

Our Ocean Backyard — *Santa Cruz Sentinel* columns by Gary Griggs, Director, Institute of Marine Sciences, UC Santa Cruz.

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Energy and the oceans—part 1

Each week I look for a topic with some relevance to current events. Sometimes it works, sometimes it doesn't. Because future energy sources are getting a lot of attention in these pre-election weeks, it seems like a particularly timely topic. While the connection to Our Ocean Backyard may not be immediately obvious, most of our present energy sources, as well as probable future sources, are related one way or another to the ocean.

For now, let's focus on oil, the largest single source of energy for the United States. Oil forms in the ocean, 25 percent of our current supply is pumped out of the seafloor, and much of it is imported and arrives by sea in tankers. With gasoline at near record highs in past weeks, many Americans have voiced support for more offshore drilling.

So let's take a look at the complex issue of U.S. oil reserves and how they stack up against our energy needs.

Before starting any discussion of energy and our options, it's important to know what energy sources we rely on today. As of 2004, which is the last year with complete information, 40% of our U.S. energy was provided by oil, 23% by natural gas, 23% by coal, 8% by nuclear, 2.7% by hydroelectric power, and 3.3% by other renewable sources (geothermal, wind and solar). Burning fossil fuels that generate carbon dioxide produced 86% of our energy, and only 5.7% came from renewable sources.

To put our energy use in perspective, the United States makes up about 5% of the total global population, but in 2004 we used 22% of the global energy. As the rest of the world industrializes and standards of living improve, particularly in China and India, it's probably fair to say that demands on and competition for existing sources of energy will increase.

Oil is worth looking at more carefully simply because it is our most important source of energy. Some feel that this will continue to be our main energy source for the immediate future and that we should be drilling for more oil. And, of

course, the gas that fuels our cars is refined from oil, and the price per gallon is something that smacks us in the face every time we fill up the tank.

We use about 22 million barrels of oil every day in the U.S., and we import almost two-thirds of this, or about 13.5 million barrels every day. At this week's falling price of about \$75 per barrel, this is a billion dollars we pay to foreign countries every day for oil. Who are we buying this oil from? Our two biggest suppliers are Canada and Mexico, which together provide one-third of our daily oil. An additional 21% comes from the Middle East. Venezuela, Nigeria, Angola and Algeria provide a combined 31%. I'm no expert in international politics, but my impression is that perhaps half of our oil imports today are coming from countries that have not historically had particularly stable governments.

How much oil is still available for us to recover on land and offshore in the U.S., since we do control our own resources? This is a complex issue that I will try to summarize briefly. The most recent estimates (2008) from oil industry research indicate that our "recoverable or proven reserves" (which are defined as the estimated quantities that are recoverable with reasonable certainty under existing economic and operating conditions) presently stand at about 21 billion barrels.

How long might this oil last? You can do the math on your calculator. If you divide 21 billion barrels of recoverable oil by our present day usage of 22 million barrels/day, you get 954 days or about 2.5 years.

That's the worst case, if we had to provide all of our own oil. Since we import 13.5 million barrels per day now, let's assume all of our oil suppliers remain friends for the next few years and we only need to continue to pump the other 8.5 million barrels/day from our own reserves. If you divide our 21 billion barrel reserves by 8.5 million barrels/day, they will only last about 6.7 years.

If we reduce our oil usage, it will last a little longer. If we increase our oil use, it will be gone sooner. Either way, the best estimates we have on our reserves indicate that we don't have very many years left.

We may find some additional oil offshore, in deeper water, which means that recovery will be more expensive. But the oil companies have been exploring for oil for decades and probably have a pretty good idea about where it is and how much there is out there, so it is unlikely that large new oil fields will be found in the U.S. or offshore waters. The federal government has offered 160 million acres for lease to the oil companies in the Gulf of Mexico, but the industry has only bid on 25% of

that area. Why? The most important reason is that the platforms for offshore drilling are very expensive to build, that the existing vessels are already under contract in more lucrative international areas, and that these drillships cannot accept any new drilling contracts for the next five years.

In two weeks, I'll address other ocean energy sources.