FILLING IN THE GAPS: SCALABLE, MARKET-DRIVEN COMMON GROUND ACTION

SETTING THE CLIMATE AGENDA FOR THE NEXT U.S. PRESIDENT
MAY 6, 2016
## CURRENT UNITED STATES POLICY SITUATION

**Over 100 Federal and State Mandates**
- Renewable Power* (37 States)
- Greenhouse Gases* (10 States)
- Power Plant Air Pollution*
- Vehicle Fuel Efficiency*
- Renewable Fuel*
- Lighting Efficiency*
- Appliance Efficiency
- Ozone Depleting Substances
- Building Efficiency Codes (50 States)
- Clean Power Plan[*]

* USES MARKET-BASED SYSTEM

**Over $150B Incentives**
- Tax Credits (on and off again)
- Clean Energy Payments
- None
- Tax Credits, Subsidies
- Tax Credit (Expired), Subsidies
- Tax Credits, Subsidies, Rebates
- Subsidies, Rebates
- None
- Tax Credits, Subsidies
- Clean Energy Incentives
NEED 60 GIGATONS OF REDUCTIONS TO REDUCE GLOBAL GHG EMISSIONS 60% BY 2050

Global Emissions

Note: 2050 forecast from OECD Environmental Outlook to 2050 (OECD, 2012).
## HOW BIG IS ONE GIGATON OF CO2?

<table>
<thead>
<tr>
<th>Today's Technology</th>
<th>Actions that Provide 1 Gigaton per Year of Mitigation¹</th>
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<tr>
<td><strong>Coal Power Plants with CCS</strong></td>
<td>Build 507 500-MW coal-fired power plants with CCS (assumes 90% capture, 25% parasitic energy loss &amp; 70% capacity factor) to replace 380 500-MW coal-fired plants w/o CCS (70% capacity factor). 0 TODAY. 10+% OF CURRENT PLANTS</td>
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<td><strong>Geologic Sequestration</strong></td>
<td>1,000 sequestration sites like Norway's Sliepner project (1.0 MtCO₂/year). 300X CURRENT</td>
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<td><strong>Nuclear</strong></td>
<td>128 1-GW plants (90% capacity factor) to replace 329 500-MW coal plants (70% capacity factor). 33% CURRENT</td>
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<td><strong>NGCC</strong></td>
<td>Install 608 500-MW NGCC plants meeting EPA's 1,000 lbs per megawatt hour New Source Performance Standard (70% capacity factor) to replace 608 500-MW coal plants (70% capacity factor). 10+% CURRENT</td>
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<td><strong>Efficiency</strong></td>
<td>Deploy 290 million new cars at 40 miles per gallon (mpg) instead of new cars at 20 mpg. ALL THE CARS IN US, EU, OR CHINA</td>
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<td><strong>Wind Energy</strong></td>
<td>Install 165,000 2-MW turbines w/30% capacity factor to replace 329 coal power plants w/70% capacity factor. 2-3X CURRENT</td>
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<td><strong>Concentrated Solar Power</strong></td>
<td>Install 1,100 300-MW CSP plants w/35% capacity factor to replace 329 coal power plants w/70% capacity factor. 300X CURRENT</td>
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<td><strong>Landfill Gas Electricity</strong></td>
<td>Install 7,700 “typical” landfill gas electricity projects (typical size being 3-MW projects at non-regulated landfills) that collect landfill methane emissions and use them as fuel for electric generation</td>
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<td><strong>Solar Photovoltaics</strong></td>
<td>Install 2.8 million acres of 2-axis concentrated solar photovoltaics (generation-weighted average land use of 2.8 acres/GWh/year) to replace 329 coal-fired power plants (operating at 70% CF). MORE THAN 100x CURRENT</td>
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<td><strong>CO2 Storage in New Forest</strong></td>
<td>Convert 100 million acres of barren area to new forest, (assumes Douglas Fir) 2.5X SIZE OF WASHINGTON STATE</td>
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</table>

1. The average size of a new wind turbine installed in 2014 was ≈ 2.0 MW.
### SCALABLE, MARKET-DRIVEN, COMMON GROUND POLICY ACTIONS

**FIRST: LEGISLATE A NUMBER, ANY NUMBER, AS LONG AS IT IS DOWN**

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**MAKE ELECTRICITY MARKETS COMPETITIVE**
- Unleash Investment in Innovation
- Constitutional Lawsuit or Federal/State Legislation

**SIMPLIFY POWER GENERATION MANDATES**
- Tech Neutral, Performance-Based, Cost Cap, Pre-Emption
- Natural Gas, Clean Coal, Nuclear, Hydro, Other Renewables

**SIMPLIFY TRANSPORTATION MANDATES**
- Tech Neutral Using Feebate for Vehicles
- Tech Neutral for All Fuels (National Security, Density, Emissions)

**RESTORE AND EXPAND NUCLEAR ENERGY**
- Gen3 Plus, Gen 4, Then Small Modular Reactors
- Infrastructure, Finance Reform, Federal Policy

**DEPLOY ANALYTICS FOR POWER, VEHICLES, FOOD**
- About 25% Power System Efficiency Gain; 8% in Grid Alone
- Federal Policy, PUC Policy—Data as New Utility Asset

**TRADE ENERGY SUBSIDIES FOR MUCH MORE R&D**
- Portion to Public and Private R&D; Portion to Pay Down Debt
- Tax Reform, Federal and State Budgets

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**TAX POLICY: CORPORATE, EXPENSING, REPATRIATION**
**MUST INFLUENCE CHINA AND INDIA AND AVOID CARBON LEAKAGE**