

Moving from Oil and Coal to Renewable Energy for Transportation and Society

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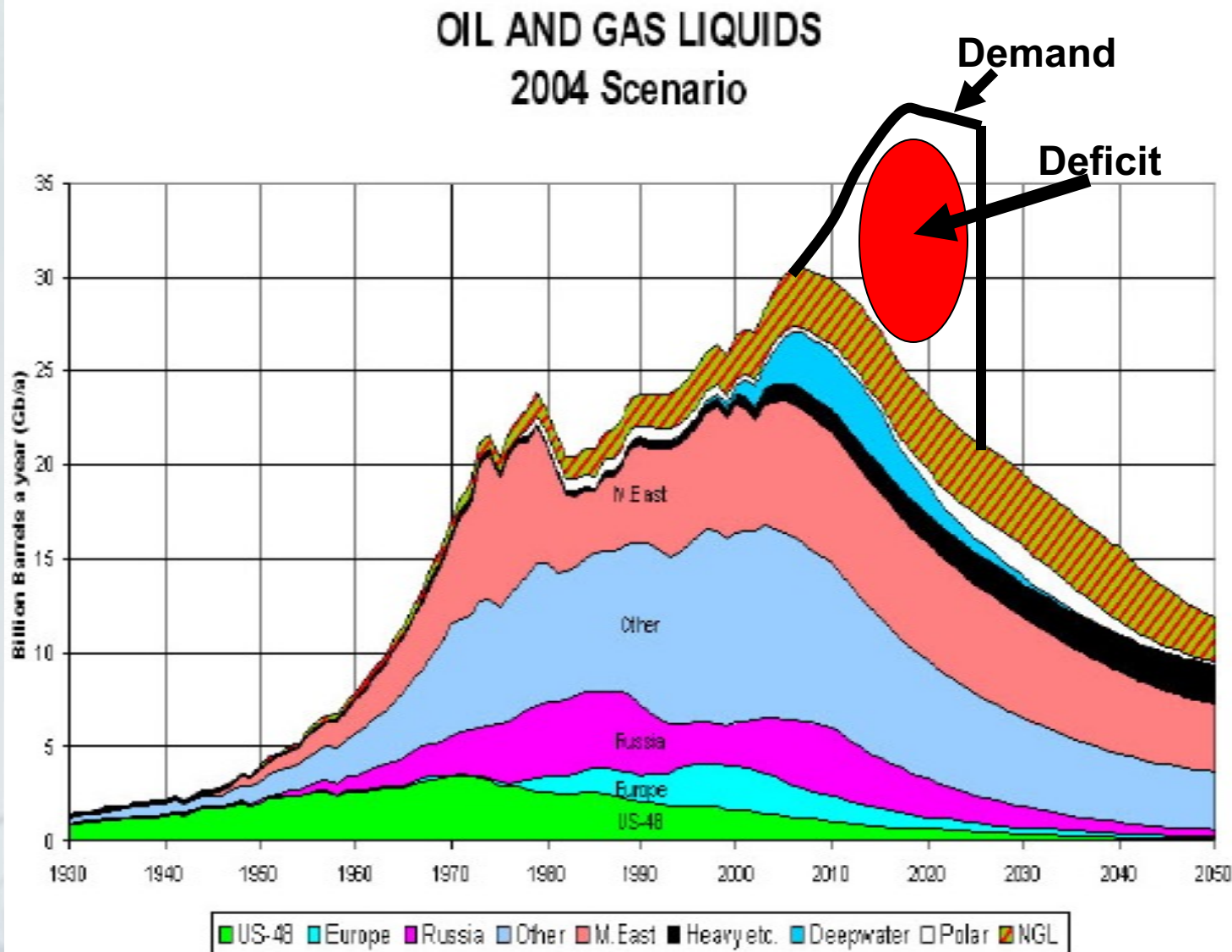
Why??

- World oil supply with conventional recovery is peaking with supply disruptions possible
- Coal is creating vast pollution and CO₂ problems
- Cost of oil will rise exponentially in time with energy security issues
- Need to go to much lower cost energy sources for transportation and all stationary power and energy uses by Solar, Wind, Hydro, and Nuclear



Oil and Gas Liquid Scenario

2004 Peak at 2007 --- US D.O.E. 2005



United States
Department of
Energy, 2005

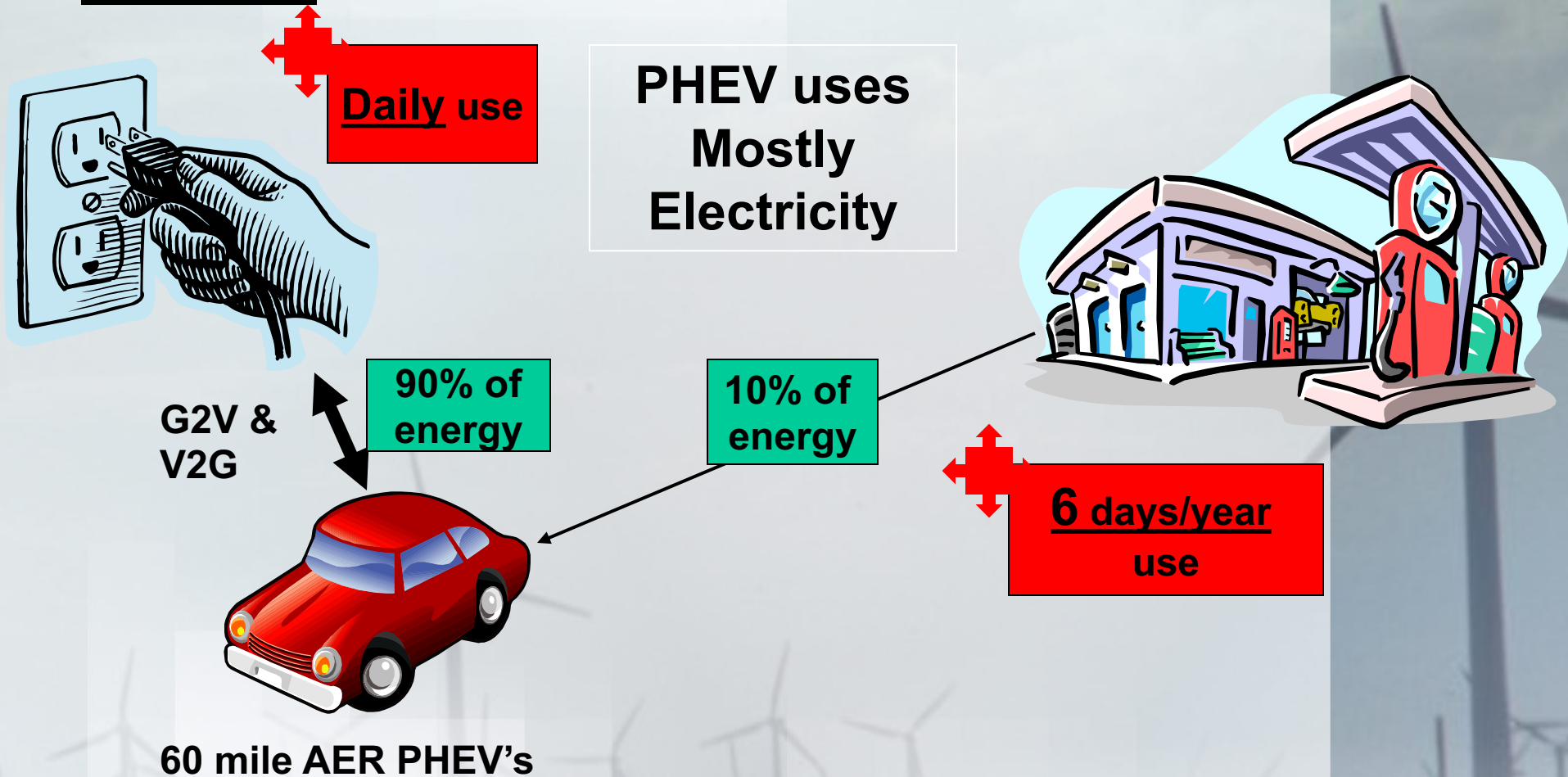
Thus:

- The deficit in oil and increasing demand will cause prices to sky rocket and loss of energy security with possible **disruption!!**
- But demand will rise faster than new recovery processes can be developed this only delays the inevitable – The need to shift from using Oil to Electricity --- **ASAP!! We cannot drill more!!**
- Only the PHEV can allow this transition to take place seamlessly in the time we have!!

What we will talk about

- **The Plug-In Hybrid PHEV as a basis for the shift from oil to electricity for transportation**
- **The PHEV to improve current electric generation efficiency and costs**
- **The PHEV to displace, oil & coal.**
- **The PHEV to allow solar and wind to power Our Entire Society**
- **Using Oil and Coal for Higher Value mass produced products than energy!**

Energy Infrastructure for the PHEV is the Existing Standard 120 volt GFI plugs (1.5 to 2KW) and gas stations

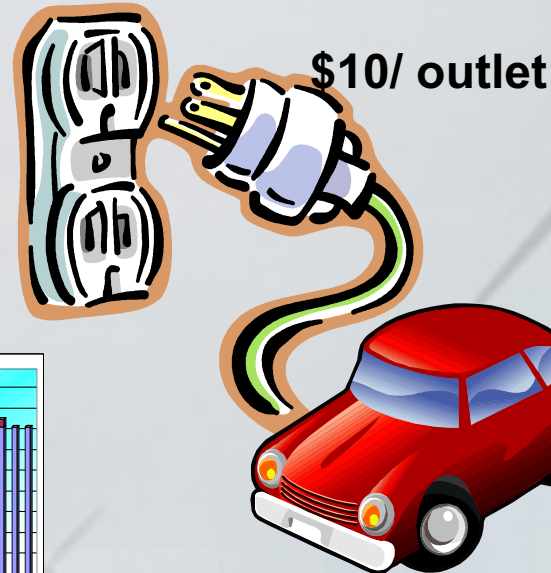


Electric Grid Improvement- Current system can provide same power but 30% more energy



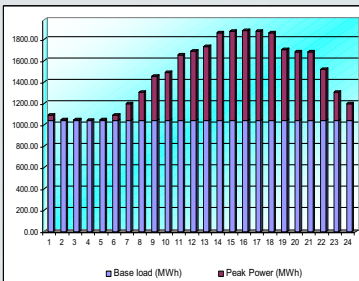
\$3000/substation

Grid managed
Intelligent controller
for the PHEV and
energy storage
outlets

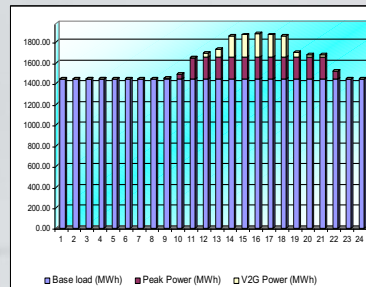


**V2G &
G2V**

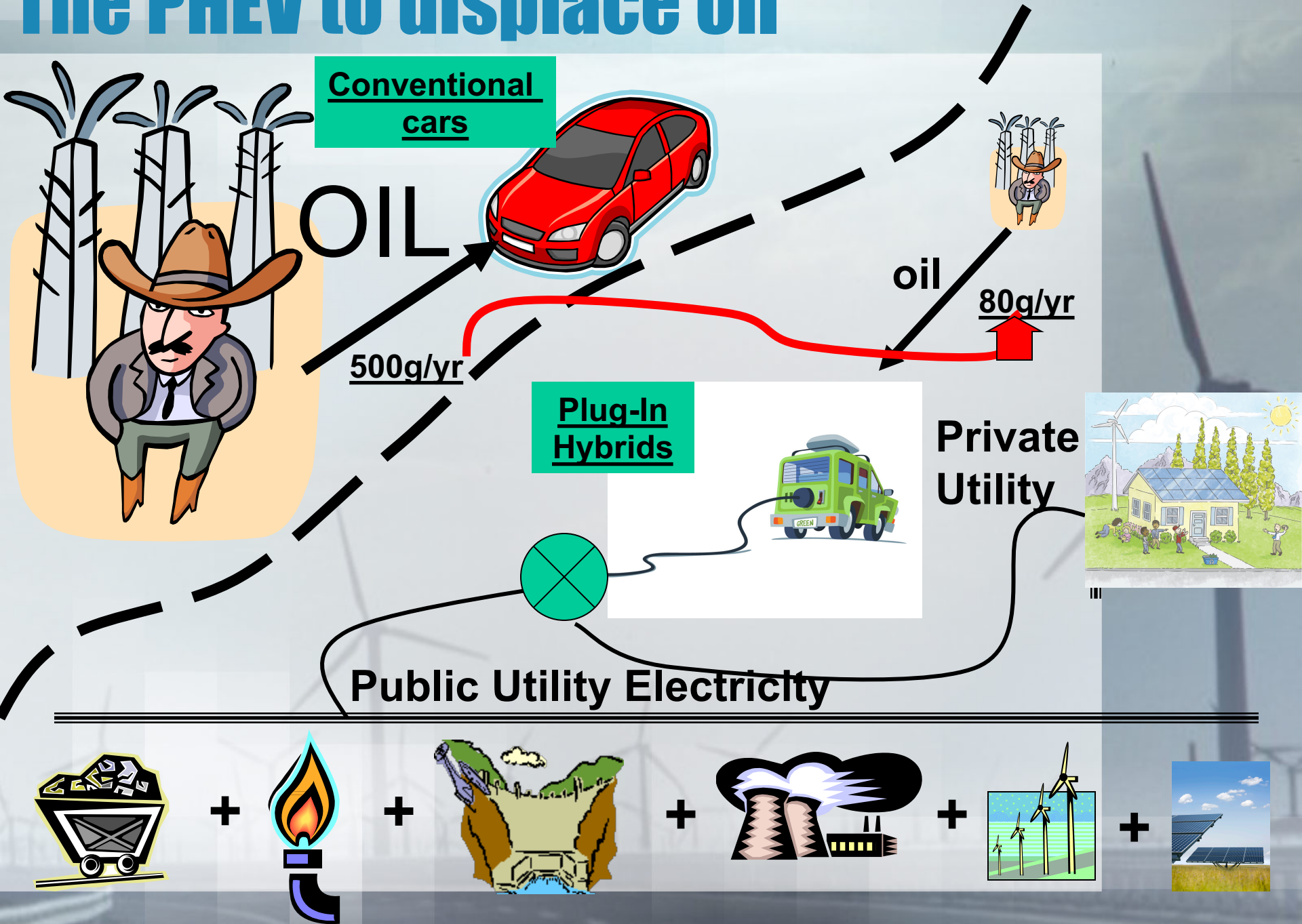
Before
intelligent
control



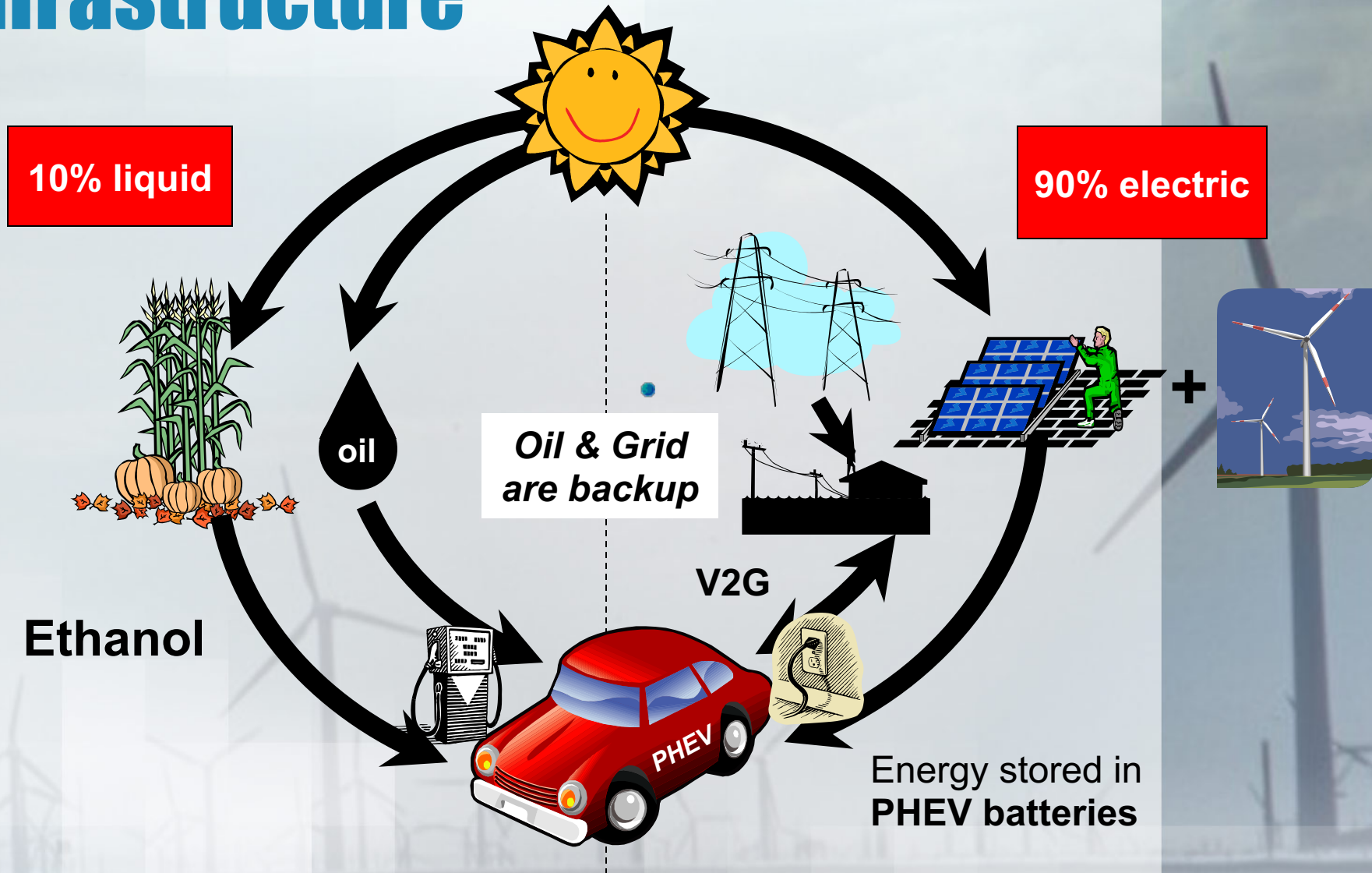
After
Intelligent
control with
only
20%PHEV's
in society



The PHEV to displace oil



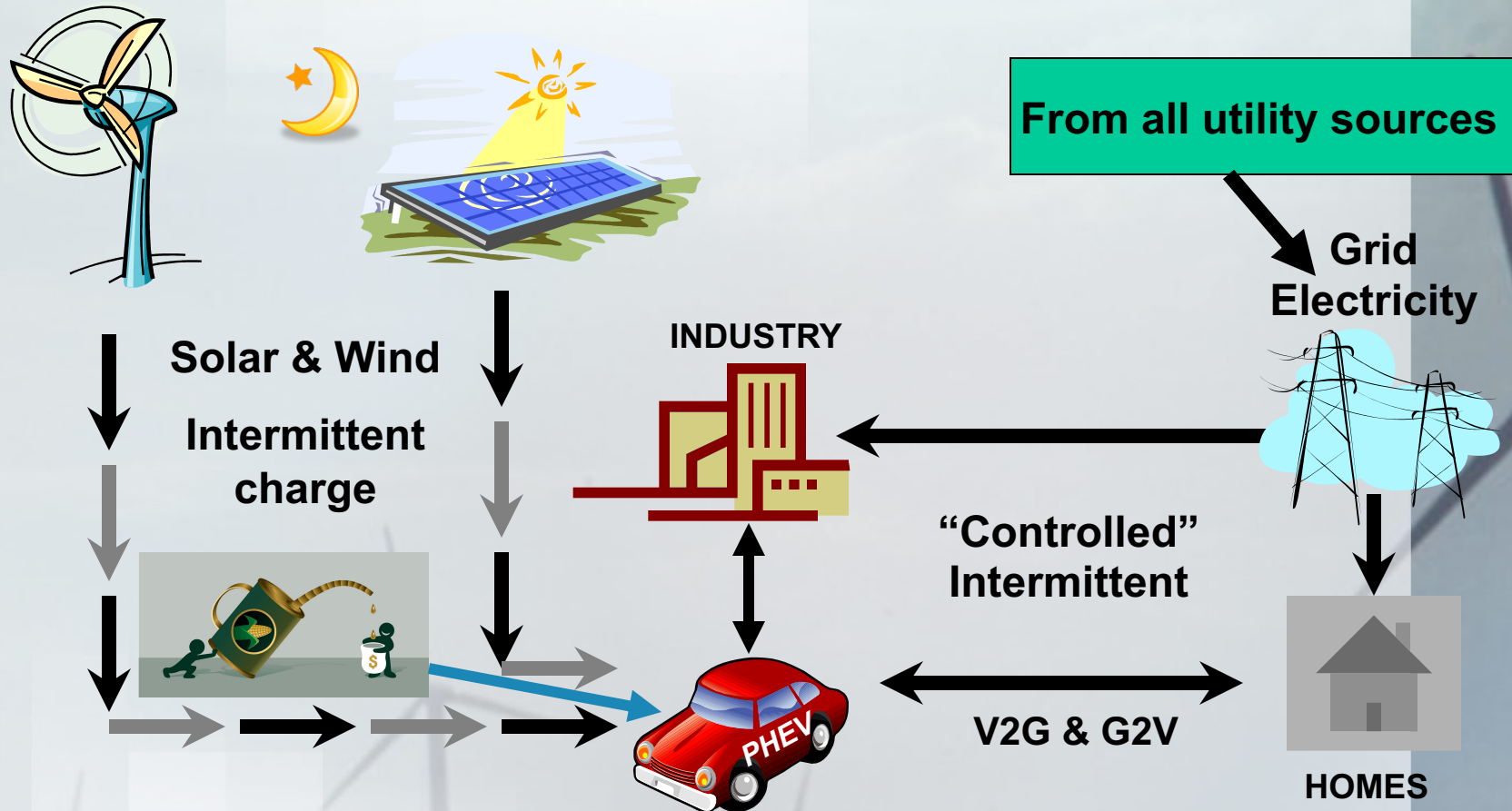
The PHEV Energy Loop and infrastructure



CONFIDENTIAL

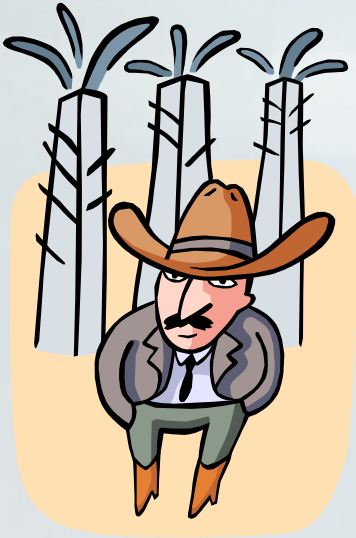
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Solar and Wind integration with PHEV and Electric Grid -- Powers **Entire Society**



Energy stored in PHEV car Batteries are capable of storing weeks of energy reserve for the Nation

Oil and Coal for High Value products



Chemistry



**Synthetic
Wood**



Oil
+ ➡ +
Coal



Save Forests



**Oil and Coal Not
used for Energy!!**



Conclusion

The PHEV Will:

- Provide a Seamless transition for Society from Oil and Coal to Solar, Wind and renewable Bio-liquid fuel
- Create New Industries for More Jobs
- Reduce Energy Cost by an order of magnitude resulting in a much more affluent society — Solar and Wind will be less than Coal to Electricity in less than 4 years--Already less than 1/6th the cost of gasoline at the pump!!

PHEV Engineering: EDI and 40 yr. Team Fate/Prof Frank Timeline



1965



"Aftershock"

1993



1998

"Coulomb"



2002

"Yosemite"

Univ of Wisconsin

UCDavis

1972

Urban Car Challenge



"Joule"

1996



"Sequoia"

2000



"Trinity" 2005



Conclusion

- **Battery technology is here and good enough- Plenty of lithium in the world!!**
- **Powertrain technology by EDI, GM, Toyota has shown that there are no barriers**
- **We must move the World toward the PHEV's, with Solar and Wind and Bio-fuels in high volume production ASAP if we are to be able to meet rising fossil fuel prices and ameliorate CO₂**
- **Need to get PHEV into society in mass production world wide Now!! EDI's objective!!**

