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SOUTHERN CALIFORNIA EDISON INVESTS IN EV CHARGING

California regulators recently approved the largest utility-led deployment of electric vehicle charging equipment in the United States. Under the new program, Southern California Edison (SCE) is permitted to expend US$436 million of ratepayer funds to install 38,000 light-duty electric car chargers. Fifty percent of those chargers must be located in communities most affected by air pollution and economic hardship.

This new program is part of a large set of measures to help update the transportation infrastructure in SCE's region. Earlier this summer, the utility broke ground to add 1,800 heavy-duty chargers for transit and school busses. As of the appropriation for the new program, SCE has approved investment for over US$800 million in electric vehicle charging stations.

THE UNIVERSITY OF NEWCASTLE DEVELOPS THERMAL BLOCK ENERGY STORAGE SYSTEM

Engineers at the University of Newcastle have developed an energy storage system comprised of Miscibility Gaps Alloy (MGA) blocks that store thermal energy. The MGA blocks are made of two primary components: a solid matrix that holds the system together in a brick shape and internal particles embedded throughout the brick that melt within. These bricks are made of materials with high thermal conductivity and thus can easily be heated to store energy and cooled to release energy. This design provides a new means to use the excess renewable energy generated during peak output to heat the MGA blocks, thereby storing energy until demand increases.

Alternatively, the MGA blocks could be stacked inside other power plants to help recycle waste heat back into the system. The engineers also assert the MGA blocks could be used to retrofit existing coal-fired power plants by using the thermal energy the blocks release to heat water into steam to run turbines without having to burn coal. Such use could also reduce the need to build new facilities or upgrade grid infrastructure.

RESEARCHERS IN SWEDEN DEVELOP MOLECULE THAT STORES SUNLIGHT AS CHEMICAL BONDS

Researchers at Linköping University in Sweden have developed a molecule that converts energy from sunlight into chemical bonds, thereby effectively converting solar energy into stored chemical energy. The molecule belongs to a group of molecules known as “molecular photoswitches.” These molecules always exist in two different forms, known as isomers. The two different forms have different properties. The chemical structures of all photoswitches are influenced by light energy, meaning that the properties of a molecular photoswitch can be

changed by illuminating it. Here, the chemical structure of the molecule developed by the researchers changes to increase in energy content when exposed to light.

The molecule was developed using theoretical chemistry to conduct calculations and simulations of possible chemical reactions. When the researchers' theoretical calculations revealed that the molecule they had developed would undergo a chemical reaction to store light energy as chemical bonds, they enlisted the Research Centre for Natural Sciences in Hungary to build the chemical to their specifications. Subsequent experiments confirmed that the researchers' theory was correct and the molecule could rapidly convert light energy into stored chemical energy.

One of the barriers to using solar energy effectively is finding a way to store the energy produced by the Sun. The molecule developed in Sweden offers a pathway for developing technology to rapidly store solar energy for future use.

MASSACHUSETTS SUPREME COURT UPHOLDS PPA BACKING A US$1 BILLION TRANSMISSION LINE TO CARRY CANADIAN HYDRO-ELECTRIC POWER TO BAY STATE

On 3 September, the Massachusetts Supreme Court unanimously upheld power purchase agreements (PPA) that the Massachusetts Department of Public Utilities (DPU) had inked with developers. The deal comprises the development of a US$1 billion inter-state, cross-border transmission line, called New England Clean Energy Connect (NECEC) to acquire 1,200 MW of hydroelectricity from Canadian utility Hydro-Quebec. The high court held that the agreements meet the eligibility requirements under the state's clean energy procurement laws.

The project involves construction of the 145-mile long NECEC line that runs from the U.S.-Canada border through Maine and into Massachusetts. NextEra Energy Resources LLC challenged the PPAs, asserting that hydroelectric generation was not eligible for the contracts because the energy could not be provided without interruption as a “firm service,” or baseload generation.

Massachusetts' energy regulators and utilities (including Eversource, Unitil, and National Grid) brokered these PPAs to purchase Hydro-Quebec's power to meet its goals under Massachusetts' clean energy procurement program, which the DPU signed off on in June 2019. Massachusetts is aiming to reduce its carbon pollution by 80 percent relative to 1990 levels by 2050. As a result of this decision, Massachusetts is now getting closer to meeting this target, and other states may follow in its footsteps to achieve their carbon reduction goals.

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