

Making the Best Use of Incentive Dollars for Distributed Wind

State Policies Driving Growth

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September 2011

CESA Member Webinar

Power through Policy

Improving the Bottom Line

- “20% by 2030” grant-funded project supporting DOE goals
- Policy Comparison Tool & Guidebook show cost-effectiveness of incentives
- Users only need to select 2 inputs:
 - State & ownership sector
- Model then populates with default values based on inputs
 - DSIRE quantitative policy data feed
 - Defaults can be adjusted on dashboard
- Designed for analysis of policies, “what if” scenarios
 - *Not project-specific, not a siting tool!*

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



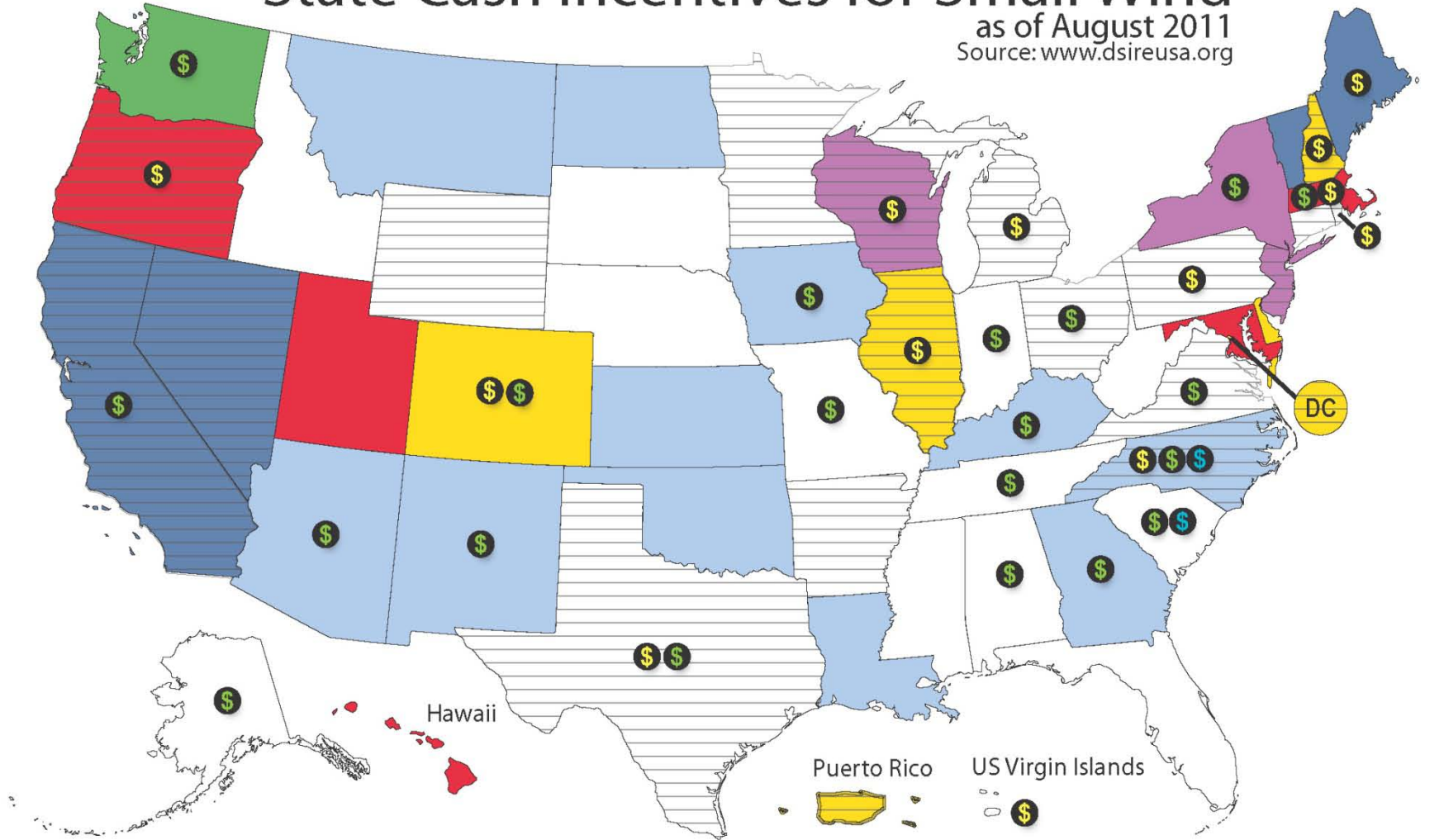
Small Wind Incentives: A Shifting Landscape

| Incentive | 1999 | Now |
|-----------------------------------|-----------------------------|---|
| States w/ Rebates | 2 | 16 (2 on hold) |
| States w/ Tax Incentives | 24 | 17 (tax credits) 25 (sales/property) |
| Performance-Based Cash Incentives | 0 | 6 |
| Net Metering | 27 | 43 (14 statewide, 19 IOUs only) |
| Total # of States with Incentives | 32 (7 net metering only) | 45 (13 net metering only) |

21 states have curtailed or suspended small wind incentives since peak in 2010

State Cash Incentives for Small Wind

as of August 2011
Source: www.dsireusa.org



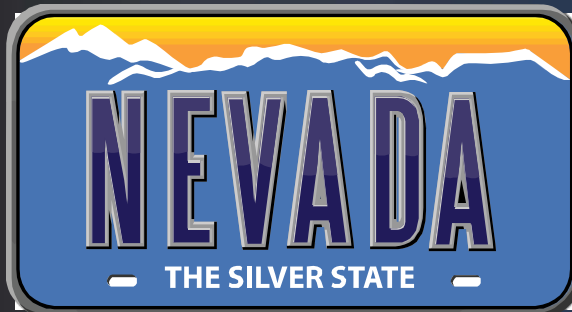
- Income Tax Credits and Rebate or Performance-based Incentives
- State Rebate and Performance-based Incentives
- State Rebate (\$/kW)

- State Rebate (\$/kWh or hybrid)
- State Performance-based Incentives
- Income Tax Credits

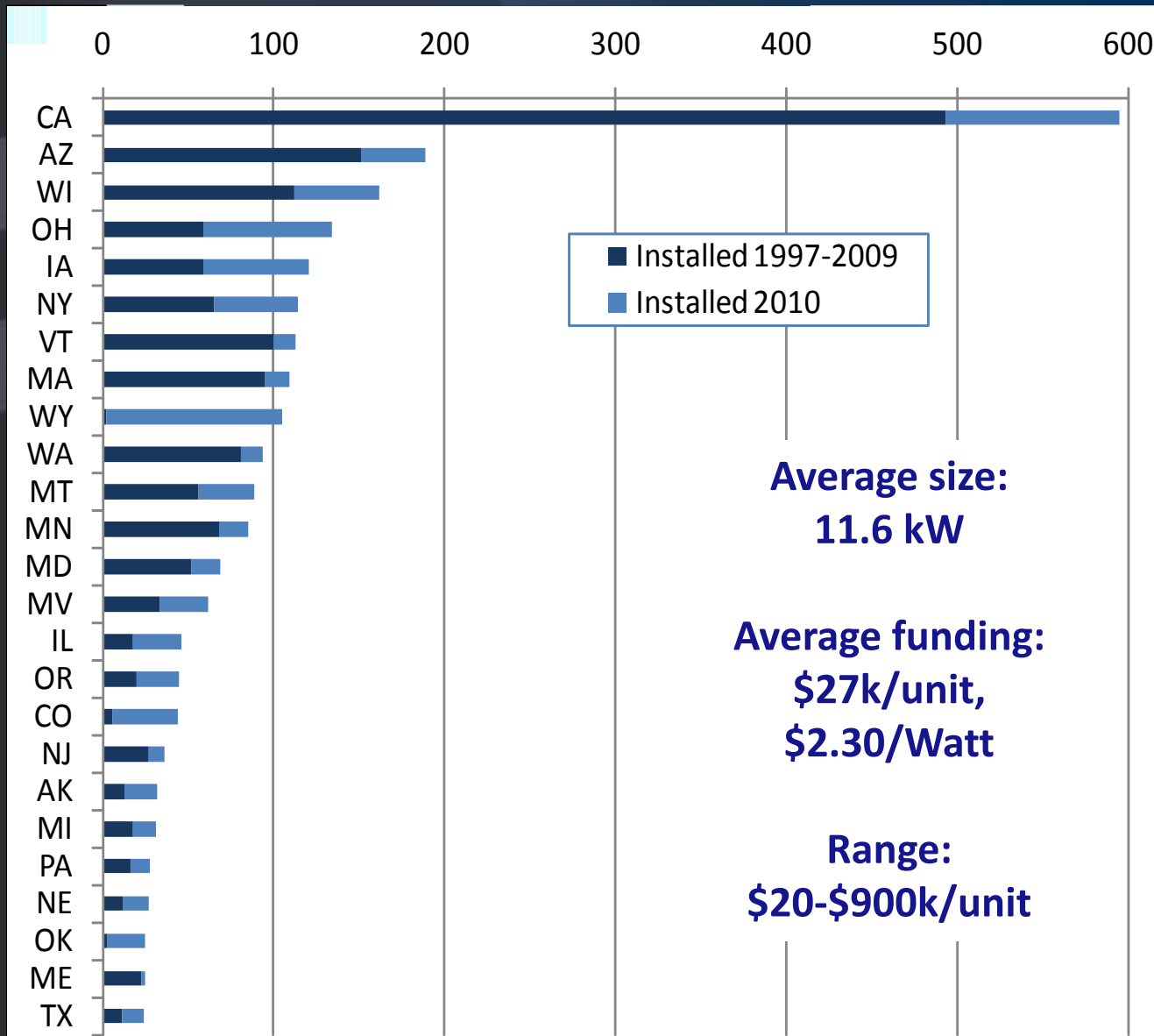
- \$ State Grant
- \$ Utility Rebate or Performance-based Incentives
- \$ Not-for-profit REC Buyback Program
- Recently Curtailed or Suspended

Policies Improving, but Still Need Work

Recent & Ongoing Developments: States to Watch



Small Wind Turbines Installed with Funding Assistance



2,500+
installations
funded
totaling
>29 MW,
\$67 million

Average size:
11.6 kW

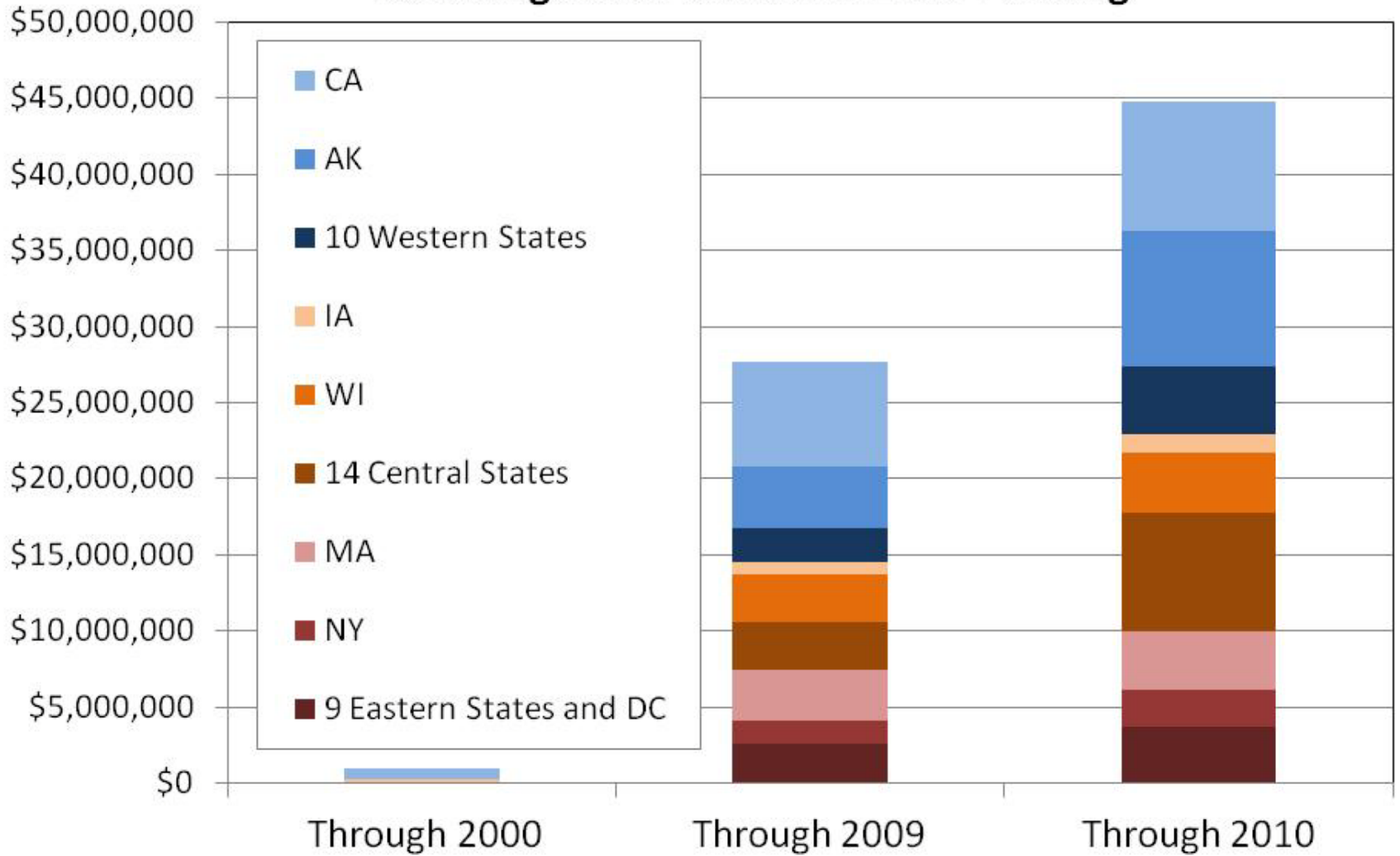
Average funding:
\$27k/unit,
\$2.30/Watt

Range:
\$20-\$900k/unit

Same time
period:
68,000
installations
in U.S. totaling
97 MW

Small Wind State, Utility, and Local Funding by Region

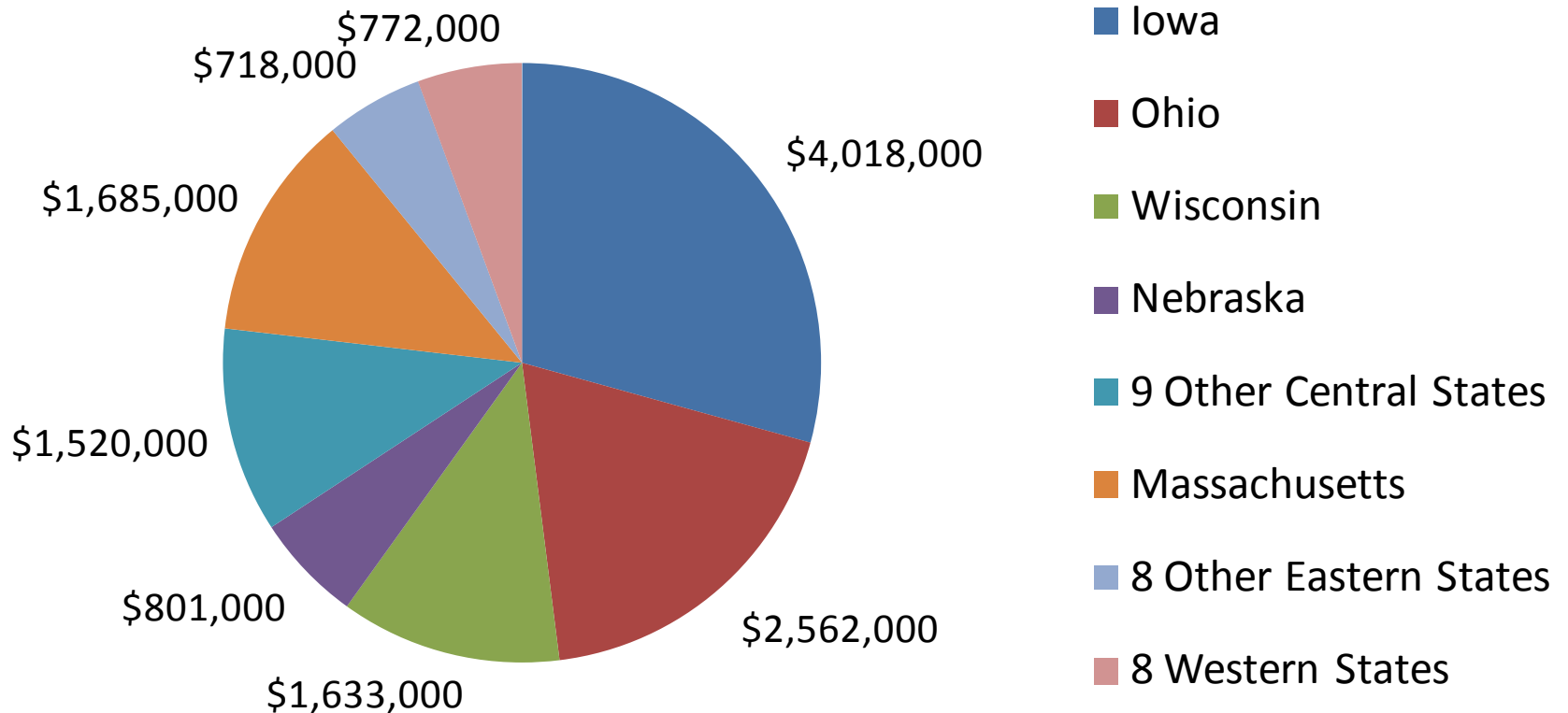
Excluding USDA & Section 1603 Funding



Small Wind Federal Funding by Region

\$13.7 million, approx 7 MW

2010 USDA REAP & Section 1603 Grants for Small Wind Turbines



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Assumptions Behind the Logic

Heather Rhoads-Weaver



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Policy Comparison Tool

- Using default values and pre-determined inputs, calculates:
 - Cost of Energy (COE)
 - Project Net Present Value (NPV)
 - Project Internal Rate of Return (IRR)
 - Simple Payback (years)
- Inputs – Turbines
 - 8 manufacturers
 - 9 turbines
 - 14 options

www.windpolicytool.org





DISTRIBUTED WIND Policy Comparison Tool



Print
Reset
Save

- Inputs
- Cost
- Financial
- Federal
- State
- Technical
- Info

California

1) Select on the map below the state for which you want to examine policies



- Residential - 2.4 kW (70 ft tower)
- Residential - 10 kW (100 ft tower)
- Non-Taxed - 50 kW (140 ft tower)
- Commercial - 100 kW (121 ft tower)

Additional turbine models are available for selection on Technical tab. Note tower heights offered may not be allowed in every jurisdiction.

IRR 6%

Payback 12 years

NPV \$984

COE \$0.18

DISTRIBUTED WIND

Policy Comparison Tool

THIS IS A *POLICY* MODEL, DESIGNED TO HELP
QUANTIFY POLICY DECISIONS

NOT MEANT TO BE A PROJECT DEVELOPMENT
OR FINANCIAL DECISION-MAKING TOOL



Four Main Categories of Assumptions

Turbine and market sectors

- Turbine selection
- Market sector selection
- Estimated turbine installation costs
- Annual operating and maintenance costs
- Wind resource classes
- Tower heights
- Power curves

Incentives

- Grants
- Federal incentives
- State tax incentives
 - Income tax Incentives
 - Property tax incentives
 - Sales tax incentives
- State rebates, including performance-based incentives (PBIs)
- Renewable Portfolio Standards and Renewable Energy Credits
- Feed-in Tariffs
- Tax implications of incentives

Regulatory policy

- Net metering and avoided cost payments
- Interconnection
- Zoning

Market factors

- Financing
- Escalation Rates
- Discount rates
- Other state-specific issues

Wind Turbine Defaults

Residential: 2.4 kW Skystream, 70 ft. guyed monopole

Residential/Farm: 10 kW Bergey Excel, 100 ft. free-standing lattice tower

Non-Taxed: 50 kW Endurance E3120, 140 ft. free-standing lattice tower

Commercial: 100 kW Northwind 100, 121 ft. free-standing monopole

Turbine **power curves** were manufacturer-supplied, tested and verified by NREL, or third-party verified

The Policy Tool limits wind class options to
Low and Mid Class 2 (average 5.1 – 5.5 m/s at 30 m hub height),
Low and Mid Class 3 (average 5.8 – 6.1 m/s at 30 m) and
Low Class 4 (average 6.4 m/s at 30 m)

Federal Incentives



Residential

- Residential Renewable Energy Tax Credit

Commercial

- Business Energy Investment Tax Credit (ITC)
- Modified Accelerated Cost-Recovery System (MACRS) depreciation
- U.S. Department of Treasury Payments for Specified Energy Property in Lieu of Tax Credits (also known as the Section 1603 Grant Program)

State Financial Incentives

Included

- Sales Tax and Sales Tax Incentives
- Production Tax Credits
- Income Tax Credits and Deductions
- Rebates that are mandated by state policy or programs
- REC price for Commercial & Non-Taxed sectors (higher for RPS states)
- Tax implications of incentives
- Feed-in tariff option



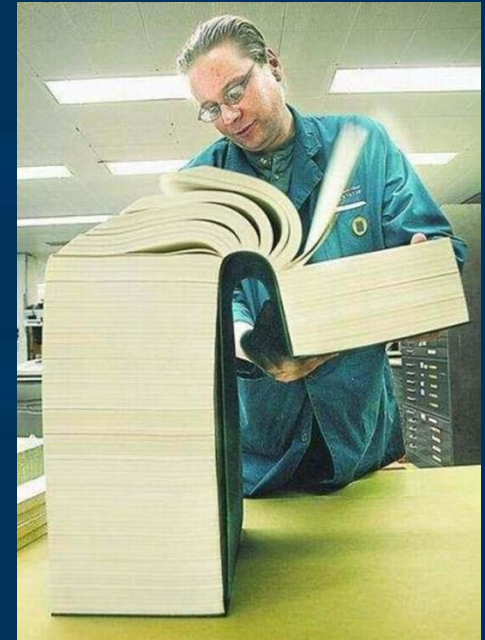
Not Included

- Property Tax Incentives
- Competitive state grants
- Utility Rebates
- RPS credit multipliers



Regulatory Policies

- **Statewide net metering** is the default if IOUs, Publics and Co-ops are all required to net meter (16 states have statewide net metering)
- **For states without net metering**, or for which net metering policies only apply to certain utilities, the Policy Tool assumes kWhs would be valued at the **avoided-cost rate** from the utility (estimated at 41% of retail value)
- **Interconnection Fees** followed the FERC SGIP Structure (+ est. \$200 for UEDS): \$300 for systems 10 kW and smaller; \$700 for systems 11-20 kW; \$1,500 for 50 kW systems; and \$6,000 for 100 kW systems
- **Zoning and Permitting:** \$300-\$2500 default, depending on turbine



Market Factors

Financing

- Tool defaults to 100% upfront investment, but user can model partial financing options

Escalation Rate

- Applied to O&M costs and Electricity Prices (e.g. Tool predicts O&M costs will increase 1.8% each year and electricity prices will increase 2.2% each year for Residential Sector)

Discount Rates

- 6% for Residential, 7% for Commercial, 5% for Non-Taxed Sector

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Policy Comparison Tool Demo, Case Studies

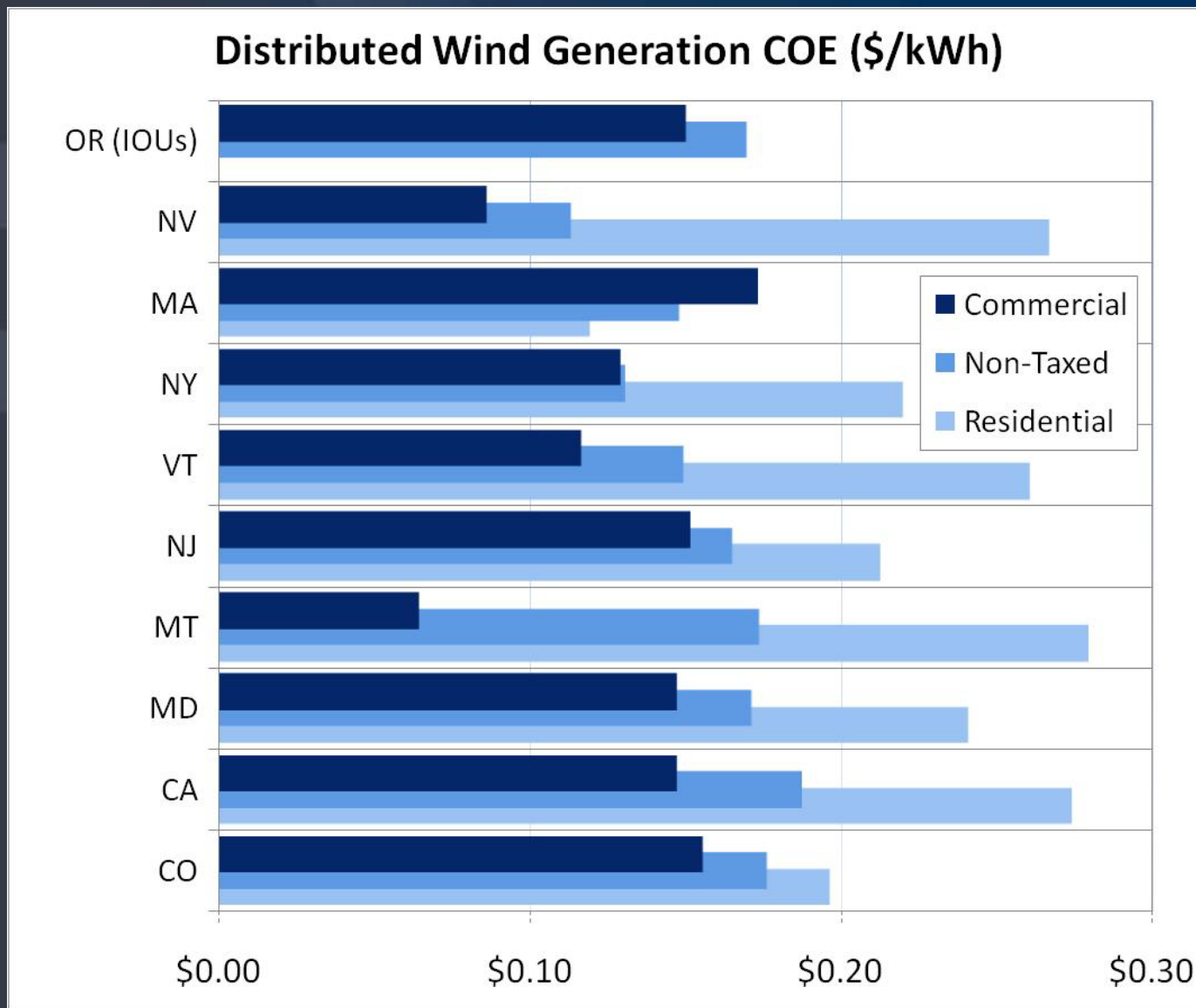
Matt Gagne



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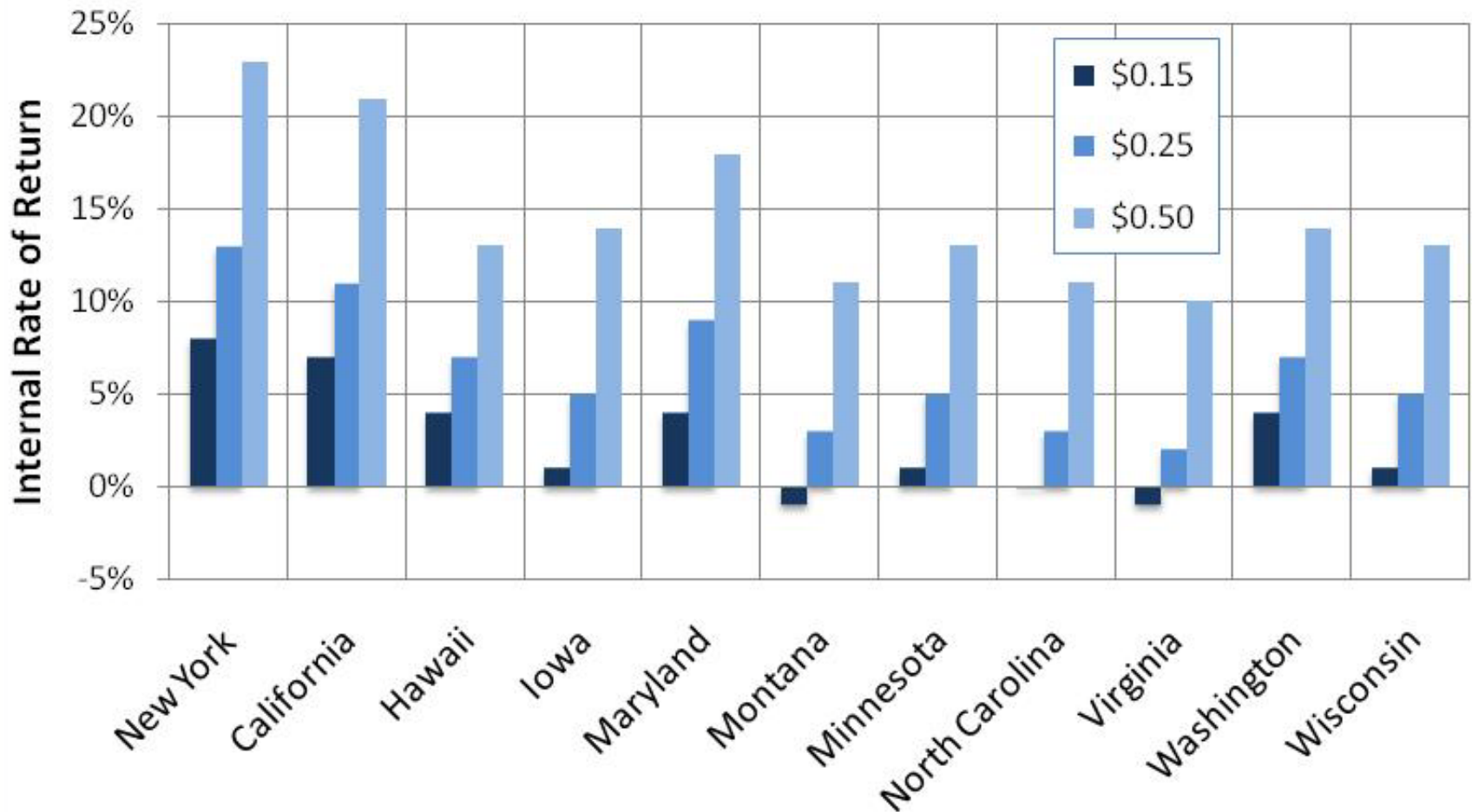
State Ranking by Net Cost of Energy



Average COE results of base case scenarios, policies and incentives as of 4/2011

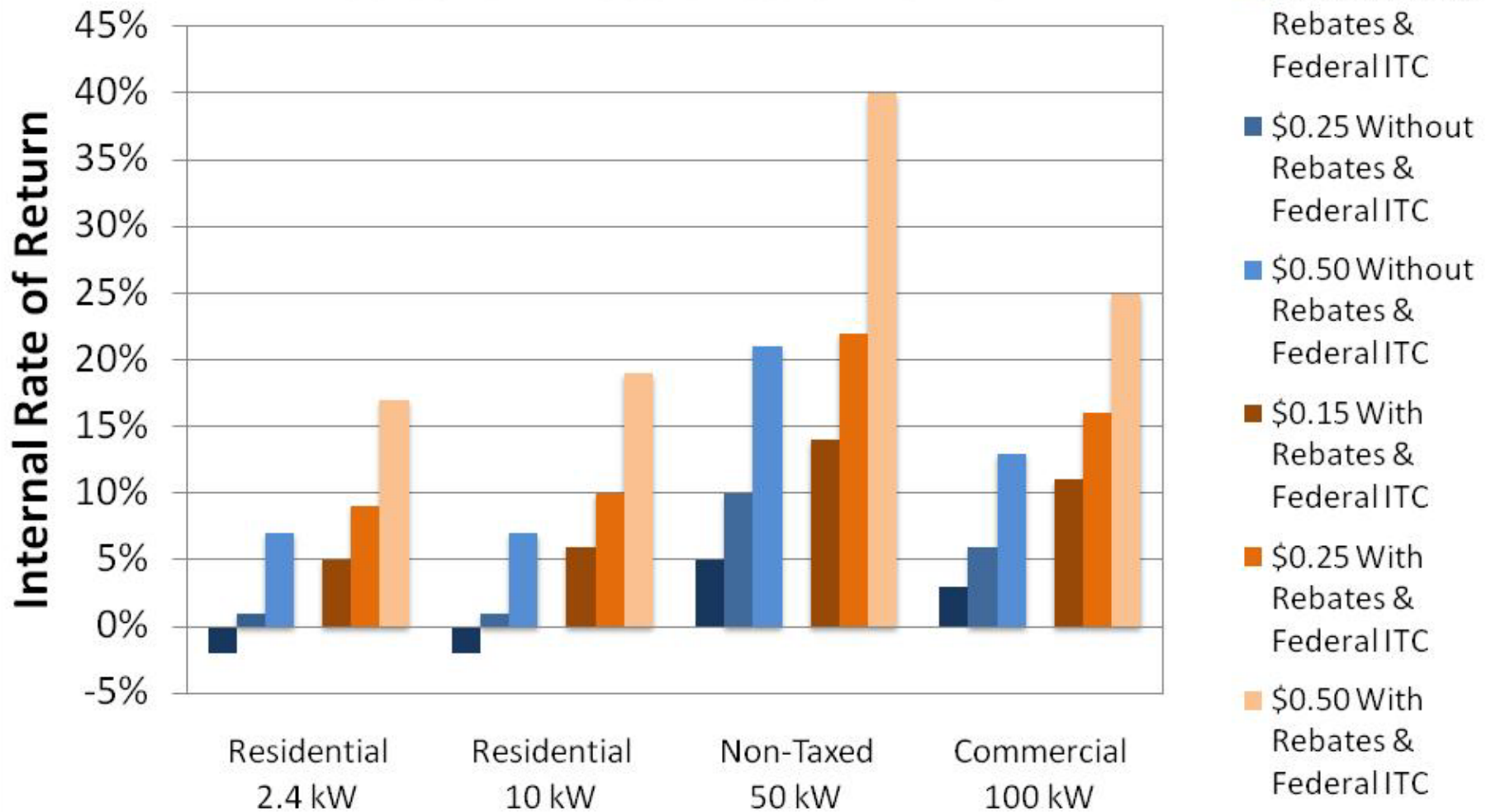
Select IRR Results of Modeling FIT Rates, Residential Sector

FIT Scenarios



Comparison of Case Study Results With and Without Rebates and Federal ITC

Additional FIT Scenarios for New York



Tower Heights Case Study - Wisconsin

Focus on Energy Rebate

- Only turbines 20 kW or less on towers of 100 feet or more qualify
- Rebate amount varies
 - Tower height
 - Turbine's expected annual generation

Policy model example

- 20 kW Jacobs 31-20 turbine on 100 foot tower
- 20 kW Jacobs 31-20 turbine on 120 foot tower

Tower Heights Case Study - Wisconsin

Wisconsin Focus on Energy Rebate Amounts

| Turbine | COE | Rebate Amount |
|-------------------------------------|------------|----------------------|
| 20 kW - 31-20 Jacobs - 100 ft tower | \$0.31 | \$8,579 |
| 20 kW - 31-20 Jacobs - 120 ft tower | \$0.17 | \$15,319 |

Production-Based Incentive Case Study – New York

3-tiered incentive program

- 0-10,000 kWh produced
- 10,000 kWh – 115,000 kWh
- 115,000 kWh – 125,000 kWh

Policy model example

- 50 kW E3120 on 120 foot tower
- 50 kW E3120 on 140 foot tower

Tower heights important permitting consideration

- Project feasibility
- Project economics

Production-Based Incentive Case Study – New York

Project Economics for a Commercial Sector 50 kW Turbine in New York

| Sector and Turbine | Wind Resource | Hub Height | COE | NPV | IRR | Simple Payback (years) | Rebate Amount |
|---------------------|---------------|------------|--------|------------|-----|------------------------|---------------|
| NY Commercial 50 kW | Mid Class 2 | 120 ft | \$0.10 | (\$20,125) | 5% | 11 | \$152,826 |
| NY Commercial 50 kW | Mid Class 2 | 140 ft | \$0.08 | \$7,442 | 8% | 9 | \$155,646 |

Optimal Policy Combination Case Study

- Kansas chosen due to minimal policies in place
- Base case compared to various policy scenarios

NYSERDA “On-Site Small Wind Incentive Program”

- 50% of installed cost of a wind system up to a max of \$400,000

Production-based incentive

- First 10,000 kWh of expected annual energy production:
\$3.50/annual kWh
- Next 115,000 kWh of expected annual energy production:
\$1.00/annual kWh
- Energy production greater than 125,000 kWh: \$0.30/annual kWh

Kansas Base Case Scenario for Commercial Sector 100 kW Turbine vs. Alternate Inputs

| | Base Case | With \$1 interconnection cost | With \$1 zoning cost | With state- wide net metering | With a \$163,468 rebate |
|----------------|------------------|--|---------------------------------|--|--|
| COE | \$0.13 | \$0.13 | \$0.13 | \$0.13 | \$0.09 |
| NPV | (\$233,188) | (\$227,189) | (\$230,689) | (\$97,483) | (\$127,370) |
| IRR | -5% | -5% | -5% | 3% | -1% |
| Payback | More than 20 | More than 20 | More than 20 | 15 years | More than 20 |

Kansas Base Case Scenario for Commercial Sector 100 kW Turbine vs. Optimized Policy Combination

| | Base Case | With \$1 interconnection cost, \$1 zoning cost, state-wide net metering and \$163,468 rebate |
|---------|--------------|--|
| COE | \$0.13 | \$0.09 |
| NPV | (\$233,188) | \$16,833 |
| IRR | -5% | 8% |
| Payback | More than 20 | 9 |

Next Steps: Enhancements & Outreach

- Allow users to adjust annual estimated production
- Ensure ongoing maintenance and updates
 - Enable automated interface with DSIRE, utility rates, etc.
- Incorporate wind map data/site assessment
- Offer video guide, tailored webinars

Expansion of Tool

- Add additional turbine & tower options, cover “mid-sized” sector up to 1 MW

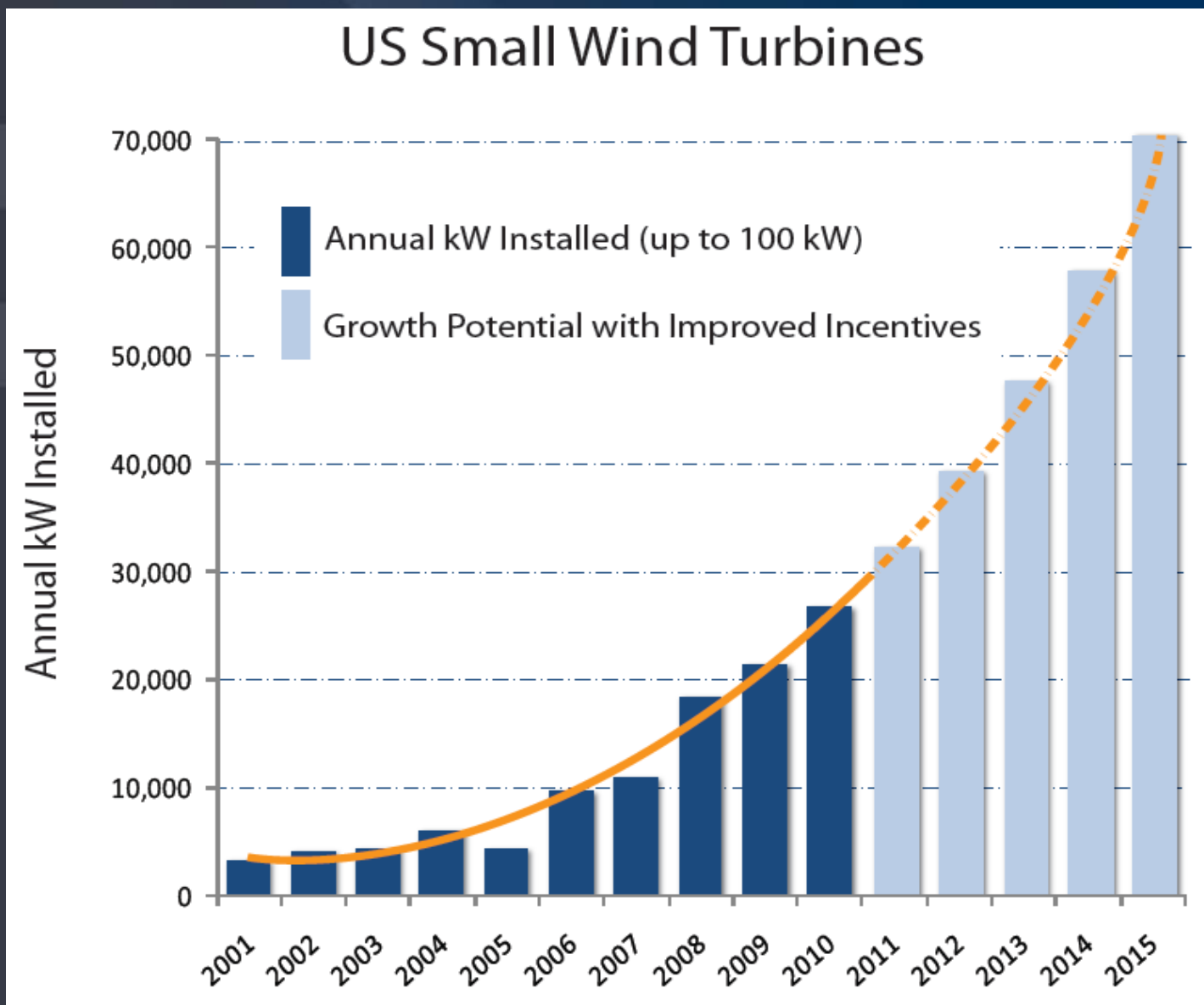
Next Steps: Expansion of Tool

- Incorporate costs for environmental evaluations and other make-or-break factors
 - Additional review of zoning restrictions, “real options” analysis
- Enable macro analysis of cumulative impacts on electricity rates such as from high uptake levels
- Build out DSIRE with more utility-specific and county-specific policies
- Enable review of more complex financing scenarios
- Create option that factors in probability of success for grants

Next Steps: Further Analysis

- Enable more nuanced view of net metering and load/generation profile overlap
- Create case studies on real world turbine installations, actual costs and incentives
- Optimize leasing scenario
- Conduct analysis on long-term nature and price stability of RECs
- Contrast state ranking results with market sales data, use Tool to estimate total value of incentives

Expanded Incentives Key to Market Growth



Sources: AWEA & EFO



Market Analysis

- Economic impacts
- Data collection/research

Development Consulting

- Launching new ventures
- Grantwriting

Public Affairs

- Community outreach
- Turnout for hearings

Project Management

- Strategic planning
- Facilitation, consensus

Heather Rhoads-Weaver

www.eformativeoptions.com

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*Data collectors:
3 dozen and growing!*

