NEWS in Science and Technology

from the

Connecticut Academy of Science and Engineering

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The following is an Executive Summary of the Academy's quarterly Bulletin (Vol. 21,3) that includes topics and issues in science and technology deemed by the Academy to be both timely and relevant to Connecticut's interests. Each item is briefly summarized from press releases and reports of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. Hyperlinks are included to the original online source, where more detailed information is available.

NOTE: Online versions of this newsletter and the Bulletin are available on the Academy website at www.ctcase.org.

FEATURE: One Solution to CT's Energy Needs

➢ Distributed Generation: One Solution to CT's Burgeoning Energy Needs

In an effort to meet increasing energy needs and rising electricity costs for Connecticut businesses and residents while using efficient, environmentally sound resources, the Connecticut General Assembly passed Public Act 05-01, An Act Concerning Energy Independence (EIA), in a June 2005 special session. One of the most important of the conservation measures called for under the act is the provision of monetary incentives designed to encourage corporations, large-scale industries, and commercial enterprises to install on-site generators, thus creating a distributed electrical power system. The bill

- Is a "win-win" situation according to state Department of Public Utility Control (DPUC) spokespserson Beryl Lyons—removing power from grid reduces energy costs for consumers, allows large-scale users to meet power needs with state-of-the-art technology that's environmentally sound and efficient.
- Will include lower back-up power charges, lower natural gas fuel charges, direct grants and payments to businesses to cover installation costs.
    - Grants will be proportional to amount of electrical load the on-site generators will remove from the grid, and could be up to $500 for each kilowatt of power generation capacity.
    - Customers will be able to sell renewable energy credits back into the market to offset cost of project.
    - Funds supporting development of on-site generators should be recoverable from FMCCs (Federally Mandated Congestion Costs, required by federal law since 2004, which occur as penalties when a more costly generator is dispatched before a less costly one because there isn't adequate transmission capacity to get the generation from the less costly plant to the load center).
- Seven organizations petitioning for funds as of May 2006; among them: Fairfield University, Anthem Blue Cross, Cellu Tissue, Frito-Lay.
- Connecticut Clean Energy Fund (CCEF) created by General Assembly to promote clean, renewable energy sources and charged under EIA with giving preference to renewable generation projects that maximize the reduction of FMCCs.
    - funded by surcharge on ratepayers' utility bills.
    - funded Bridgeport Fuel Cell Park, largest in nation, with $500,000 grant in June 2006.
    - Approved $1.7 million grant for largest photovoltaic system in CT, to be built on the grounds of a Staples distribution plant in Killingly.

[See http://www.ctcase.org/bulletin/21_3/21_3.pdf]

NEWS FROM THE NATIONAL ACADEMIES

➢ Strengthening Foundation of US Aviation Research

If the United States is to maintain global leadership in the field of aviation, NASA (the National Aeronautics and Space Administration) should expand its partner-ships with public and private institutions and prioritize its aeronautics research according to a "decadal survey" that ranks projects based on their ability to improve the nation's air transportation system, according to a new report from the National Research Council. According to the report:

- NASA should expand partnerships with public and private institutions, prioritize aeronautics research using a "decadal survey" that ranks projects based on ability to improve US air transportation.

(continued on back page)

Connecticut Science Center Releases Educational Videos and Classroom Activities

Although it opens in 2008, the Connecticut Science Center is using the construction of its dramatic new building to help teach science and math skills even before it's finished. That's the idea behind The Science of Building, a new series of digital videos that can be viewed on the Center's website at www.CTScienceCenter.org, which are available to teachers just in time for the new school year. The videos use the construction of the new facility to demonstrate how science and math is used in everyday life activities, like construction, and its lessons are directly tied to the state's new Connecticut Science Framework. Each video is accompanied by a classroom activity, which can easily be incorporated into a teacher's lesson plan along with the video.

The first of the series of videos focuses on simple machines, and is illustrated by the actual construction machinery involved in building the Center. The second video explains how glaciers and erosion caused the path of the Connecticut River to meander, effecting lifestyles along the river and dictating how the Science Center's foundation should be built. In this video the Center is joined by CASE member and geologist Ralph Lewis and members of Archeological and Historical Services, Inc. The third video explains the process of making concrete and the chemical reaction it undergoes. It was created with the help of Tilcon Connecticut, demonstrating the science of concrete from the quarry, where it all begins to the final product used for building the new Science Center. These are just the first in a series of videos that will be offered by the Connecticut Science Center to help teachers bring real-world science into the classroom. The Center's Program Outreach staff is available to provide teachers with more information at (860) 727-0457.

[See http://ww.ctcase.org/bulletin//21_3/21_3.pdf]

- NASA should pursue a list of research challenges and strategic objectives over the next 10 years, including developing aircraft that are quieter, more efficient and less polluting; developing technologies to reduce delays during peak travel conditions; and developing "smart" technologies that can quickly detect and respond to anomalies outside or inside a plane.
- NASA should have clear criteria for starting, continuing to support, and discontinuing research projects.
- synergies between research objectives of the nation's civil aeronautics industry and those of national security.

[CASE president Alan C. Eckbreth served on the Steering Committee for this report, and chaired Panel B: Propulsion and Power. CASE member David (Ed) Crow also served on Panel B.]

[http://www.nap.edu/catalog/11664.html]

➢ Alternatives to Indian Point Nuclear Plant

The September 11 terrorist attacks prompted calls from concerned residents of New York State to shut down the Indian Point nuclear power plant near New York City. In response, Congress asked the National Research Council if it would be possible to replace the energy lost by closing Indian Point, which provides 25% of the electricity in New York City and the lower Hudson Valley. An expert committee concluded that Indian Point's energy supplies could be replaced with non-nuclear power plants, additional transmission lines, and new efforts by consumers to save energy, but the state would need to overcome many political, regulatory, and financial hurdles. The report found

- not all of Indian Point's 2,000 megawatts would need to be replaced if consumers use electricity more efficiently.
- the most readily available to replace the energy is with plants fueled by natural gas, but noted that possible shortages and high prices of natural gas a potential concern—new supply sources, including imported gas, will be needed.
- a new coal plant would be cheapest alternative but is unlikely to be ready by 2015 unless planning starts soon.

[http://newton.nap.edu/catalog/11666.html?infocus_6.2]

➢ Lower Limit for Naturally Occurring Fluoride Urged

A new report from the National Research Council finds that children who are exposed to too much naturally occurring fluoride in drinking water—4 milligrams or more of fluoride per liter of water (the maximum allowed by the US Environmental Protection Agency)—risk developing severe tooth enamel fluorosis, a condition characterized by ugly discoloration, enamel loss, and pitting of the teeth. It says

- a majority of the committee agreed that damage caused by severe enamel fluorosis should be deemed a toxic effect, and the entire committee agreed that EPA should lower its "maximum contaminant level goal" for fluoride in order to prevent it.
- most of the committee concluded that a population with lifetime exposure to water with 4 mg/L or higher of fluoride is at increased risk for bone fractures; research is needed into the question of whether fluoride also can cause bone cancer.
- About 200,000 Americans have water sources containing fluoride at 4 mg/L or higher, while another 1.4 million have water with 2 mg/L of fluoride. Artificially fluoridated water contains between 0.7 and 1.2 mg/L of total fluoride.

[http://newton.nap.edu/catalog/11571.html?infocus_6.2]

➢ Temperature Data "by Proxy"

Climate scientists who want to know how modern temperature fluctuations compare with natural variations that took place before the Industrial Revolution, before meteorologists started using instruments to collect temperature data and when levels of heat-trapping greenhouse gases in the atmosphere were much lower, must rely on "proxy evidence"—tree rings, boreholes, ice cores, corals, and ocean and lake sediments—to reconstruct past temperatures. The accuracy of such evidence has been the subject of considerable debate within the scientific community, and last year, Congress asked the National Research Council to assess the ability of scientists to reconstruct surface temperatures for the past 2,000 years. The committee found that

- the warming recorded by instruments in the last century is also reflected in temperature reconstructions derived from borehole measurements, retreating glaciers, and other proxies.
- surface temperature reconstructions for the last millennium are generally consistent, showing relatively warm conditions around AD 1000 and a "Little Ice Age" from roughly 1500 to 1850.
- little confidence can be put in statements about average global surface temperatures earlier than AD 900 because proxy evidence is so scarce.

[http://newton.nap.edu/catalog/11676.html?infocus_6.2]

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