Our Ocean Backyard
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The Future of Oil

It was April 29, 2008, almost 14 years ago now that I wrote my first Ocean Backyard column. This Sunday marks my 362nd column and for those of you who may have missed a few of these and can't wait to read them, all of the columns are now accessible on the Seymour Marine Discovery Center website at: https://seymourcenter.ucsc.edu/ouroceanbackyard/
They are organized by topic so you can look under Climate Change, The Global Ocean, Energy and Power, Beaches, Coastal Geology and a few others.

The very first column I wrote was titled Oil from the Sea and the second was Inside the Ocean's Oil-Making Machine. These articles explained that our global petroleum deposits are a result to two processes: 1] the preservation and conversion of massive amounts of microscopic marine algae like diatoms into oil and gas by burial and increased pressure and temperature; and 2] tectonic processes whereby the sedimentary rocks that contain these hydrocarbons are folded and faulted and trap the oil and gas. It was surprising to some of the readers of these early columns that oil formed from microscope marine plants rather than seaweed or dinosaurs or any of a number of other types of marine life.

The process of oil formation take millions of years, however, and what we have now is all we will ever have. It just doesn't form overnight. When our present reserves are gone, they're gone. Our oil will run out.

Globally we use about 95 million barrels of oil every day. While the US has just 4.2% of the world's population, we use 19% of the world's daily oil consumption, 18 million barrels of oil every day. We import 44% of that or 8 million barrels every day of the year, and what may be somewhat surprising, that comes from 84 different countries. The big sources are Canada, providing 50% of our imports, Mexico 8%, Saudi Arabia 5.4%, and Russia 5.1%. The last one has clearly become problematic and is now being terminated. Oil and natural gas are Russia's biggest exports, and while we fortunately have other sources, Eastern Europe does not have many alternatives.

One important question to ask is how long will our oil reserves last? This is related to two numbers: how much oil is left in the ground, and how fast are we using it? Think of this like the gas tank in your car and wondering how far you can drive on a full tank. How many gallons does your tank hold and what kind of mileage per gallon does your car get? Until a few years ago stretching out the gas in your tank until you found the next gas station was always a bit of a gamble. All you had was your car's gas gauge. But now automobile manufacturers have provided most cars with an indicator that tells you how many more miles you have left in the tank.

This is a bit more complicated for the planet's oil reserves, however. We have a reasonably good idea from decades of oil exploration and recovery how much oil is left in the ground. Using the Earth's proven oil reserves as of 2016 (1.65 trillion barrels) and our rate of consumption of 35.4 billion barrels/year (you can divide this on your calculator or I phone) you get a lifetime of our

existing reserves of about 47 years. But this was the reserves we had six years ago and we have continued to use more oil each year. The number that is generally agreed upon is that the remaining oil will last about 40 more years or until about the year 2062 at present consumption rates. As our annual use of oil increases, however, and this is the clear trend, the lifespan of that oil will decline.

There is another analogy here with your car's gas tank. Optimum miles per gallon for most cars is in the 50 miles/hour range. The faster you go, however, the lower your mileage/gallon. The faster we use our oil the shorter will be its lifespan.

There are several important take-home messages here. Oil take millions of years to form and what is in the ground now is all we will ever have. At present rates of consumption, this may last about 40 more years, but it likely will be gone sooner than this as our global rate of consumption continues to increase as more countries industrialize and use more oil. There are clearly strong climate change mitigation arguments for weaning ourselves from fossil fuels as rapidly as possible and moving to renewables. But there are two other compelling arguments for moving in this direction. There is no question that we will run out of oil before long and we want to have planned for that and developed other energy sources well before that date. Secondly, we import about eight million barrels of oil every day into the US and there is no guarantee that we be able to continue to rely on the countries that we buy oil from – Russia being one example – or that the prices of oil won't continue to rise dramatically. In contrast, the costs of solar and wind energy are falling as technologies continue to improve and we are never going to run out of either.