

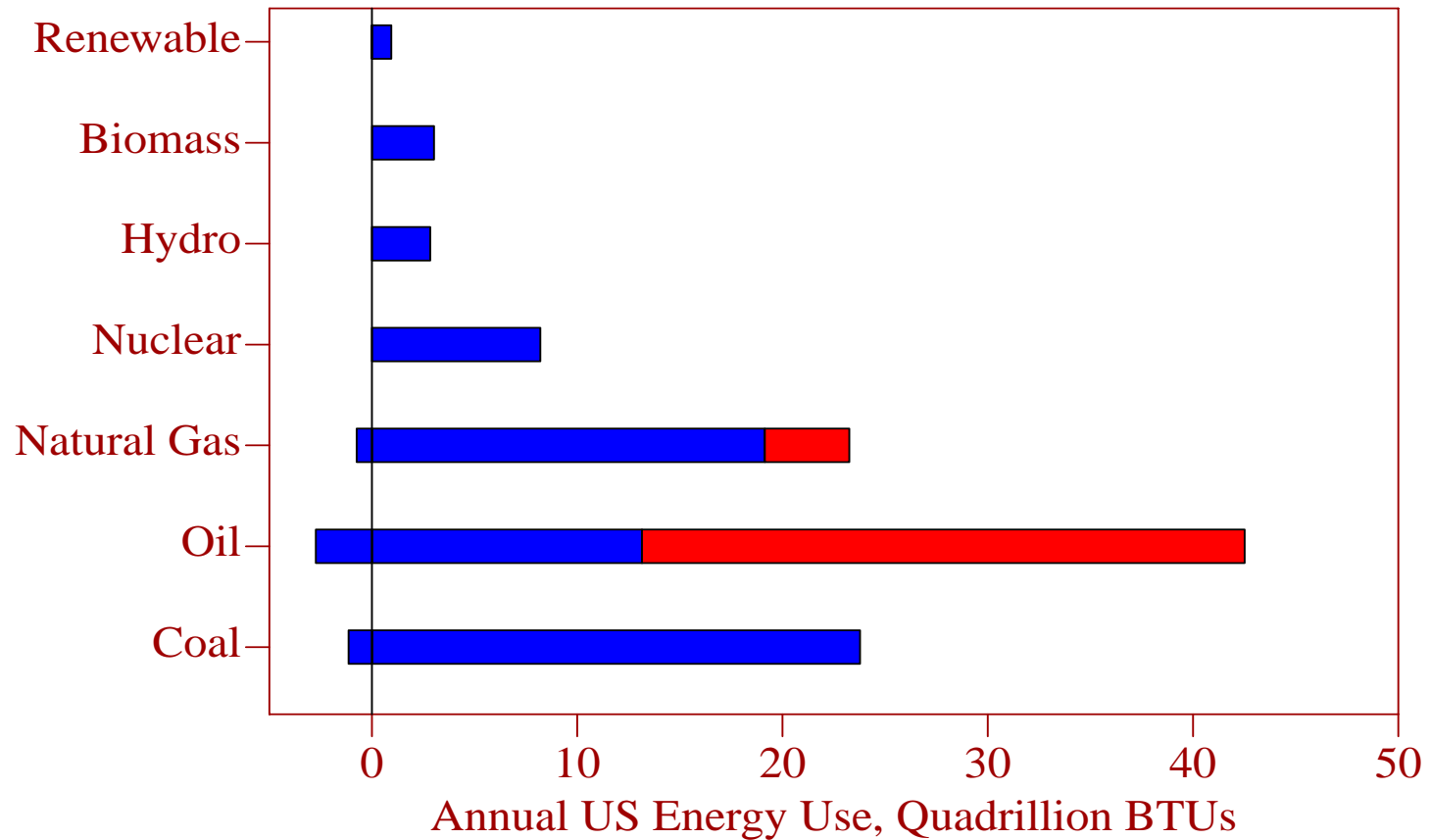


***The Energy Mix for
Energy Independence***

Rich Kochendarfer

April 18, 2007

Short term: Eliminate imports



Source: U.S. Department of Energy, Energy Information Administration

How much time do we have?

Total Resource Base:

economic extraction is potentially feasible

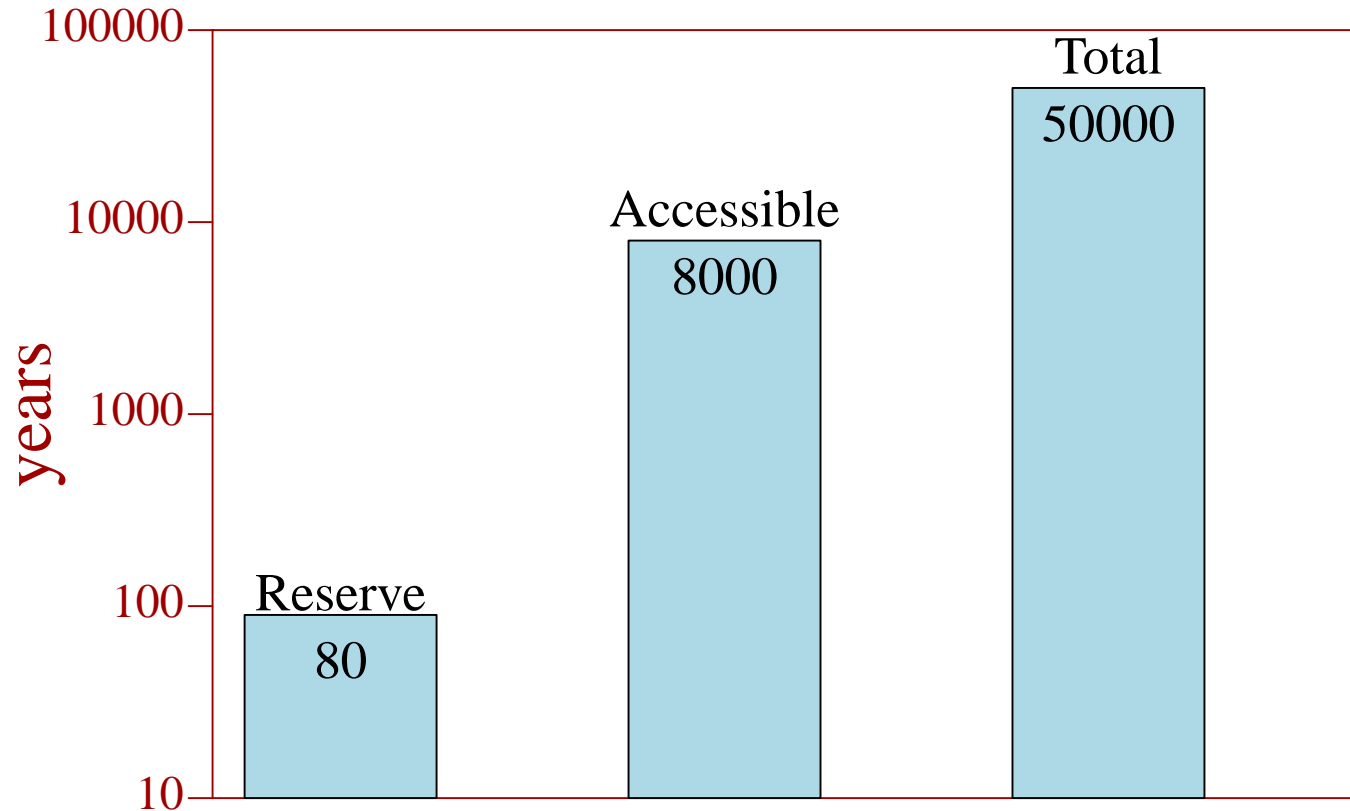
Accessible Resource Base:

technology will support extraction in 3 to 5 years

Reserve:

**can be legally extracted with existing technology
under present economic conditions**

Energy Independence



Source: *Characterization of U.S. Energy Resources and Reserves, Dec. 1989, DOE/CE-0279*

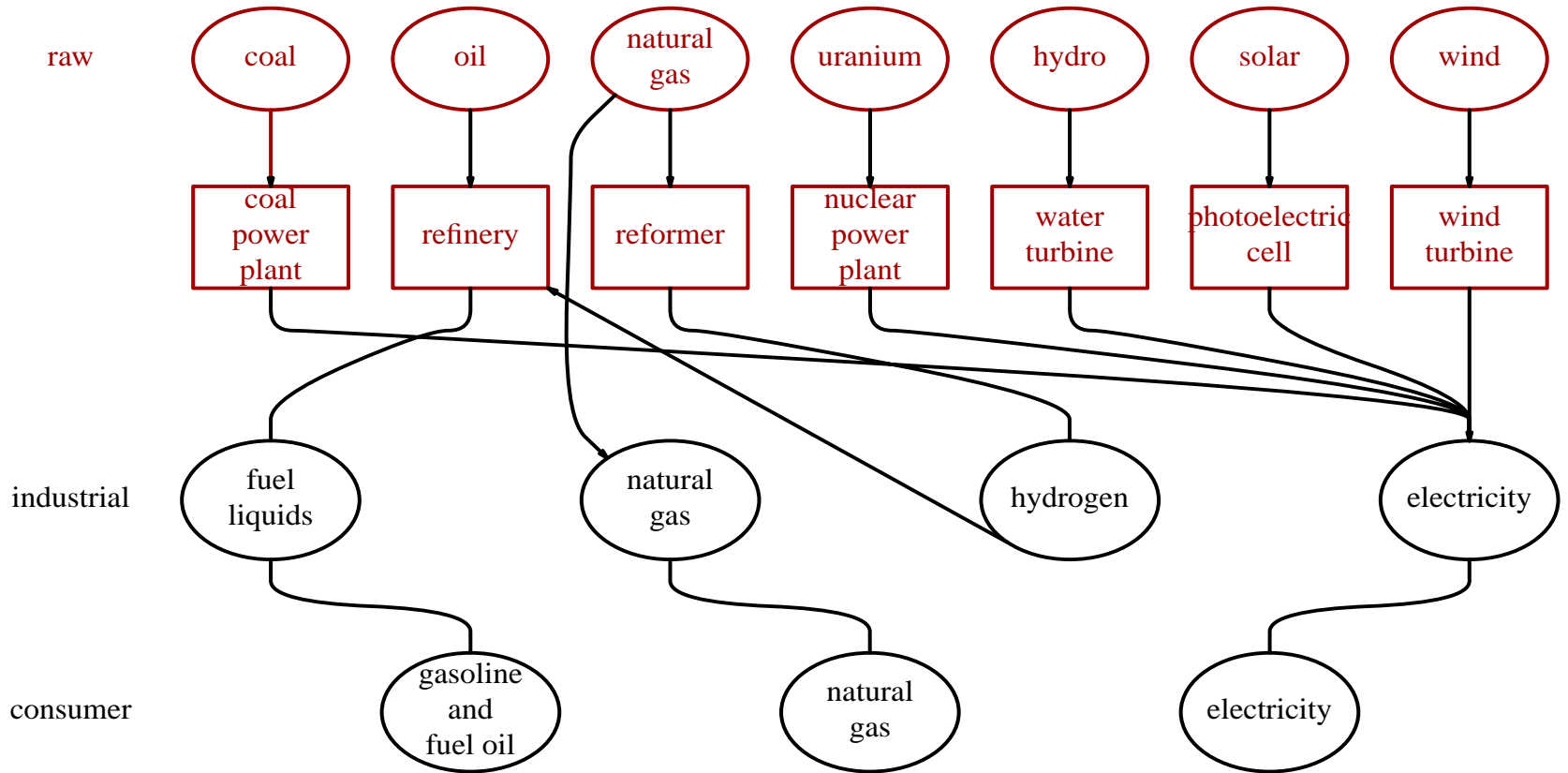
Resource Barriers

Resource	<u>coal oil gas</u>	<u>uranium</u>	<u>solar wind hydro</u>
Category	carbon based	nuclear	renewable
Barriers	carbon dioxide sulfur dioxide	long-lived waste	lower energy density limited resource

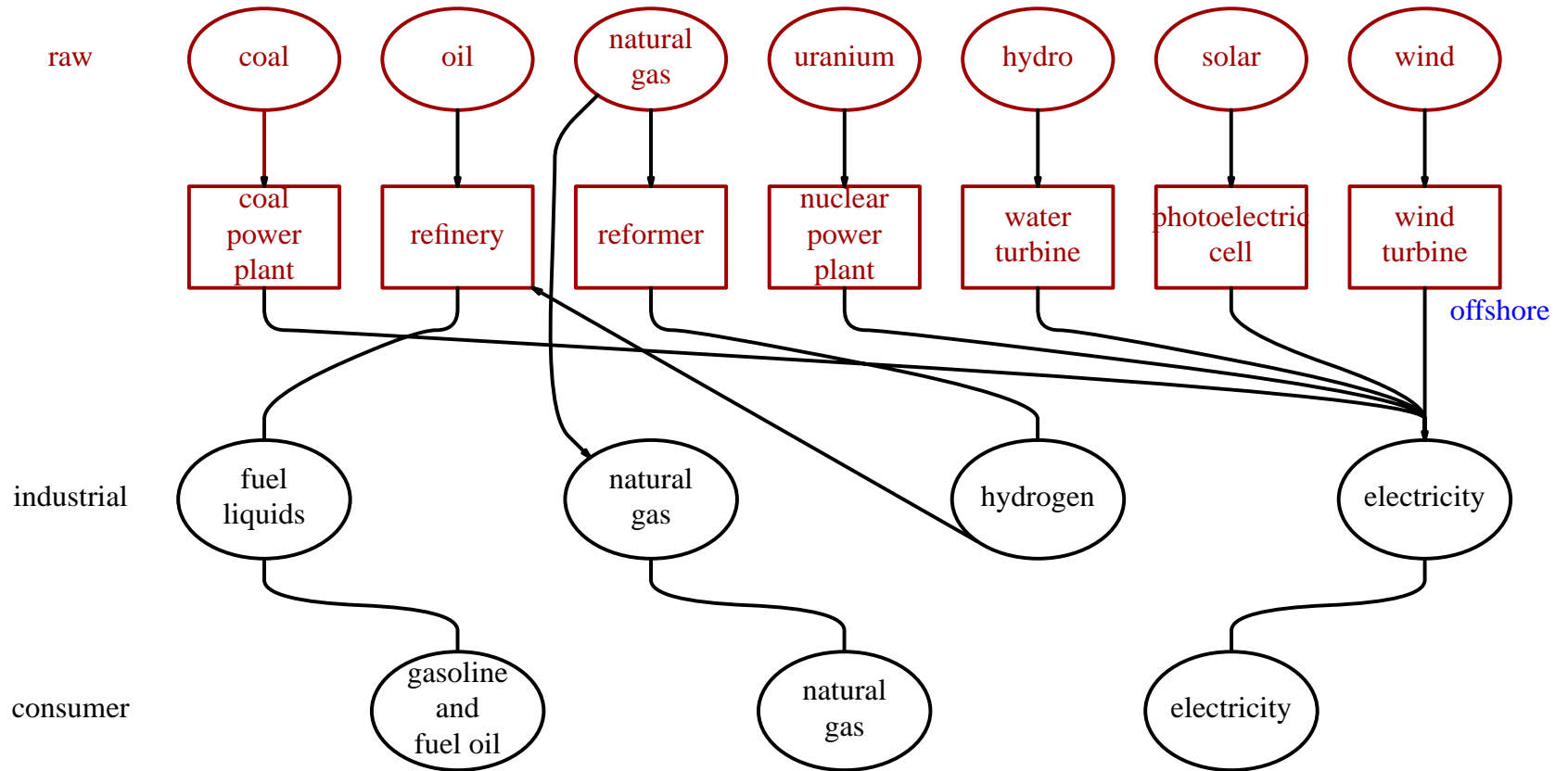
Technology Development

- ▶ **Investment needed in any technology that will transform the resources**
 - ◆ **More efficiently**
 - **Extends the use of the present resource**
 - ◆ **More cleanly, cheaply**
 - **Addresses barriers to use of that resource**

Energy Technologies Required

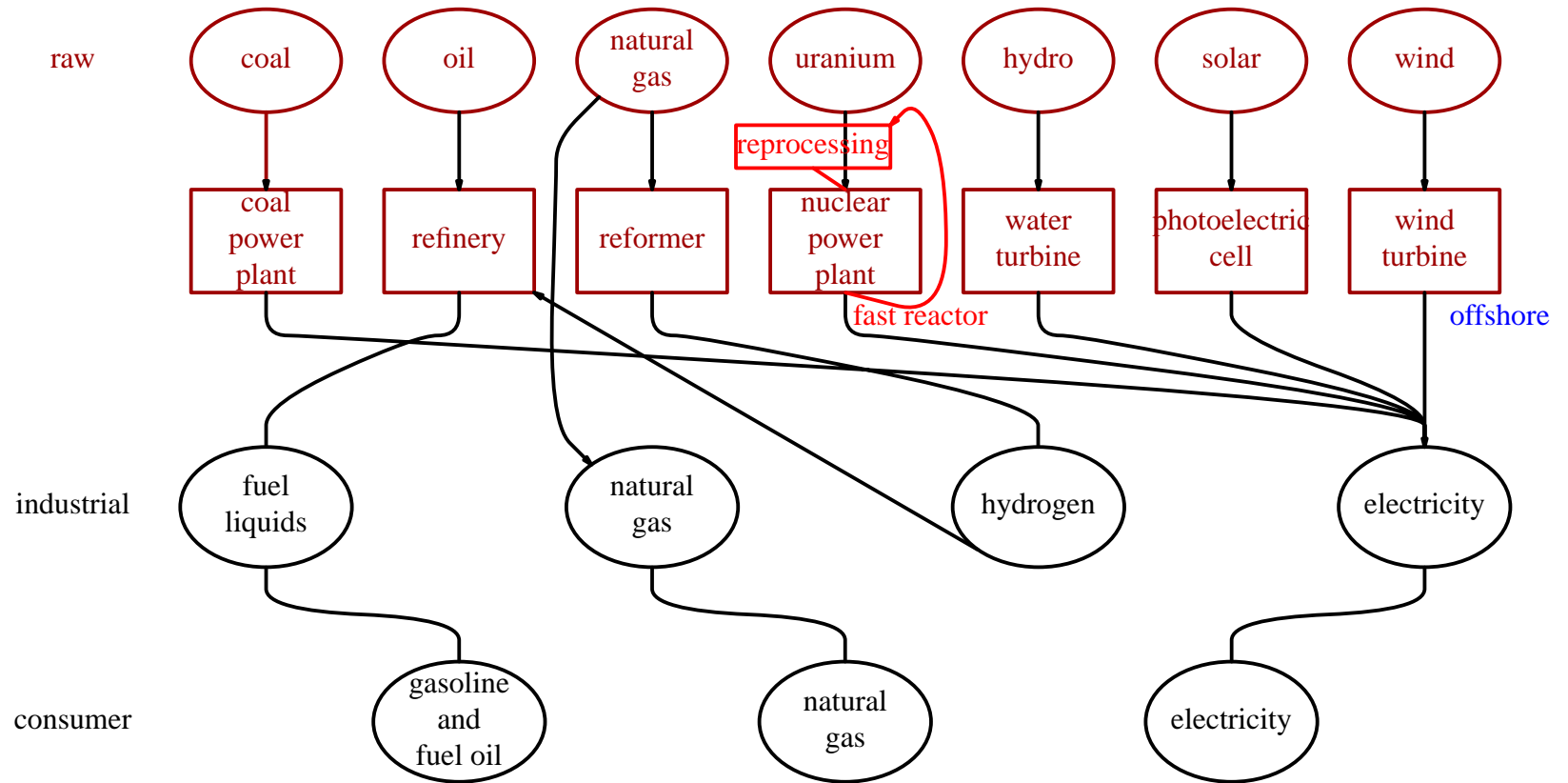


Energy Technologies Required



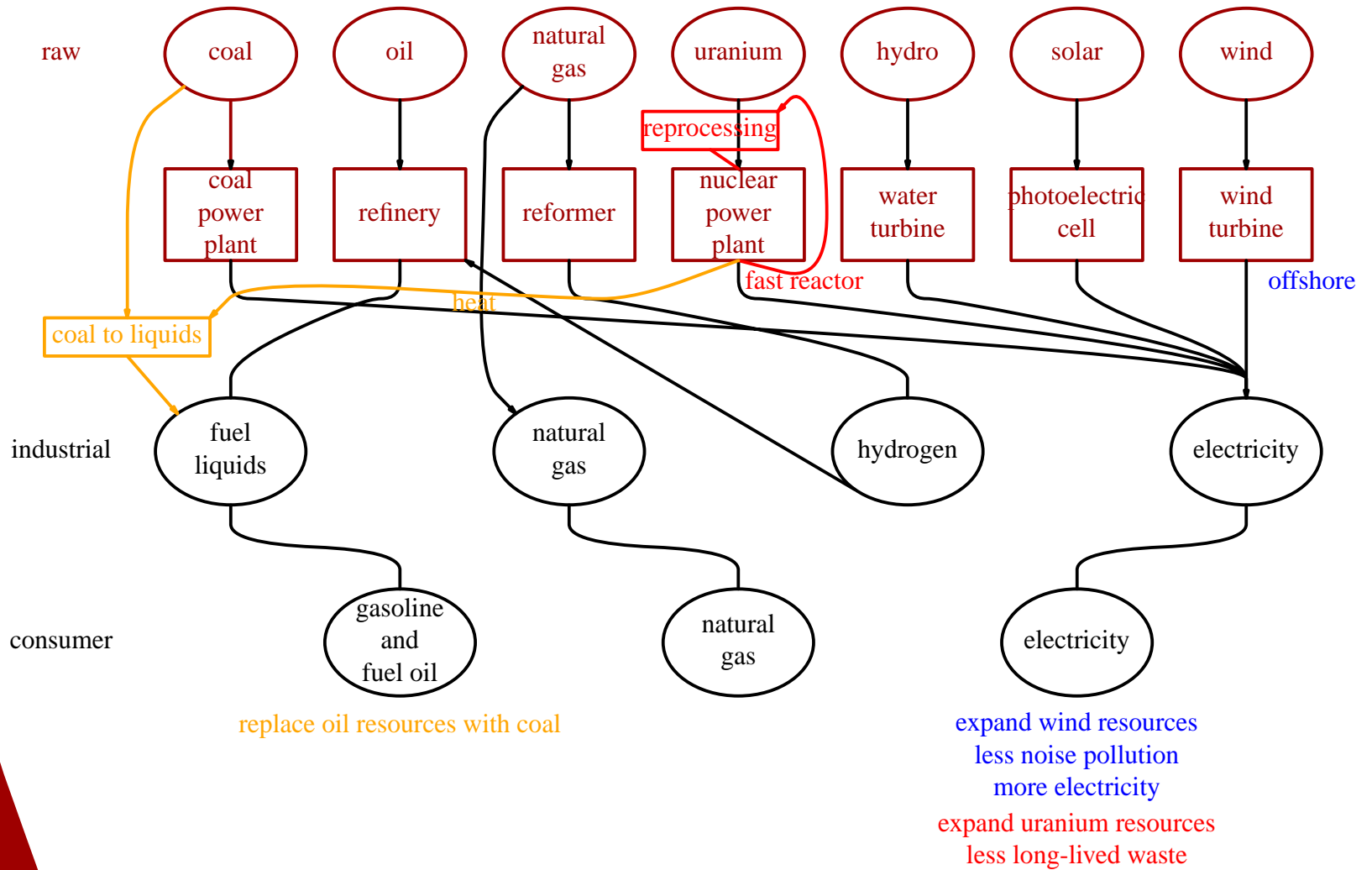
expand wind resources
less noise pollution
more electricity

Energy Technologies Required

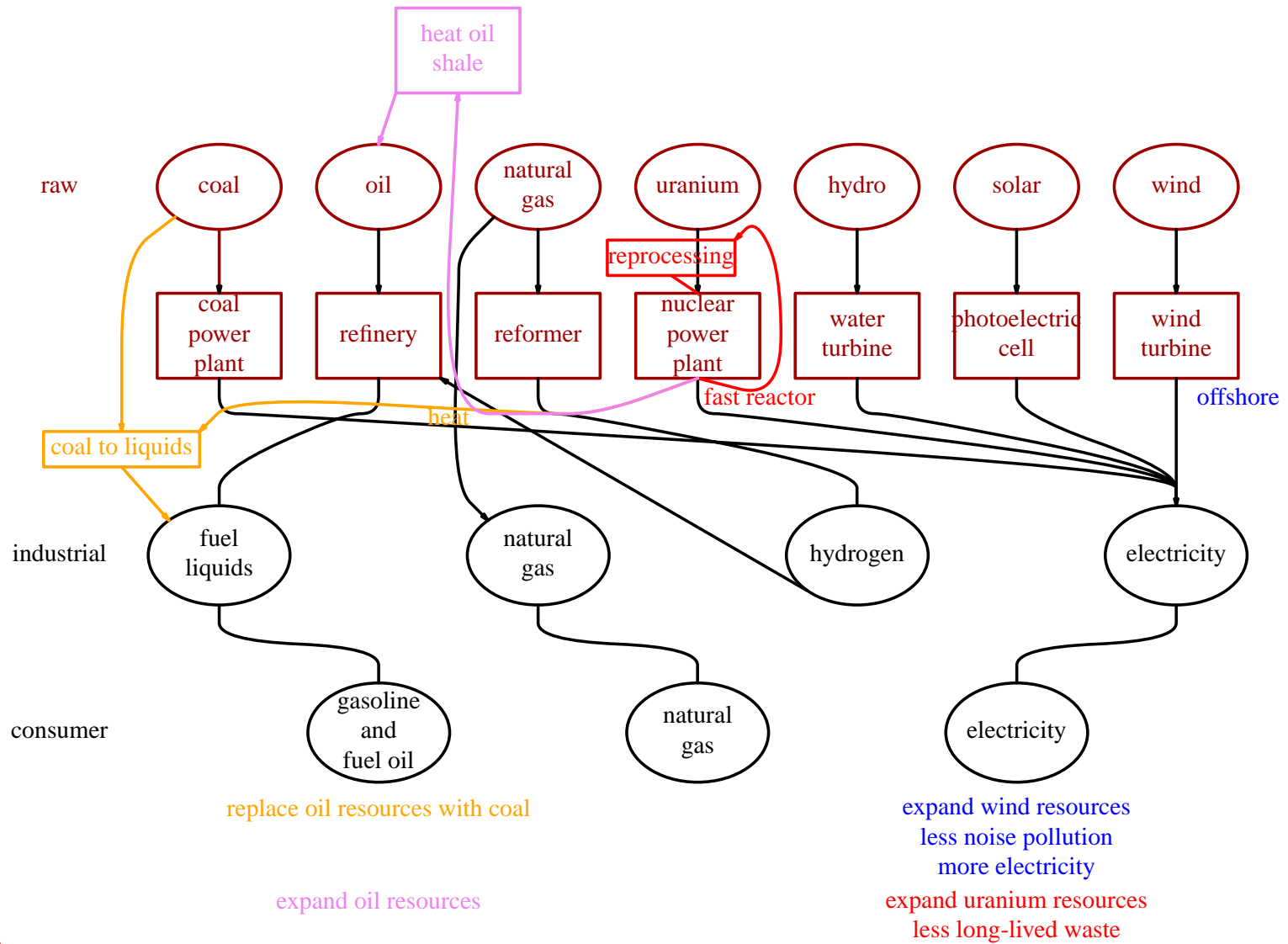


expand wind resources
less noise pollution
more electricity
expand uranium resources
less long-lived waste

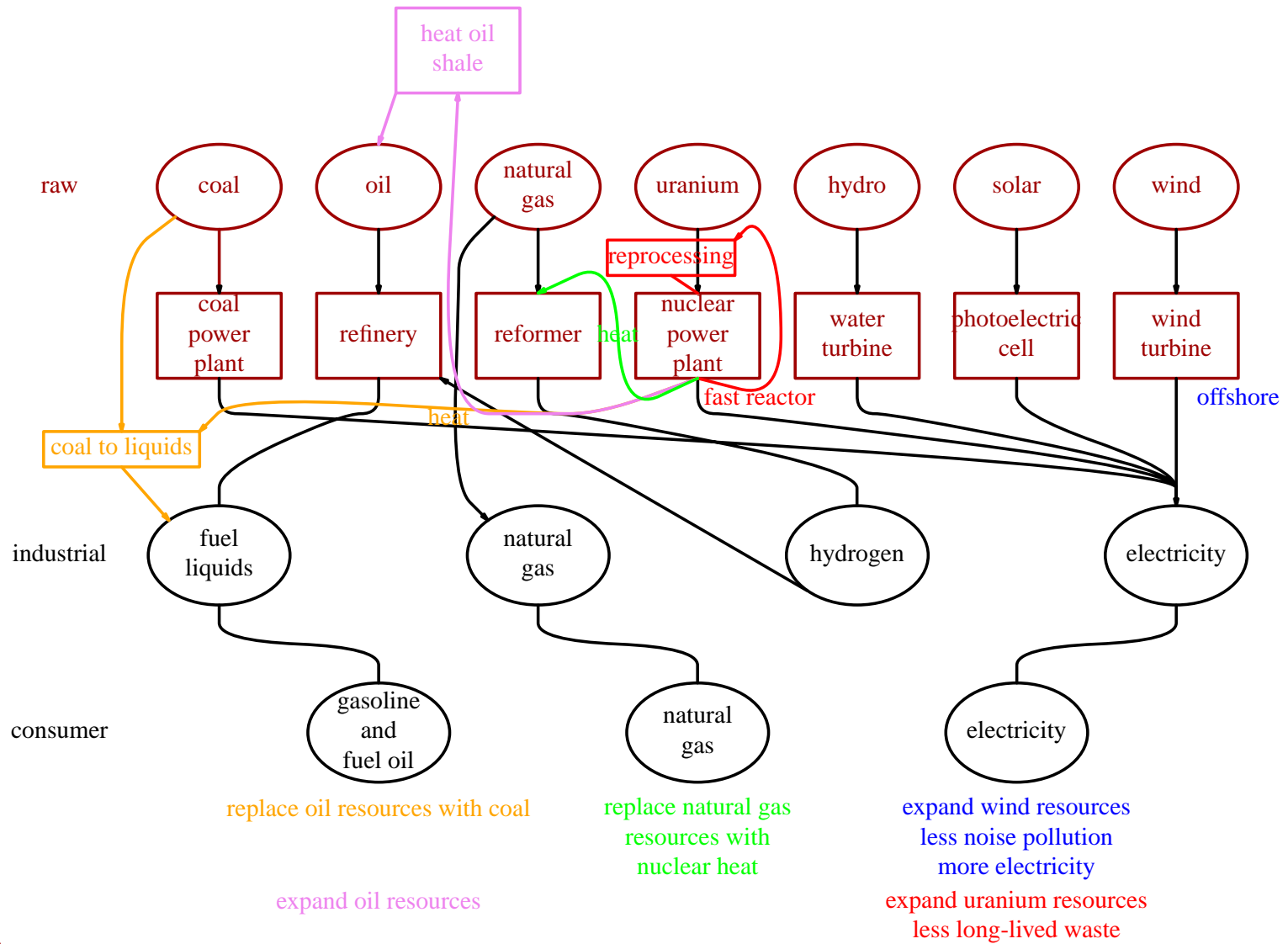
Energy Technologies Required



Energy Technologies Required



Energy Technologies Required



Examples of AREVA Investments Which Contribute to US Energy Independence

- ▶ **Use nuclear heat source for coal-to-liquids**
- ▶ **Use higher-temperature reactors for greater thermal to electric power conversion efficiency**
- ▶ **Use supercritical fluids for more efficient thermal to electric power conversion**
- ▶ **Use reprocessing and fast reactors to address nuclear waste issues**
- ▶ **Use fast reactors to extend the uranium resources**

Energy Independence

▶ **Requires**

- ◆ **New technologies**
- ◆ **Replacement of some resources with others**