

letters

aircraft carrier task groups are required to defend the transportation corridors or the government of Canada.

The U.S. taxpayer is on the hook for a bill of roughly \$27 for each of those Middle East barrels that make their way to the United States every day. To be clear, this is in addition to the daily quoted NYMEX price.

How can the U.S. afford to ignore a readily available, cost-effective, and secure source of oil?

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To the Editor: I agree with former Secretary of State George Shultz and former CIA Director James Woolsey in their call for oil independence. They say that our nation's dependence on imported oil leaves our economy vulnerable to oil supply disruptions and jeopardizes our national security. They say that world oil supply lines are already vulnerable and will become more vulnerable in the future. Thus, in the economic and security interests of the U.S., oil independence must be pursued.

They say that our nation can make large reductions in oil imports in the area of transportation with the development of more fuel-efficient hybrid vehicles and development of alternative fuels such as bio-fuels.

I don't agree that oil independence can be achieved by transportation improvements and bio-fuels alone. World oil production will peak and decline in the next 50 years, while demand will increase tremendously. U.S. oil reserves in Alaska and elsewhere in America will never supply enough for oil independence.

Engineers and scientists have shown that our nation could achieve oil independence by relying on clean coal fuels and nuclear fuels, for about 300 years anyway. However, both coal and nuclear energy have their own detrimental side effects.

There are problems of mine tailings, mining safety, greenhouse gases, and nuclear waste transportation and disposal to be resolved. To achieve total

Stamp of Authenticity

To the Editor: Knowing my passion for thermodynamics, my wife, Wiebke, got me the American Scientists stamps, which the United States Postal Service released in May 2005.

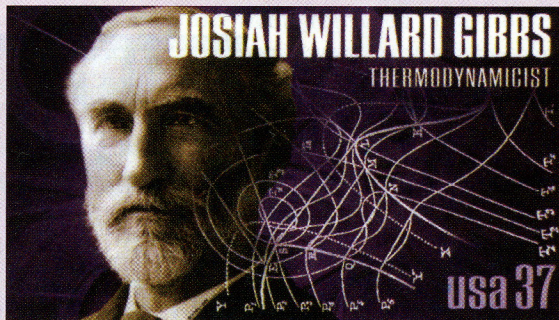
The stamps celebrate thermodynamicist Josiah Willard Gibbs, geneticist Barbara McClintock, mathematician John von Neumann, and physicist Richard P. Feynman. I was very pleased that Gibbs, the first

American to receive a doctorate of engineering, in 1863, was chosen for a stamp.

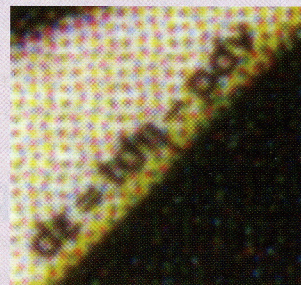
Josiah Willard Gibbs was the founder of modern thermodynamics and a pioneer in graphical methods for thermal sciences. The combination of the two great principles of thermodynamics, the first law (conservation of energy) and the second law (the definition and behavior of entropy that describes the direction of natural processes) carry Gibbs's name, and the equation expressing this is generally known as the Gibbs equation. The ideas and concepts behind this equation are fundamental to thermodynamics and yield an enormous amount of depth; yet the equation can be written in a very simple form $d\mathcal{E} = td\eta - pdv$. However, the Postal Service selected a rather complicated illustration as background: an entanglement of thermal coordinates.

I couldn't take my eyes off the Gibbs stamp. I noticed that there were some dark spots on his collar. A closer look under the microscope revealed a very pleasant discovery: the Gibbs equation is written on his collar. It is in the original form Gibbs reported on the second page of his paper, "Graphical Methods in the Thermodynamics of Fluids," published in the *Transactions of the Connecticut Academy*, 1873.

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Ring around the collar: The stamp that honors Josiah Gibbs and (below) a closeup view of the marks on his shirt collar.



energy independence, the U.S. will need to convert existing oil- and gas-fired power plants to clean coal-fired power plants and to build many new coal and nuclear plants to support the growth of energy needs.

Unfortunately, the U.S. will run out of coal and nuclear fuels within 300 years. Thus, the best long-term solution to energy independence is to add solar energy as a major component to the energy mix. Solar power does not

have the side effects of oil, gas, coal, or nuclear energy. America should be taking the lead in the development of solar energy.

We need a policy that gives our nation energy independence and economic security from the world oil-exporting countries and terrorists who can easily disrupt these oil supply lines.

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