

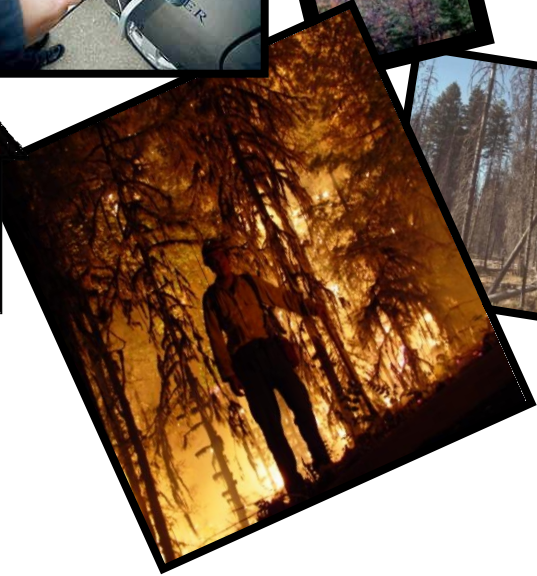
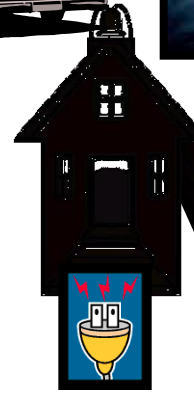
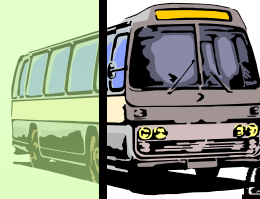
BIOFUELS:

A Restoration and Invasive Species Management Tool With \$\$ Potential

Kristiina Vogt

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Its NOT JUST Biomass Utilization



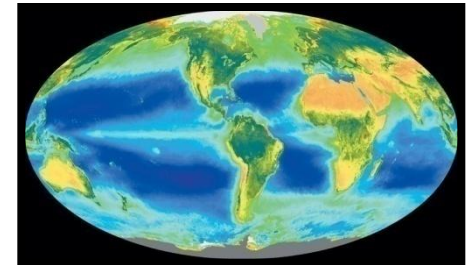
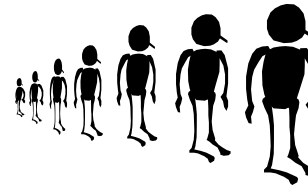
Energy Security

Higher Paying JOBS, New Markets

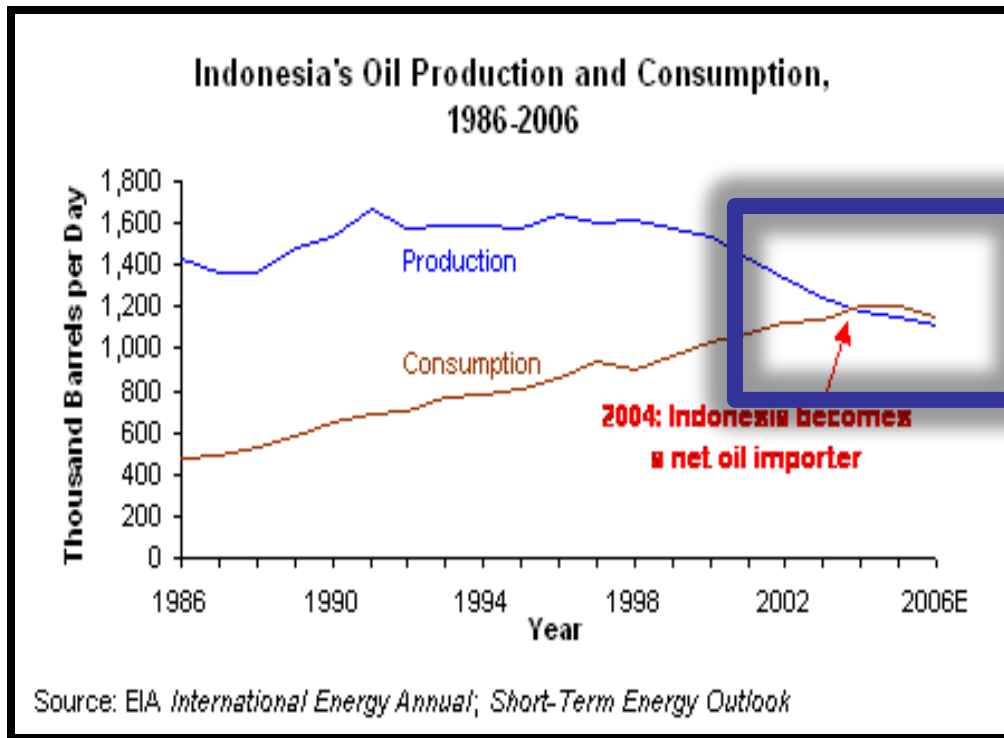
Climate Change Mitigation

**Maintaining & Restoring
Environmental / Ecosystem
Services and Human Health**

Reduction in Fire Risk



Indonesia Energy Supply



Oil

- 63% of its energy is produced from oil
- Will be exhausted within 18 years without new reserves

Indonesia is at the turning point of changing from an **oil exporter** to a **net oil importer**

Indonesia: Biodiesel Production



Forest fires and forest conversion



Unintended Consequences

- 1.8 million hectares of natural forest converted to palm oil plantations (WWF, 2007)
- Palm oil mostly exported to EU

Issues Hindering Biofuel Adoption

- **Competition between food and energy**
- **Growing plants potentially invasive**
- **Large Resource footprint to collect biomass and its lack of availability**
 - Oils for biodiesel production in Seattle coming from Malaysia, Indonesia, Canada, mid-west US
- **Transportation costs economically prohibitive as distance to facility increases**
 - California logger going > 200 miles but only because state paying well (even using helicopter logging)

Food or fuel? It's the ethanol battle

BY TODD MURPHY

Pamplin Media Group, Aug 14, 2008



Corn production for ethanol ... blamed for ... increasing food costs, .. critics suggest ethanol ... **produce more greenhouse gases than gasoline.**

... **United Nations food expert recently described ethanol** as “a crime against humanity.”

.. an unpublished July 2008 ... **World Bank report concluded ... ethanol production, especially in US, .. raised world food prices by 75% last six years.**

The race for nonfood biofuel. High gas prices and politics push companies toward the 'holy grail' of biofuel: cellulosic ethanol.

By [Mark Clayton](#) | Staff writer of The Christian Science Monitor / June 4, 2008 edition

<http://features.csmonitor.com/environment/2008/06/04/the-race-for-nonfood-biofuel/>

Invasive Species??



GM and Coskata Partner In Syngas-to-Ethanol Technology

13 January 2008

<http://www.greencarcongress.com/2008/01/gm-and-coskata.html>

A pilot plant ..in operation ..fourth quarter .. 2008. GM will use the fuel in testing vehicles at GM's Milford Proving Grounds. **Coskata expects .. first commercial-scale plant .. capacity of 50-100 million gallons of ethanol per year running in 2011.**

Coskata .. proprietary process .. patented microorganisms .. bioreactor .. to produce ethanol .. any carbon-based feedstock, including garbage, old tires and plant waste, .. **less than \$1 a gallon** — about half of today's cost of producing gasoline.

How much biomass is needed for 1 facility?

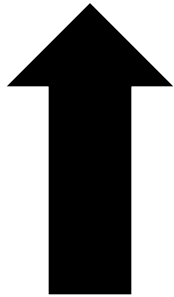
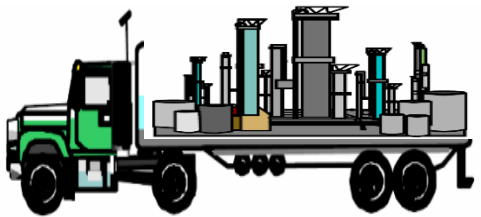
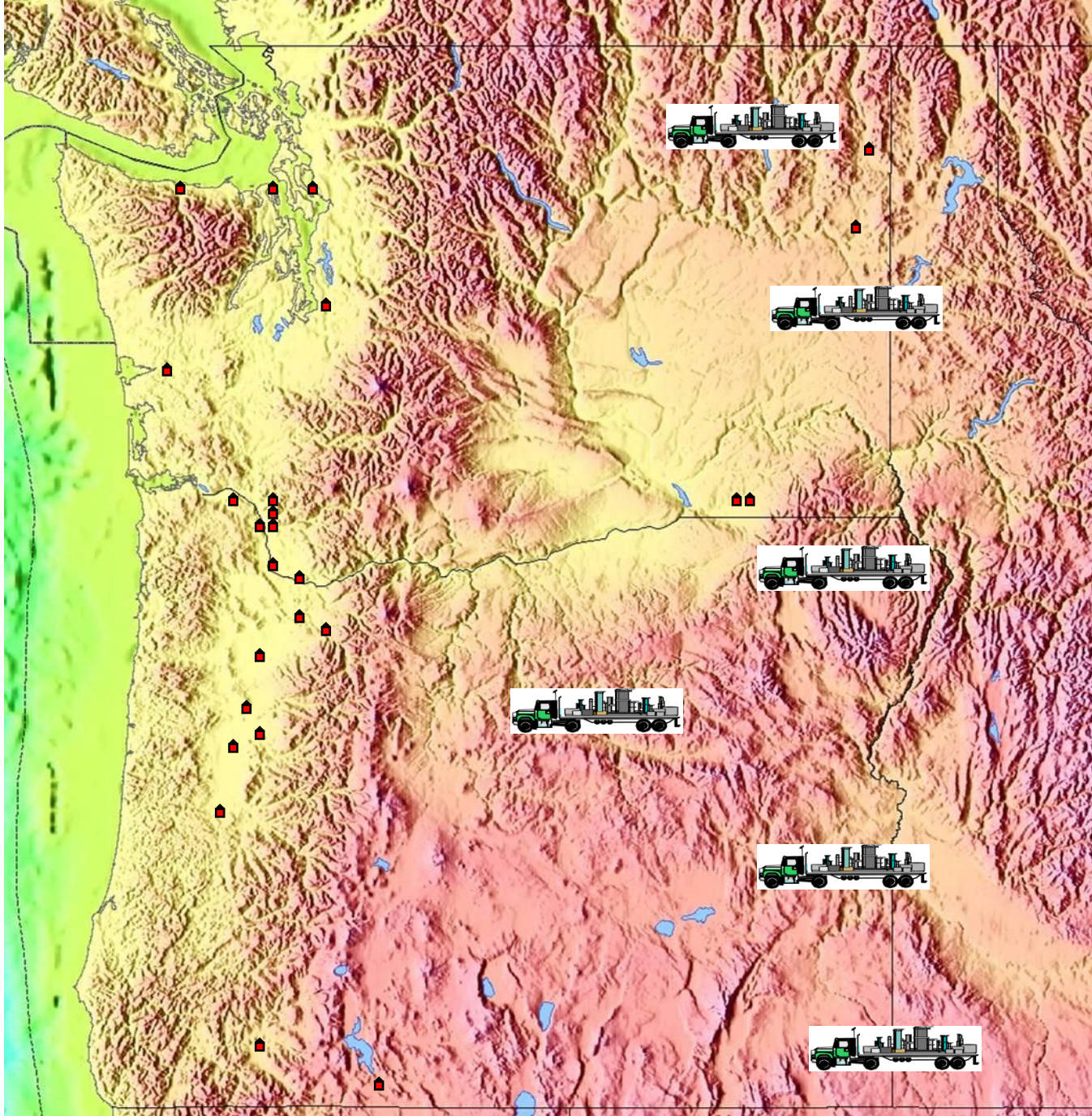
Fuel needed for Wood Biomass plant in Nevada (Ind. Report)

An \$8,300,000 US biomass plant previously identified in our Sept. 29, '06 issue that was expected to provide power for two Nevada state prisons has been unable to **operate on a full-time basis due to a lack of wood. (Source: Nevada Appeal, Mar. 24, '08)**

Biomass use is amenable to distributed biofuels production

Biomass Types:

- **biomass wastes**
- **sustainably collected materials**
- **invasive species**
- **microbially or chemically contaminated materials**

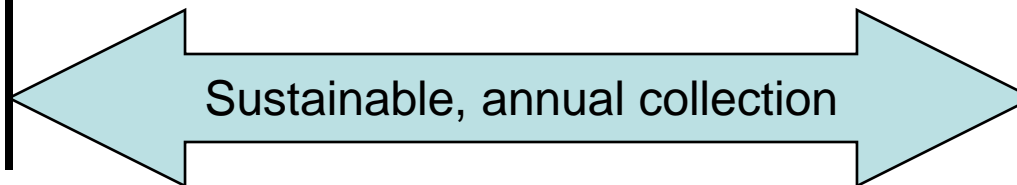


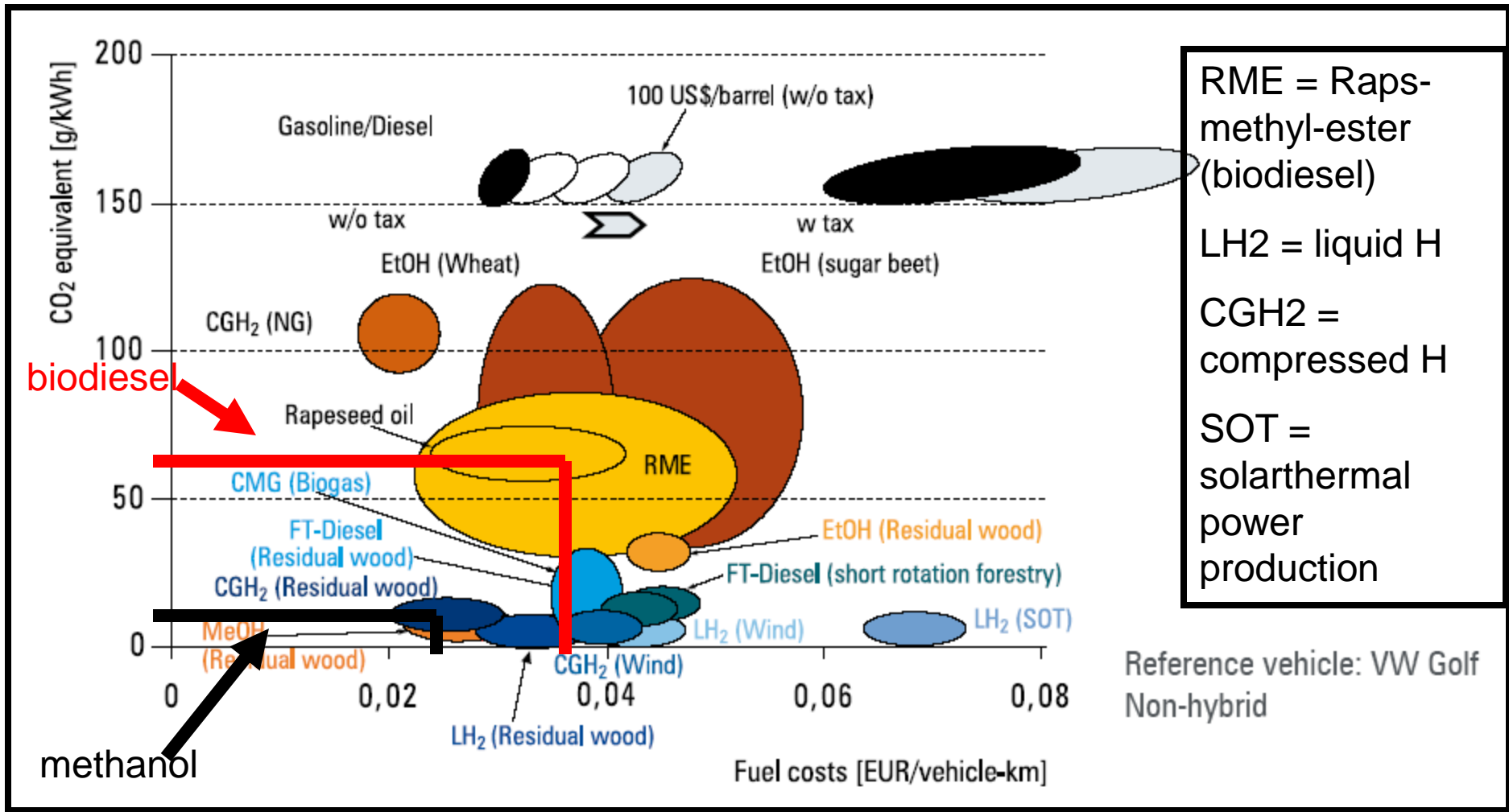
**A new kind
of infra-
structure!**

% Total State Gasoline substituted by Bio-methanol

Primary Power: **coal = red**; **hydroelectric = green**; **gas = blue**

	MSW	Ag Waste (used 25%)	Forest Waste (bone dry tons/yr x 1,000,000)	Forests with High Fire Risk (2-7 inch diam)
California	40	4	28 (26.8)	119
Colorado	4	3	2 (0.3)	358
Idaho	11	42	145 (5.9)	1796
Montana	13	23	68 (21.6)	1808
New Mexico	3	1	4 (0.2)	513
Oregon	18	10	136 (12.7)	886
Washington	20	12	48 (8.1)	337
Wyoming	3	1	16 (0.3)	340

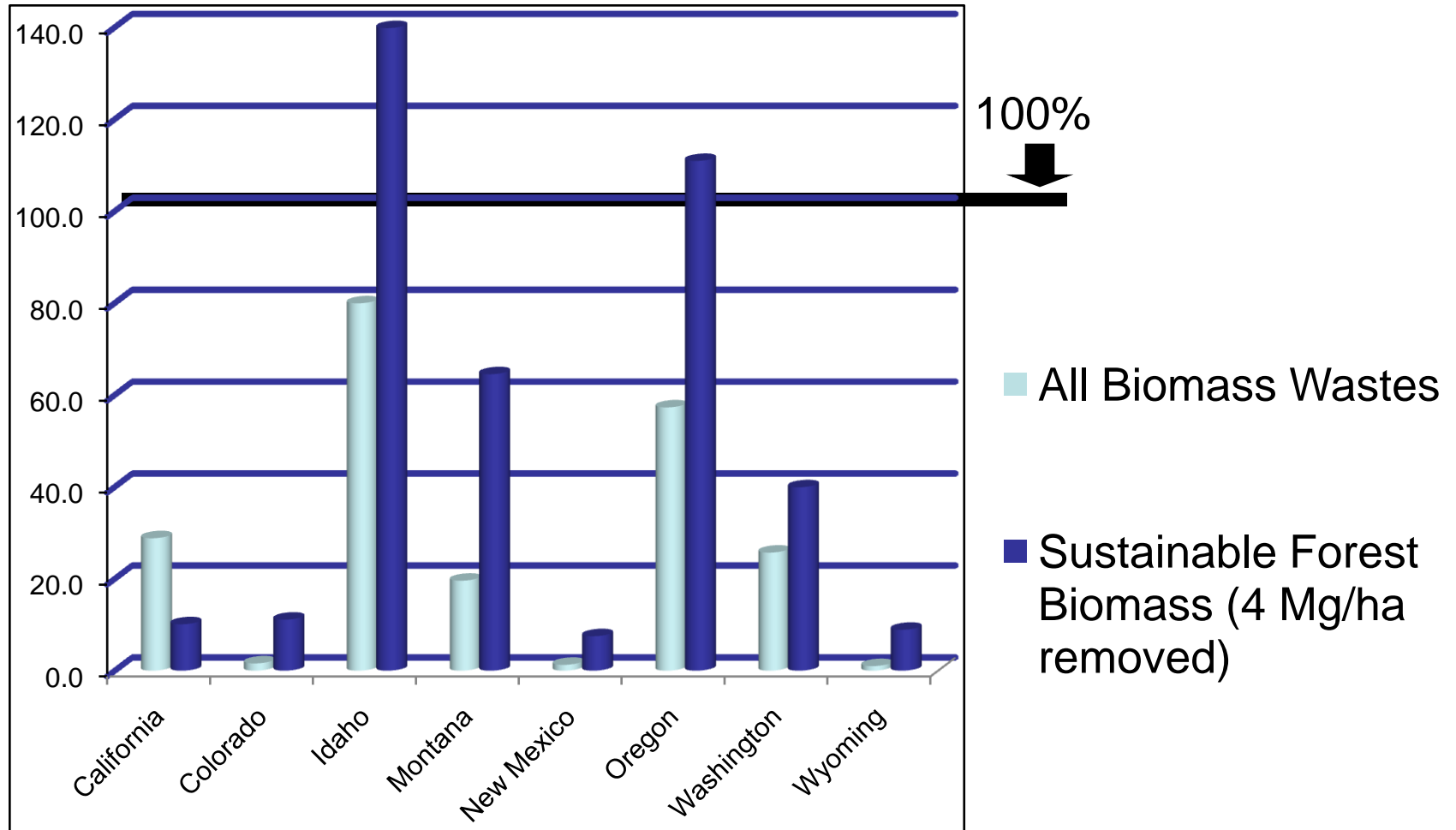




Compares costs of various fuels “Well to Wheel” for vehicle km traveled and the greenhouse gas emissions of the fuels

Schindler J, R Wurster, M Zerta, V Blandow and W Zittel. 2006. Where will the energy for hydrogen production come from? – Status and alternatives. European Hydrogen Association, Ludwig-Bolkow-Systemtechnik GmbH (LBST), Ottobrunn, Germany

C Emissions Avoided Substituting Bio-methanol for Gasoline



FACTS – cost to buy METHANOL

- wholesale price of **\$2.10/gal** (Methanex February 2008)
- **\$3.75/gal** (Montana biodiesel producers price for mid-volumes, >1,000 gallons)
- **\$13.63/gal** when buying <1 to 5 gallons (www.shopping.com)

ASSUMPTIONS:

1 ton of wood = 160 gallons of methanol

625 tons of dry wood needed annually per 1 plant producing 1,000,000 gallons of biodiesel per year

SELLING METHANOL to a 1,000,000 gallon biodiesel plant:

- **At wholesale price would return \$210,000/year**
- **At non-wholesale price would return \$375,000/year**

[NOTE: Non-wholesale price paid by Montana biodiesel producers is \$3.75 but \$1.00 subsidy from federal government]

Wednesday, September 12, 2007

Sweden signs biofuel accord with Brazil; abolishes tax on imported ethanol

Both governments will also work together to help African countries become biofuel producers who can supply global markets. Sweden is thus creating the kernel of a genuine 'biopact'.

**Someone will
Supply the Demand**



**Will it be BIOFUELS
from Biomass Wastes?**

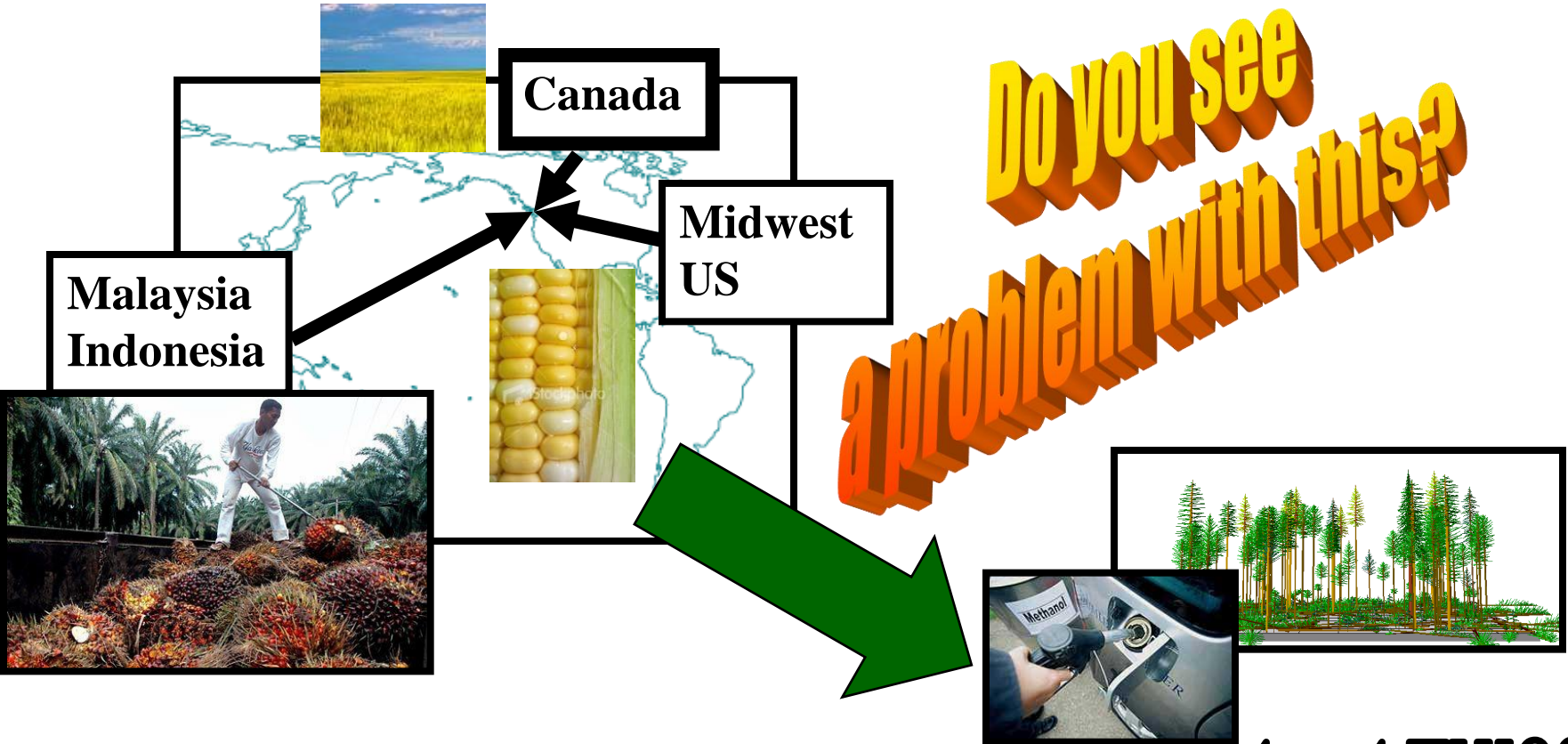


Transportation sector **emits 22%** of the global CO₂ emissions and **consumes 25%** of the world's energy (Azar and Rodhe 1997, Azar et al. 2003).

**Driver for
BIOFUELS**

\$4 per Gallon Gas Has Arrived

Seattle Biomass Sources for Ethanol and Biodiesel Production



**Seattle Biodiesel
= \$6/gallon**

But not THIS??

In western US, 30% forests are *overstocked*, have *insects* (bark beetle) & high *fire risk*



STILL Need to
manage invasives
species and restore
altered landscapes

BIOFUELS as a Management Tool:

**Helping to Develop a
Sustainable Carbon and Energy Society
from Biomass Wastes and
Invasive Species**