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## AMERICA'S ALTERNATIVE ENERGY SOURCES

### Nuclear

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#### ***Current state of the nuclear industry***

A. How much used?

About 19% of the electricity produced in the U.S.,<sup>1</sup> or about 780B kWh in 2005,<sup>2</sup> is generated by more than 100 nuclear power plants.<sup>3,4</sup>

B. Where?

While plants are located in 31 of the 50 states, they are concentrated near urban centers. For example, approximately 20% of U.S. nuclear production capacity is generated along the North East Corridor.<sup>5</sup> To date, there are five nuclear power facilities currently generating electricity in Pennsylvania. These contain nine operational reactors, with a total net production capacity of 9,229 MW. Nuclear power plants generate about 1/3 of Pennsylvania's electricity, and the Commonwealth is second only to Illinois in total nuclear production capacity.<sup>6</sup>

C. Cost?

The cost of nuclear power production in 2003 averaged \$0.0172/kWh,<sup>7</sup> making it more economical to operate than any clean-air technology other than hydro-electric generation.<sup>8</sup>

D. Who is using it?

Nuclear power is used primarily in the First World, namely the U.S., E.U., and Japan. However, plants can also be found scattered about the former U.S.S.R., and indeed on every continent except Antarctica and Australia.<sup>9</sup>

## ***Outlook for nuclear power***

### A. Pros and cons?

Nuclear power, relative to other alternative generation technologies, is cheap,<sup>10</sup> clean,<sup>11</sup> safe,<sup>12,13</sup> compact,<sup>14</sup> and abundant.<sup>15</sup> Disadvantages include significant *potential* danger from plant operator error and equipment failure<sup>16,17,18</sup> and spent fuel disposal difficulties.<sup>19</sup>

### B. Barriers

Barriers include a long and expensive licensing process, expensive infrastructure,<sup>20</sup> and the NIMBY syndrome, which seems to be dwindling of late.<sup>21</sup>

### C. Incentives

Taking a cue from the French nuclear industry, the U.S. Department of Energy “Nuclear Power 2010” program seeks to streamline the licensing process for new “Gen III+” nuclear power plants. By participating in this program, utility companies can reduce the lead-time, and thus the cost, of licensing by adopting a standardized plant from among DoE pre-certified designs.<sup>22</sup>

## ***Costs for nuclear power***

### A. Infrastructure

New nuclear plant construction costs between \$1,000<sup>23</sup> and \$4,000<sup>24</sup> per kW of capacity.

### B. Cost per kilowatt hour

As stated earlier, the cost of nuclear power production in 2003 averaged \$0.0172/kWh.<sup>25,26</sup>

### C. Environmental costs

Nuclear power’s most notable impact on the environment happens during the beginning and ending of the plant fuel’s life cycle. The mining of uranium and disposal of spent fuel represent nuclear power’s most significant environmental challenges. However, because the economic cost of environmental management and mitigation are fully internalized in nuclear power production cost statistics (unlike all other generation technologies) these costs need not be noted here.<sup>27,28</sup>

## ***Recommendations***

Nuclear power, like most other technologies, has a steep learning curve. Lessons learned from early designs and accidents such as those at Three Mile Island and Chernobyl have been integrated into modern designs, making power plants build today safer, cheaper to build and operate, and more efficient than earlier models. While not technically a renewable energy source, nuclear power represents a very effective use of natural resources, and could power the country well into the future.

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