BACKGROUND ANALYSIS: There are many ways to stabilize carbon emissions. For these Reports REPP used the "wedge" analysis developed by Pacala and Socolow. (Pacala, S. and R. Socolow, Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies, Science, 13 August 2004, Vol. 305) To stabilize carbon emissions, the authors proposed to split the growth of carbon emissions into seven parts or wedges and look for the set of already existing technologies that can generate the required electricity without a wedge of carbon emissions. An international program of stabilization based on current levels of global emissions would make the United States responsible for about two wedges or two-sevenths of global carbon emissions. Since transportation and electricity generation each provide about half the emissions, electricity generation in the United States would be responsible for about one wedge.

The calculation of what is required to stabilize these emissions with renewable energy is straightforward. The base of carbon emissions now is 7 billion metric tons per year of carbon, growing at 1.5% per year. For the first year, global growth would be 105 million tons, and to stabilize or remove the growth each wedge would require removing 15 million tons of carbon or 55 million tons of CO2 per year. Coal generation emits on average 2.1 pounds of CO2 per kWh produced, which translates to approximately 58 billion kWh generated with zero CO2 emissions to capture one wedge. To achieve these reductions would require the addition of between 18,000 and 19,000 MW per year of wind power generation, assuming an average capacity factor of 35%. (Biomass and geothermal resources have much higher capacity factors and would require smaller capacity additions to achieve the CO2 reduction.)

These Reports look at the total demand for component parts generated by a ten-year stabilization program and tracks that demand down to the individual industries capable of manufacturing the components. The national demand is assigned to individual states and eventually to the county level. These Reports also look at the likelihood that new demand on the scale necessary to stabilize carbon emissions would lead to bottlenecks in the component supply chain. For example, climate stabilization efforts will create an annual demand for approximately $1 billion for wind turbine gearboxes. Currently, this industrial sector is running at close to full capacity. Department of Commerce data shows an available, unused capacity of roughly $15 million. In other words, any major push for renewable installations would run into an immediate shortage of these critical components. Looking more closely at this carbon stabilization program reveals that there is a very great likelihood that severe bottlenecks will develop in many critical sectors. For wind and photovoltaic components, the annual, new demand will greatly exceed available industrial capacity for more than 50% of the industrial sectors. All of the renewable technologies face a bottleneck in one or more critical components.

Renewable Energy Policy Project: REPP conducts a variety of educational, outreach and policy analyses to accelerate the development and market acceptance of renewable energy. Over the past three years REPP has broken down the primary renewable technologies, i.e. wind, photovoltaic, geothermal, and biomass, into their major component parts. This engineering analysis was then integrated with a climate stabilization program to determine the economic development potential of such an effort. REPP also analyzed the effect of wind farm development on local property values.

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