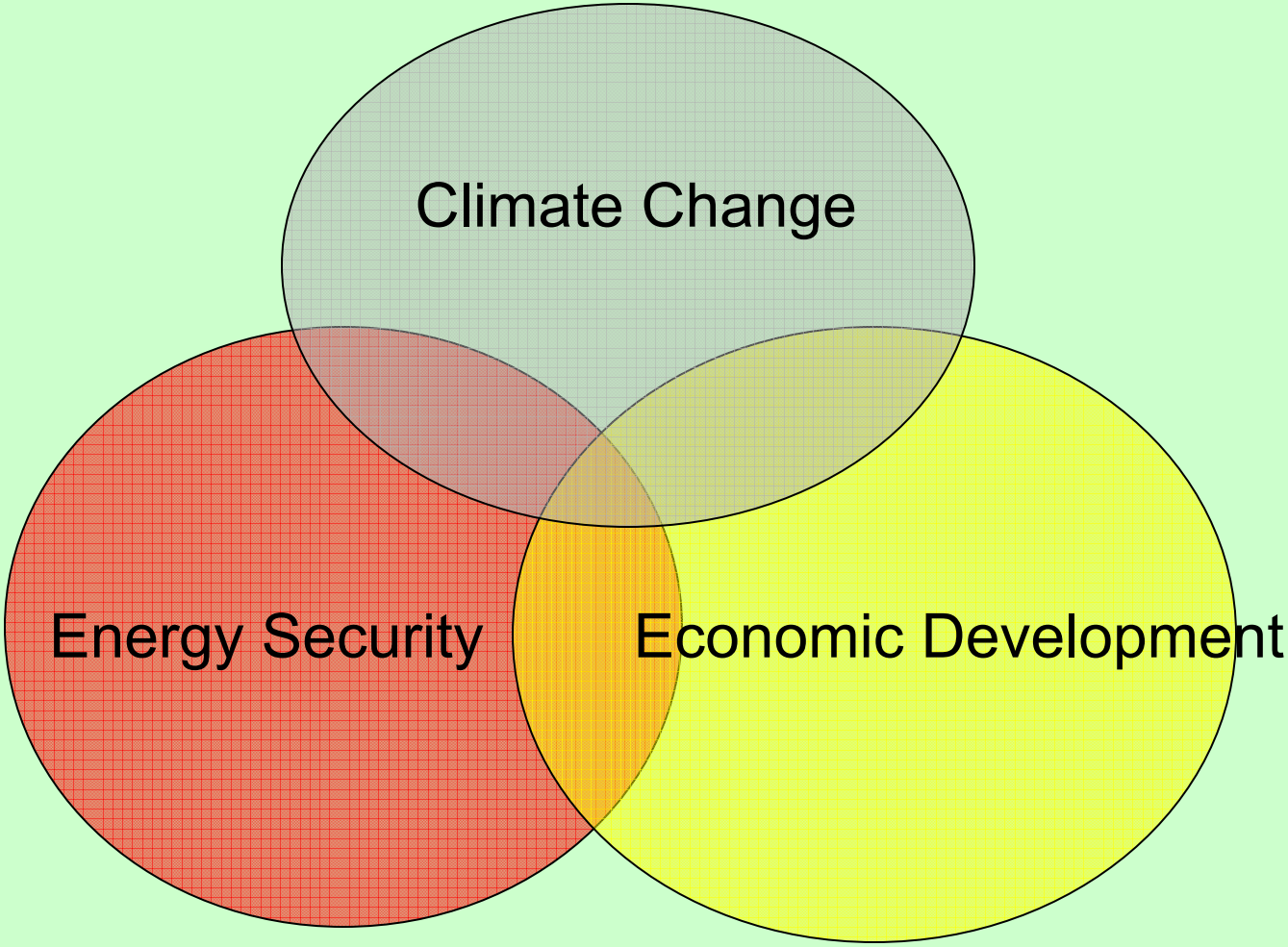
Policy Experiences for Promoting Renewable Energy and Energy Efficiency

Judy Siegel

March 5, 2007
OAS SEPI Meeting

Key Market Drivers for RE/EE



Agenda

- Renewable Energy for Electricity Generation
- Biofuels
- Energy Efficiency

Renewable Energy

RE Policy Overview

- RE policy incentives generally seek to:
  - Reduce costs of constructing or producing RE
  - Increase costs for fossil fuels, based on environmental costs
  - Open markets for renewables
- Policies typically fall into two categories:
  - Market push, aimed at increasing RE supply
  - Market pull, aimed at increasing demand for RE

RE Policy Options

- Market Push
  - Tax Incentives
  - Direct Cash Payments
  - Low-Cost Capital Programs
- Market Pull
  - Distributed Resource Policies
  - Customer Choice Opportunities
  - Other Market Pull Policies
- General Environment Regulations (Push and Pull)
- Mega Policies
  - Renewable Portfolio Standards
  - Feed-in Law
  - Tendering

Tax Incentives

Goal: To reduce capital and operating costs for RE

- Production Tax Credits
- Investment Tax Credits
- Sales Tax Reductions
- Property Tax Reductions
- Accelerated Depreciation

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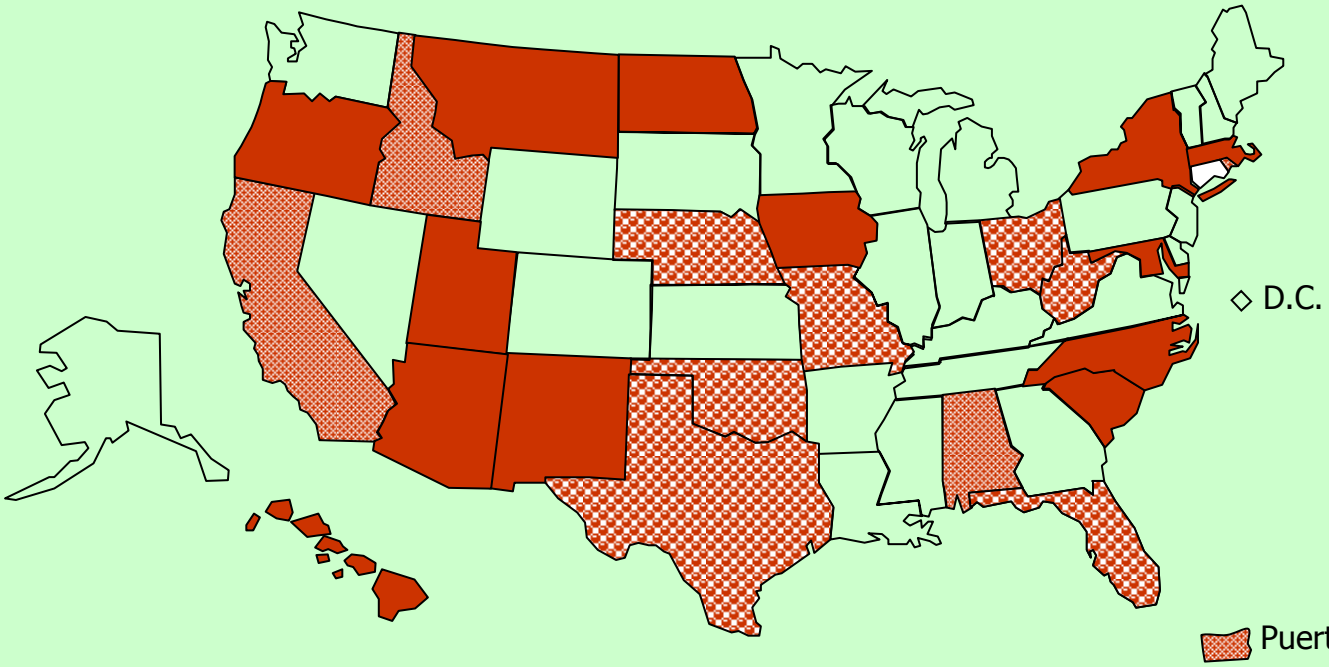
State Tax Credits & Deductions for Renewables



State offers only Personal Tax Incentives

State offers only Corporate Tax Incentives

State/Territory offers Personal & Corporate Tax Incentives

Direct Cash Payments Incentives

Goal: To increase number of RE facilities

- Direct Investment Incentives (Grants)
- Direct Production Incentives

Low-Cost Capital Program Incentives

Goal: To increase financing for RE facilities

- Government Subsidized Loans
- Project Loan Guarantees
- Project Aggregation and Bulk Purchasing

Distributed Resource Policies Incentives

Goal: To increase market demand for RE

- Standard Contracts for Small Projects
- Net Metering
- Line Extension Policies
- Public Benefit Funds (System Benefit Charges)

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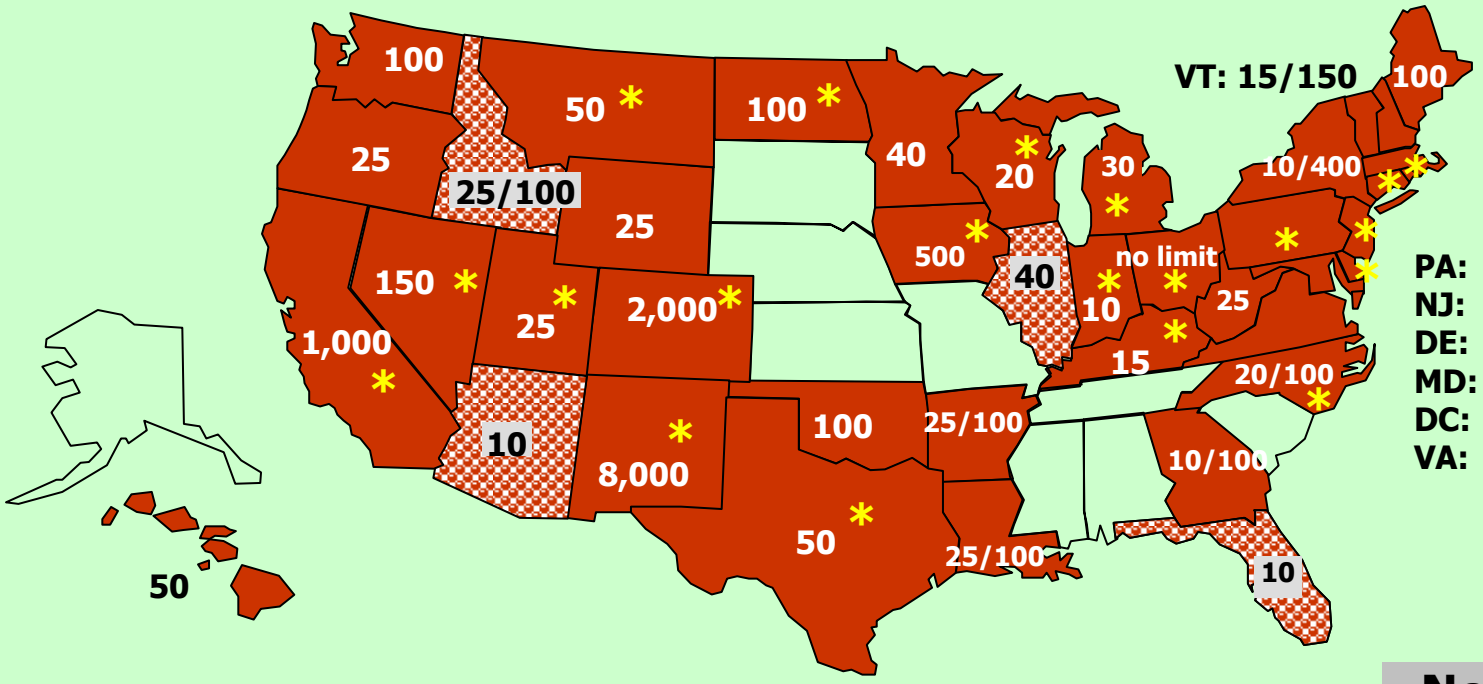
Net Metering



Net metering is available in 41 states + D.C.

State-wide net metering for all utility types

* State-wide net metering for certain utility types (e.g., IOUs only)

Net metering offered by one or more individual utilities

#s indicate system size limit (kW); in some cases limits are different for residential and commercial as shown

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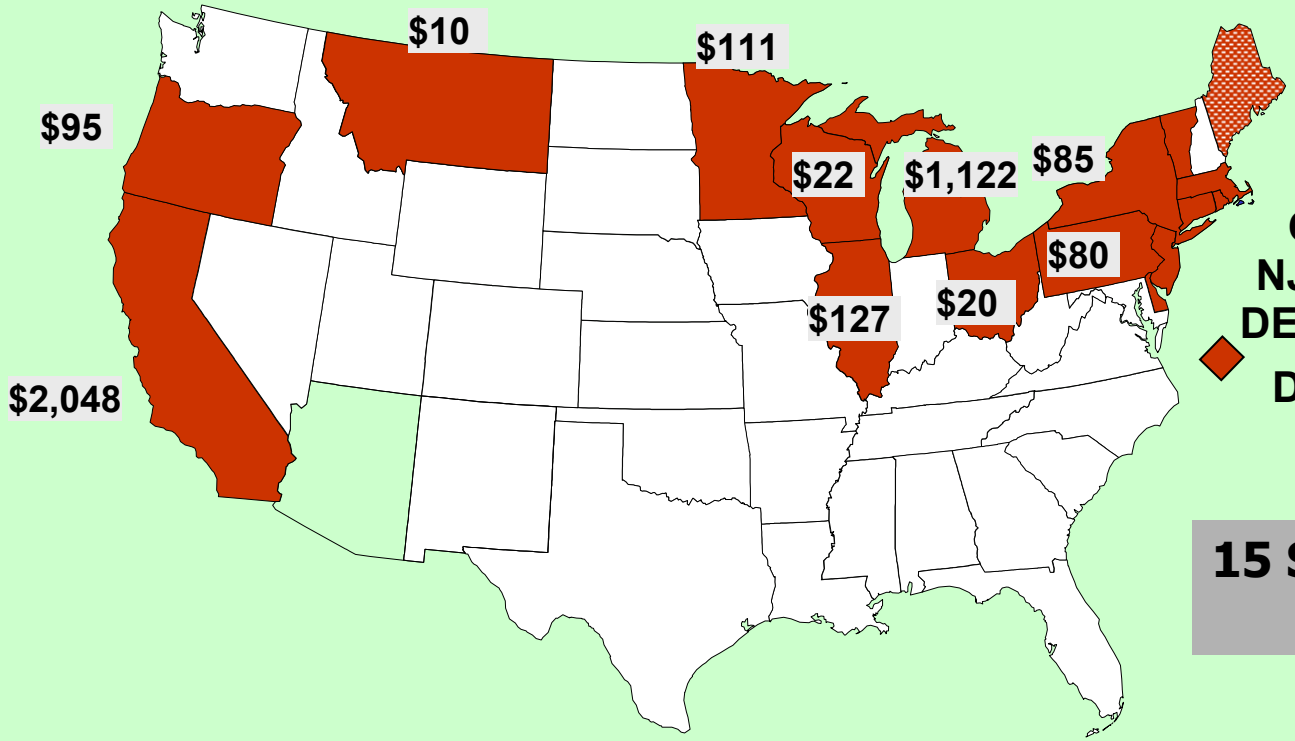
Public Benefit Funds for Renewables

Cumulative 1998 – 2017 (Million $)



15 State Funds + DC
$4 B by 2017

Funded by Voluntary Contributions

Customer Choice Opportunities Incentives

Goal: To stimulate markets for RE

- Utility-Supplied Green Pricing Options
- Green Marketing
- Aggregated Consumer Purchases

General Environmental Regulations Incentives

Goal: To increase price of fossil fuels relative to RE

- Externality Valuation
- Environmental Dispatch
- Emissions Taxes
- Emissions Caps

Mega Policy Options

- Renewable Portfolio Standard
  - e.g., U.S. States
- Feed-In Laws
  - e.g., European Union countries
- Tendering
  - e.g., California

Renewable Portfolio Standards (RPS)

- **Quantity**-based Government Mandate
- Focused on **Emerging and New** RE Technologies
- Requirement on Wholesale or Retail Market Participants (**Utility or Grid Company**)

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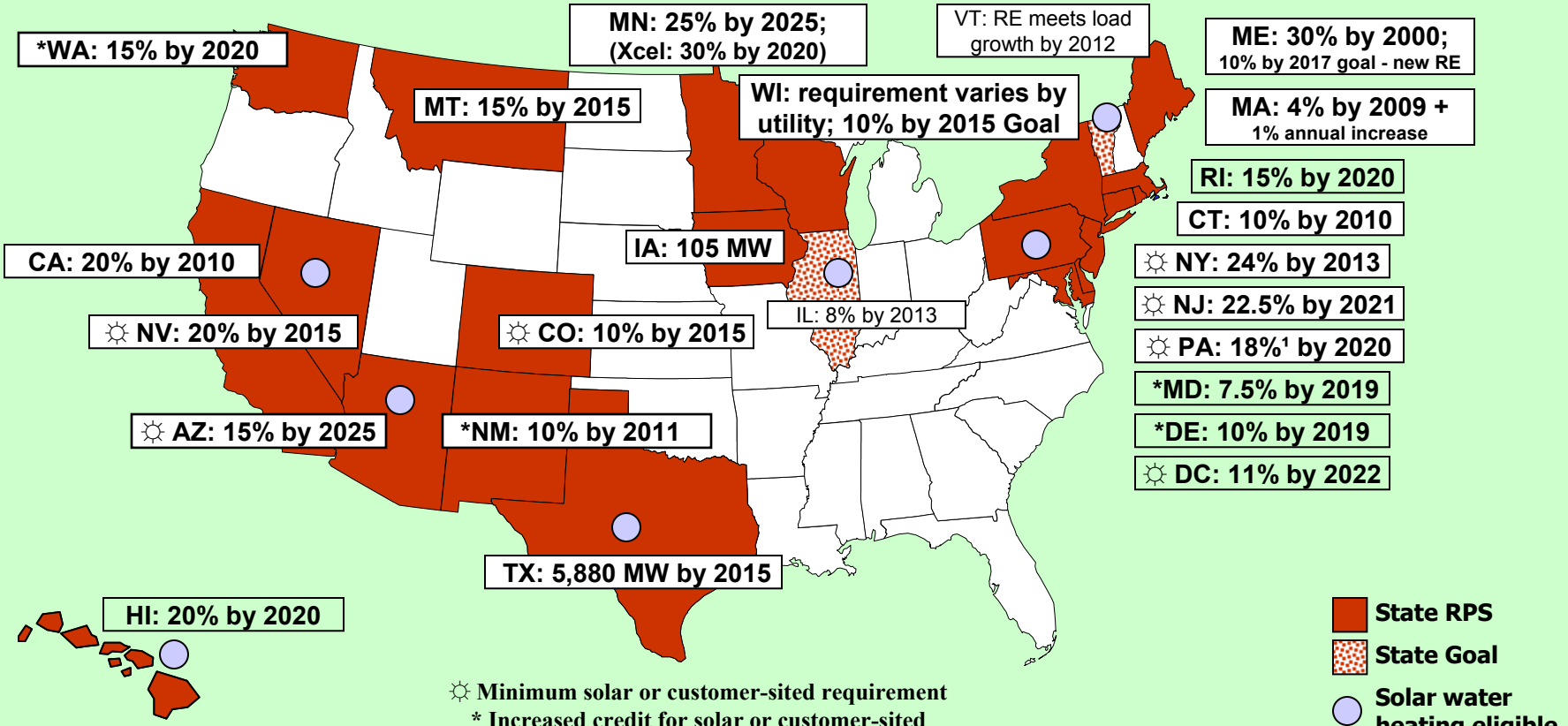
Renewables Portfolio Standards



☼ Minimum solar or customer-sited requirement

* Increased credit for solar or customer-sited

[1]PA: 8% Tier I, 10% Tier II (includes non-renewable sources)

RPS Success Factors

- **Policy design** is critical to success!
- Energy/Output-based target levels
  - **Target increasing over time**
- Strong & Effective **Enforcement**
- Creation of **Certificate Trading Platform** based on compliance tracking

Feed-in Laws

- Government Mandated **Price**
- Utility must take power from **eligible** facilities
- Focused on **new and emerging** technologies
- Three methods of setting price
  - Estimated long term cost plus reasonable profit
  - Wholesale avoided cost of power
  - Percent of retail electricity rate

Feed-in Law Success Factors

- **Long-term** Contracts – 15-20 years
- Guaranteed **buyer** under standard contract
- Tariff that gives **reasonable rate of return**
- **Flexibility** to capture cost efficiencies

Tendering Policies

- **Government sponsored competitive bidding** process for RE
- **Lowest priced projects** awarded contracts
  - Contract guarantees to take all power generated at specified price over fixed time period
- Govt. pays **incremental** cost of RE
- Usually **combined with other policies**, e.g. Public Benefit Funds(NFFO) or Resource Concessions(Wind)

Tendering Success Factor

- **Long term standard contract** reduces risk for investors
- Contracts/Tenders awarded must be **large enough** to achieve economies of scale
- Contracts/Tenders should be awarded every year to **create stability**
- Appropriate **Penalties** for Not Meeting Milestones
- Need **stable** source of **funding**

Renewable Energy Policy Review

	Quantity Of RE Development	Cost/ Price Reduction	Resource Diversity	Market Sustainability	Local Industry Development	Investor Certainty	Simplicity
Feed-In Laws	Large amounts RE in short time	Cost efficient if the tariff is periodically and wisely adjusted	Excellent	Technically & economically sustainable	Excellent	Can reduce investor risk with price guarantee & PPA	Most simple to design, administer, enforce, contract
RPS	If enforced, can meet realistic targets	RPS and Tendering best at reducing cost & price with competitive bidding	Favor least-cost technologies	Technically & economically sustainable	Favor least-cost technologies & established industry players	Lack of price certainty difficult for investors/PPA can reduce risk	More complex to design & administer & complex for generators
Tender-ing	Related only to quantity RE established by process	Good at reducing cost	Favor least-cost technologies	Tied to resource planning process; sustainable if planning supported, stable funding	Favor least-cost technologies & established industry players	Can provide certainty if well designed (more risk than feed-in)	More complex than Feed-in, simpler than RPS

Mega Policy Summary

- **No silver bullet; d**ifferent policies better matched to different goals
  - **Important to articulate & prioritize goals**
- **Feed-in Law**:
  - **Simplest** to administer/enforce, greatest resource **diversity, best local industry development, w**orks best in **regulated markets**
- **RPS:**
  - Good **cost & price minimization** if accompanied by long term PPA & well-designed, good **resource development**, more compatible with **reformed** electricity markets, may take **longer** to build local industry & meet resource targets, more **complex** to administer
- **Tendering:**
  - Best at price minimization **if industry established; c**an be **combined** with other options; will **not build market by itself-** need companion policies; can **discourage** local industry formation; can be **politically challenging** to find stable source of funding

RE Conclusions

- RE development requires a range of ***market push and market pull*** policies:
  - These are not mutually exclusive, working together may be best
- Mega policies require mandatory access to grid; long-term, secure payment
- Financial incentives are important
  - Account for externalities and diversification of RE in power sector planning
- RE incremental costs:
  - Pass onto consumer
  - Addressed thru system benefit charge
  - Paid by carbon tax
- Sector reform should consider RE upfront

Biofuels

Key Market Drivers for Biofuels

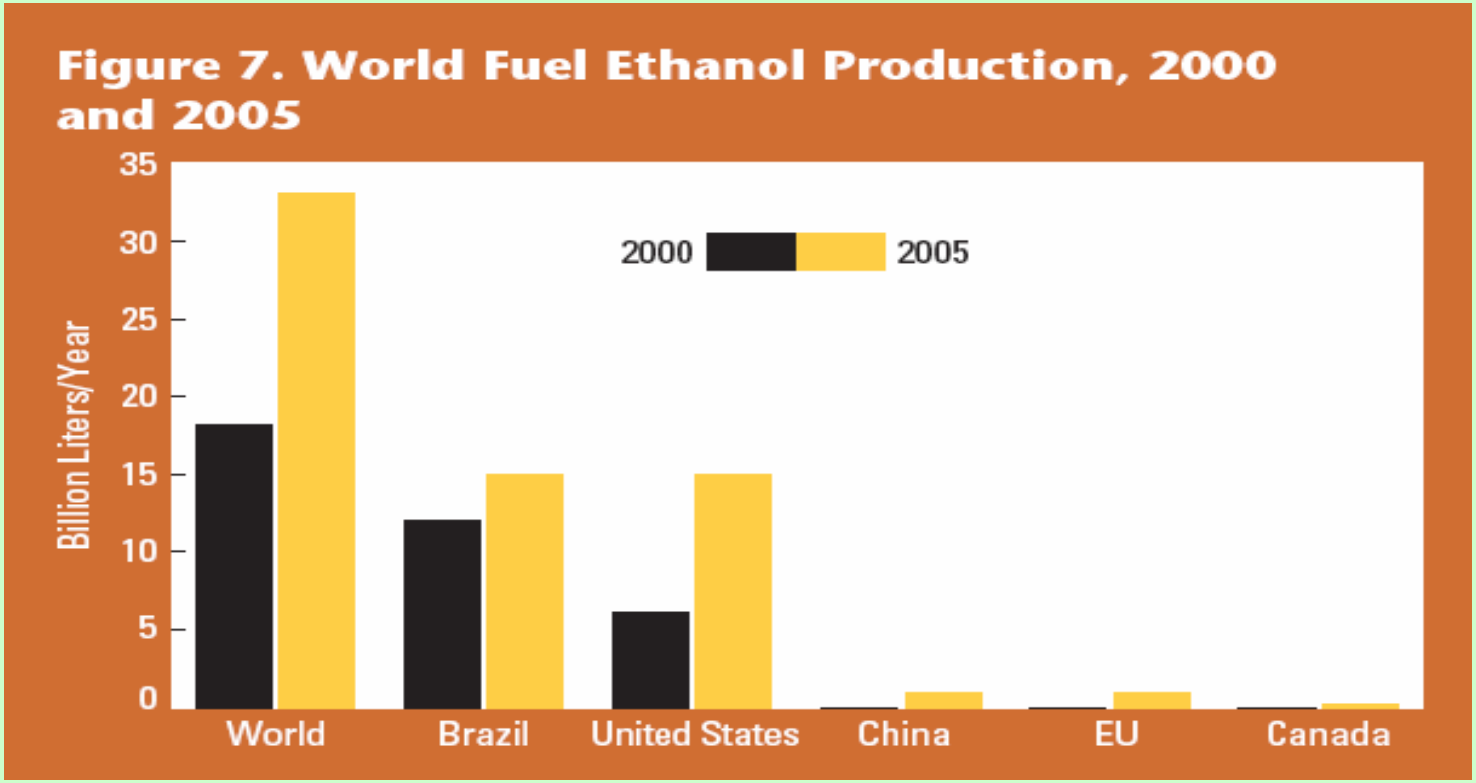
- Reducing dependence on imported oil and fuel supplies
- Reduction of greenhouse gas (GHG) emissions
  - Kyoto Protocol and Carbon Credit Sales
- Ability to blend with other liquid fuels
  - Compatibility with existing fuel distribution infrastructure
- Help stimulate agricultural markets and reduce poverty
  - Elimination of sugar price supports by EU
- Step-up of targets and tax incentives for biofuels
  - EU - 5.75% biodiesel in fuel products by 2010 and 20% by 2020
  - U.S.- annual volume blended 7.5 billion gallons of biofuels by 2012

At least 8 countries & 30 states/provinces have biofuels blending mandates

Biofuel Targets: LAC

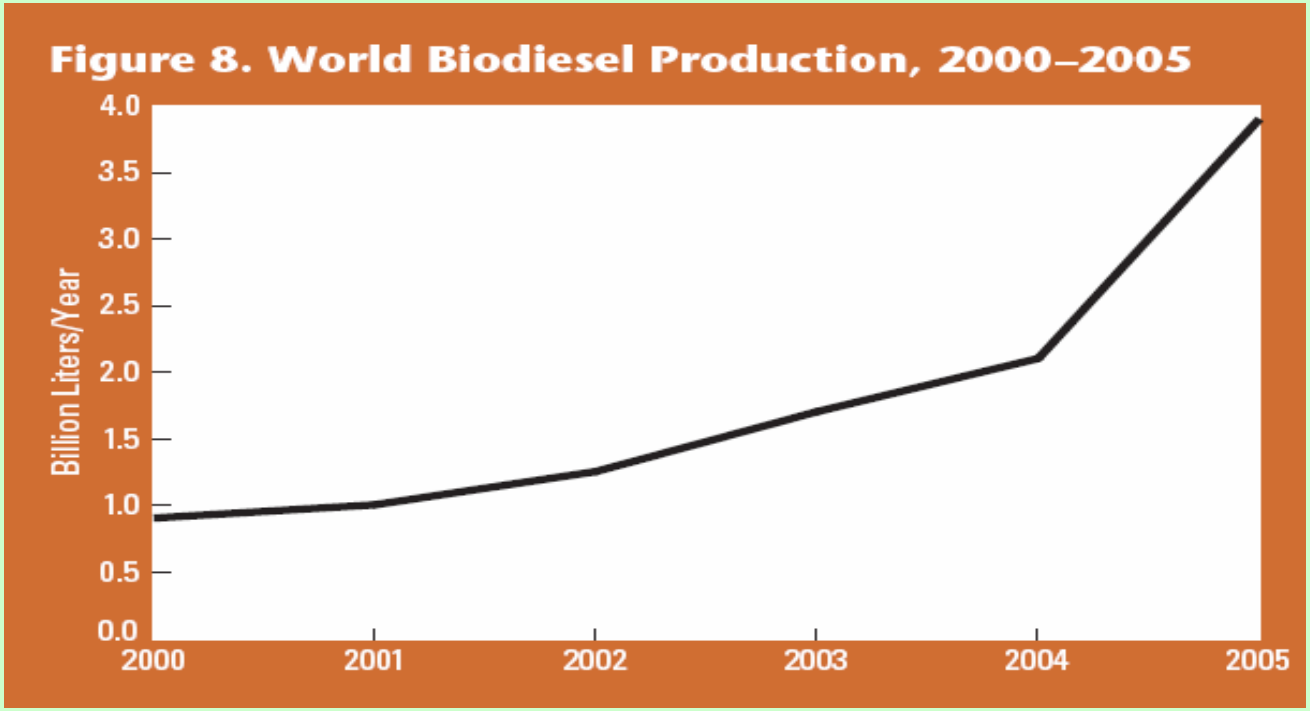
- DR: require E15 and B2 by 2015
- Colombia: E10 blending mandates in cities
- Brazil allows B2 blending
  - Require it >2008, increase to B5 by 2013
- Argentina: Requires B5 or E5 in petroleum derivatives in 2010
- Biodiesel projects: Guatemala, El Salvador, Honduras, Panama, Costa Rica, Mexico, DR
- Ethanol: Panama, Honduras, Costa Rica, Belize, El Salvador
- >90 biofuel projects in Central America

World Production



*From REN21.'Renewables Global Status Report 2006 Update'

World Production



*From REN21.'Renewables Global Status Report 2006 Update'

Energy Efficiency

Why Energy Efficiency

- Growing Global Energy Demand
- Rising Energy Costs
- Energy Efficiency Offers a No Regret Solution
  - Fastest, cheapest, cleanest way to stretch energy supplies
  - A kilowatt saved always cheaper than a kilowatt generated
- EE Benefits
  - Reduce waste
  - Increase efficiency
  - Reduce need for future investments,
  - Enhance competitiveness
  - Free-up capital, hedge fuel risks
  - Help long term resource planning

Top 10 EE Policy Lessons

- Political will and commitment are key
- Policy should be long term in nature, with proper pricing signals
- Legal/institutional frameworks should be supportive, remove market distortions
- Regulatory interventions required for norms/certification programs
- Policies should consider demand and supply aspects
- State/local governments can be as important as national govts
- Funding for EE program can come from a number of sources
- Most EE projects have a complementary TA program
- EE savings hindered by delivery mechanisms (e.g, ESCO/DSM)
- Range of policy measures have been used, typically sector focused

Energy Efficiency Policy and Program Summary

Sector	Energy Efficiency Promotion Activity
Industrial	•Regulation measures •Tax incentives •Energy efficiency funds and low interest loans •Performance codes, standards, incentives, and regulations •Mandatory/compulsory energy efficiency targets •Technical assistance and small business programs •Energy audits for factories •Product labeling, rating, certification, & retro-commissioning •Energy conservation management •Recognition programs, technology adaptation &upgrades; and bulk procurements
Residential	•Energy manager capacity building/recognition programs •Product standards, labeling, appliance recycling •Funding/rebate programs •Energy audits/surveys •Regulations and codes for new buildings •Residential lighting incentives and new construction programs •Pro-poor fuel support programs
Commercial	•Technology upgrades •Energy audits & management programs •Energy product labeling •Mandatory/compulsory efficiency targets •Recognition/incentive programs •Public procurement programs & Green Buildings

Energy Efficiency Policy and Program Summary

Sector	Energy Efficiency Promotion Activity
Power Generation and Utilities	• Utility obligation programs • Demand side management (time of use) • Heat rate improvement of power plants • System loss reduction program
Transport	• Introduction of more efficient vehicles • Increase production of alternative fuels (e.g., biofuel, ethanol); tax holiday and import duty exemptions for these products • Low interest loans for conversion of fleet vehicles • Voluntary agreement programs (carless day program, carpooling, park/ride programs) • Mass transit programs; tighter regulations for transport companies and cargo owners • Energy saving measures for traffic systems
Information, Education, and Outreach	• Energy audit procedures/training • Energy manager guidelines/certification/training • Technology transfer and demonstration programs • Public awareness campaigns, fuel economy guides, conservation programs in schools • Documentation/dissemination of best practices • Survey and monitoring, discount programs & demand bidding programs
ESCO Promotion	• Tax incentives • Access to low interest loans • Training/technical assistance • Monitoring and verification protocols • Standard performance contracting
Climate Change	• GHG reduction registry center • Emission trading & support for Clean Development Mechanism (CDM) projects
Market Trans-formation	• Mix of policies, incentives, information, targets, standards above to mitigate barriers and accelerate energy efficiency adoption

Growing Interest in RE/EE from International Community

- GEF committed over $2 billion for RE/EE
- World Bank targeting 20% average annual energy growth from RE/EE in next 5 years
- Inter-American Development Bank launched a major RE/EE program
- Export Credit Agencies set favorable terms for RE/EE
- G8 has made RE/EE a priority
- Energy, particularly RE/EE, the focus of CSD-15

Sources

- DSIRE database, http://www.dsireusa.org/
- Proceedings, presentations of the Mexico Grid Connected Renewable Energy Forum, Mexico City, Feb 1-3, 2006
  - Particularly Jan Hamrin, from Center for Resource Solutions and Xiaodong, Wang, World Bank
- Proceedings of the Energy Efficiency Investment Forum, May 8-9, 2006, NY, NY