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GEA UPDATE
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National News

Future of Geothermal Research at Stake as Congress to Take Up FY 07 Funding This Week, Prepares to Receive FY 08 Budget

The 109th Congress ended with only 2 of the annual appropriations bills completed, leaving most federal agencies to operate under a continuing resolution until February 15, 2007. The continuing resolution funded programs at the lower of the levels set by the unfinished House or Senate bill. So, for geothermal energy, the DOE research program is being funded at an annual level of $5 million – an 80% cut from previous years!

“While Washington politicians talk about a new commitment to renewable power, geothermal researchers are being let-go as their budgets dry-up," commented Karl Gawell, GEA’s Executive Director. "Continued FY 07 funding is critical to preserve the base of our research community." It has implications not only for the single budget year, but for the future of the geothermal industry as a whole.”

This week, the House is set to begin consideration of a wrap-up FY07 funding bill for the remainder of the Fiscal Year, and at the same time is preparing to receive President Bush’s FY 08 Budget proposal. The

FY07 bill is expected to take the next three weeks to complete, and most programs are expected to be funded at their FY06 level. However, there is intense lobbying going on by some interests to push for increases in AIDS funding and other areas that would have to be offset somehow. It's not clear how much specific budget direction Congress will be able to give the federal agencies, because of the hype to reduce earmarks which is tying Congress' hands and allowing the Administration to set priorities.

Also, on February 5th, the President's FY08 Budget will be released. The expectations are that the Administration will continue its hard-line on geothermal energy and propose "zeroing-out" the program again in FY08. In addition, the budget may contain proposals to repeal provisions of EPAct that provide the BLM dedicated funding to ensure completion of work on the substantial geothermal lease backlog, new national assessment, and planned programmatic EIS. Finally, the budget may again propose repealing EPAct provisions dedicating 25% of geothermal royalty revenues to county governments.

"Report after report shows the dramatic, untapped potential of geothermal energy in the US and around the world, yet the Administration remains deaf to the calls for increased funding geothermal research by the National Research Council review, Western Governors' Clean Energy Report, and the new MIT study," Gawell noted. "If, as is reported to be the case, they continue to insist on terminating the DOE Geothermal Program only Congress can keep alive the hope that the federal government will support the efforts needed to tap the immense potential of our geothermal resources."

Senate Energy Committee has announced its plans for a hearing on DOE FY'08 budget request on February 7. The Full Senate Committee on Energy and Natural Resources will hold its hearing in SD-366 at 9:30 am.

Comments about Passage of H.R. 6 – Creating Long-Term Energy Alternatives for The Nation Act

Partial Statement by Energy Secretary Samuel W. Bodman

"Energy is a bipartisan issue and together we can work to reduce our reliance on foreign sources of energy while expanding our nation's economy. We can accomplish this by increasing our investments in new energy technology and also in the further development of our nation's natural energy resources.

"We support the bill's effort to repeal some of the unnecessary oil and gas incentives from the Energy Policy Act of 2005 (EPAct). In addition, we would ask that Members consider repealing other unneeded incentives contained in EPAct, such as federal funding for oil and gas research and development.

"While there are areas of agreement in this legislation, there are also areas of disagreement. Among them is a provision requiring companies that signed favorable oil development leases with the Department of the Interior in 1998 and 1999 to renegotiate those leases. While I agree that the leases are out of line with prior and current policy, the bigger issue is protecting the sanctity of contracts.

"I often talk with leaders around the world about the valuable expertise and capital that U.S. businesses can bring to their energy sectors. As part of that discussion, I also impress upon them the importance of two things: transparency and respecting contracts. Contracts are a fundamental principle of the rule of law and a functioning economy. To renege on the government's agreements is unfair and sets a bad example for nations around world. I would ask Congress to closely review this provision as the bill moves forward.

"In addition, we can continue our work to invest more in clean energy technology today. So I am again asking that Congress fully and immediately support the President's $2.1 billion Advanced Energy Initiative. This 22 percent increase in funding for projects in vehicle technology, solar and wind research, nuclear energy, and clean coal projects would kick start the development and eventual deployment of these new clean energy technologies and allow us to more quickly wean our dependence from foreign sources of energy. Also, I encourage the Congress to fund the President's American Competitiveness Initiative. This multi-billion investment is important to advance basic science research, which can lead to revolutionary

discovery and ultimately greater energy independence." *To view the press release, please visit* *http://www.energy.gov/news/4616.htm*.

Chairman Jeff Bingaman (D-NM)

"I congratulate the House of Representatives for acting to remedy the problems caused by the leasing mistakes in the Gulf of Mexico in 1998-1999 and the subsequent lack of action to address those mistakes. I support the principle behind the House bill that funds recovered for taxpayers should be used for energy programs and other purposes consistent with laws we have passed through the Committee on Energy and Natural Resources in previous Congresses. …I will be working on a bipartisan basis to develop an overall amendment to the House bill that will avoid legal pitfalls and provide a better financial footing for the energy and natural resources programs that are crucial to America's economic, energy, and environmental future." *To view the press release, please visit* *http://energy.senate.gov/public/index.cfm?FuseAction=PressReleases.Detail&PressRelease_id=235180&Month=1&Year=2007*.

State of the Union – Selected Remarks

The following are Bush's energy-related remarks during the State of the Union Address:

"It's in our vital interest to diversify America's energy supply -- the way forward is through technology. We must continue changing the way America generates electric power, by even greater use of clean coal technology, solar and wind energy, and clean, safe nuclear power. (Applause.) We need to press on with battery research for plug-in and hybrid vehicles, and expand the use of clean diesel vehicles and biodiesel fuel. (Applause.) We must continue investing in new methods of producing ethanol -- (applause) -- using everything from wood chips to grasses, to agricultural wastes.

…To reach this goal [of reducing gasoline usage by 20 percent in the next 10 years], we must increase the supply of alternative fuels, by setting a mandatory fuels standard to require 35 billion gallons of renewable and alternative fuels in 2017 -- and that is nearly five times the current target. (Applause.) At the same time, we need to reform and modernize fuel economy standards for cars the way we did for light trucks -- and conserve up to 8.5 billion more gallons of gasoline by 2017.

…America is on the verge of technological breakthroughs that will enable us to live our lives less dependent on oil. And these technologies will help us be better stewards of the environment, and they will help us to confront the serious challenge of global climate change. (Applause.) *To view the press release, please visit* *http://www.whitehouse.gov/news/releases/2007/01/20070123-2.html*.

Responses to President's State of the Union Address

Bingaman Responds about President's Energy Initiatives

"…To make a successful major push on renewable and alternative fuels, we will have to make real investments in our fuels infrastructure nationwide. We have yet to learn whether the President's detailed proposals will take these infrastructure needs into account or not.

"…I am disappointed at two big energy policy holes in what the President will be announcing. First, Senate Democrats would like to see a real push on renewable energy and energy efficiency across the board, and particularly in how we generate and use electricity. The President's speech is completely silent on these broader goals, which are crucial to protecting American jobs for the future. Second, I am disappointed that the President is not really saying much on addressing global warming in a comprehensive way. There is a great desire across the country -- including from leading American companies -- for Presidential leadership on this important issue. By essentially ducking the issue of taking a mandatory, economy-wide approach to the problem, the President has missed a real opportunity." *To view the press release, please visit*

http://energy.senate.gov/public/index.cfm?FuseAction=PressReleases.Detail&PressRelease_id=235190&Month=1&Year=2007.

Domenici's Statement

"I appreciate the President's leadership in seeking to reduce our use of gasoline…I am pleased that he proposes an improvement in CAFÉ standards… However, I am very disappointed. The President gave little attention to the tremendous promise nuclear power holds for this nation. …I have been troubled by the Administration's tepid commitment in recent months to loan guarantees that provide the support needed to deploy new nuclear power plants as well as biomass, solar and clean coal projects. All of these energy sources can help us address climate change . *To view the press release, please visit* http://energy.senate.gov/public/index.cfm?FuseAction=PressReleases.Detail&PressRelease_id=235191&Month=1&Year=2007.

Boxer Reacts to President's Lack of Global Warming Plan

"Tonight was a missed opportunity for the President to exert strong leadership on the challenge of global warming.

"By not presenting a comprehensive plan to combat global warming, the President is ignoring the consensus of eleven National Academies of Science, clear decisive action by our communities and states, and a growing coalition of businesses that realize that they have a responsibility to solve this problem.

"For me, the President's speech was more notable for what he didn't say on global warming than what he did say. When you get to the bottom line, there are no hard caps, no enforcement mechanisms, and we aren't even going to start reversing the increase in carbon dioxide emissions in the transportation sector for 10 years.

"The President is taking baby steps to deal with a giant problem. I urge the President to listen to all of the voices that are coming before the EPW committee to confront this challenge, not just pay lip service to it." *To view the press release, please visit* http://epw.senate.gov/public/index.cfm?FuseAction=PressRoom.PressReleases&ContentRecord_id=54f5ff09-802a-23ad-40d5-c0e9ac377295&Designation=Majority.

State of the Union Falls Short on Energy, Says Worldwatch Institute

The energy and climate initiatives announced in U.S. President George W. Bush's State of the Union address left the White House well behind the growing public and business momentum for an overhaul of U.S. energy policy, a recent press release by Worldwatch reports. The proposals lacked both the breadth and the specificity needed to cope with the twin problems of energy security and global warming, and leaves national leadership on the issue up to Congress, it reads. About renewable electricity, Worldwatch says:

"Beyond biofuels, the array of other promising renewable energy sources—including solar energy, wind power, and geothermal energy—received only a mention in the president's speech, and is generally ignored in his detailed energy plan. It will therefore fall to Congress to develop the kind of solid, far-reaching national commitment to renewable resources and efficiency that will be needed to fuel a strong domestic economy and lower the consumption of oil and other fossil fuels."

About climate change, Worldwatch says:

"For those who were hoping that President Bush would announce a u-turn in climate policy, his glancing reference to 'the challenge of climate change' was a disappointment. The president's speech came a day after CEOs of leading U.S. corporations called for a mandatory 'cap' on U.S. emissions, but it is clear the administration is still not ready to take the lead on an issue it has stubbornly refused to address for the last

six years. So, once again, it is up to Congress to pass the kind of strong new legislation that will allow the United States to catch up with the policies being enacted by other nations—and by many U.S. states."
To read the complete press release, please visit http://www.worldwatch.org/node/4873.

More Needed on Energy Policy, Says Sustainable Energy Network

The energy policy initiatives put forth by President Bush in his State of the Union address last evening are inadequate to fully tap the potential of energy efficiency and renewable energy technologies or to address climate change and the national security threat posed by energy imports, according to the Sustainable Energy Network (SEN)

The Sustainable Energy Network offered general outline as a preferred alternative to the President's proposals. Some of these include

CLIMATE CHANGE: Continuing to invest primarily in long-term research and development is not an adequate response to the climate crisis now facing the global community and for which the U.S. bears a significant responsibility. Aggressive action is needed now and it must include a broad mix of actions that include, but are not limited to, placing a rapidly-tightening cap on greenhouse gas emissions, imposing a "user fee" on carbon and other greenhouse gas sources, and sharply reducing reliance on the mix of fossil fuels by quickly expanding the deployment of energy efficient and renewable energy technologies.

SUSTAINABLE ENERGY: Curbing gasoline use by 20 percent over the next decade is a positive goal but it is not enough. It is time to pull out all of the stops and launch an intensive national effort to significantly reduce total energy use and greatly increase the share of energy coming from renewable sources - with a goal of at least 25 percent by 2025. This would include at least a near-term doubling, if not tripling, of federal tax incentives as well as federal funding of research, development, and deployment of the full spectrum of energy efficient and renewable energy technologies -- with heavy emphasis on actual deployment. This should be accompanied by a shift of funding from fossil and nuclear technologies to sustainable energy programs. It would also include a national Renewable Portfolio Standard requiring at least 20 percent of the nation's electricity supply be met with renewables by 2020. And it would include much tighter energy efficiency standards for appliances, buildings, vehicles, lighting, industrial processes, and electric generation. *To view the press release, please visit http://www.earthtoys.com/news.php?section=view&id=2058.*

Strong Actions Needed After Bush's Warning on Global Warming, Says NRDC President

In acknowledging global warming for the first time in a State of the Union address, President Bush sent a strong signal that we must take urgent action to curb the emission of heat-trapping carbon dioxide into our atmosphere, according a press release by the Natural Resources Defense Council (NRDC).

Below is a partial statement from Frances G. Beinecke, president of the NRDC.

"Ominously, President Bush was silent on America's need for a mandatory limit on greenhouse gases from all sources of global warming pollution, including power plants and factories, which is precisely what 10 of our biggest corporations called for on Monday as they joined NRDC and other environment groups in forming the U.S. Climate Action Partnership.

"Such a cap on carbon dioxide emissions -- and a wholehearted embrace of cleaner, cheaper and renewable sources of energy -- will help end our dependence on dirty fossil fuels while fostering innovation, lowering costs and creating jobs in a cleaner and safer world that we can bequeath to our children. A sound energy policy and an effective plan to slow, stop and reverse global warming must go hand-in-hand. Talk is easy. Let's all roll up our sleeves and get on with the task -- and end our state of denial."
To view the press release, please visit http://www.nrdc.org/media/2007/070124.asp.

ACORE Supports President Bush's Renewable Energy Initiatives in State of the Union 2007

ACORE issued a press release saying in part: "President George W. Bush laid out a set of important programs and goals for a national shift to renewable energy and fuels in last night's State of the Union address. The President laid out a comprehensive set of actions and goals to increase the use of renewable energy in America. He called for an increase in solar energy and wind power for electricity generation, and an increase in renewable fuels such as biodiesel and ethanol for more fuels."

"The President called for Americans to live our lives less dependent on oil, and to reduce the threat of global climate change. The American Council On Renewable Energy (ACORE) is pleased with this forward-stepping program for increased use of renewable energy."

"The President's program for renewable energy gets things going in the right direction for our country," said Michael Eckhart, ACORE President, who added, "but we can actually do much more." ACORE, a 400-member non-profit organization, was formed five years ago to assume responsibility for the success of renewable energy in America, to bring renewable energy into the mainstream of our country, and to be for renewable energy and against nothing." *To view the release, please visit: http://www.acore.org/news/07-ACORE-Press-Release_1_24_07.html.*

President Bush Discusses SOU Energy Initiative in Grater Detail

At the DuPont Theater Hotel du Pont in Wilmington, Delaware, the President discussed his energy plan in greater detail. His remarks are reproduced in part below:

"…I'm here to talk about an interesting opportunity for our country. I made the case last night to the American people that we have got to do something about our dependence on oil -- for two reasons. One, dependence on oil provides an economic and national security risk, a problem that this country better start dealing with in a serious fashion now, before it becomes acute. And second, we've got to be wise stewards of the environment, and dependency on oil makes it harder to be wise stewards of the environment.

And what's interesting about the debate is it's the confluence of national security and economic security concerns and environmental concerns that come together and can be solved at the same time by technologies. It's really what's begun to evolve here in America. In other words, we can get beyond the post-Kyoto -- the pre-Kyoto era with a post-Kyoto strategy, the center of which is new technologies.

…So we're spending a lot of money, by the way -- your money -- on developing -- on helping to develop new technologies. I think it's an appropriate use of taxpayers' money to spend on developing new technologies to help us deal with problems that affect today and the future for your children. We spent about $10 billion so far on the technologies that are -- I think are going to help change America and our habits. And we're going to spend more.

…Part of my request to Congress is going to be, we want to put $2.7 billion of your money to help concerns and smart people develop new ways of powering our homes and powering our automobiles.

…We're also spending money on wind and solar. As a matter of fact, I saw your solar panel expert. And we spent a little time on -- here's the dream. The dream is, some day the technology will be such that you'll be -- your house will become a little power generator. And if you use -- if you got excess electricity generated by solar, you'll be able to feed it back into your grid. Is that possible? Yes, it's possible. As a matter of fact, the advance in solar technology has been quite dramatic. There's more advance still to be done, which requires your money being spent to help concerns develop new solar energy.

…Wind energy is an interesting alternative. I strongly believe that if we're that interested in greenhouse gases and renewable fuels, this country has got to be aggressive about establishing safe nuclear power. If that is -- one of our objectives is to be serious about dealing with the environment, there's no cleaner source

of energy than nuclear power. *To view the press release, please visit* *http://www.whitehouse.gov/news/releases/2007/01/20070124-4.html*.

MIT Study: Hot Dry Rocks Potential Significant

A recent report on the immense potential available from Hot Dry Rock (HDR) geothermal has received coverage from a considerable number of news outlets, including Reuters, Men's News Daily, Scientific American, Slashdot, People's Daily Online, RedBolivia.com, IEEE Spectrum, Scripps News, innovations report, Environmental Leader, Mongabay.com, ZDNet, Science Daily, Earthtimes.org, ABC News, Marketplace, MIT Technology Review, the Boston Globe and Grist Magazine.

The MIT press release follows:

CAMBRIDGE, Mass., Jan. 22 -- Massachusetts Institute of Technology scientists say geothermal energy can supply much of the United States' electric needs at competitive prices.

The MIT-led international study also suggests such mining of heat stored as thermal energy in the Earth's hard rock crust would have minimal environmental impact.

An 18-member panel prepared the 400-page-plus study for the U.S. Department of Energy -- the first in some 30 years to take a look at the potential of geothermal energy.

"We've determined that heat mining can be economical in the short term, based on a global analysis of existing geothermal systems, an assessment of the total U.S. resource and continuing improvements in deep-drilling and reservoir stimulation technology," said panel leader Jefferson Tester, a MIT professor of chemical engineering.

The panel concluded the environmental impacts of geothermal development are lower than those from fossil-fuel and nuclear power plants.

Panel members included scientists from Britain the European Union and Canada.

The following Excerpt represents the findings as presented in the Summary of the Report. *To view the full report, please visit this link: http://www1.eere.energy.gov/geothermal/future_geothermal.html.*

Findings: Geothermal energy from EGS represents a large, indigenous resource that can provide base-load electric power and heat at a level that can have a major impact on the United States, while incurring minimal environmental impacts. With a reasonable investment in R&D, EGS could provide 100 GWe or more of cost-competitive generating capacity in the next 50 years. Further, EGS provides a secure source of power for the long term that would help protect America against economic instabilities resulting from fuel price fluctuations or supply disruptions. Most of the key technical requirements to make EGS work economically over a wide area of the country are in effect, with remaining goals easily within reach. This achievement could provide performance verification at a commercial scale within a 10- to 15-year period nationwide.

In spite of its enormous potential, the geothermal option for the United States has been largely ignored. In the short term, R&D funding levels and government policies and incentives have not favored growth of U.S. geothermal capacity from conventional, high-grade hydrothermal resources. Because of limited R&D support of EGS in the United States, field testing and supporting applied geoscience and engineering research has been lacking for more than a decade. Because of this lack of support, EGS technology development and demonstration recently has advanced only outside the United States with accompanying limited technology transfer. This has led to the perception that insurmountable technical problems or limitations exist for EGS. However, in our detailed review of international field-testing data so far, the panel did not uncover any major barriers or limitations to the technology. In fact, we found that significant progress has been achieved in recent tests carried out at Soultz, France, under European Union (EU)

sponsorship; and in Australia, under largely private sponsorship. For example, at Soultz, a connected reservoir-well system with an active volume of more than 2 km3 at depths from 4 to 5 km has been created and tested at fluid production rates within a factor of 2 to 3 of initial commercial goals. Such progress leads us to be optimistic about achieving commercial viability in the United States in a next phase of testing, if a national-scale program is supported properly. Specific findings include:

1. EGS is one of the few renewable energy resources that can provide continuous base-load power with minimal visual and other environmental impacts. Geothermal systems have a small footprint and virtually no emissions, including carbon dioxide. Geothermal energy has significant base-load potential, requires no storage, and, thus, it complements other renewables – solar (CSP and PV), wind, hydropower – in a lower-carbon energy future. In the shorter term, having a significant portion of our base load supplied by geothermal sources would provide a buffer against the instabilities of gas price fluctuations and supply disruptions, as well as nuclear plant retirements.

2. The accessible geothermal resource, based on existing extractive technology, is large and contained in a continuum of grades ranging from today's hydrothermal, convective systems through high- and mid-grade EGS resources (located primarily in the western United States) to the very large, conduction-dominated contributions in the deep basement and sedimentary rock formations throughout the country. By evaluating an extensive database of bottom-hole temperature and regional geologic data (rock types, stress levels, surface temperatures, etc.), we have estimated the total EGS resource base to be more than 13 million exajoules (EJ). Using reasonable assumptions regarding how heat would be mined from stimulated EGS reservoirs, we also estimated the extractable portion to exceed 200,000 EJ or about 2,000 times the annual consumption of primary energy in the United States in 2005. With technology improvements, the economically extractable amount of useful energy could increase by a factor of 10 or more, thus making EGS sustainable for centuries.

3. Ongoing work on both hydrothermal and EGS resource development complement each other. Improvements to drilling and power conversion technologies, as well as better understanding of fractured rock structure and flow properties, benefit all geothermal energy development scenarios. Geothermal operators now routinely view their projects as heat mining and plan for managed injection to ensure long reservoir life. While stimulating geothermal wells in hydrothermal developments are now routine, the understanding of why some techniques work on some wells and not on others can only come from careful research.

4. EGS technology has advanced since its infancy in the 1970s at Fenton Hill. Field studies conducted worldwide for more than 30 years have shown that EGS is technically feasible in terms of producing net thermal energy by circulating water through stimulated regions of rock at depths ranging from 3 to 5 km. We can now stimulate large rock volumes (more than 2 km3), drill into these stimulated regions to establish connected reservoirs, generate connectivity in a controlled way if needed, circulate fluid without large pressure losses at near commercial rates, and generate power using the thermal energy produced at the surface from the created EGS system. Initial concerns regarding five key issues – flow short circuiting, a need for high injection pressures, water losses, geochemical impacts, and induced seismicity – appear to be either fully resolved or manageable with proper monitoring and operational changes.

5. At this point, the main constraint is creating sufficient connectivity within the injection and production well system in the stimulated region of the EGS reservoir to allow for high per-well production rates without reducing reservoir life by rapid cooling. U.S. field demonstrations have been constrained by many external issues, which have limited further stimulation and development efforts and circulation testing times – and, as a result, risks and uncertainties have not been reduced to a point where private investments would completely support the commercial deployment of EGS in the United States. In Europe and Australia, where government policy creates a more favorable climate, the situation is different for EGS. There are now seven companies in Australia actively pursuing EGS projects and two commercial projects in Europe.

6. Research, Development, and Demonstration (RD&D) in certain critical areas could greatly enhance the overall competitiveness of geothermal in two ways. First, it would lead to generally lower development

costs for all grade systems, which would increase the attractiveness of EGS projects for private investment. Second, it could substantially lower power plant, drilling, and stimulation costs, which increases accessibility to lower-grade EGS areas at depths of 6 km or more. In a manner similar to the technologies developed for oil and gas and mineral extraction, the investments made in research to develop extractive technology for EGS would follow a natural learning curve that lowers development costs and increases reserves along a continuum of geothermal resource grades. Examples of impacts that would result from research-driven improvements are presented in three areas:

- Drilling technology – both evolutionary improvements building on conventional approaches to drilling such as more robust drill bits, innovative casing methods, better cementing techniques for high temperatures, improved sensors, and electronics capable of operating at higher temperature in downhole tools; and revolutionary improvements utilizing new methods of rock penetration will lower production costs. These improvements will enable access to deeper, hotter regions in highgrade formations or to economically acceptable temperatures in lower-grade formations.
- Power conversion technology – improving heat-transfer performance for lower-temperature fluids, and developing plant designs for higher resource temperatures to the supercritical water region would lead to an order of magnitude (or more) gain in both reservoir performance and heat-topower conversion efficiency.
- Reservoir technology – increasing production flow rates by targeting specific zones for stimulation and improving downhole lift systems for higher temperatures, and increasing swept areas and volumes to improve heat-removal efficiencies in fractured rock systems, will lead to immediate cost reductions by increasing output per well and extending reservoir lifetimes. For the longer term, using CO2 as a reservoir heat-transfer fluid for EGS could lead to improved reservoir performance as a result of its low viscosity and high density at supercritical conditions. In addition, using CO2 in EGS may provide an alternative means to sequester large amounts of carbon in stable formations.

7. EGS systems are versatile, inherently modular, and scalable from 1 to 50 MWe for distributed applications to large "power parks," which could provide thousands of MWe of base-load capacity. Of course, for most direct-heating and heat pump applications, effective use of shallow geothermal energy has been demonstrated at a scale of a few kilowatts-thermal (kWt) for individual buildings or homes. For these applications, stimulating deeper reservoirs using EGS technology is not relevant. However, EGS also can be easily deployed in larger-scale district heating and combined heat and power (cogeneration) applications to service both electric power and heating and cooling for buildings without a need for storage on-site. For other renewable options such as wind, hydropower, and solar PV, these applications are not possible.

8. Using coproduced hot water, available in large quantities at temperatures up to 100°C or more from existing oil and gas operations, it is possible to generate up to 11,000 MWe of new generating capacity with standard binary-cycle technology, and increase hydrocarbon production by partially offsetting parasitic losses consumed during production.

9. A cumulative capacity of more than 100,000 MWe from EGS can be achieved in the United States within 50 years with a modest, multiyear federal investment for RD&D in several field projects in the United States.

Because the field-demonstration program involves staged developments at different sites, committed support for an extended period will be needed to demonstrate the viability, robustness, and reproducibility of methods for stimulating viable, commercial-sized EGS reservoirs at several locations. Based on the economic analysis we conducted as part of our study, a $300 million to $400 million investment over 15 years will be needed to make early-generation EGS power plant installations competitive in evolving U.S. electricity supply markets.

These funds compensate for the higher capital and financing costs expected for early-generation EGS plants, which would be expected as a result of somewhat higher field development (drilling and stimulation) costs per unit of power initially produced. Higher generating costs, in turn, lead to higher perceived financial risk for investors with corresponding higher-debt interest rates and equity rates of return. In effect, the federal investment can be viewed as equivalent to an "absorbed cost" of deployment.

In addition, investments in R&D will also be needed to reduce costs in future deployment of EGS plants.

To a great extent, energy markets and government policies will influence the private sector's interest in developing EGS technology. In today's economic climate, there is reluctance for private industry to invest its funds without strong guarantees. Thus, initially, it is likely that government will have to fully support EGS fieldwork and supporting R&D. Later, as field sites are established and proven, the private sector will assume a greater role in cofunding projects – especially with government incentives accelerating the transition to independently financed EGS projects in the private sector. Our analysis indicates that, after a few EGS plants at several sites are built and operating, the technology will improve to a point where development costs and risks would diminish significantly, allowing the levelized cost of producing EGS electricity in the United States to be at or below market prices.

Given these issues and growing concerns over long-term energy security, the federal government will need to provide funds directly or introduce other incentives in support of EGS as a long-term "public good," similar to early federal investments in large hydropower dam projects and nuclear power reactors.

Based on growing markets in the United States for clean, base-load capacity, the panel thinks that with a combined public/private investment of about $800 million to $1 billion over a 15-year period, EGS technology could be deployed commercially on a timescale that would produce more than 100,000 MWe or 100 GWe of new capacity by 2050. This amount is approximately equivalent to the total R&D investment made in the past 30 years to EGS internationally, which is still less than the cost of a single, new-generation, clean-coal power plant.

The panel thinks that making such an investment now is appropriate and prudent, given the enormous potential of EGS and the technical progress that has been achieved so far in the field. Having EGS as an option will strengthen America's energy security for the long term in a manner that complements other renewables, clean fossil, and next-generation nuclear.

Clean Energy Investments More Than Double in 2006

Venture capital and private equity investments in clean energy companies increased by 167 percent in 2006, according to investment analysts at New Energy Finance Limited. These clean energy investments increased from $2.7 billion in 2005 to $7.1 billion in 2006, driven mainly by a surge of investments in biofuels in the United States. *To view the report, please visit* http://www.newenergyfinance.com/NEF/HTML/Press/2007-01-22_VCPE.pdf.

American Petroleum Institute Announces 2006 Uses

The American Petroleum Institute (API) announced that total petroleum deliveries in the United States decreased by 1.1 percent in 2006. Jet fuel deliveries dropped by 2.8 percent as airlines continued to economize on fuel, and residual fuel oil deliveries dropped by 27 percent as electric utilities replaced that fuel with natural gas.

The year's largest increase in deliveries was for distillate fuel oil, which includes both highway diesel fuel and heating oil. API credits an increase in highway diesel fuel consumption for an overall increase of 1.3 percent for deliveries of distillate fuel oil. The institute notes that ultra-low sulfur diesel (ULSD) came into widespread production in mid-year and accounted for most of the fuel used by on-highway diesel trucks by the end of the year. That conclusion was confirmed by the U.S. Environmental Protection Agency (EPA) in early December, when the agency noted that about 85 percent of the highway diesel fuel sold at retail stations now meets the ULSD standard. See the EPA press release.

Gasoline deliveries increased only 0.8 percent, which led API to declare that the increase in gasoline deliveries was, in effect, "met entirely by a substantial jump in the blending of ethanol into gasoline." API estimates ethanol use in gasoline at 5.4 billion gallons in 2004, noting that more than 40 percent of all

gasoline sold in the United States now includes ethanol. *To view the report, please visit http://www.api.org/Newsroom/upload/MSR_DEC_2006_SUMMARY.pdf.*

Diablo to Get New Environmental Review for Terrorist Attacks

Dry-cask storage of nuclear waste at Pacific Gas & Electric's Diablo Canyon nuclear power plant will get another review under a U.S. Supreme Court decision Jan. 16, ordering the U.S. Nuclear Regulatory Commission to consider the environmental impacts of a terrorist attack. PG&E is running out of storage room for spent fuel. Plans for a federal repository at Nevada's Yucca Mountain have been stymied, and PG&E won approval for the dry-cask project in 2004 from the NRC. The Ninth Circuit decision could particularly affect license renewals for plants such as Oyster Creek in New Jersey and the Vermont Yankee nuclear plant. According to the Nuclear Energy Institute, nine nuclear plants have filed for license renewal with the NRC, and another 25 plants are expected to apply. *To view the complete article, please visit http://www.energyprospects.com/cgi-bin/package_display.pl?packageID=2118.*

Chill Pushes NW Power Pool to Potential Peak Demand Record

An all-time-record peak demand for the Northwest Power Pool may have occurred for the region in mid-January. The Pool reported a 10-minute integrated peak of 59,400 MW at 7:50 a.m. Pacific Standard Time Jan. 12. This came during a period when temperatures dropped well below zero in parts of Idaho and Montana, and into the single digits in some Washington and Oregon locations. Seattle and Portland never rose above the freezing mark. The standing record occurred in December 1998, when the Pool--which consists of major generating utilities serving the Northwest, British Columbia and Alberta--recorded an hourly integrated-peak of 59,199 MW, said president/director Jerry Rust. Less than six months ago, the Power Pool set a new summertime peak, recording a real-time demand of about 54,600 MW during a regionwide scorcher on July 24. *To view the complete article, please visit http://www.energyprospects.com/cgi-bin/package_display.pl?packageID=2125.*

President Bush Issues New Directives on Federal Government Energy Use

President George W. Bush issued an Executive Order on January 24, 2007, instituting new guidance for energy efficiency, use of renewable energy and reduction of environmental impact throughout the Federal government.

The President's Executive Order calls upon all federal agencies to "improve energy efficiency and reduce greenhouse gas emissions of the agency, through reduction of energy intensity by (i) 3 percent annually through the end of fiscal year 2015, or (ii) 30 percent by the end of fiscal year 2015, relative to the baseline of the agency's energy use in fiscal year 2003" and "ensure that (i) at least half of the statutorily required renewable energy consumed by the agency in a fiscal year comes from new renewable sources, and (ii) to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use".

The order also calls for agencies to reduce fleet fuel consumption by two percent annually through fiscal year 2015, increase use of non-petroleum fuels by 10 percent annually and use plug-in hybrid vehicles when they are commercially available and reasonably priced, as well as considering the highest energy efficiency and environmental standards when purchasing new electronics. *The full text of this Executive Order can be found at: http://www.whitehouse.gov/news/releases/2007/01/print/20070124-2.html.*

Company News

Statement from Robert P. May, CEO, Calpine Corporation, on CPUC Interim Greenhouse Gas Emissions Performance Standard Rulemaking

SAN JOSE, Calif., Jan. 25 /PRNewswire-FirstCall/ -- Calpine Corporation (OTC Pink Sheets: CPNLQ), issued a statement from its Chief Executive Officer, Robert P. May, in support of today's interim

rulemaking decision by the California Public Utilities Commission (CPUC). This decision creates a new greenhouse gas emissions performance standard for long-term electricity supply contracts and power plant investments made by load serving entities:

"The CPUC's interim greenhouse gas emissions performance standard is a major step toward assuring that California attains its vision for a low-carbon future. Calpine commends the CPUC for its leadership and foresight in taking early measures to create emissions performance standards that are fair, attainable and affordable. As a long-time proponent of renewable and low- carbon power generation, Calpine believes that the environment, consumers and the economy can benefit from the advancement of fuel-efficient and renewable power technologies."

Calpine continues to advocate for more stringent environmental standards at both the state and federal level. In particular, the company believes that the impact of greenhouse gas emissions on the climate is a serious problem and that all of us must take immediate steps to address the issue. Last week, Mr. May joined U.S. Senator Dianne Feinstein and representatives from five major power generators for a press conference on Capitol Hill to support her landmark bill, co-sponsored by U.S. Senator Tom Carper, to reduce greenhouse gas emissions from the nation's electric power industry. In addition, last year Calpine was actively involved in the development and enactment of California's landmark global warming legislation, AB 32. *To view the press release, please visit* *http://phx.corporate-ir.net/phoenix.zhtml?c=103361&p=irol-newsArticle&ID=954395&highlight=*.

Department of Energy and Ormat Join to Validate Electricity Generation from Oil Field Heat

RENO, Nev., Jan. 25 /PRNewswire-FirstCall/ -- Ormat Technologies, Inc. today announced it has signed a shared-cost Cooperative Research and Development Agreement (CRADA) with the US Department of Energy (DOE) to validate the feasibility of proven technology already used in Geothermal and Recovered Energy Generation for the production of commercial electricity using hot water produced during the process of oilfield production. The project will be conducted at the DOE Rocky Mountain Oil Test Center (RMOTC), near Casper Wyoming, and will use an Ormat Organic Rankine Cycle (ORC) power generation system to produce commercial electricity.

The test will use a commercial air-cooled, skid mounted standard design Ormat Organic Rankine Cycle system. Ormat will supply the ORC power unit at its own expense while the DOE will install and operate the facility for a 12- month period. Ormat and the DOE will share the total cost of the test and the study, with Ormat bearing approximately two thirds of the less than $1M total investment.

Presently there are two large unutilized sources of hot water at the RMOTC Naval Petroleum Reserve No. 3, which produces water in excess of 190 degrees Fahrenheit and at flow rates sufficient for generation of approximately 200 kW. The project will consist of the installation, testing and evaluation of a binary geothermal power unit in the field near these hot water sources. The ORC power unit will be interconnected into the field electrical system and the energy produced will be used by RMOTC and monitored for reliability quality.

The Ormat ORC unit that will be used in the study is similar to the 250 kW air-cooled unit that has been producing electricity from 210 degrees Fahrenheit geothermal water for more than six years at an Austrian resort. Additionally, there are similar units in Nevada and Thailand that have been in continuous commercial operation and without overhaul, since 1984 and 1989, respectively.

A 70 kW Ormat ORC power system was also used in a project co-sponsored by the US Bureau of Reclamation, Ormat and others. This ORC unit operated for 16 years using water with temperatures as low as 154 degrees Fahrenheit to produce electricity.

Some 8,000 similar wells were identified in Texas, by Prof Richard Erdlac of the University of Texas of the Permian Basin, and the US DOE Geothermal Research Project Office. Ormat is now assessing the

feasibility of utilizing some of these wells to support on site power generation by employing Ormat's factory integrated sub megawatt geothermal power units, based on the Company's proprietary ORC technology, which has been field proven in installations totaling 900 MW world wide. *To view the press release, please visit http://www.ormat.com/news.php?did=134.*

Western Geopower Welcomes Federal Incentive

VANCOUVER, Canada , January 19, 2007, TSX Venture Exchange Trading Symbol: WGP – Western GeoPower Corp., a renewable energy company focused on geothermal energy development, welcomed today's announcement by the Canadian Government of the ecoENERGY Renewable Initiative to provide funding incentives for renewable power.

Western GeoPower President Kenneth MacLeod said the incentive of 1 cent per kilowatt hour could help the economic viability of the Company's South Meager Geothermal Project, located 170 kilometers north of Vancouver, British Columbia.

The incentive was announced in Victoria today by Prime Minister Stephen Harper and Natural Resources Minister Gary Lunn. Canada is targeting a potential 4,000 MW of renewable power production from eligible sources including geothermal and has allocated a budget of $1.48 billion. A ten-year incentive program will be established for eligible projects to be constructed over the next four years

"This comes at an opportune time for Western GeoPower as we are presently planning the next stage of our resource confirmation program at South Meager," MacLeod said. The Company has confirmed temperatures up to 275°C at South Meager and will initiate production flow tests this summer on the three wells completed to date.

"While the flow tests will help to confirm the 'technical' feasibility of the project, we also will be conducting financial feasibility studies," he said. "Obviously, the option of plugging a federal incentive into our financial model could assist in establishing project viability." *To view the press release, please visit http://www.geopower.ca/news%202007/19jan2007.htm.*

Renewable Energy and Climate Change News

$1.6 Billion US Proposed New Funding for Ag-Based Renewable Energy

Agriculture Secretary Mike Johanns will propose $1.6 billion US in new funding for renewable energy, with a focus on cellulosic energy research and production, as part of the Administration's 2007 farm bill proposals. This funding will support the goal of reducing gasoline usage by 20 percent in the next ten years and will compliment an array of renewable energy-related efforts underway at the U.S. Department of Agriculture. *For more information, please visit www.usda.gov.*

Exxon Mobil Softens its Climate-Change Stance

In one of the strongest signs yet that the U.S. industry anticipates government curbs on global-warming emissions, Exxon Mobil Corp., long a leading opponent of such rules, is starting to talk about how it would like them to be structured, says the Wall Street Journal. After several years of open skepticism about global warming, Exxon says climate-science models that link greenhouse-gas concentrations to global warming are getting more reliable. And it is meeting in Washington with officials of other large corporations to discuss what form the companies would prefer possible U.S. carbon regulations to take. Exxon wants any regulation to be applied across "the broadest possible base" of the economy, said Jaime Spellings, Exxon's general manager for corporate planning. Exxon says avoiding a ton of carbon-dioxide emissions is, with certain exceptions, less expensive in the power industry than in the transportation sector.

To view the complete article, please visit http://www.stltoday.com/stltoday/business/stories.nsf/0/BC7776F0CC67D5918625726900167B66?OpenDocument.

New Warnings on Climate Change

The main international scientific body assessing causes of climate change is closing in on its strongest statement yet linking emissions from burning fossil fuels to rising global temperatures, according to scientists involved in the process. In fresh drafts of a summary of its next report, the group, the Intergovernmental Panel on Climate Change, has said that it is more than 90 percent likely that global warming since 1950 has been driven mainly by the buildup of carbon dioxide and other heat-trapping greenhouse gases, and that more warming and rising sea levels are on the way. In its last report, published in 2001, the panel concluded that there was a 66 to 90 percent chance that human activities were driving the most recent warming. *To view the complete article, please visit http://www.climateark.org/shared/reader/welcome.aspx?linkid=67330.*

House to Consider Alternative Energy Tax

An alternative energy tax program to make use of municipal bonds to counter global warming through renewable and more efficient energy will be on the U.S. House Committee on Ways and Means' agenda this session, the committee's chief tax counsel said recently. The committee has jurisdiction over all taxation, tariffs and other revenue-raising measures, as well as a number of other programs with the U.S. Constitution requiring all tax bills to originate in the House of Representatives, the NY Times reported. *To view the complete article, please visit http://www.nytimes.com/reuters/washington/politics-usa-muni-congress.html.*

Nuclear Weapons, Climate Change Move 'Doomsday Clock' Forward 2 Minutes

On January 17, the Bulletin of the Atomic Scientists (BAS) moved the minute hand of the Doomsday Clock from seven to five minutes to midnight. Reflecting global failures to solve the problems posed by nuclear weapons and climate change, the decision by the BAS Board of Directors was made in consultation with the Bulletin's Board of Sponsors, which includes 18 Nobel Laureates. Stephen Hawking, a BAS sponsor, professor of mathematics at the University of Cambridge, and a fellow of The Royal Society, said "As we stand at the brink of a second nuclear age and a period of unprecedented climate change, scientists have a special responsibility once again to inform the public and advise leaders about the perils that humanity faces. We foresee great peril if governments and society do not take action now to render nuclear weapons obsolete and prevent further climate change."

"As scientists, we understand the dangers of nuclear weapons and their devastating effects, and we are learning how human activities and technologies are affecting climate systems in ways that may for ever change life on Earth. As citizens of the world, we have a duty to alert the public to the unnecessary risks that we live with every day, and to the perils we foresee if governments and societies do not take action now to render nuclear weapons obsolete and to prevent further climate change.... The effects may be less dramatic in the short term than the destruction that could be wrought by nuclear explosions, but over the next three to four decades climate change could cause irremediable harm to the habitats upon which human societies depend for survival," Hawking said. *This information was reported by EESI.*

Global Warming Emerges as 2008 Election Issue

Presidential candidates for 2008 mostly agree that global warming is a problem that merits government action, a signal that debate on the issue will be more practical than conceptual, says the Washington Times. "I would anticipate that both the Republican and the Democratic nominee will be arguing over who is best to solve the problem of global warming," said Sen. Barbara Boxer, California Democrat and chairman of the Environment and Public Works Committee.

Presidential hopefuls have also expressed their views about the signifance of climate change.

Senator McCain: "I am confident that given our will and what's at stake, America can and must assume its proper leadership role in addressing the pre-eminent environmental issue of our time, the consequences of which so directly affect our national interests."

Sen. Clinton: "Given the scientific evidence that we have and the potential consequences of continued warming, I strongly believe this nation needs to take sensible first steps to slow and ultimately reduce emissions of carbon dioxide and other gases that contribute to climate change,"

Senator Obama: "Our continued dependence on oil has put our security and our very planet at risk." *To view the complete article, please visit http://washingtontimes.com/national/20070118-110939-5617r.htm.*

National Parks Workshops Bring Warming Trend to Forefront

According to a recent article, one of the most encouraging signs of Bush administration shifting on climate change is the attention now being given to the issue by the National Park Service. According to Sustainability News, "Seven national parks have hosted workshops as part of the Climate Friendly Parks Program, a collaboration between the U.S. Environmental Protection Agency and the National Park Service. Workshops help park employees and partners identify actions to mitigate the negative environmental impacts of climate change. *To view the complete article, please visit http://www.dailyastorian.info/main.asp?SectionID=23&SubSectionID=392&ArticleID=39639.*

Climate Change in Caribbean Demands Urgent Mitigation, Says OAS Seminar

The Caribbean region is already suffering some of the negative impacts of climate change, and urgent action must be taken to mitigate the effects of such human activities as over-fishing and pollution, a group of regional climate-change experts argued at the Organization of American States (OAS). *For more details about the seminar, please visit http://www.caribbeannetnews.com/cgi-script/csArticles/articles/000052/005251.htm.*

Climate Change Data Loss Possible, Says NASA

About half of the scientific instruments on the country's environmental satellites are expected to stop working by 2010, which will lead to a loss of data used to study climate change, predict natural disasters, and monitor land use. NASA and NOAA should secure long-term funding to maintain existing and previously planned satellite missions and to undertake a set of 17 new missions between 2010 and 2020, says a new National Research Council report. *For more information, please visit http://www.nap.edu/catalog/11820.html.*

Major Businesses/Environmental Leaders Unite to Call for Swift Action on Global Climate Change

A diverse group of U.S.-based businesses and leading environmental organizations called on the federal government to quickly enact strong national legislation to achieve significant reductions of greenhouse gas emissions. The group said any delay in action to control emissions increases the risk of unavoidable consequences that could necessitate even steeper reductions in the future. This unprecedented alliance, called the U.S. Climate Action Partnership (USCAP), consists of market leaders Alcoa, BP America, Caterpillar, Duke Energy, DuPont, FPL Group, General Electric, Lehman Brothers, PG&E, and PNM Resources, along with four leading non-governmental organizations – Environmental Defense, Natural Resources Defense Council, Pew Center on Global Climate Change, and World Resources Institute. At a news conference at the National Press Club, USCAP issued a landmark set of principles and recommendations to underscore the urgent need for a policy framework on climate change. The solutions-

based report, titled A Call for Action, lays out a blueprint for a mandatory economy-wide, market-driven approach to climate protection.

USCAP's recommendations are based on the following six principles:

1. Account for the global dimensions of climate change;
2. Recognize the importance of technology;
3. Be environmentally effective;
4. Create economic opportunity and advantage;
5. Be fair to sectors disproportionately impacted; and
6. Recognize and encourage early action.

To view the press release, please visit http://www.us-cap.org/media/release.pdf.

State News

California: State Predicted to Fall Short of Renewable Energy Goal, According to PUC

California is expected to fall short of its goal to increase renewable resource electricity use to 20 percent by the year 2010. The state Public Utilities Commission reports that the target is only off by a year or two, and one of the main reasons why is the lack of adequate transmission lines for geothermal energy and wind power. Without the lines, little power can be added to the grid from renewable sources. In addition, one of the largest projects using solar technology is still undergoing testing. An energy advocate for Environment California criticizes the announcement that the 2010 target can't be met. Bernadette Del Chiaro told the Los Angeles Times "it's absurd to suggest that California can't meet a 20-percent goal by 2010. There's no question California has enough renewable resources to meet the 20-percent and beyond." *For more information, please visit http://kcbs.com/pages/187352.php?contentType=4&contentId=292834.*

California: Utility Renewables Plans for 2007 Could Be Modified Slightly

Plans of California investor-owned utilities to procure green power in 2007 to satisfy the state's renewables portfolio standard would be approved with a few changes, according proposed decision by California Under the decision, Pacific Gas & Electric would be able to reduce its project-development security in its 2007 solicitation by as much as half, from $20/kW to $10/kW. Under Mattson's decision, PG&E in its solicitation for renewable power could seek sites where the utility could develop its own green projects. Mattson encouraged San Diego Gas & Electric and Southern California Edison to adopt similar sites for development. He wrote that IOUs should further consider building their own renewable-power plants, as he previously suggested for the 2006 plans. The draft decision also would adopt a definition for renewable-energy credits, terming them "green attributes" instead of "environmental attributes." The CPUC recently decided that any "green claims" or RECs will remain with the operators of renewable distributed-generation systems. It has been envisioned that utilities, if they are short on green power to meet the RPS after contracting with large-scale generators, may one day buy RECs from DG owners – for example, homes and businesses that generate their own power from solar panels. The CPUC is slated to conditionally approve the RPS plans in February. The IOUs will issue requests for proposals in March. *To view the complete article, please visit http://www.energyprospects.com/cgi-bin/package_display.pl?packageID=2120.*

Idaho: Boise City Improves Its Geothermal Heating Program

Boise leaders have made some improvements to their geothermal program, so it's more efficient, and now they're looking into expanding that program. The city recently installed more pipes, which take the water that was running off as waste back to the aquifer. Those improvements save about 20 million gallons of water a year. Since the aquifer was depleted before the city's improvements, a cap was put in place that limits the amount of water that can be drawn from it for geothermal heating. But with 100 percent of the

water that's used now being returned to the aquifer, the city hopes that cap will eventually be lifted... so the program can be expanded even further.
To read the complete article, please visit http://www.fox12news.com/Global/story.asp?S=5960363.

New Mexico: Attorney General Joins States Challenging EPA Mercury Rules

Attorney General Gary King joined a coalition of states challenging the Environmental Protection Agency's (EPA) rules governing harmful mercury emissions from power plants. The brief, filed with a federal appeals court in Washington, D.C., asks that the existing rules be vacated and that EPA be directed to establish new, more stringent standards. The brief contends that EPA violated the Clean Air Act by exempting power plants from regulations requiring deep reductions in their emissions of hazardous air pollutants. The coalition asserts that the alternative cap-and-trade regulations EPA developed for power plants – the Clean Air Mercury Rule – will delay meaningful emission reductions of mercury for many years, perpetuating mercury depositing "hot spots" and endangering the health of children. The states contend that creating a cap-and-trade system for regulating a potent neurotoxin like mercury is unprecedented, and does not protect public health or the environment. The coalition challenging the EPA regulations also includes California, Connecticut, Delaware, Illinois, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and Wisconsin.
To view the press release, please visit http://www.ago.state.nm.us/pio/pressrel/2007/html/01-12-07_mercury_brief.htm.

International News

World: Reports Calls for Comprehensive Global Energy Strategy, Sets Out A Blueprint For Tackling Climate Change

Renewable energy, combined with efficiencies from the 'smart use' of energy, can deliver half of the world's energy needs by 2050, according to a plan for future sustainable energy provision, launched recently. The report: 'Energy [R]evolution: A sustainable World Energy Outlook', produced by the European Renewable Energy Council (EREC) and Greenpeace International, provides a practical blueprint for how to cut global CO2 emissions by almost 50% within the next 43 years, whilst providing a secure and affordable energy supply and, critically, maintaining steady worldwide economic development. Notably, the plan takes into account rapid economic growth areas such as China, India and Africa, and highlights the economic advantages of the energy revolution scenario. It concludes that renewable energies will represent the backbone of the world's economy – not only in OECD countries, but also in developing countries such as China, India and Brazil. The plan states that renewable energies have the potential to deliver nearly 70% of global electricity supply and 65% of global heat supply by 2050.

However, the report also highlights the short time window for making the key decisions in energy infrastructure, which will have to be made by governments, investment institutions and utility companies. Within the next decade, many of the existing power plants in the OECD countries will come to the end of their technical lifetime and will need to be replaced, whilst developing countries such as China, India and Brazil are rapidly building up new energy infrastructure to service their growing economies. The report was developed in conjunction with specialists from the Institute of Technical Thermodynamics at the German Aerospace Centre (DLR) and more than 30 scientists and engineers from universities, institutes and the renewable energy industry around the world. *A copy of the Energy [R]evolution: A Sustainable World Energy Outlook report can be downloaded at: www.greenpeace.org/energyrevolution and www.energyblueprint.info.*

Indonesia: State Oil and Gas Firm Sets Aside Money for Possible Compensation Over Disputed Geothermal Project

Indonesian state oil and gas firm, PT Pertamina, has set aside about $315 million to pay possible compensation to U.S. firm, Karaha Bodas, over a disputed geothermal energy project, a Pertamina executive said recently. Last October, the U.S. supreme court turned down an appeal by Pertamina, which

was seeking to overturn an arbitration panel to award $261 million compensation to Karaha Bodas, controlled by Florida-based utility company FPL Group Inc (FPL.N: Quote, Profile , Research). The firm is now awaiting a ruling by a Cayman Islands court. The dispute centers around the project in Indonesia's West Java province agreed between Pertamina and Karaha in 1994, but suspended in 1998 during the Asian financial crisis. Soemarno said Pertamina wanted to settle this dispute as soon as possible to avoid potential problems doing business abroad. Karaha, which had spent $111 million on the project, in 1999 asked a Swiss arbitration panel to force Pertamina to repay its lost investment and cover future profits. The tribunal awarded Karaha $261 million in 2000. *To read the complete article, please visit http://today.reuters.com/news/articleinvesting.aspx?view=CN&storyID=2007-01-25T102802Z_01_JAK142678_RTRIDST_0_PERTAMINA-INDONESIA-KARAHA.XML&rpc=66&type=qcna.*

Philippines: President to Attend Geothermal Plant Dedication

The Visayan Daily Star reports that Philippines President Gloria Macapagal Arroyo will attend the commissioning of the Northern Negros Geothermal Power Plant in Barangay Mailum, Bago City, on February 2. To read the complete story visit: *http://www.visayandailystar.com/2007/January/27/topstory10.htm*

Notices and RFPs

Sustainable Energy Coalition Renewable Energy Expo: GEA Seeks Participants and Supporters

The annual Sustainable Energy Coalition (SEC) Renewable Energy Expo will take place in mid-June. GEA is one of several organizations planning the event. Last year, the event brought in hundreds of congressional staffers, dozens of Representatives and Senators, numerous government officials and members of the public. We expect similar crowds this year. As part of the day-long event, each renewable technology will have a display area, and GEA will be coordinating the geothermal area. GEA is looking for participation and/or support from GEA member companies in presenting geothermal technology and potential to this influential audience. Last year, GEA co-hosted the display with a major geothermal company who called the event "extremely successful." *If you would like to take advantage of this opportunity, or have further questions, please contact Alyssa at research@geo-energy.org.*

Conservation Innovation Grants (Due February 2)

The U.S. Department of Agriculture requests proposals for the Conservation Innovation Grants Program. The purpose of CIG is to stimulate the development and adoption of innovative conservation approaches and technologies for environmental enhancement and protection, in conjunction with agricultural production. 3 categories of interest include: 1) National Natural Resource Concerns (atmosphere, water, soil grazing land and forest health), 2) National Technology (improved on-farm energy efficiency including but not limited to renewable energy resources, methane recovery, and water management), and 3) The Chesapeake Bay Watershed. $2 million expected to be available, up to 60 awards anticipated. Responses due 2/2/07. *For more info, contact Tessa Chadwick at tessa.chadwick@wdc.usda.gov or go to: http://www.grants.gov/search/search.do?mode=VIEW&oppId=11733. Refer to Sol# USDA-NRCS-NHQ0701. (Grants.gov 12/1/06)*

Innovation Grants – California (Due February 6)

The California Energy Commission requests proposals for the Energy Innovations Small Grant (EISG) Program. This program supports small businesses, non-profits, individuals and academic institutions to conduct research that establishes the feasibility of new, innovative energy concepts that address a CA energy problem, provide a potential benefit to CA electric and natural gas ratepayers, and target one of the

following: Industrial/Agriculture/Water End-use Efficiency; Building End-use Efficiency; Environmentally Preferred Advanced Generation; Renewable Generation; Energy-Related Environmental Research; Energy Systems Integration. Individual awards NTE $95K. Responses due 2/6/07. *For more info, contact eisgp@energy.state.ca.us or go to http://www.energy.ca.gov/contracts/smallgrant/index.html*.

Arctic Energy Summit Call for Papers (Due Feb 15)

The Arctic Energy Summit is an International Polar Year program on energy development and rural power as it relates to the Arctic regions. The Summit has received the official endorsement of the ICSU/WMO (International Counsel for Science/World Meteorological Organization) Joint Committee for the International Polar Year 2007-2008. The Summit has also received the endorsement of the Arctic Council as an approved Arctic Council project. The Summit features a technology conference to be held October 15-18, 2007. Abstract submissions are due February 15, 2007. Abstract should demonstrate clearly that your paper:

- Will contribute to energy technology or rural power issues applicable in the Arctic, particularly in the area identified as the technical focus for the specific section, or will present other information of immediate interest,
- Will present information that is technically sound,
- Will present new knowledge or experience, the substance of which has not been previously published,
- Will not be commercial in nature and will not promote specific companies, products or services.

For more information, please visit https://www.confmanager.com/main.cfm?cid=680.

DOE Request for Information – Ways to Improve Geothermal Well Productivity (Comments Due Feb 12)

Request For Information DE-PS36-07GO37001
Program Manager / Area: Allan Jelacic, Acting Program Manager, Geothermal Technologies Program
Description: Wells of Opportunity for Geothermal Stimulation, under provisions of the Geothermal Energy Research, Development, and Demonstration Act of 1976, PL 93-410.
The Department of Energy (DOE) is seeking information from the geothermal industry and academia regarding the most effective and efficient ways to improve productivity of geothermal reservoirs. The information will be used by DOE for internal planning and decision-making purposes.
Request for Information Guidelines:
DOE will not pay for information provided under this Request for Information (RFI), and there is no guarantee that a geothermal well stimulation project will be supported as a result of this RFI.
Comments in response to this RFI must be provided to the DOE Golden Field Office as an attachment to an e-mail message at RFI-07GO37001@go.doe.gov. Comments must be provided no later than 8 p.m., Eastern Time, on February 12, 2007.
All documents providing comments in response to this RFI must be deliverd electronically to the indicated e-mail address above using Microsoft Word (doc.) format. DOE recommends that responses to the RFI be under 10 pages in length, no greater than 5MB in file size, with 1 inch margins, single spaced, and a minimum of 11 pt font.
Questions regarding the content of this RFI should be submitted through the "Submit Question" feature of the DOE Interactive Procurement System (IIPS) at http://e-center.doe.gov.
Information Requested
DOE would appreciate information and suggestions to assist in the possible formation of a Funding Opportunity Announcement (FOA) designed to stimulate geothermal wells for purposes of enhancing geothermal fluid production. You may consider the list of topics below as you prepare your response.

- Geothermal Rights
- Availability of the Geothermal Resources
- Well Location and Selection Criteria
- Well History, Geology, Geophysical Data, etc.

- Documentation of Well Condition
- Motivation/Potential Resource Improvement Resulting from Stimulation
- Stimulation Technologies (Hydraulic, Chemical, Thermal, Etc.) and Approach
- Data Collection Methods for Pre and Post Stimulation (Tracers, Microseismicity, etc.)
- Proposed Cost and Schedule for Stimulation Activities
- Proximity to Power Plant and Transition Lines
- Evidence of Cost Share (Non-Federal Share)

If there are other topics or issues you may wish to raise, please include them in your response. In summary, please provide comments to aid and inform DOE in the composition of a competitive solicitation to stimulate geothermal wells for purposes of enhancing geothermal fluid production. The Department thanks you for your assistance and input.

Nicaragua's Energy Regulator Launches Geothermal Concession Tender (Documents Due Feb 15)

Nicaragua's energy regulator INE has launched an international E&P concession tender for three geothermal blocks with a combined potential to generate 1,500MW. The blocks are Volcn Casita-San Cristbal, Caldera de Apoyo and Volcn Mombacho, which hold Central America's largest reserve of geothermal resources, according to INE. The regulator has opened a data room with company documents due February 15. The contract is due to be awarded in April. Site visits are scheduled for next month. In 1999, INE awarded two production concessions for geothermal power and this year granted two exploration concessions. *The information can be viewed at http://www.tmcnet.com/usubmit/2006/09/19/1905118.htm.*

GHG Reduction and Pollution Prevention - Region 10 (Due March 9)

The U.S. Environmental Protection Agency, Region 10, seeks proposals for the Regional Geographic Initiative (RGI). RGI supports projects that use integrated, collaborative, or community-based approaches to reduce greenhouse gas emissions or prevent pollution by promoting the availability of energy efficiency, renewable energy, or carbon sequestration. Project implementation must take place in Region 10 which includes AK, ID, OR and WA. $400K expected to be available, up to 4 awards anticipated. Responses due 3/9/07. *For more info, please visit http://www.grants.gov/search/search.do?mode=VIEW&oppId=12229. Refer to Sol# EPA-R10-RGI-2007. (Grants.gov 1/11/07)*

Sustainable Development Technology Canada seeks Clean Energy and Transportation technologies (Due March 15)

Sustainable Development Technology Canada (SDTC), a Government of Canada foundation that finances and supports the development and development of clean technologies is accepting Statements of Interest (SOI) for its eleventh round of funding. Projects will be considered for technology solutions designed to improve sustainability for all Canadian economic sectors including energy exploration and production, power generation, energy utilization, transportation, agriculture, forestry and waste management. SDTC actively seeks applications for technology innovations that deliver clean water, clean soil, clean air, and a reduction in greenhouse gas emissions. The deadline for proposals is March 14, 2007. *Please visit www.sdtc.ca for more information.*

Rural Business Opportunity Grant (Due March 30)

The U.S. Department of Agriculture requests proposals for Rural Business Opportunity Grants. This program promotes sustainable economic development in rural communities with exceptional needs through support of economic planning for rural communities, technical assistance for rural businesses, and training for rural entrepreneurs or economic development officials. $1.5 million expected to be available, average

grant $50K. Responses due 3/30/07. *For more info, go to:* *http://www.rurdev.usda.gov/rbs/busp/rbog.htm*. *Refer to Sol# RBS-RBOG2007. (Grants.gov 12/18/06)*

Upcoming Events

7th Annual Northwest "Harvesting Clean Energy" Conference, January 28-30, Boise, Idaho

The 7th Annual Northwest "Harvesting Clean Energy" Conference is scheduled to be held in Boise, Idaho, on January 28-30, 2007. The theme of this conference is "Charting the way to rural economic development through clean energy production". The conference will feature sessions on ethanol, wind farming, geothermal, carbon sequestration, and many others. Three local field trips (geothermal, wind, and biofuels) are also offered at the conference. The sponsors are expecting at least 500 participants at the conference. *For information about this event, including on-line registration, visit the website at* *www.harvestcleanenergy.org/conference*.

Colorado State Working Group Meeting, January 31, Lakewood, Colorado

The Colorado Governor's Office of Energy Management and Conservation (OEMC) and the US Department of Energy (DOE) are pleased to invite you to attend the first Colorado State Working Group meeting in support of DOE's GeoPowering the West initiative. The OEMC, with support from DOE, is in the preliminary stages of forming a Working Group and Steering Committee. OEMC is seeking individuals representing a cross section of the geothermal power generation and direct use industry and other interested parties to attend this meeting and to assist Colorado in this endeavor. The first meeting will be held Wednesday, January 31, 2007 at the Western Area Power Administration Headquarters in Lakewood, Colorado at 12155 W. Alameda Parkway. *The meeting will be in conference room's 225B & 225C from 8:30 AM to 4:00 PM. Seating is limited so please RSVP by January 26, 2007 by calling 970-240-1273 or e-mail* *www.dcarron@dmea.com*.

Essentials of Energy Risk Management, Houston, TX, February 12-13

The resurgence in energy trading and the volatility of energy prices has highlighted the need for energy professionals in all areas to develop a functional proficiency in the management of energy risks. This program imparts a practical understanding of the array of tools and concepts that are at the core of the contemporary energy markets. It also provides insights into diverse approaches to evaluating and managing risks unique to the energy business. This course compresses into two days much of the material covered in Paradigm's four-day (two two-day) programs on Fundamentals — 1) Energy Trading and Hedging and 2) Using Energy Options. Participants preferring to learn these concepts in a less hurried and less intense format should consider the two two-day programs. *For more information, please visit* *http://www.paradigmtraining.com/brochures/eerm_feb12_ec.pdf*.

Utility Rate Case Issues & Strategies, Feb 22 - 23, Las Vegas, NV

Law Seminars International present regulators, attorneys and consultants who will update participants on strategies for bringing about win-win results for shareholders and customers. The Hon. Marc Spitzer, FERC Commissioner, will review recent FERC initiatives and decisions with an impact on state rate cases, and the Hon. Donald L. Soderberg, Nevada PUC Commissioner will address the agency perspective on working with Interveners and settling cases. Learn about: Filing strategy tips for utilities ~ Rate case issues arising from policies favoring cleaner energy supplies ~ Rate case treatment of fuel costs ~ Regulatory treatment of new technologies ~ State authority, policy priorities, and regulatory. *For more information, please visit* *http://www.lawseminars.com/section_details/07RATENV.htm#%20*.

Cleantech Forum™ XII, February 19-22, San Francisco CA

Join 600 of the leading venture capitalists, investment bankers, pensions, endowments, family offices and corporate executives for senior level networking and an exceptional thought-leadership program. The Cleantech ForumsTM are the world's premier cleantech investment platforms, providing unparalleled access to emerging innovation, analysis, networking, deal flow and thought-leadership for the rapidly emerging cleantech industry. In North America, over $2.9 billion was invested in cleantech by venture capitalists representing over an 80% increase over 2005 which followed a 25% increase over 2004 according to Cleantech Venture Network® researchers. The influx capital from private equity, family offices, endowments, pension funds, hedge funds, angel investors as well as venture capitalists requires a solid understanding of trends and emerging opportunities provided by the Cleantech ForumsTM for four years. *For more information, please visit http://www.RenewableEnergyAccess.com/partner/Cleantech/ .*

Financing Renewable Energy Projects, Mar 1 - 2, Berlin, Germany

The European renewable energy markets are in growth mode, affording investors and developers great opportunities. Political initiatives are fueling the development of the renewable energy industry, and investors are now looking to capitalize on the growing demand for green power markets. The event will take place at the Kempinski Hotel Bristol. *More information is available at http://www.c5-online.com/renewableenergy/pr10.*

Power-Gen Renewables Conference, March 6 – 8, Las Vegas, Nevada

With the passing of the Energy Bill coupled with critical initiatives to reduce our dependence on oil imports, one thing is clear - the future of renewable energy is NOW. In its 4th year of partnership, PennWell Corp. and the American Council on Renewable Energy (ACORE) present the industry's premier event covering the most important trends and issues impact the industry's progress. Bringing the wind, solar, biomass and fuels, hydro and geothermal sectors together for three days of information exchange and fast-track networking, POWER-GEN Renewable Energy & Fuels attracts the biggest names in renewables to discuss technical, strategic, regulatory, structural and economic issues. *For more information, please visit http://pgre07.events.pennnet.com/fl/index.cfm.*

GeoExchange Conference and Trade Show, March 7-9, Burnaby, British Columbia, Canada

GeoExchangeBC is pleased to announce confirmation of the 2nd Biennial International GeoExchange Conference and Trade Show. Scheduled for March 7-9, 2007 at the Hilton Vancouver Metrotown in Burnaby, British Columbia, this event will feature regional and international speakers, an expanded trade show, informative site tours and a proposed geoexchange system designer training course coinciding with the conference. *Call for papers now being accepted. Check back for regular updates: http://www.geoexchangebc.ca/announcement.aspx*

Utah Geothermal Working Group Meeting, March 14-15, Salt Lake City, UT

The event will include topics such as Geothermal Development Activity in Utah, New Federal Rules for Geothermal Leasing and Permitting, Utah State Legislative Update – New incentives for renewable energy development, Review of Activities of the Geothermal Utility Working Group, Renaissance Geothermal Project, Blundell Geothermal Plant Expansion, and Raft River Geothermal Project, among others. *For more information and to RSVP, contact Jason Berry at Utah Department of Natural Resources, State Energy Program – jasonberry@utah.gov, (801) 538-5413, or Robert Blackett, Utah Geological Survey – robertblackett@utah.gov, (435) 865-9035.*

Energy Markets and Regulation, Mar 15- 16, Washington, DC

Law Seminars International presents a conference on energy markets and regulation that provides basic and updated information for professionals. *For more information, please visit* http://www.lsinews.com/07endccentral.htm.

Geothermal Resource and Finance Workshop, April 2007, San Francisco, CA

GEA announces plans for a workshop bringing together professionals in the geothermal community to discuss the issues and strategies involved in identifying and developing geothermal resources in the United States and to discuss approaches and considerations for financing geothermal projects. Exact date and hotel location are under negotiation and will be announced in Mid-January. *Those interested in being sponsors for the event or making presentations, please contact Karl Gawell at 202-454-5264 or email* karl@geo-energy.org.

Wall Street Green Trading Summit VI , Apr 16 - 17, New York City

Speakers from investment banking, hedge funds, venture capital, insurance, and the brokerage community will present on the trading opportunities in alternative energy, project finance, carbon market developments, REC trading and demand response programs at this annual event in New York. Attend either in person or via webcast. *For more information, please visit* http://www.hedgeconnection.com/wsgts.

Accelerating Development/Deployment of Asia Pacific Clean Technologies, Apr 17-18, Melbourne, Australia

The AustralAsian Cleantech Forum in Melbourne is the premier international platform for knowledge exchange and commercial interaction for the full range of investors, companies and government involved in the Cleantech market in the Asia Pacific. The 3rd AustralAsian Cleantech Forum will provide unparalleled networking with key decision makers that are leading the growth of the Cleantech industry. *For more information, please visit* http://www.cleantechforum.com/index.php?page=Home.

RENEXPO Central & South East Europe, Apr 19 - 21, Budapest, Hungary

The event will highlight present renewable energy technologies and products as well as the latest developments in energy efficient construction and renovation. The exhibition serves to provide a platform at which major players from the renewable energy and energy efficient construction and renovation sectors can convene, network, and exchange knowledge. Target countries include Hungary, Bulgaria, Austria, Slovakia, Romania, Ukraine, Croatia, and Slovenia to name a few. *For more information, please visit* http://www.renexpo-budapest.com.

RENEXPO India 2007, Apr 25 - 26, New Delhi

Over 500 business leaders and CEOs, representing non-conventional energy sources will once again convene to explore possibilities for the transfer of technologies. The Associated Chambers of Commerce and Industry of India (ASSOCHAM), together with the Ministry of Non-Conventional Energy Sources and the Government of India, have invited delegates from India, Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Pakistan and Sri Lanka. The event, presented by REECO India, will be held at the Hotel Le Méridien. *For more information, please visit* http://www.renexpo-india.com/.

GEA TRADE SHOW/GRC ANNUAL MEETING, September 30-October 3, Reno, Nevada

It's not too early to be planning for the next GEA Trade Show/GRC Annual Meeting. This coming year they will be held at John Ascuaga's Nugget Hotel & Casino in Reno, Nevada, September 30 - October 3, 2007. For more information about the GEA Trade Show contact Daniela Stratulat at 202-454-5263 or email Daniela@geo-energy.org. *For information about the GRC Annual Meeting contact GRC at 530-758-2360 or email grclib@geothermal.org*.

GEA Update
A newsletter for GEA Members written by Alyssa Kagel and Karl Gawell.
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