The Future of Energy: The European and American Approaches -- The American Approach

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THE FUTURE OF ENERGY: THE EUROPEAN AND AMERICAN APPROACHES—THE AMERICAN APPROACH

Presentation by Professor Gina S. Warren

Thanks so much to Dr. Reichert for joining us today. It is interesting to learn about European complexities in development of energy law and policy. The United States has many of the same types of issues, although we address them differently—or do not address them at all.

I want to start by providing an idea of the energy mix in the United States, where the energy comes from, and what it is used for. Next, I will discuss U.S. energy policy and climate change proposals. Finally, I will provide some numbers and indicators from a report released three days ago (April 17, 2013) by the U.S. Department of Energy (“DOE”) outlining projections in energy through 2040.

Table 1 illustrates energy consumption by energy source.1 As you can see, the U.S. consumes a significant amount of fossil fuels, including petroleum, natural gas, and coal. Nuclear power accounts for about 8% to 9% of consumption, as do renewables.

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PETROLEUM</td>
<td>36.2%</td>
</tr>
<tr>
<td>HYDROPOWER</td>
<td>3.3%</td>
</tr>
<tr>
<td>GEOOTHERMAL</td>
<td>0.2%</td>
</tr>
<tr>
<td>WIND</td>
<td>1.2%</td>
</tr>
<tr>
<td>SOLAR &amp; OTHER</td>
<td>0.1%</td>
</tr>
<tr>
<td>BIOMASS</td>
<td>4.5%</td>
</tr>
<tr>
<td>NATURAL GAS</td>
<td>25.2%</td>
</tr>
<tr>
<td>COAL</td>
<td>20.4%</td>
</tr>
<tr>
<td>URANIUM</td>
<td>8.5%</td>
</tr>
</tbody>
</table>

Table 2 shows how each energy source is used. For example, nuclear energy is solely used to generate electricity, and electricity generated by nuclear energy contributes 21% of the electricity consumed in the U.S. Almost all coal goes to generate electricity (92%). Natural gas is a multifaceted energy source used for many different sectors, including for electric power and transportation. Petroleum is mostly used for transportation (gasoline).

We will start with nuclear. Nuclear energy generation has remained relatively consistent in its history. After Fukushima, many thought the U.S. would decrease its reliance on nuclear power, but that has not occurred. The last time a reactor came online in the U.S. was in 1996; however there are about eighteen applications for new nuclear facilities/reactors currently before the Nuclear Regulatory Commission at various stages of licensing, so the U.S. may have more reactors in the future. The U.S. has the largest number of reactors of any country by far with 104 of the 436 in the world. Table 3 shows where the reactors are located. Texas has four facilities. California, Arizona, and Washington have a few, but for the most part, most of the nuclear energy

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4. Id. at 155–56.
5. Id. at 31 fig.14.
was developed in the east. The main issue with nuclear in the U.S. right now is what to do with the waste. It is a big problem now and will become an even bigger problem in the near future.

**Table 3**

When the U.S. first started developing nuclear energy, the intent was to recycle the waste. A processing plant located in New York recycled the waste until the 1970s when the Carter Administration shut down the program due to global fears of proliferation. Now, nuclear facilities must temporarily store their nuclear waste onsite until Congress designates a permanent place to put it. For a while, the plan was to develop Yucca Mountain in Nevada as a permanent storage facility. The U.S. invested somewhere near $10 billion dollars on the Yucca Mountain facility and years of effort, but for political and geological reasons, the project has been shut down.6

We are in Texas, so let’s talk about oil. The industry is booming right now. The U.S. has had major increases in production over the last few years, and it is now the third largest producer of petroleum (oil) in the world, behind Saudi Arabia and Russia. The U.S., however, consumes all of the oil it produces and more. Current imports are about 45% of domestic oil consumption.

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Table 4 shows where petroleum is produced. Texas is still the number one producer; however, North Dakota has recently come on the stage and is producing a significant amount of oil from shale plays. Federal offshore wells produce about a third of all oil consumed, which is more than any state except Texas. It will be interesting to see if that number grows as the U.S. issues more leases for offshore drilling.

Table 4

Top Crude Oil Producing States, 2011

The U.S. has experienced a sharp increase in production and a sharp decrease in imports. This is consistent with one of the DOE goals—to decrease reliance on foreign oil. The U.S. is actually becoming relatively successful at meeting this goal, and horizontal hydraulic fracturing is the reason. When most people think of fracturing, they think of natural gas. But, oil can also be produced from shale plays. North Dakota is a good example. Its boom is due to hydraulic fracturing of shale for oil.

I talk to people all of the time who ask how we can stop hydraulic fracturing. My response is that it is too late to ask that question. Instead of asking how to stop hydraulic fracturing, we should be asking how to best mitigate the known environmental implications (which can potentially be huge) such as earthquakes, water contamination, and decreased water quantity. Water quality, especially in Texas, is probably the biggest issue right now. The amount of water used for

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any type of energy production is substantial, but it is especially volu-
minous for horizontal hydraulic fracturing.

So let’s talk about natural gas. It is an intriguing energy resource
that the U.S. is producing a lot of right now. Natural gas had histori-
cally held steady at about 25% of the U.S. energy supply. Now, pre-
dictions are that number will double by 2030. It is a multi-faceted
energy source that many predict will replace coal as the number one
generator of electricity, and compete with gasoline for transportation.

Table 5 shows where natural gas is being produced. Texas is cur-
rently the number one producer. Louisiana is next, followed by Wyo-
ing, and Oklahoma. Offshore natural gas wells produce about as
much as natural gas as Oklahoma.

Table 5

Top Natural Gas Producing States, 2011

Table 6 is a map of the shale plays in the lower 48 states. It illus-
trates why those states are the biggest producers of natural gas. For
example, Fort Worth sits right on top of the Barnett Shale. The Per-
mian Basin is also located in Texas and may be the next big shale play.

8. U.S. ENERGY INFORMATION ADMINISTRATION, THE NORTH EAST NATURAL
GAS MARKET IN 2030, slide 4, http://www.eia.gov/pub/oil_gas/natural_gas/presenta-
9. U.S. ENERGY INFORMATION ADMINISTRATION, NATURAL GAS MONTHLY
_04/pdf/ngm_all.pdf.
10. U.S. ENERGY INFORMATION ADMINISTRATION, LOWER 48 STATE SHALE
Marcellus Shale in the east is probably the largest in size, but it is not currently producing as much as some of the other plays.

Table 6

Source: Energy Information Administration based on data from various published studies. (updated May 9, 2011)

So let’s talk about coal for a moment. Coal has historically generated the majority of the electricity consumed in the U.S., and currently generates about 42%. Table 7 shows where the coal mines are located. The mines in the east, in the Appalachian Basin, are generally pillar and beam mines that produce high-sulfur coal. The mines in the west, in the Northern Rocky Mountains and Great Plains, are generally strip mines that produce lower-sulfur coal.

The main problem with coal as an energy source is that it has basically out-polluted all of the other fossil fuels for years. Some of the numbers suggest up to 40% of the emissions in the U.S. come from coal-powered plants. Because of this, many believe the U.S. will decrease its reliance on coal by utilizing natural gas for more electricity generation. Interestingly, however, the projections just released by the DOE suggest that coal consumption not decrease, but will hold steady.

for a while.\footnote{U.S. Energy Information Administration, Short-Term Energy Outlook, http://www.eia.gov/forecasts/steo/report/coal.cfm (last visited Aug. 28, 2013).} This prediction appears to be based in part on the prediction that the U.S. will have an increasing need for electricity generation (even though in the short-term electricity consumption has decreased due to a downturn in the economy). As such, while new power plants are likely to be natural gas plants, existing coal plants will continue to operate to provide for an increasing need for electricity.

\begin{table}[h]
\centering
\caption{Table 7}
\end{table}

The last energy source I would like to discuss is energy generated by renewable resources. Renewables in the U.S. currently contribute a very small amount to the overall energy consumption. Table 8 shows that hydropower makes up the majority of renewable energy.\footnote{U.S. Energy Information Administration, U.S. Energy Consumption by Energy Source, 2011, tbl.8, http://www.dailyenergyreport.com/natural-gas-theoretical-alternative/ (last visited Oct. 10, 2013).} Solar, is approximately 1\% of the renewable mix and wind is about 13\%. Non-hydropower renewable energy production, however, is on the increase in the U.S., as illustrated by Table 9.
TABLE 8


<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum</td>
<td>33%</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>25%</td>
</tr>
<tr>
<td>Coal</td>
<td>20%</td>
</tr>
<tr>
<td>Renewable Energy</td>
<td>9%</td>
</tr>
<tr>
<td>Nuclear Energy</td>
<td>6%</td>
</tr>
<tr>
<td>Solar</td>
<td>1%</td>
</tr>
<tr>
<td>Geothermal</td>
<td>1%</td>
</tr>
<tr>
<td>Wind</td>
<td>13%</td>
</tr>
<tr>
<td>Biomass Waste</td>
<td>5%</td>
</tr>
<tr>
<td>Biofuels</td>
<td>21%</td>
</tr>
<tr>
<td>Wood</td>
<td>22%</td>
</tr>
<tr>
<td>Hydropower</td>
<td>35%</td>
</tr>
</tbody>
</table>

Total: 17.5 quadrillion Btu
Total: 9 quadrillion Btu


Table 9 shows the increase in non-hydroelectric renewable energy production from 2001 to 2011.15

TABLE 9

Non-Hydroelectric renewable share of total net generation by state

Energy is complex. Unlike the European Union, the U.S. does not have a comprehensive federal plan for energy development. Instead, some energy sources are developed pursuant to federal rules, some pursuant to state and local rules, and some pursuant to a mix of them

all. To give you an idea of the complexities, for licensing and regulatory purposes, hydropower and nuclear are highly regulated by the federal government. States and local governments (and others), however, also have a say in development and licensing. On the opposite side of that, almost all fossil fuel development is regulated solely by state and local agencies, with little to no input from the federal government (except potentially with regard to environmental and endangered species regulations). Renewables are also regulated at state and local levels.

While the U.S. has multiple federal energy acts, the majority of the acts are dedicated to a specific energy source. For example, the Atomic Energy Act is dedicated to developing nuclear energy.\(^{16}\) The Federal Power Act is dedicated to developing hydropower and regulating wholesale electricity.\(^{17}\) Some small energy policy acts, however, have been enacted over the last decade and provide miscellaneous energy-related regulations such as regulations to increase efficiency in automobiles, buildings, and appliances. But, there is no comprehensive federal energy plan or policy.

The DOE does, however, have energy policy goals.\(^{18}\) One goal is to have an overall increase in energy production by taking an “all of the above” approach. Meaning, the U.S. does not want to stop producing fossil fuels in order to produce more renewables. Instead, the goal is to produce more of everything. Another goal is to promote energy conservation. Some of the smaller energy acts have helped with conservation by providing funding to states for development of conservation technologies. In addition, transportation and building standards are now in place, resulting in better fuel economy and efficiency. President Obama especially has been encouraging technology and new science and development. Underlying all of this is the goal for economic growth.

The U.S. does not have a comprehensive climate change control strategy like the European Union has. Instead, most states have a renewable portfolio design whereby the states require a certain percentage of energy sold from utilities be from renewable sources by a certain date. To meet the requirement, a utility has the option to develop its own renewable energy facility or buy it from another utility (and the other utility can get renewable energy credits). Many believe that the portfolio standards have acted as a catalyst to increase renewable generation as illustrated in Table 9.


A few years ago, the U.S. Environmental Protection Agency ("EPA") was sued for failure to regulate greenhouse gas emissions from motor vehicles. The EPA did not want to regulate, claiming global warming is too big for the EPA to regulate and also claiming it is a political question. The U.S. Supreme Court heard the case and held that if greenhouse gas emissions endanger the public, the EPA must regulate the emissions under the Clean Air Act. In 2009, the EPA issued a finding that greenhouse gases (including carbon dioxide) do endanger the public health and welfare and began regulating greenhouse gas emissions from automobiles. Many thought the next logical step was for the EPA to regulate emissions from power plants and refineries.

Parallel to the Massachusetts case, a public nuisance case was brought by several states and land trusts in the northeast against some of the biggest power plant emitters. When it got to the U.S. Supreme Court, the Court dismissed the case, holding that the Clean Air Act “displaced” any federal public nuisance cause of action, and that the EPA would regulate emissions under that Act. At the time of filing, the EPA had not begun regulating greenhouse gas emissions from major stationary sources, such as power plants and refineries, but the court mentioned that if the EPA did not regulate it, plaintiff’s remedy would be to come back to court.

The EPA has since acknowledged that it will regulate greenhouse gas emissions from stationary sources and has issued proposed rules. The proposed EPA rules will regulate emissions in three phases. Phase I will include regulation of emissions from new or modified sources. Importantly, the emission standard is below that of an average coal plant. In essence that means that coal plants will be at a significant disadvantage, and will most likely need to utilize new technologies to meet the standard. Many see this as an obvious intent to run out coal. Phase II will apply the standards to all major emitters, and Phase III will make the standards more widely applicable to other emission sources. The rules still have not been implemented.

Interestingly, even without a comprehensive climate change plan, Table 10 shows that the U.S. has decreased its greenhouse gas emis-

sions in recent years. Unfortunately, much of the decrease has to do with the downturn in the economy. When the economy is down, people consume less electricity and gasoline, which corresponds to lower emissions. In addition, the lower vehicle emission standards have contributed to lower overall emission levels.

Table 10

<table>
<thead>
<tr>
<th>Annual carbon dioxide emissions from U.S. energy consumption (1980–2012)</th>
<th>billion metric tons of carbon dioxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>1.0</td>
</tr>
<tr>
<td>1984</td>
<td>1.1</td>
</tr>
<tr>
<td>1988</td>
<td>1.2</td>
</tr>
<tr>
<td>1992</td>
<td>1.3</td>
</tr>
<tr>
<td>1996</td>
<td>1.4</td>
</tr>
<tr>
<td>2000</td>
<td>1.5</td>
</tr>
<tr>
<td>2004</td>
<td>1.6</td>
</tr>
<tr>
<td>2008</td>
<td>1.7</td>
</tr>
<tr>
<td>2012</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Finally, I will close with an overview of the Annual Energy Outlook through 2040, published a couple of days ago by the DOE. The DOE is predicting a sharp increase in oil production and a sharp increase in natural gas production and exports. Petroleum consumption will decrease, and renewable fuel use will increase. Domestic coal is projected to increase slightly, but mostly just stay the same. Finally, the DOE projects only small reductions in energy-related carbon dioxide emissions through 2040.
