### Key Considerations

- Approximately 14% of U.S. farms are irrigated, representing ~57 million acres of irrigated land.
- 61.5% of irrigation systems in the US are powered by electric energy.
- In 2008, the energy expenses for pumps totaled $2.68 billion, an increase of 73% from 2003.
- More than half of the top 15 irrigation states have good to excellent wind resources.
- Wind reduces the impact on the environment, including significant water savings, as it does not require the cooling of thermal generators.

### Summary of Net Metering Policies in Top Irrigation States

<table>
<thead>
<tr>
<th>State</th>
<th>Net Metering Policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>Yes, capped at 50%</td>
</tr>
<tr>
<td>California</td>
<td>Yes, capped at 50%</td>
</tr>
<tr>
<td>Colorado</td>
<td>Yes, capped at 50%</td>
</tr>
<tr>
<td>Texas</td>
<td>Yes, capped at 50%</td>
</tr>
</tbody>
</table>

### THE VIABILITY OF SMALL WIND DISTRIBUTED GENERATION FOR FARMERS WHO IRRIGATE

**Becki Meadows, NREL**  **Trudy Forsyth, NREL**  **Scott Johnson, CWEC**  **Dave Healow, Two Dot Wind, LLC**

**Optimal policy design for irrigators include: annualized net metering, single electricity tariff (combined demand and energy costs into kWh charge), 100 kW minimum capacity limit for net metering, buydown and incentives (REAP, IT, etc.).**

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**As illustrated in the case studies below, in states with a good wind resource and large amounts of irrigation by electricity, a net metering policy with an annual true up can lead to the greater expansion of distributed wind and significant savings for farmers who irrigate.**

#### H2O Farms in Walsh, CO: Installed Two 50-kW Wind Turbines, 2009

- **Total Project Costs (w/out incentives):** $360,000
- **% Irrigation Load Offset:** 55%
- **% Wind Energy Valued at Retail Rate:** 80%

#### Salinas Valley Ranch, CA: 50-kW Turbine Feasibility Study Completed, 2009

- **Total Project Costs (w/out incentives):** $215,000
- **% Irrigation Load Offset:** 50%
- **% Wind Energy Valued at Retail Rate:** 100%

#### Agnew Farms, Big Timber, MT: Installed One 65-kW Wind Turbine, 2002

- **Total Project Costs (w/out incentives):** $50,000
- **% Irrigation Load Offset:** >100%
- **% Wind Energy Valued at Retail Rate:** 0%

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**Sources:** The National Agriculture Statistics Service (NASS) 2008 Farm and Ranch Irrigation Survey; NREL 10-m Wind map; Database of State Incentives for Renewable Energy

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**Image Credits:**
- An irrigation pivot shows the use of water on a working farm. (iStock #1897682)
- One of the two 50 kW turbines located at H2O Farms in Walsh, CO. (POW 17246)
- The 65 kW, refurbished Windmatic, erected by Tom Agnew at Agnew Farms. (PB #19147C)

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**For Further Information:**
- **THE VIABILITY OF SMALL WIND DISTRIBUTED GENERATION FOR FARMERS WHO IRRIGATE**
- **Becki Meadows, NREL**  **Trudy Forsyth, NREL**  **Scott Johnson, CWEC**  **Dave Healow, Two Dot Wind, LLC**

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**Recommended Resources:**
- **NREL:** National Renewable Energy Laboratory
- **CWEC:** Clean Energy Education and Economic Development Center
- **REAP:** Renewable Energy Farming Assistance Program

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**Incentives:**
- **Montana:** $125,000
- **Arkansas:** $147,750
- **Colorado:** $150,000
- **Kansas:** $125,000
- **Texas:** $200,000

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**Program Summary:**
- **Variable Costs:** Operations and Maintenance, Insurance
- **Estimated Average Annual Production:** 70,000 kWh
- **Average Retail Cost of Electricity:** $0.15/kWh
- **Estimated Payback:** 6.8 years

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**Retail Costs:**
- **Montana:** $1,500/yr
- **Arkansas:** $6,000/yr
- **Colorado:** $23,113/yr
- **Kansas:** $700/yr
- **Texas:** $18,637/yr

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**Average Electricity Costs:**
- **Montana:** $0.037/kWh
- **Arkansas:** $0.086/kWh
- **Colorado:** $0.043/kWh
- **Kansas:** $0.086/kWh
- **Texas:** $0.027/kWh

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**Annualized Savings:**
- **Montana:** $5,570/yr
- **Arkansas:** $18,400/yr
- **Colorado:** $2,811/yr
- **Kansas:** $18,637/yr
- **Texas:** $18,637/yr

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**Estimated Annual Wind Turbine Production and Actual On-Site Energy Consumption**

- **H2O Farms in Walsh, CO:** Installed Two 50-kW Wind Turbines, 2009
- **Salinas Valley Ranch, CA:** 50-kW Turbine Feasibility Study Completed, 2009
- **Agnew Farms, Big Timber, MT:** Installed One 65-kW Wind Turbine, 2002

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**Notes:**
- All economic data is determined on a constant US$2008 basis.
- All estimates are based on achieving 8,000 annual operating hours per year.
- Wind energy is valued at retail rate based on average retail rate of electricity.