The issue: National Energy Policy

• Environmentalists advocate strong steps to conserve oil resources

• VP Chaney advocates a supply-side strategy of more drilling and disparages the environmentalist’s attitude:
  – “Conservation may be a personal virtue, but it is not sound energy policy.”

• S. Olsen: “This is a subject that should be subject to some elementary analysis.”
Assumptions

• We currently have known oil reserves that will last for ~100 years at the current rate consumption.

• Without conservation, the oil consumption rate will increase at a rate roughly proportional to the economy (at an annual growth rate ~5%).

• Exploration may result in a doubling of the known oil reserves in the next century. However, increases by as much as a factor of ten are very unlikely.
Consumption for the next $n$ years

Here $w =$ oil used in 2003; assume 5% increase/yr

<table>
<thead>
<tr>
<th>year</th>
<th>oil used</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>$w$</td>
</tr>
<tr>
<td>2004</td>
<td>$(1.05)w$</td>
</tr>
<tr>
<td>2005</td>
<td>$(1.05)^2w$</td>
</tr>
<tr>
<td>2006</td>
<td>$(1.05)^3w$</td>
</tr>
<tr>
<td>2007</td>
<td>$(1.05)^4w$</td>
</tr>
<tr>
<td>2008</td>
<td>$(1.05)^5w$</td>
</tr>
<tr>
<td>...</td>
<td>etc.</td>
</tr>
<tr>
<td>2003+$n$</td>
<td>$(1.05)^nw$</td>
</tr>
</tbody>
</table>

Total ($n$ yrs) = $w + (1.05)w + (1.05)^2w + (1.05)^3w + \ldots + (1.05)^nw$
When the Total (n yrs) = 100w, the known reserves are gone.

When it = 200w, the reasonable guess for future reserves is gone.

When it = 1000w, the wildly optimistic hope for future reserves would be gone.

Total (n yrs) = w[1 + (1.05) + (1.05)^2 + (1.05)^3 + … + (1.05)^n]
Every banker knows this sum, it is (related to) the compound interest formula

$$\text{Total}(n \text{ yrs}) = w\left[ 1 + (1.05) + (1.05)^2 + (1.05)^3 + \ldots + (1.05)^n \right]$$

$$= w \frac{(1.05)^n - 1}{0.05}$$

(1.05)^n - 1
0.05

semi-log is easier to see
\[
\frac{(1.05)^n - 1}{0.05}
\]
My conclusions

• Without conservation, the world’s oil reserves will not suffice for more than 50 years.

• Even a wildly optimistic supply-side scenario will not suffice for the lifetime of our current generation of children.

• For anyone with a perspective that extends further into the future than the next election, conservation must be an important component of energy policy.