

## **BACKGROUND for AB-2339**

Geothermal heat pumps (GHPs) geothermal ground loops and solar water heating systems use the renewable energy of the earth and the sun to provide heating and air conditioning (HVAC), domestic hot water (DHW) and pool and spa heating more efficiently than other HVAC, DHW and pool and spa heating technologies without consuming fossil fuels on site.

GHPs, geothermal ground loops and solar DHW are mature but under deployed renewable energy technologies capable of achieving the energy efficiency goals stated in The Energy Action Plan, The Global Warming Solutions Act, California's Clean Energy Future (CCEF) Initiative and Governor Brown's Clean Energy Jobs Plan.

According to the U.S. Environmental Protection Agency, renewable energy includes resources that rely on fuel sources that restore themselves over short periods of time and do not diminish. Such fuel sources include the sun, wind, moving water, organic plant and waste material (biomass), and the earth's heat (geothermal).

Geothermal ground loops are sustainable BTU producing utilities with a conservative life expectancy of greater than 50 years without ongoing maintenance requirements.

According to data supplied by the U.S. Department of Energy (DOE) Office of Geothermal Technologies, nearly 40% of all U.S. emissions of carbon dioxide (Co2) are the results of using energy to heat cool and provide hot water for buildings.

A study by the U.S. Environmental Protection Agency (EPA) comparing the major heating, ventilating, and air-conditioning (HVAC) options for residential applications determined that GHP was the most energy-efficient and environmentally benign option (EPA 1993).

Geothermal heat pumps reduce the energy consumed by residential heating and air conditioning systems by an average of 44% according to preliminary findings of the California Geothermal Energy Collaborative in an ongoing CEC PIER Program study.

According to a recent CEC report (Project Negatherm) California houses 12.1 percent of the country's population but represents only 2.3 percent of national geothermal heat pump activity.

Space heating, air conditioning, water heating and pool and spa heating consume 91% of the natural gas and 17% of the electricity supplied to California residences. (CA Energy Efficiency Strategic Plan – 2011 Update)

In California commercial buildings, space heating, air conditioning and water heating consume 79% of the natural gas and over 17% of the electricity supplied to the building. (CALIFORNIA COMMERCIAL END-USE SURVEY (CEC-400-2006-005)

GHPs use the only renewable energy resource that is available at every building's point of use, on-demand, that cannot be depleted (assuming proper design), and is potentially affordable in all 50 states. The GHP industry contends that they are the most affordable renewable energy resource, especially considering the investments in electrical transmission that will be necessary to deliver many of the best wind, solar, and geothermal power generation resources to market. (Patrick Hughes ORNL/TM-2008/232)

GHPs could also avoid the need to build 91 to 105 GW of electricity generation capacity, or 42 to 48 percent of the 218 GW of net new capacity additions projected to be needed nationwide by 2030. In addition, \$33 to



38 billion annually in reduced utility bills (at 2006 rates) could be achieved through aggressive deployment of GHPs. (Patrick Hughes ORNL/TM-2008/232)

A report by the American Physical Society (2008, 56, 73) referred to GHP systems as being among the options that could help the U.S. building sector achieve the goal of using no more primary energy in 2030 than in 2008, rather than increasing energy use by 30 percent by 2030 as currently projected. (Xiabing Liu ORNL/TM-2010/122)

According to the DOE, water heating, space heating, and space cooling accounted for 69% of the energy used in an average household in the U.S. in 2005. A properly designed and installed solar water heating system can be expected to provide a significant percentage (40 to 80 percent) of a building's hot water needs..

Geothermal heat pumps, geothermal ground loops, electric vehicles, and solar water heating are all penalized by Renewable Electric Standards (they do not generate electricity); yet all four provide significant application of renewable energy (assuming electric vehicles are charged using renewable sourced electricity) and are cost effective if allowed under a renewable energy standard.

The model exists for utilities to own and rate base the ground loops for GHPs, just as they can own renewable energy generators and the related transmission grid requirements to support this generation. Several utilities are now deploying this model as a cost effective way to meet peak demand, energy reductions, and the resulting carbon savings. By including GHPs into a renewable energy standard, utilities will be able to make investments in renewable energy based on the most cost effective investments required to meet the intent of the statutes.

Increased deployment of geothermal heat pumps, geothermal ground loops and solar water heating systems will reduce the need for fossil fuel powered peak generation, improve utility load factor and provide on-site consumer energy savings without the need for expensive rebates and provide all of the benefits that drive the desire for renewable energy standards without putting pressure on electric rates or rate payers energy bills.

## **BACKGROUND from the 2011 INTEGRATED ENERGY POLICY REPORT**

Energy efficiency remains California's top priority for meeting new electricity needs and is a key strategy for increasing jobs and reducing greenhouse gas emissions from the electricity sector.

California's energy resource "loading order" guides the state's energy decisions and requires meeting new electricity demand first with energy efficiency. As part of this commitment, Assembly Bill 2021 (Levine, Chapter 734, Statutes of 2006) established several important energy efficiency policies, including a statewide commitment to cost-effective and feasible energy efficiency.

The Energy Commission recognizes that more efficient residential and commercial buildings will contribute significantly to achieving California's clean energy and GHG emission reduction goals.

Expansion and acceleration of energy efficiency initiatives are at the forefront of the state's energy policy goals and mandates. The state's ongoing efforts to achieve all cost-effective energy efficiency in buildings are pivotal for achieving the state's goals for job creation, economic development, and environmental protection, including the following:

- The Energy Action Plan established the principle of following the "loading order" for new generation resources, directing that growth in energy needs must be met first by cost-effective energy efficiency improvements.
- The Global Warming Solutions Act (Assembly Bill 32 [Núñez, Chapter 488, Statutes of 2006]) has been the foundation of California's efforts over the past five years to address climate change by reducing greenhouse gas (GHG) emissions to the state's 1990 level by 2020. The adopted AB 32 Scoping Plan recommended expanding and strengthening building and appliance standards and energy efficiency programs aimed at existing buildings. The Energy Commission's 2007 Integrated Energy Policy Report concluded that climate change is the most important environmental and economic challenge of the century; GHG emissions are the largest contributors to global warming; and California's ability to slow the rate of GHG emissions depends first on energy efficiency.
- California's Clean Energy Future (CCFE) Initiative articulates the importance of new investments in energy efficiency, as well as in electricity transmission, smart grid applications, and increased use of renewable resources.

Governor Brown's Clean Energy Jobs Plan advocates focusing on renewable energy and energy efficiency technologies to achieve California's economic recovery and growth goals, creating more than half a million green jobs. In the area of building efficiency, the plan calls for:

- Adopting a plan and timeline for achieving "zero net energy" homes and businesses through the building standards by integrating high levels of energy efficiency with onsite renewable electricity generation.
- Making existing buildings more efficient, especially the half of California homes that were built before the advent of modern building standards.

The Energy Commission, California Air Resources Board, and the California Public Utilities Commission have adopted the policy goal, consistent with existing statutory authority, to achieve zero net energy (ZNE) building standards by 2020 for residential buildings and 2030 for commercial buildings.

Consistent with the loading order, the goal is to minimize energy use as much as technologically possible through cost-effective efficiency measures, and then generate the balance of the building's energy needs with onsite renewable electricity generation such as solar photovoltaic systems or wind-driven electricity generators.