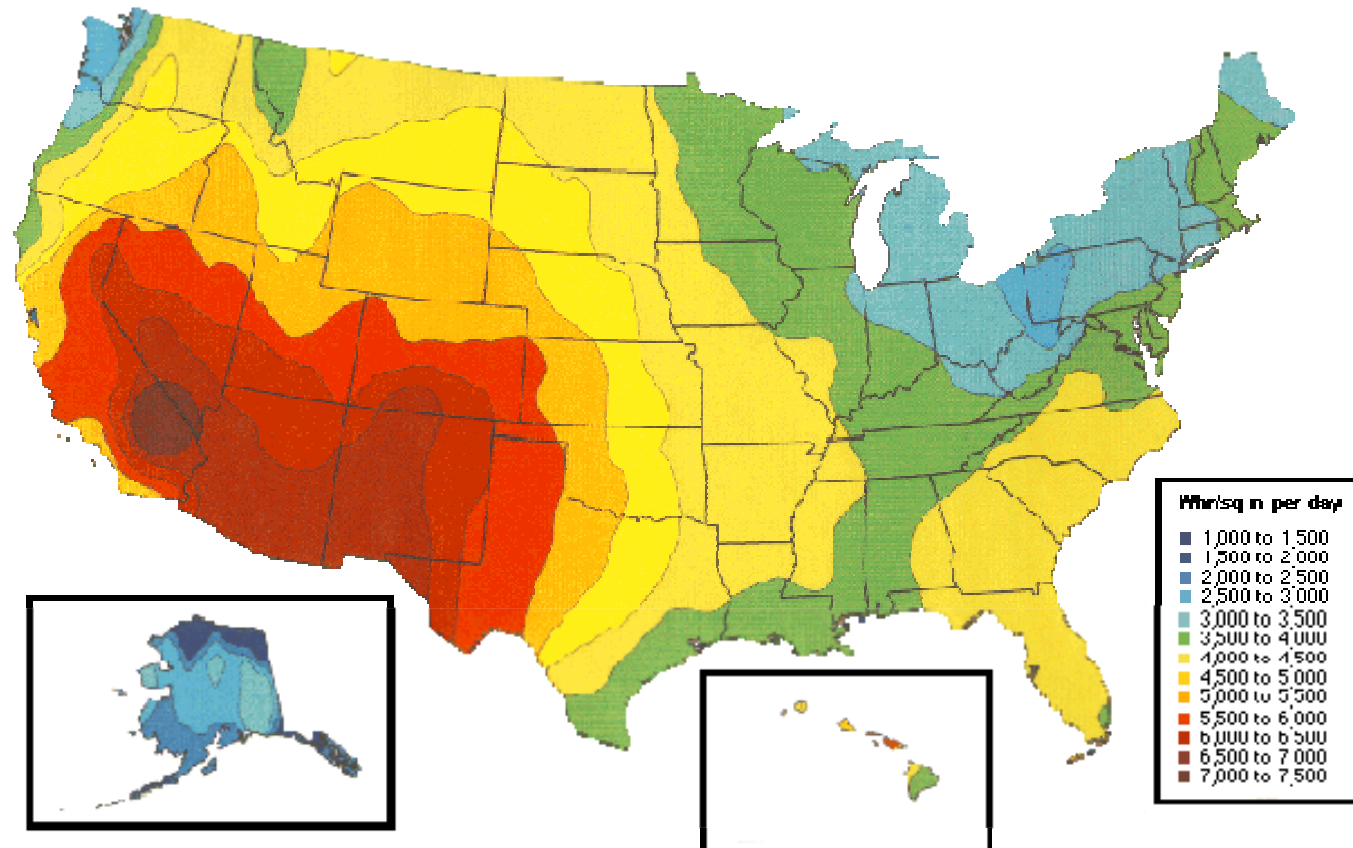
- Based on feed-in tariff
- Based on system performance / system output
- Utilities purchase solar kWh at rates 2x or more higher than retail rates
- German pioneered feed in tariff method
- 3.5GW installed by the end of 2007
- 40,000+ jobs created since 2000 (1,500 in 1999)
- German fastest growing PV market worldwide
- Other European & Asian countries are emulating the German model (Spain, Italy, Greece, South Korea...)

# Solar Map

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## Average daily solar radiation, 1961-1990



**Energy from the sun on a surface directly facing the sun.**

## Border Region: What we Have in Common

- Solar resources
- Grid congestion issues
- Population growth – energy demand
- Industry growth
- Pollution – we share the air
- Relative low market penetration – opportunity for solar market growth
- Labor force (high-tech & low-tech)

## Border Region: What's Different

- Uniformed policies are possible in MX, but difficult in the U.S.
- CFE in MX vs. thousands of utilities in the U.S.
- U.S. (California) has more experience with solar policies than MX

## Kyocera Recommendations

- Incentive programs should be based on system performance
- Rebates for residential and small commercial projects
- Net metering
- Electricity tariffs that promote solar energy
- Feed-in-tariff programs to accelerate the PV market
- Incentive programs should last 5-10 years
- Programs need to promote competition to be sustainable
- Learn lessons from each other

# Impact of Effective Policies

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- Investments in Manufacturing
- Stability of Material Supply
- Investments in R&D
- Price Reductions
- Creation of a Self-sustaining Industry





# Conclusion

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- U.S. border region has great solar resources
- Mexico can learn lessons from California – what works & what doesn't
- Easier to implement uniform policy in Mexico (U.S. has many utilities)
- Technology transfer easier from California to Baja California
- Baja California can lead the way for Mexico