Coal-Fired Power, Nuclear, Natural Gas from Fracking Singled Out As Increasingly Untenable in Portions of U.S. Already Struggling With Shrinking Water Supplies; U.S. Needs to Start Planning to Take Into Account Energy Water Use … Not Just Energy Production.

WASHINGTON, Sept. 12, 2013 /PRNewswire-USNewswire/ -- Industry critics of solar and wind power are quick to assert that there will be problems for renewable energy when the sun doesn't shine and the wind doesn't blow. But a new Civil Society Institute (CSI) report prepared by Synapse Energy Economics suggests that dirty energy sources – including coal-fired electric power, nuclear power, and natural gas from fracking – face an even bigger challenge: What are you going to do if the water doesn't flow?

The CSI report notes: **"Currently, 97 percent of the nation's electricity comes from thermoelectric or hydroelectric generators, which rely on vast quantities of water to produce electricity … Water is increasingly becoming a limiting factor on U.S. energy production and a key obstacle to maintaining both electricity output and public health and safety. The constraints range from insufficient water supplies to meet power plants' cooling and pollution control needs—a challenge likely to be exacerbated by climate change, population growth, and competition from other sectors—to the high costs of energy-related water contamination and thermal pollution."**

Key report conclusions include the following:

- Thermoelectric plants withdraw 41 percent of the nation's fresh water—more than any other sector.
- The amount of water available to serve diverse needs is a growing concern across the country, from the arid western states to the seemingly water-rich Southeast. Thermoelectric generation compounds the stress already faced by numerous watersheds and adds additional risk for the future. If current trends continue, water supplies will simply be unable to keep up with our growing demands. Factors that are likely to exacerbate the problem include climate change, water shortages, and carbon capture and sequestration (CCS). For example, CCS is projected to increase water consumption rates for existing coal plants by 83 percent and natural gas plants by 91 percent. Failure to address these constraints now is bound to lead to further

intersectoral conflicts and forced plant shutdowns that will jeopardize electricity production and constrain economic growth in the future.

- On an average day, water withdrawals across the nation amount to an estimated 85 billion gallons for coal plants, 45 billion gallons for nuclear plants, and 7 billion gallons for natural gas plants. Additional water is required to extract, process, transport, and store fuel, and this water is often degraded in the process.
- Coal mining consumes between 70 million and 260 million gallons of water per day.
- Natural gas fracking requires between two and six million gallons of water per well for injection purposes.

Synapse Associate Melissa Whited said: **"Our electric system was built on traditional, water-intensive thermoelectric and hydroelectric generators. The water requirements of this energy system are enormous and leave it vulnerable to droughts and heat waves… Going forward, our water resources will be further squeezed by population growth coupled with the impacts of climate change. The massive water use of coal, nuclear, and natural gas generators will be increasingly challenged, particularly when alternatives that require little water, such as wind and solar, are readily available."**

CSI Senior Energy Analyst Grant Smith said: **"Continued reliance on water-intensive electric generation technologies puts consumers and regional economies at risk of interruptions in electricity supply or on the hook for costly infrastructure investments. To ensure a reliable, cost-effective supply of energy, these water-related risks must be fully accounted for in energy planning and regulation. Once the environmental costs of conventional fuels are recognized, it becomes clear that energy efficiency and renewable energy are bargains by comparison. These clean alternatives cause little if any harmful environmental impacts. On a full-cost accounting basis, clean energy would win out as the least-cost solution and solution that harbors the least risk, as our energy system would no longer threaten (or be vulnerable to) the quantity and quality of our water."**

FUEL PRODUCTION AND USE IMPACTS

According to the report, energy-sector impacts on water quality are significant, and are likely to increase if the United States continues to rely heavily on thermoelectric power plants. The following are just a sample of the impacts associated with fuel production and use:

- Coal mining: Elevated and unsafe levels of arsenic and other heavy metals have repeatedly been found in drinking water in coal mining areas.

- Uranium mining and milling: Runoff from uranium mine tailings is contaminated not only with uranium and other radioactive materials, but also with toxic heavy metals.
- Natural gas production: Seepage of fracking fluids into groundwater has contaminated drinking water with toxic chemicals such as benzene.
- Thermal pollution: Once-through cooling systems withdraw water from rivers, lakes, and estuaries, use it for cooling, then discharge it at a much higher temperature. These thermal discharges can harm phytoplankton, accelerate the growth of bacteria, increase algal blooms, and otherwise disrupt fish habitats.

EARLIER RESEARCH

On April 17, 2013, a CSI study conducted by Synapse found that, in an envisioned 2050 scenario with a heavy reliance on renewables, regional electricity generation supply could meet or exceed demand in 99.4 percent of hours, with load being met without imports from other regions and without turning to reserve storage. In addition, surplus power would be available to export in 8.6 percent of all hours, providing an ample safety net where needed from one region of the U.S. to the next.

In 2011, Synapse prepared a study for the Civil Society Institute that introduced a "Transition Scenario" in which the United States retires all of its coal plants and a quarter of its nuclear plants by 2050, moving instead toward a power system based on energy efficiency and renewable energy. The Synapse study for CSI showed that this Transition Scenario, in addition to achieving significant reductions in emissions of carbon dioxide (CO2) and other pollutants, ultimately costs society less than a "business as usual" status quo strategy -- even without considering the cost of carbon. The 2011 study also projected that, over 40 years, the Transition Scenario would result in savings of $83 billion (present value) compared to the status quo strategy.

To achieve these lower-cost and low-emissions results, the Transition Scenario included large amounts of renewable energy resources with "variable output," such as wind and solar. While the need for variable-output resources is well defined, questions have been raised about the impact of large-scale wind and solar integration on electric system reliability. To address this, Synapse paid careful attention to the amount of wind and solar in each region when designing the Transition Scenario for the 2011 report, taking steps to ensure that the projected regional resource mixes could respond to all load conditions.

The April 2013 study took the 2011 analysis one big step farther, in order to explore the extent to which the Transition Scenario's resource mixes for 2030 and 2050 are capable of meeting projected load for each of the 10 studied regions — not just during peak demand conditions, but in every hour of every season of the year as consumers require.

ABOUT THE GROUPS

Based in Newton, MA, the nonprofit and nonpartisan Civil Society Institute (http://www.CivilSocietyInstitute.org) is a think tank that serves as a catalyst for change by creating problem-solving interactions among people, and between communities, government and business that can help to improve society. Since 2003, CSI has conducted more than 25 major national and state-level surveys and reports on energy and auto issues, including vehicle fuel-efficiency standards, consumer demand for hybrids/other highly-fuel efficient vehicles, global warming and renewable energy. In collaboration with the Environmental Working Group, the Civil Society Institute has initiated the American Clean Energy Agenda (http://www.americancleanenergyagenda.org/), an effort calling for bold steps to move the United States toward a clean, safe energy future, which has been endorsed by over 110 organizations representing more than 1.7 million Americans.

Synapse Energy Economics, Inc. (http://www.synapse-energy.com) provides research, testimony, reports and regulatory support on energy, economic, and environmental topics. Synapse has a professional staff of 30 with more than 300 years of combined experience in the electricity and natural gas industries. Synapse assesses the implications of electricity and natural gas industry planning, regulation and restructuring. Synapse's work covers various interrelated issues such as transmission planning, service reliability, siting, fuel diversity, resource planning, financial and economic risks, renewable energy potential and renewable portfolio standards, energy efficiency, electricity modeling, portfolio management, customer service and more. Synapse works for a wide range of clients throughout the United States , including attorneys general, offices of consumer advocates, public utility commissions, a variety of environmental groups, foundations, the U.S. Environmental Protection Agency, Department of Justice, the National Association of Regulatory Utility Commissioners, and others.

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