CLEAN COALITION

Making Clean Local Energy Accessible Now

Distributed Generation + Smart Grid

Success Depends on Significant Interconnection Reform

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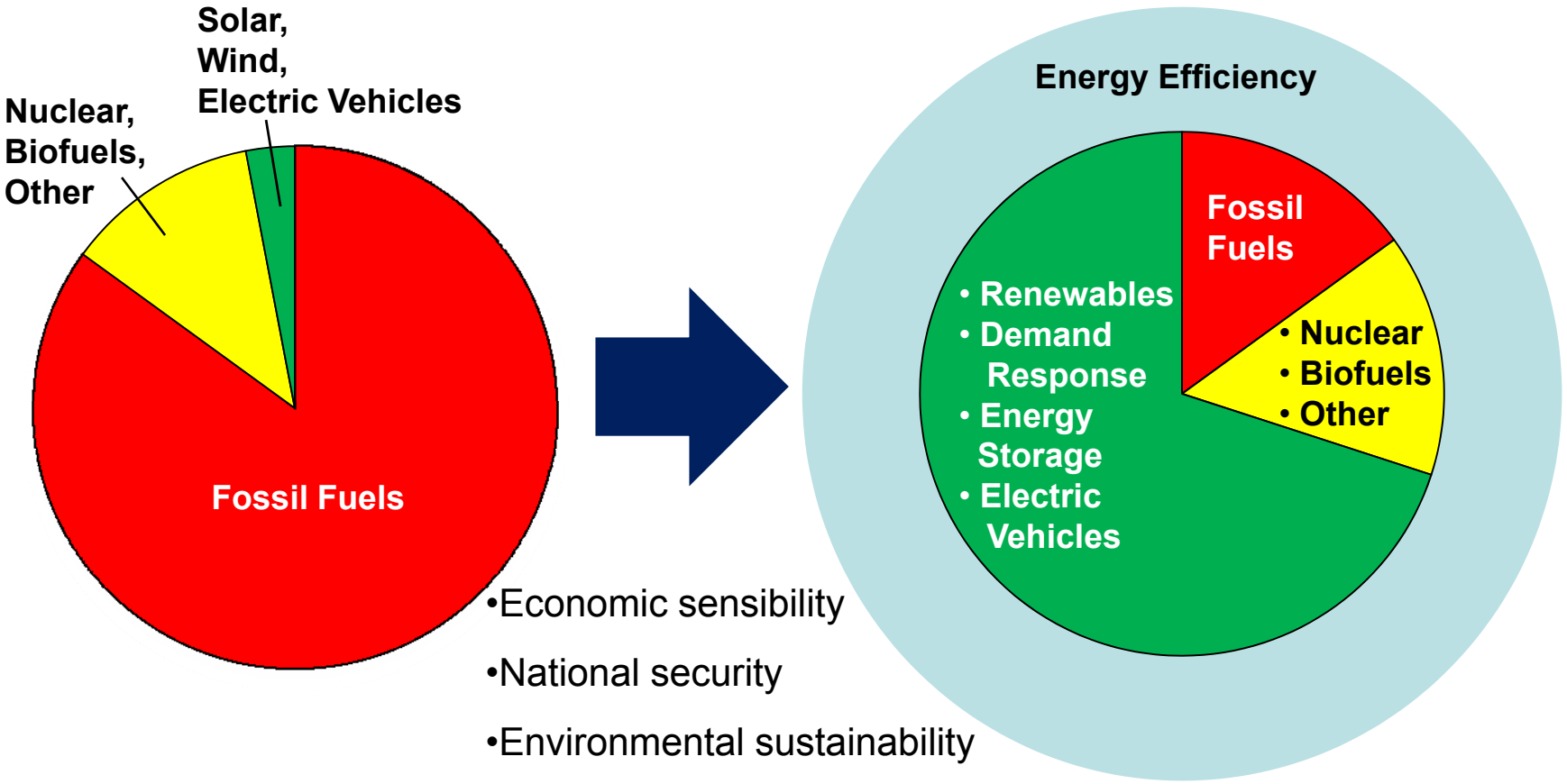
The Ultimate Clean Coalition Vision



The $6 trillion energy market will transition to Smart Energy

Clean Coalition – Mission and Advisors

Mission

Accelerate the transition to cost-effective clean energy while delivering unparalleled economic benefits

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California in Perspective

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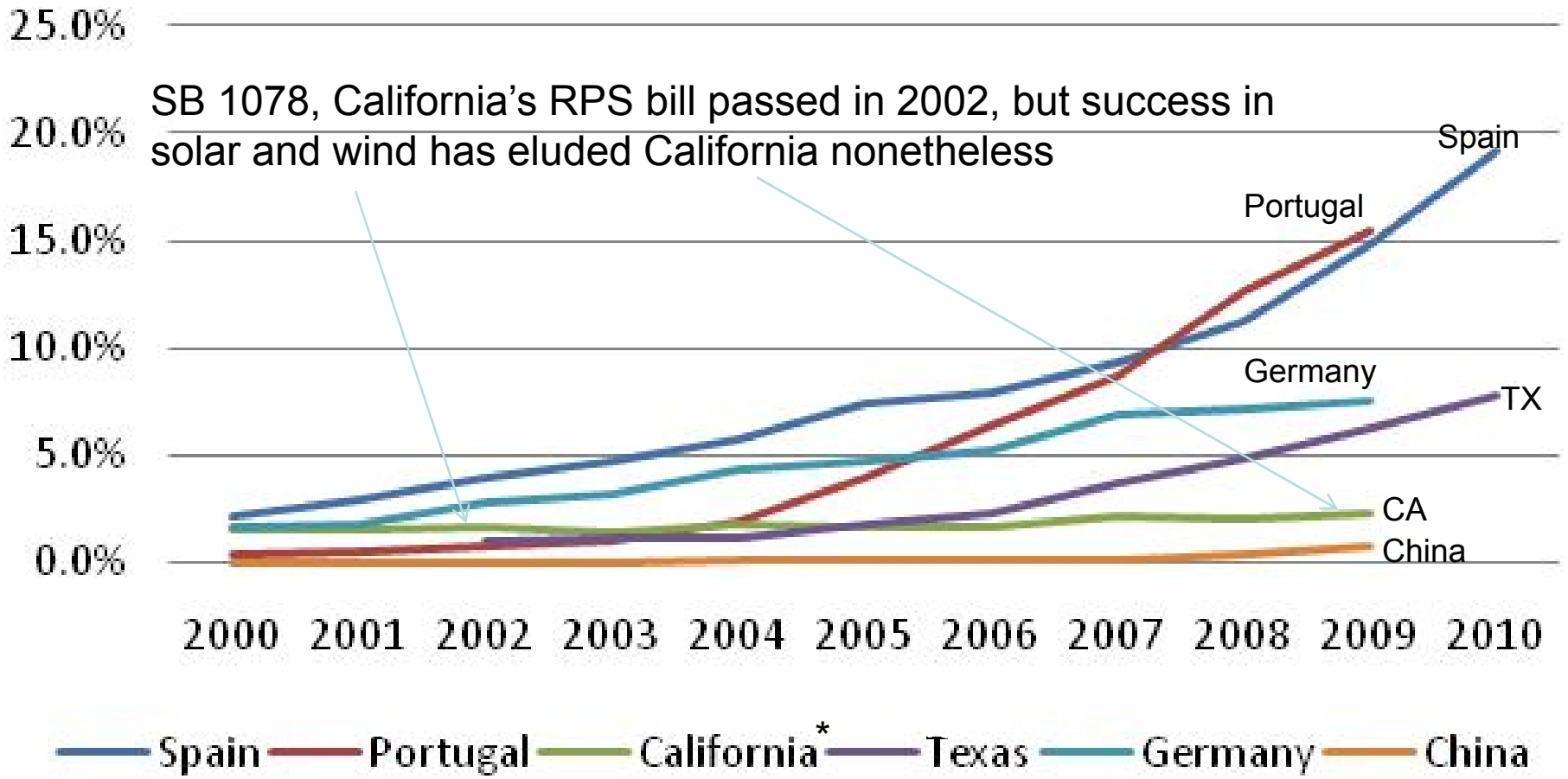
Wind and Solar as % of Total Elec.



* Includes all IOUs and POUs in California

Sources: EIA, CEC

Policies Need to Reduce Costs and Risks

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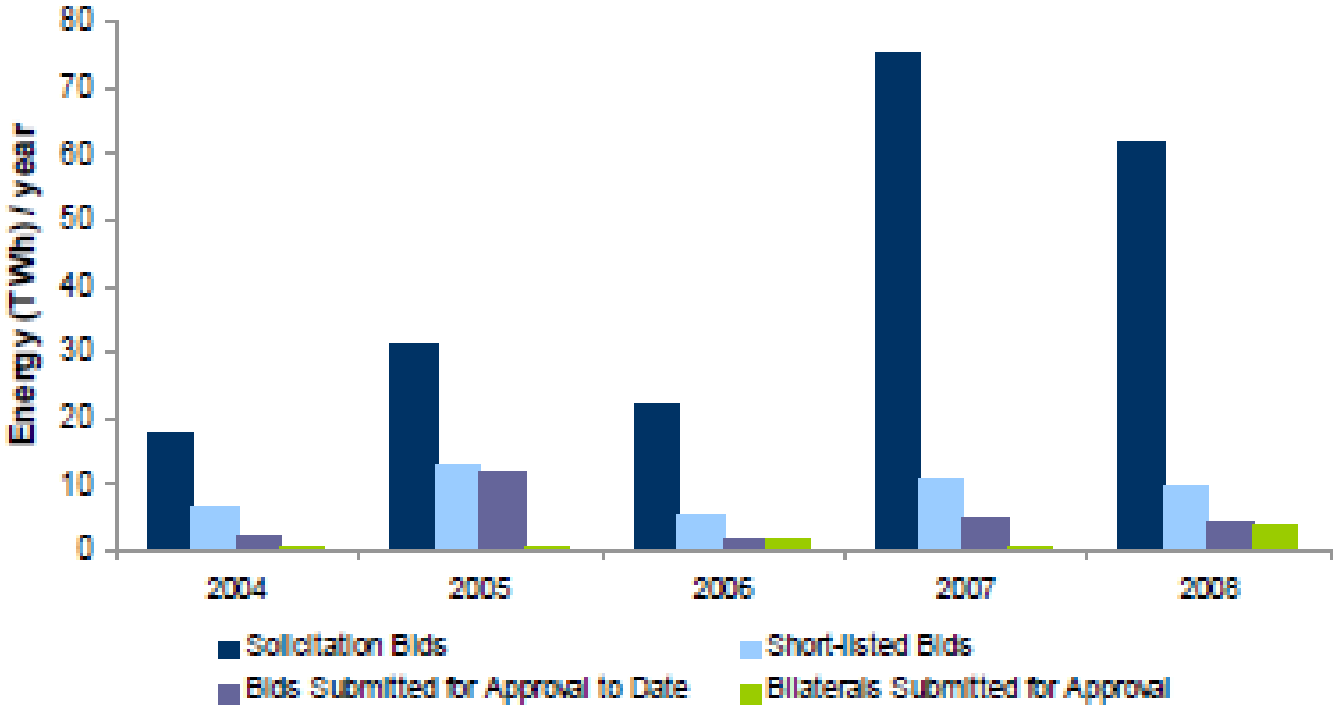
Current California Policies Result in ~97% Failure Rates



Source: California Public Utilities Commission, 2nd Quarter 2009

Current solicitation/auction and interconnection processes result in massive failure rates: roughly 97% of the bid capacity fails to reach contract.

Clean Local Energy Accessible Now (CLEAN) Programs (aka Feed-In Tariffs) are used in leading renewables markets

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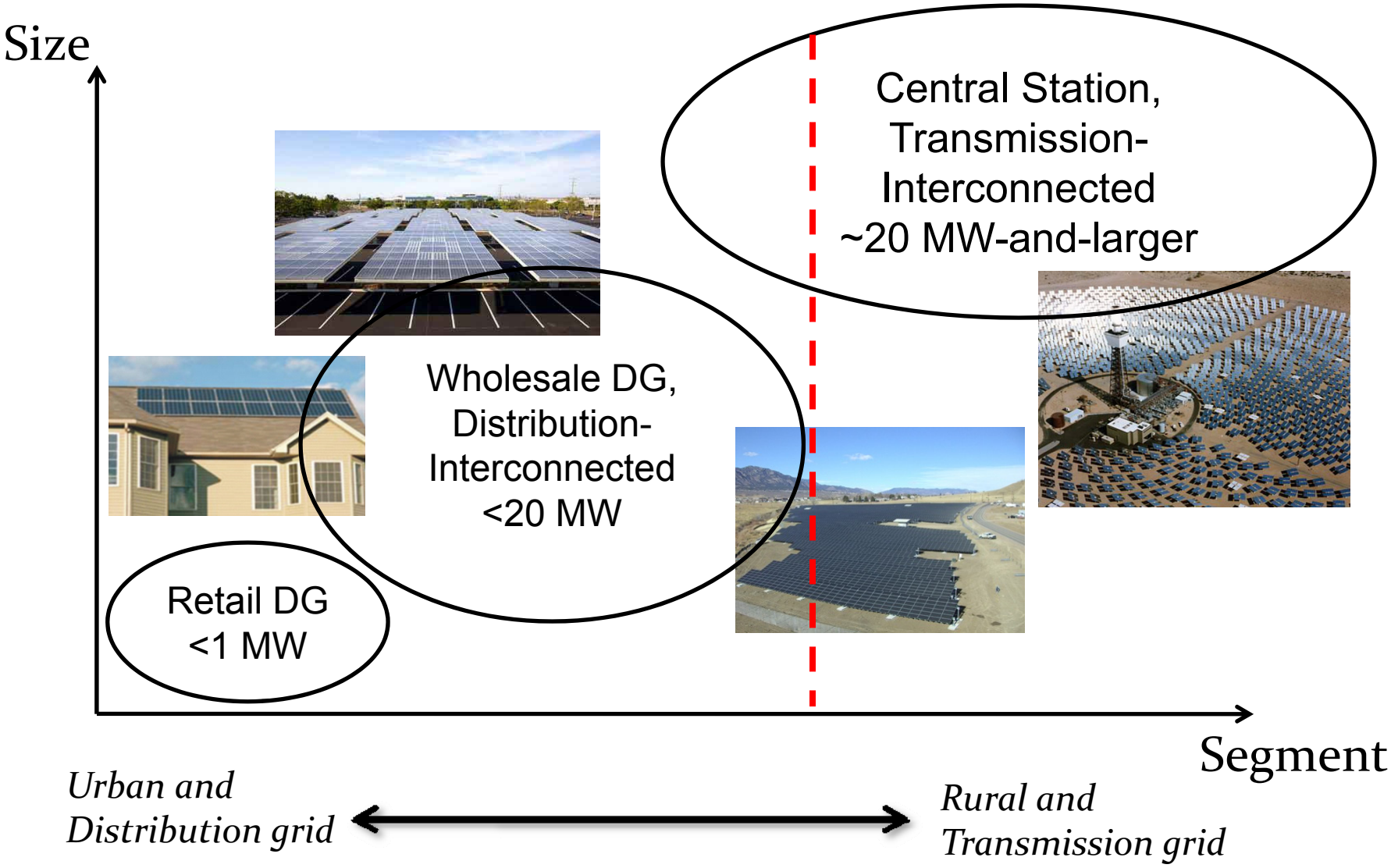
- CLEAN Features:
  - Standard and guaranteed contract between the utility and a renewable energy facility owner
  - Predefined fixed rates for long durations
  - Predictable and streamlined distribution grid interconnection

- CLEAN Benefits
  - The vast majority of renewable energy deployed in the world has been driven by CLEAN Programs (NREL, Center for American Progress)
  - Allows any party to become a clean energy entrepreneur
  - Attracts private capital, including vital new sources of equity
  - Drives employment and generates tax revenue at no cost to government

Wholesale Distributed Generation (WDG) = Solution



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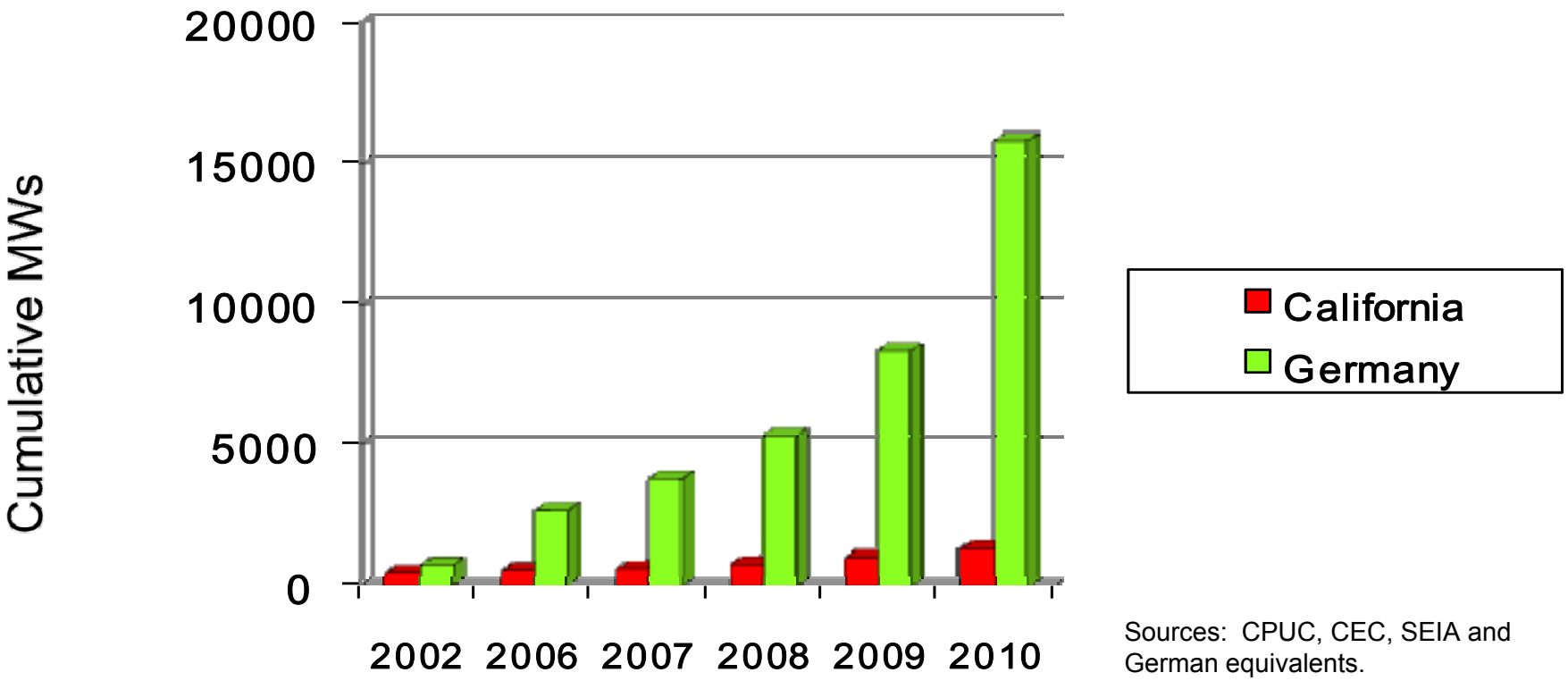
Solar Markets: Germany vs California (RPS + CSI + other)

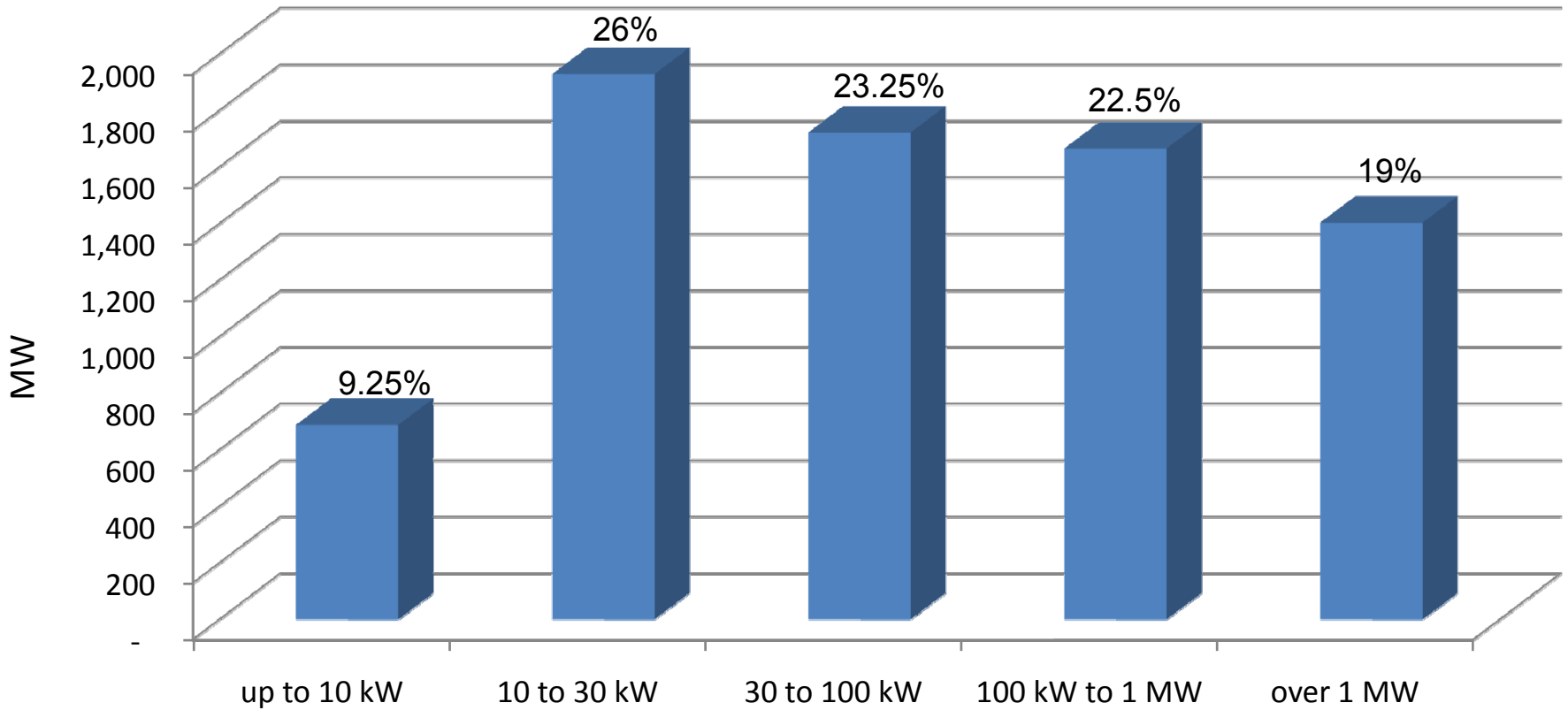


Sources: CPUC, CEC, SEIA and German equivalents.

Germany added roughly 25 times more solar than California in 2010.
Even though California's solar resource is about 70% better!!!

German Solar Capacity is Small WDG

German Solar PV Capacity Installed in 2010



Germany's capacity is almost entirely small WDG (less than 2 MW projects) interconnected to the D-grid (not behind-the-meter)

Source: Paul Gipe, March 2011

Germany has Cheapest Solar in World (US$0.12/kWh)

- Most expensive German CLEAN rate is set for solar
- Germany's weighted average Wholesale Distributed Generation (WDG) solar rate is about US$0.30/kWh
- In California, the equivalent rate would be less than $0.12/kWh
  - Tax credits in US reduce the German rate by 40%
    - Investment Tax Credit (ITC) and Accelerated Depreciation
  - Solar resource is at least 50% better in California, which reduces German rate by more than an additional one-third
- Effectively: 30 cents/kWh goes to 18 and then to less than 12

German PV rate of 30 cents is equivalent to less than 12 cents in California

US has far better solar resource than Germany

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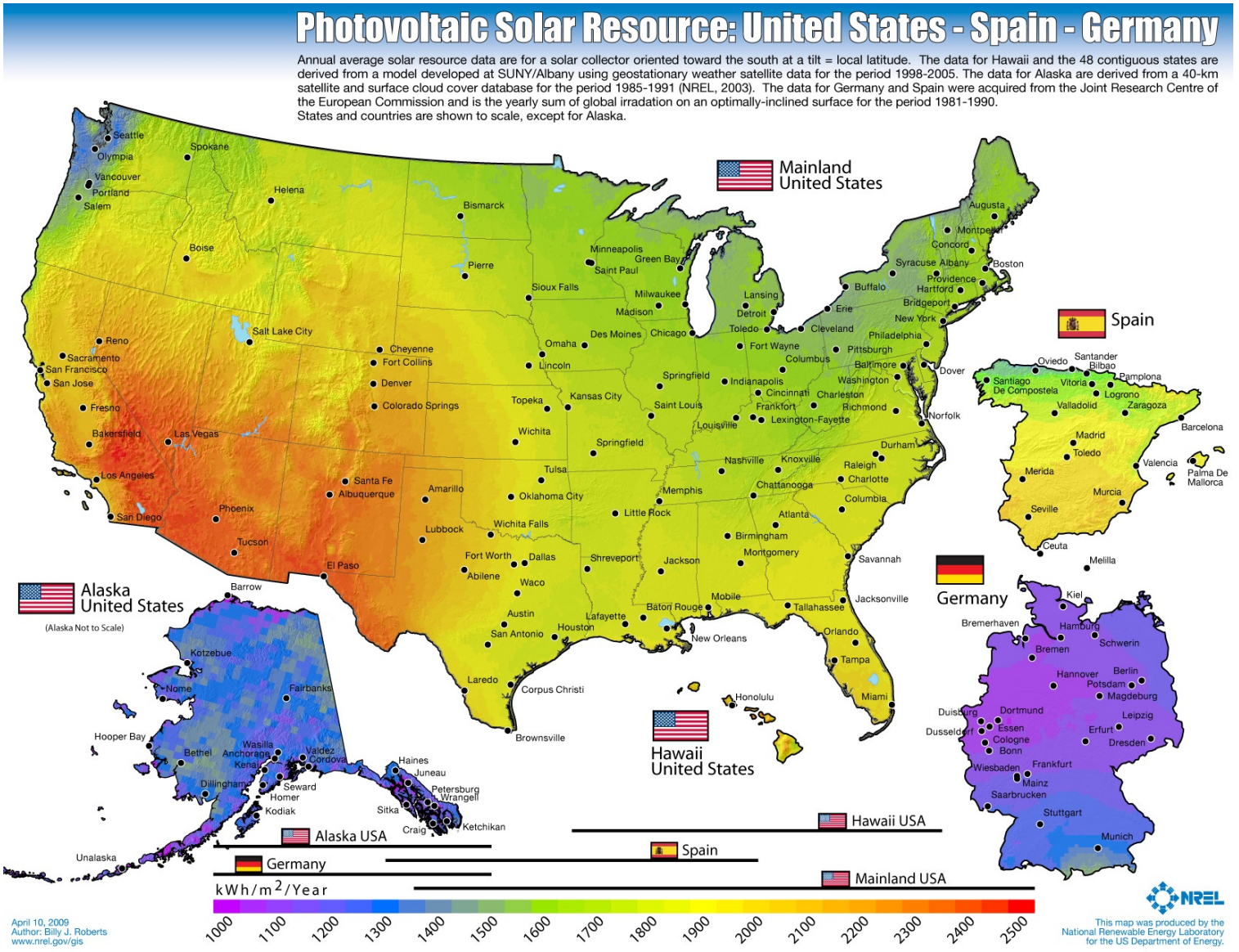
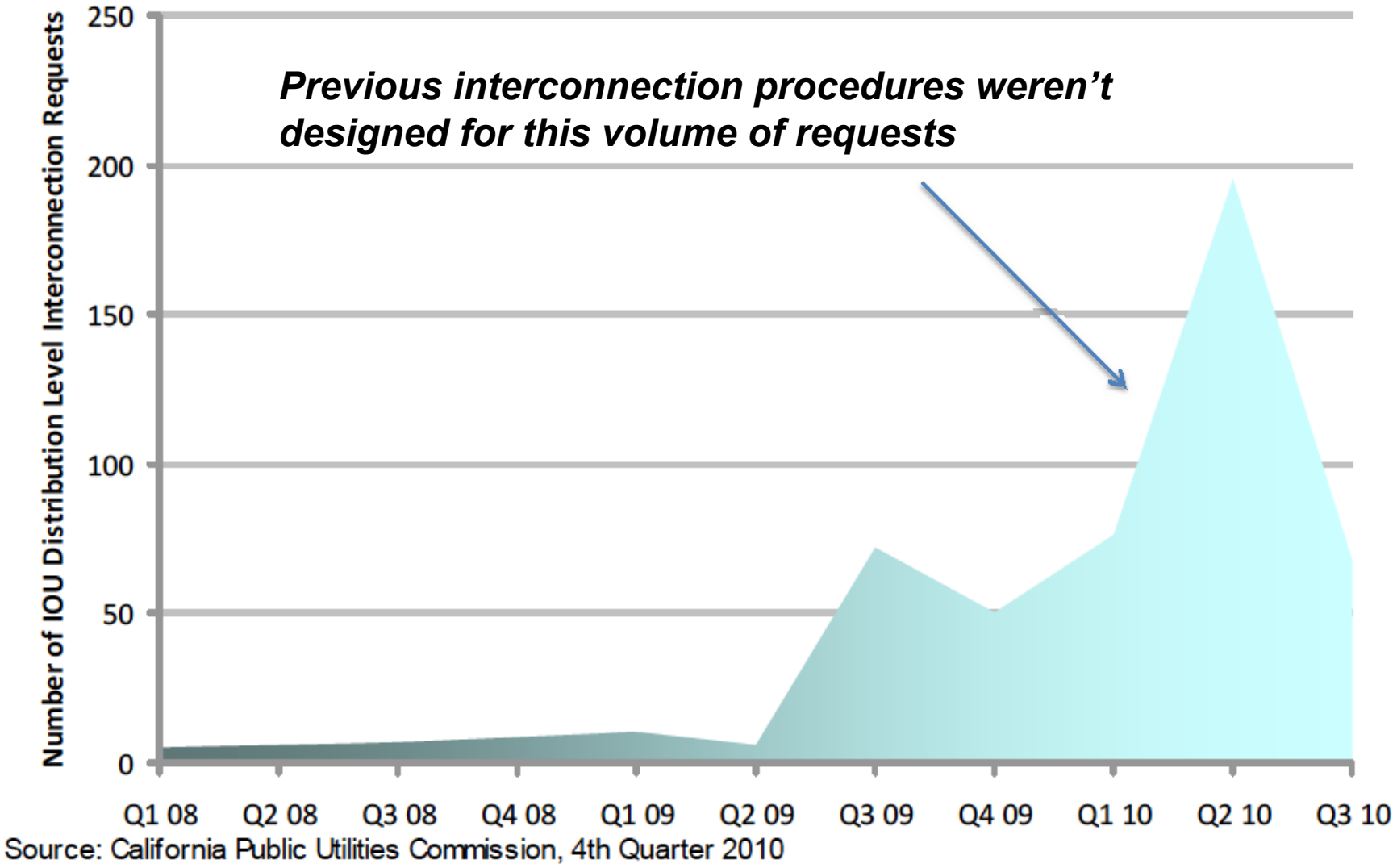


D-Grid Interconnection Requests



Source: California Public Utilities Commission, 4th Quarter 2010

Comparing Investor-Owned Utilities (IOUs) and SMUD project development timelines

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CA IOUs	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12
Cluster process	Potential cluster process waiting period											2nd cluster window	IR review	Scoping Meetings	Phase I study					Results meeting	
Fast Track	IR validation and initial review	Options mtg and supp. Review agreement	Supp. Review	IA	EPC (construction)																
Ind. Study Procedure	IR validation and initial review	System Impact Study Agreement (SISA)	SIS			Security Posting	Facilities Study (FS)			IA	EPC										
SMUD FIT Program	IR review and scoping meetings				IA		Contract [illegible]		EPC (estimated)												

Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14
Security posting	Phase II study							Interconnection agreement negotiation (IA)			EPC (construction)											

Sources: PG&E and SMUD

- SMUD: about 1 year total (6 months for interconnection)
- IOU default cluster process: up to 3.5 years (average of 2 years for interconnection)

Interconnection with California IOUs takes 4 times longer than with SMUD

Connecting-the-Dots to Reform

- 75% of California IOU capital expenditures are made on the distribution grid (D-grid) and California ratepayers deserve maximized returns on their MASSIVE investments (2007 IEPR)
  - Investment needs to be future-proofed to allow significant penetrations of clean local energy
  - Confidentiality rules need to change to allow proper regulatory oversight of these massive ratepayer investments

- Germany and Spain are excellent proxies for California's D-grid accommodating significant penetrations of clean local energy (May 2011 CEC/KEMA report)

- MPR is determined at point-of-interconnect and Wholesale Distributed Generation (WDG) and a Locational Benefits (LBs) adder is needed to compensate for extra value of WDG
  - Average extra LBs value of DG is in the neighborhood of 25% (Transmission Access Charges of 1.5 cents/kWh plus 10% for transmission line/congestion losses)
  - The LBs adder should be handled just like the Time-of-Delivery (TOD) adder
  - Ratepayers currently get massive free value from WDG in the form of uncompensated LBs

Connecting-the-Dots to Reform (continued)

- Currently, developers are responsible for 100% of D-grid upgrade costs without any opportunity for reimbursement, EVER
  - This is different than transmission upgrade costs that are ALWAYS borne by the ratepayer
  - Recommendation for the 50% of the D-grid where LBs value is above average, utilities pay for D-grid upgrades and recover through the rate-base.
  - Ratepayers currently get massive free value from WDG in the form of uncompensated D-grid upgrade costs

- Wholesale Distributed Generation (WDG) interconnections need to be far more timely and transparent
  - WDG interconnection processes in IOU D-grids are expected to require an average of 2 years
  - WDG interconnection processes in the SMUD D-grid requires 6 months
    - Interconnection studies for 100 MW of WDG projects in its Feed-In Tariff program were completed in 2 months (performed by 2 guys)
    - 100 MW of WDG in SMUD territory is equivalent to 2,500 MW of WDG statewide
    - TWO GUYS for TWO MONTHS should be an achievable benchmark for all utilities

The Solutions

1. Re-reform D-grid interconnection procedures to dramatically reduce study times
2. Create a robust CLEAN (feed-in tariff) program for projects 5 MW and below
3. Implement the Clean Coalition's "D-Grid Vision" > today's main topic

* Includes IOUs and POUs (statewide)

1. Interconnection Reform

- Solutions:
  - Clarify state jurisdiction versus federal jurisdiction
    - Based on our research, states enjoy broad jurisdiction over D-Grid interconnections, but FERC should clarify further in a declaratory order
  - California should reassert jurisdiction over all WDG interconnection, under an improved Rule 21
  - FERC and California should hold utilities accountable for interconnection deadlines and transparency through audits and penalties

* Includes IOUs and POUs (statewide)

2. CLEAN California Campaign

- Fulfills Governor Brown's vision for 12,000 MW of DG by 2020
- Key CLEAN Features
  - CLEAN/Feed-in tariff for 5 MW and smaller
  - Standard and guaranteed contract between the utility and the renewable energy facility owner
  - Fixed rate for a long duration
  - Predictable and streamlined interconnection
- Removes the top barriers to WDG renewable energy project development
  - Procurement: Securing a contract to sell energy to the utility
  - Interconnection: Gaining access to the grid
  - Financing: Attracting investors/lenders to fund projects

D-Grid Vision Key Principles

1. D-Grid planning should encourage 2-way flow and DG: All future d-grid investments should make the grid smarter with respect to managing DG.
2. D-Grid planning should identify where DG is most beneficial to consumers: Smart Grid should enable detailed data on power flows to understand where DG can help. This is the core idea behind AB1302
3. D-Grid planning should be transparent and accountable: Smart Grid should enable quick, low cost transparent modeling. AB1302 D-Grid Investment Plan amendment targets this

D-Grid Vision Key Principles

4. D-Grid upgrades for DG interconnect in beneficial locations should be rate-based:

   Example - smart grid investments should provide telemetry without asking developers to pay for it. Not being addressed in legislation this year.

5. Interconnection procedures should start from “dynamic pre-studies” of the D-grid. Smart Grid should provide near real-time data on the costs to interconnect and this should be published monthly. This is the #1 paradigm shift, from reactive to proactive.

6. Interconnection should be fast and transparent. If the first 5 principles are met with help from smart grid investments, then interconnection should be very quick.

Integrate with Related Regulatory Efforts

- DG Procurement: SB32, RAM
  - Locational Benefits are key for appropriately compensating WDG
- Interconnection: Rule 21
- Long-term Procurement Planning (LTPP)
  - Resource adequacy
  - Renewables integration
- Smart Grid: Demand Response, Smart Grid Planning (July 2011)
- General Rate Cases
  - Connect WDG upgrade costs to general D-Grid upgrade plan and ultimately mandate utility-paid (ie, rate-based) upgrades to facilitate high penetrations of WDG

Legislative Backstop: Freeing-the-Grid (FTG) bill

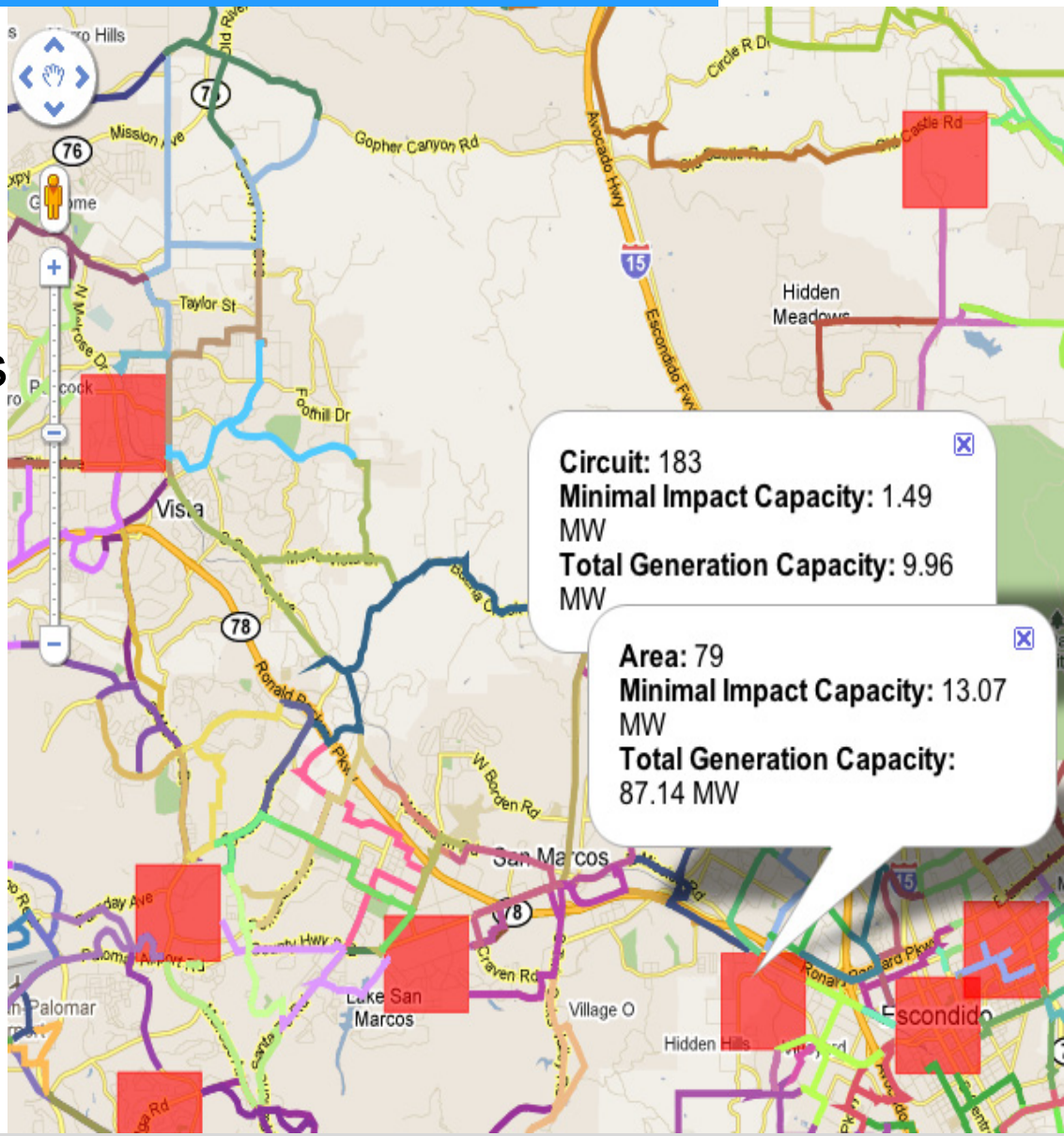
- Clean Coalition initiated the Freeing-the-Grid (FTG) bill in 2010 (AB 1302, Williams, includes some of our recommendations)
  - Most parties are highly supportive of interconnection reform: CPUC, SMUD, broad industry groups, including all renewable energy industries. IOUs?
  - AB 1302 is a work-in-progress, but it is staged to become a bill that can effect useful interconnection reform
- The ideal FTG bill starts with transparency
  - Audit of interconnection processes
  - Clarity on relevant interconnection tariff and jurisdiction
  - Published grid data for optimal siting and faster proceses
- A large issue is the lack of accountability/enforcement

Transparent Upgrade Costs are Critical too

- Assessing the cost for interconnecting a project at a given location requires:
  1. Knowing the circumstances at that location
     - Capacities of substations, circuits, and lines
     - Back-feed and cross-feed capabilities
     - Peak & minimum loads of all of the above
     - Size and location of all projects in the queue
  2. Predicting the D-grid upgrade requirements
  3. Determining the expected D-grid upgrade costs

Data Availability Improving, but…

- More D-grid information is being made accessible through improved interconnection maps
- But, improved information does not translate into accelerated interconnection processes nor transparent upgrade assessments



Solution to D-grid Transparency: Standardize and Map D-grid Upgrades

- Knowing the options
- Grid impact can be predicted based on local conditions and project size

Equipment Requirements: Generation vs Line Load	**5%**	**10%**	**15%**	**25%**	**50%**	**80%**	**90%**	**>90%**
Reactive controls		X	X	X	X	X	X	X
Protection equipment			X	X	X	X	X	X
Transformer upgrades				X	X	X	X	X
Circuit reconfiguration					X	X	X	X
Conductor upgrade						X	X	X
Substation connection						X	X	X
Substation upgrade						X	X	X
New substation								?

Solution to D-grid Transparency: Standardize and Map D-grid Upgrade Costs

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- Determining the price based on grid impact and average equipment and upgrade costs

Equipment Requirements: Generation vs Line Load	**5%**	**10%**	**15%**	**25%**	**50%**	**80%**	**90%**	**>90%**
Reactive controls		$	$	$	$	$	$	$
Protection equipment			$	$	$	$	$	$
Transformer upgrades				$	$	$	$	$
Circuit reconfiguration					$	$	$	$
Conductor upgrade						$	$	$
Substation connection						$	$	$
Substation upgrade						$	$	$
New substation								$

Standardize and Ratebase for Preferred Locations

- Using the knowledge and experience gained from hundreds of interconnections, typical equipment upgrade requirements and associated average costs can be applied to many scenarios
- Averaging pricing avoids utility or ratepayer risk
- Predetermined pricing avoids application submissions for projects that are not viable
- Avoids interconnection study delays and backlogs to accelerate rapid project deployment
- Rate-basing D-grid upgrades for preferred locations maximizes value to the ratepayers and facilitates the most intelligent roll-out of high penetrations of clean local energy and accommodating Smart Grid solutions

Backup Slides

Managing Business

- Grid interconnection applications were once individually unique, infrequent and could be easily managed.
- Today, the volume of applications results in hundreds or thousands of similar requests
- Rule 21 reform accommodated net metering applications, successfully interconnecting thousands through standardized, predictable, streamlined procedures
- As the number of WDG applications grows, we need to extend these practices to manage demand and provide timely service to generator clients.

SMUD Interconnection

- SMUD 100 MW FIT Program

Days in Review			Interconnection Voltage		Project Size			
<=30 days	31-60 days	>60 days	12kV	69kV	<1 MW	1-3 MW	>-3-5 MW	>5MW
6	6	0	6	6	0	4	2	6

- Individual projects limited to 5 MW
- 34 total applications, all submitted in one week
- Clusters of projects through common interconnection point allowed
- Clustered project interconnection review done together = 12 reviews

SMUD

“Reformed” IOU Interconnection Procedures

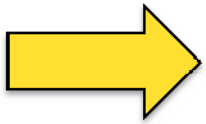
- FERC recently approved IOU-requsted interconnection reforms (ie, reforms to WDATs)
- New average IOU interconnection timeline for even the smallest of Wholesale Distributed Generation (WDG) projects is up to 3.5 years!
- Major problems have been created by IOU “reform.” The cure appears worse than the disease!
- Clean Coalition has asked FERC for a rehearing and is pushing for CPUC to assert jurisdiction over all distribution grid (D-grid) interconnections

Additional serious reform is needed for IOU interconnection procedures

- SCE's own Utility-Owned Generation (UOG) program manager stated in a recent presentation:
  - *WDAT "reform" does not look promising from a small (<20 MW) Applicant perspective. Expect process to be slower, more costly, not "user friendly."*
  - Perez expects a three-year process for interconnection under the new WDAT
  - Compare this to SMUD's one-year FIT interconnection process
- IOUs can do MUCH better on interconnection
- Clean Coalition has designed a comprehensive legislative and regulatory reform program

3. Reaching the D-Grid Vision

Step 1: The grid is viewed as a two-way system > this is a paradigm shift.



D-Grid planning should expect and encourage the delivery of electricity from renewable distributed generation (DG) resources.

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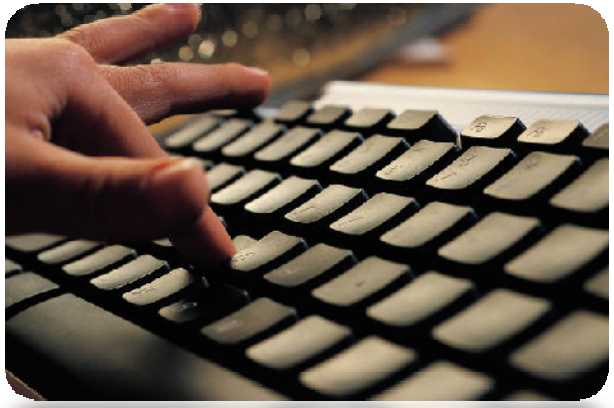
Step 2: Utilities create long-term distribution grid upgrade and investment plans.

D-Grid planning should be a transparent process where the utilities are held accountable for investing in ways that maximize ratepayer investments

Step 3: Public access to grid data.

All DG interconnection procedures should start from detailed, public D-Grid information that is regularly updated.



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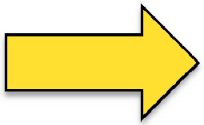
Step 4: Utilities identify DG priority zones where interconnecting DG most benefits consumers.

Economic benefits to ratepayers when:



- New DG is close to current & anticipated energy needs
- New T-grid/D-grid investments can be avoided
- D-grid resilience is improved
- BUT no detriment should accrue to developers not in the preferred zones

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Step 5: Beneficial D-grid interconnection costs are included in rate base.

Reasonable costs to interconnect power plants in beneficial D-Grid locations are a good consumer investment.

Step 6: All interconnection processes are transparent, and utilities are held accountable.

Utilities should be fully transparent with DG interconnection procedures and be held accountable to timelines and other required compliance.

German Solar Pricing is a Bargain

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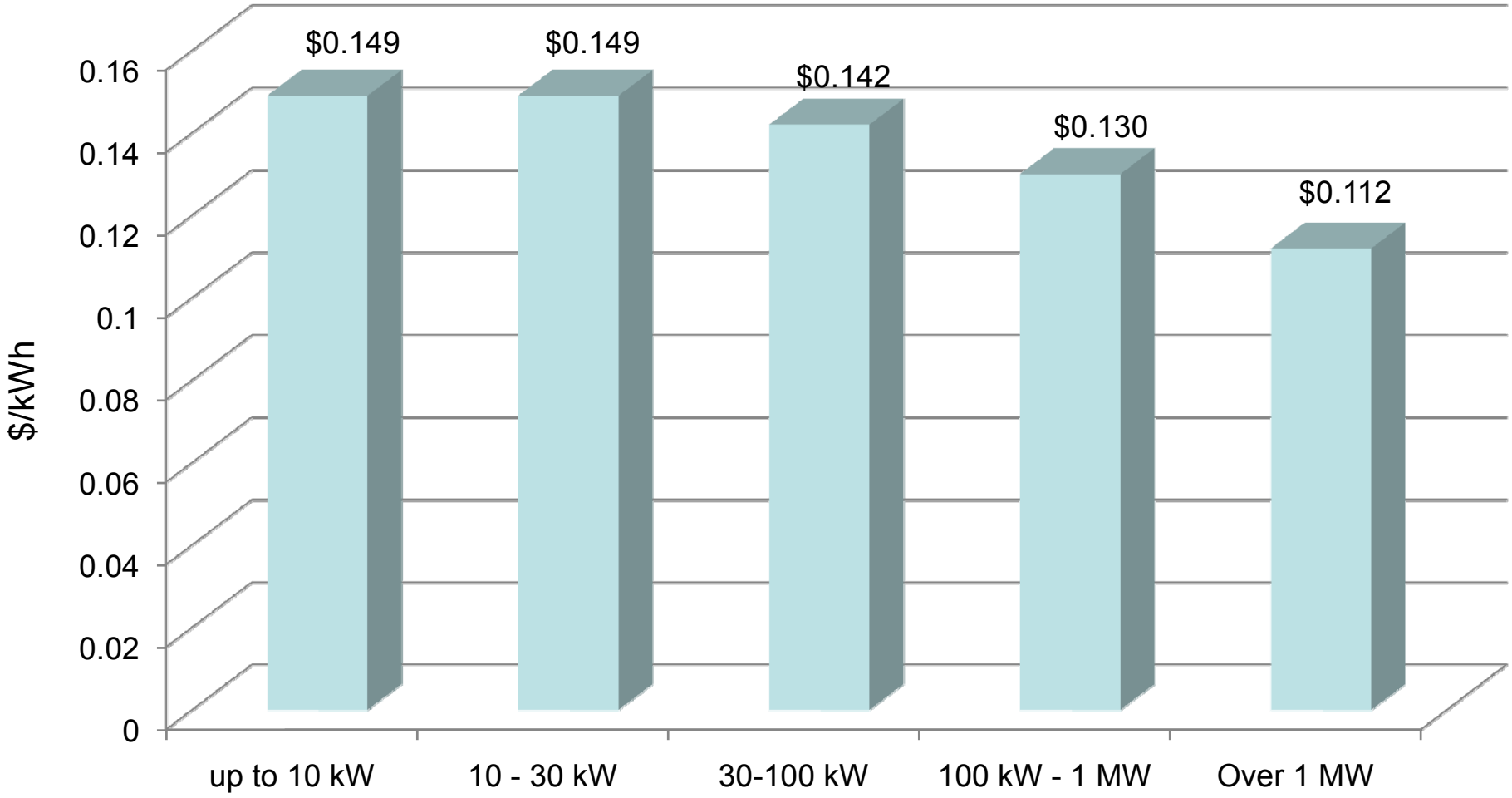
California-equivalent German Pricing by Solar Project Size



Source: BSW Solar, German EEG

Distribution of Systems Installed 2010 - Germany

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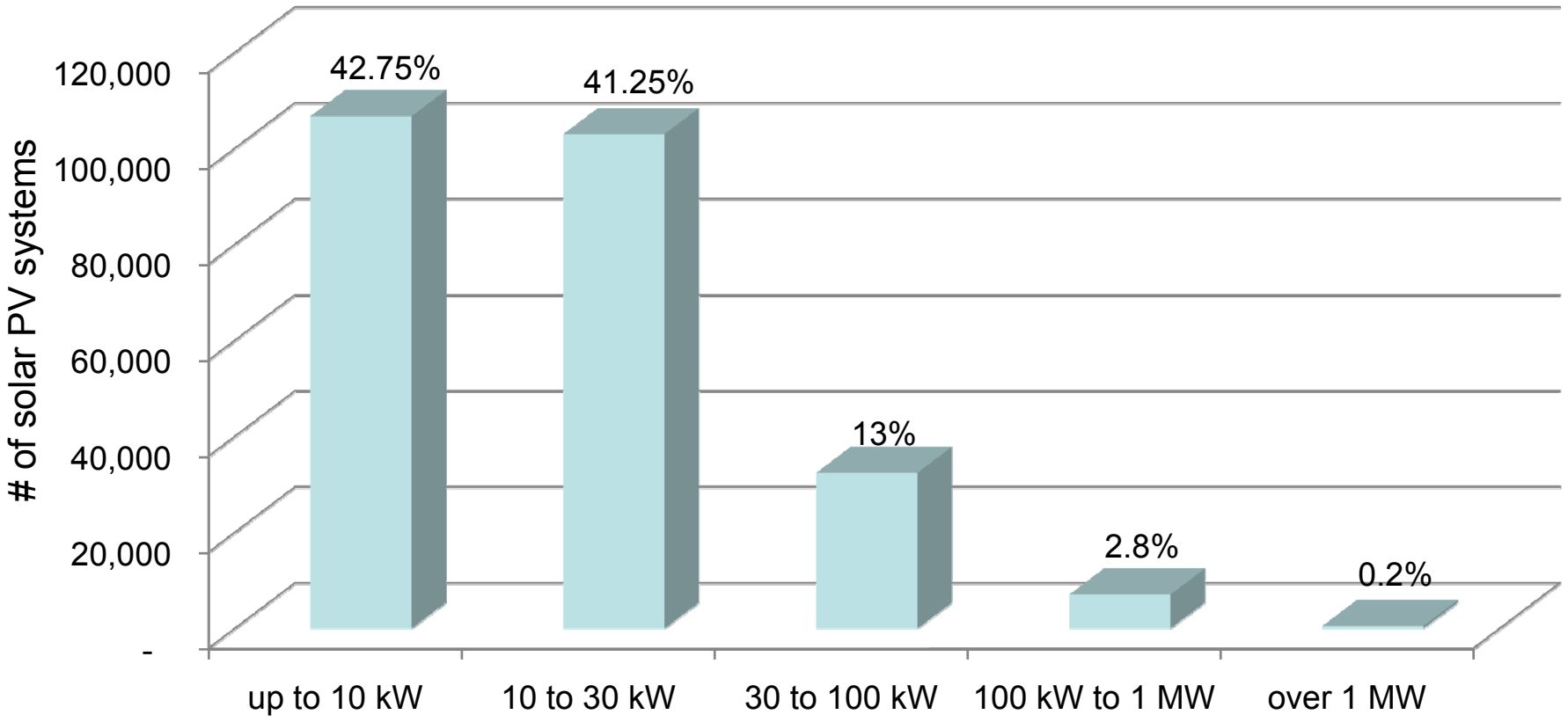
German Solar PV Systems Installed in 2010



Germany's projects are much more evenly distributed by project size

Source: Paul Gipe, March 2011

CLEAN Programs can Drive All Renewables

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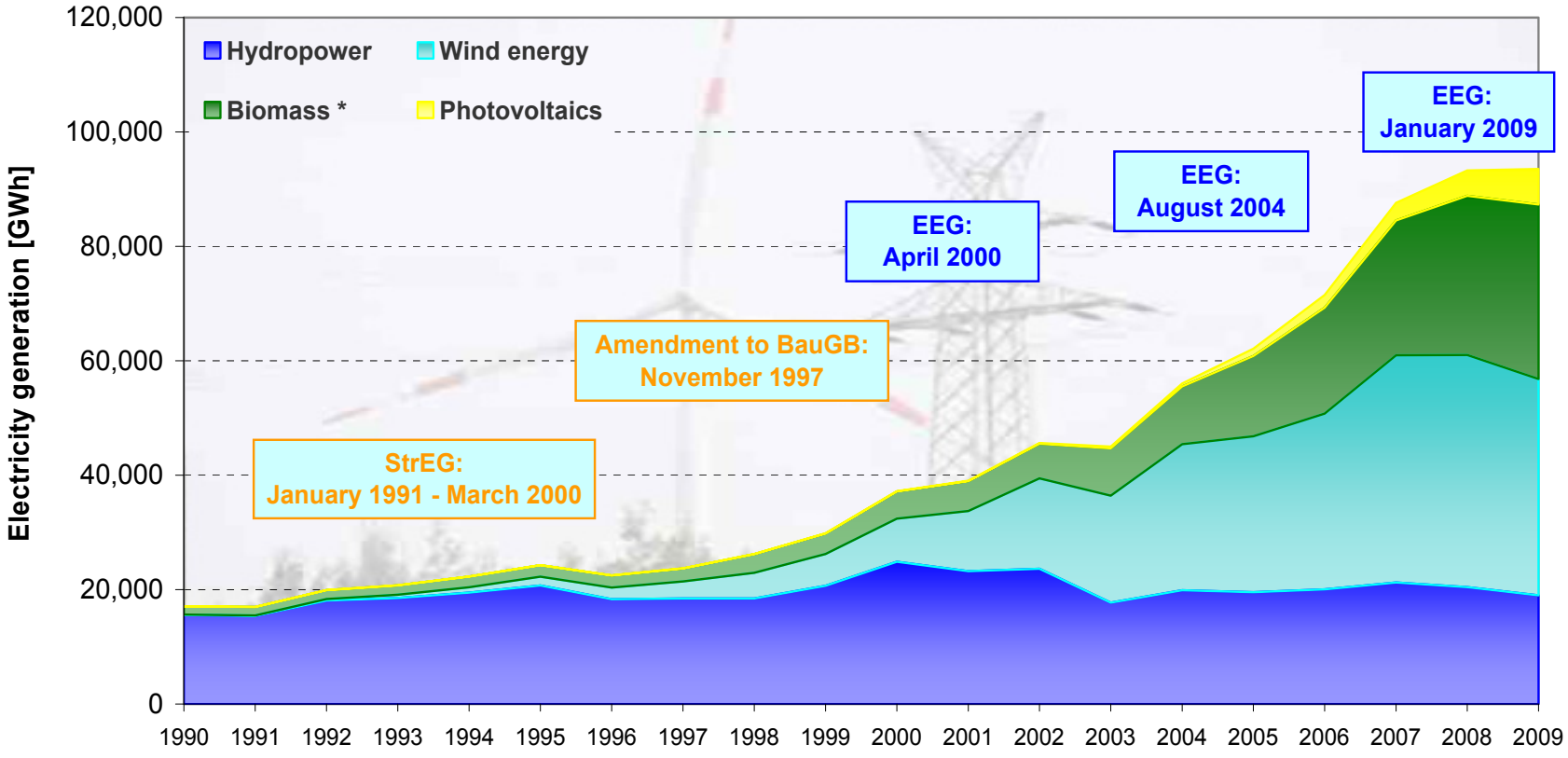
Development of electricity generation from renewable energy sources in Germany 1990 - 2009



* Solid, liquid, gaseous biomass, biogenic share of waste, landfill and sewage gas;
Electricity from geothermal energy is not presented due to the negligible quantities of electricity produced; StrEG: Act on the Sale of Electricity to the Grid; BauGB: Construction Code; EEG: Renewable Energy Sources Act; Source: BMU-KI III 1 according to Working Group on Renewable Energies-Statistics (AGEE-Stat); Image: BMU / Christoph Edelhoff; all figures provisional