

# The Case For Electrification: An Oil Industry Perspective

Electrifying Transport Conference  
Raleigh, May 27 2009

David Larson

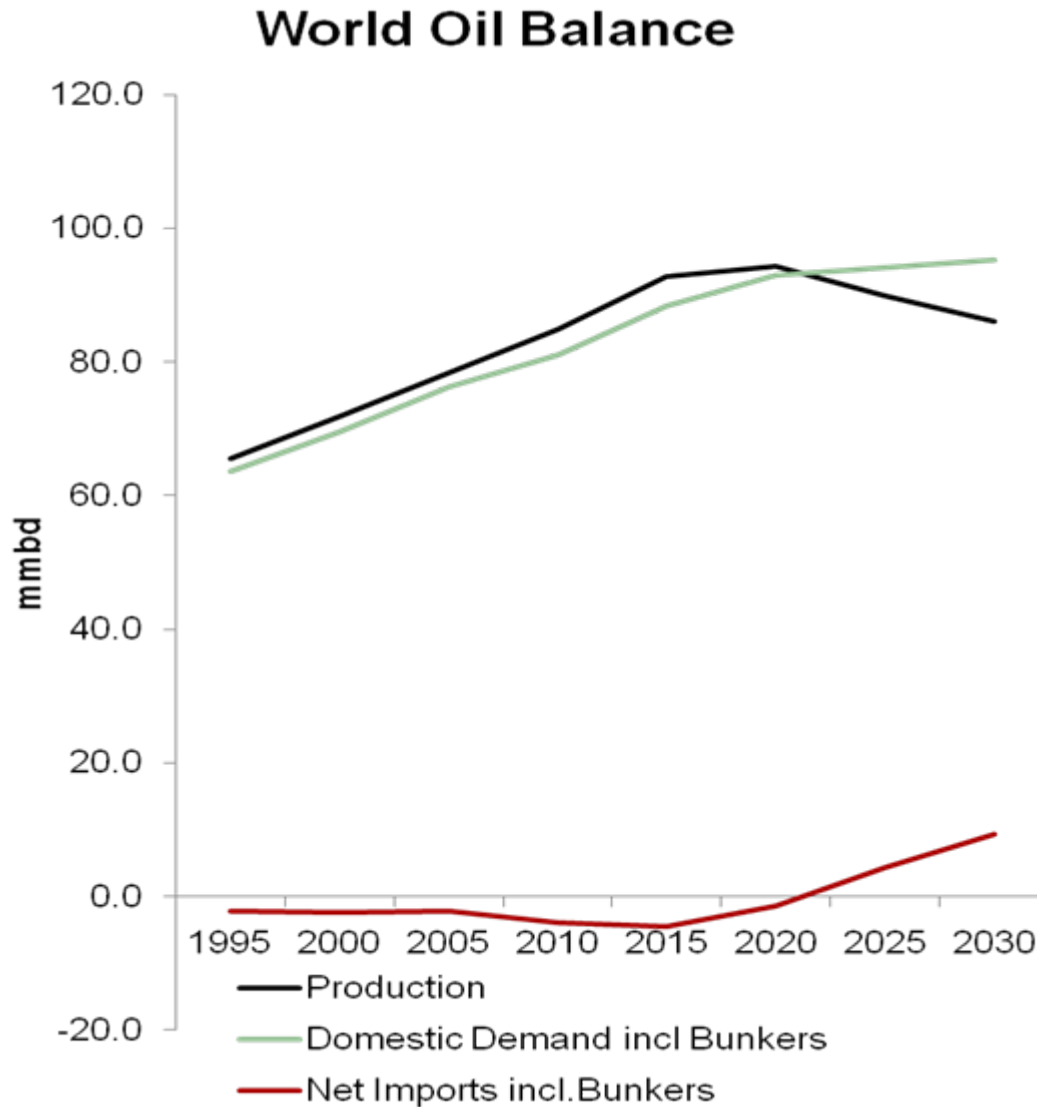
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- **Global oil supply will be inadequate in the longer term, even with pessimistic assumptions for GDP growth and reasonable assumptions for energy conservation and fuel substitution**
- **By ~2020 demand will become impossible to meet without an energy “regime change” that draws on every potential energy source—the alternative will be a crippling economic depression**
- **Most of the fuels that will have to make up for falling oil production—wind, nuclear, coal—are really suited only for power generation**
- **Given the share of transportation in total energy consumption, this means that vehicle electrification will play an essential part in negotiating the impending energy transition**

# The Energy Transition—About 10 Years Away

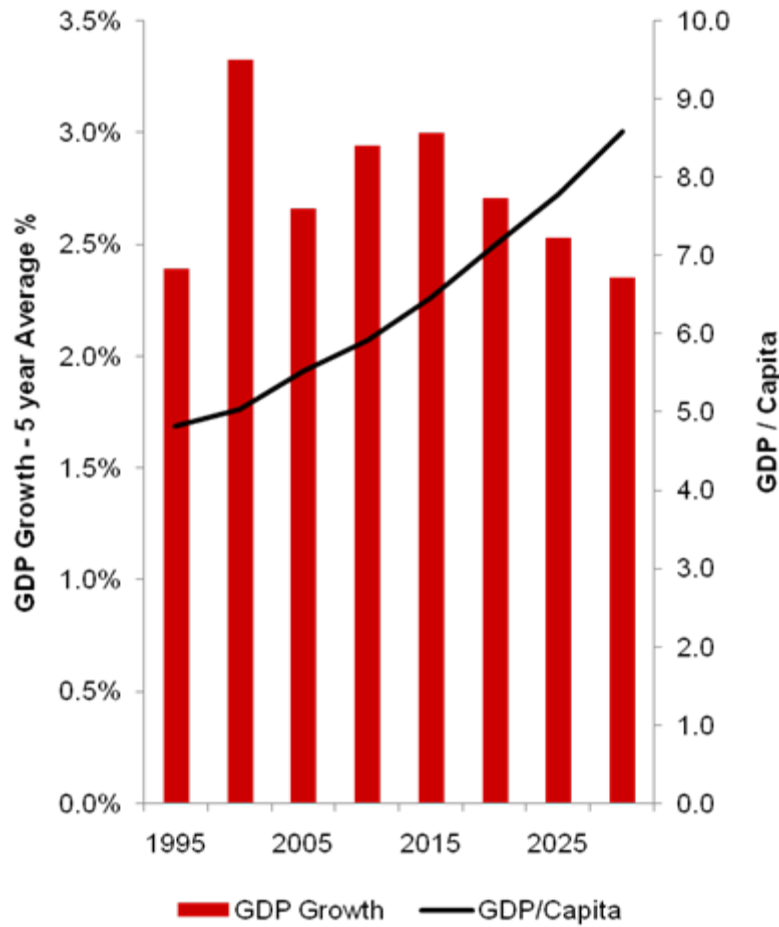
*Demand Must Fall—Unless Alternatives Can Fill the Gap*



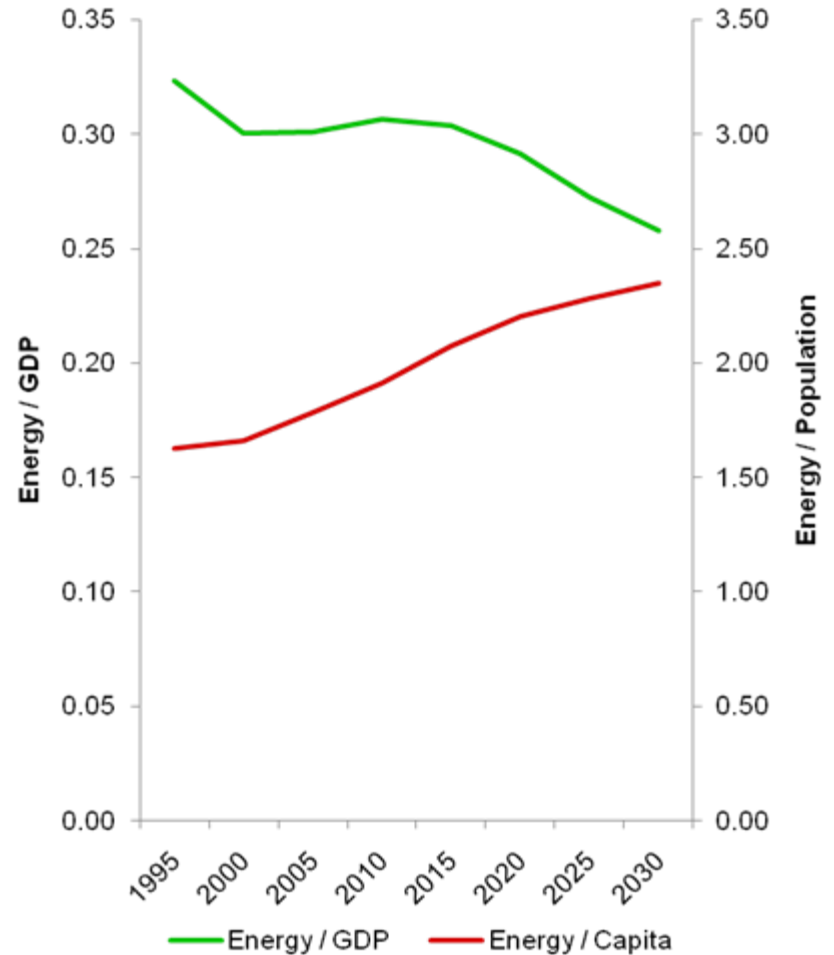
# Slower Growth, Higher Efficiency Won't Be Enough

Forecast Model Incorporates Both, Still Comes Up Short

## World GDP Growth and GDP / Capita



## World Energy Indicators

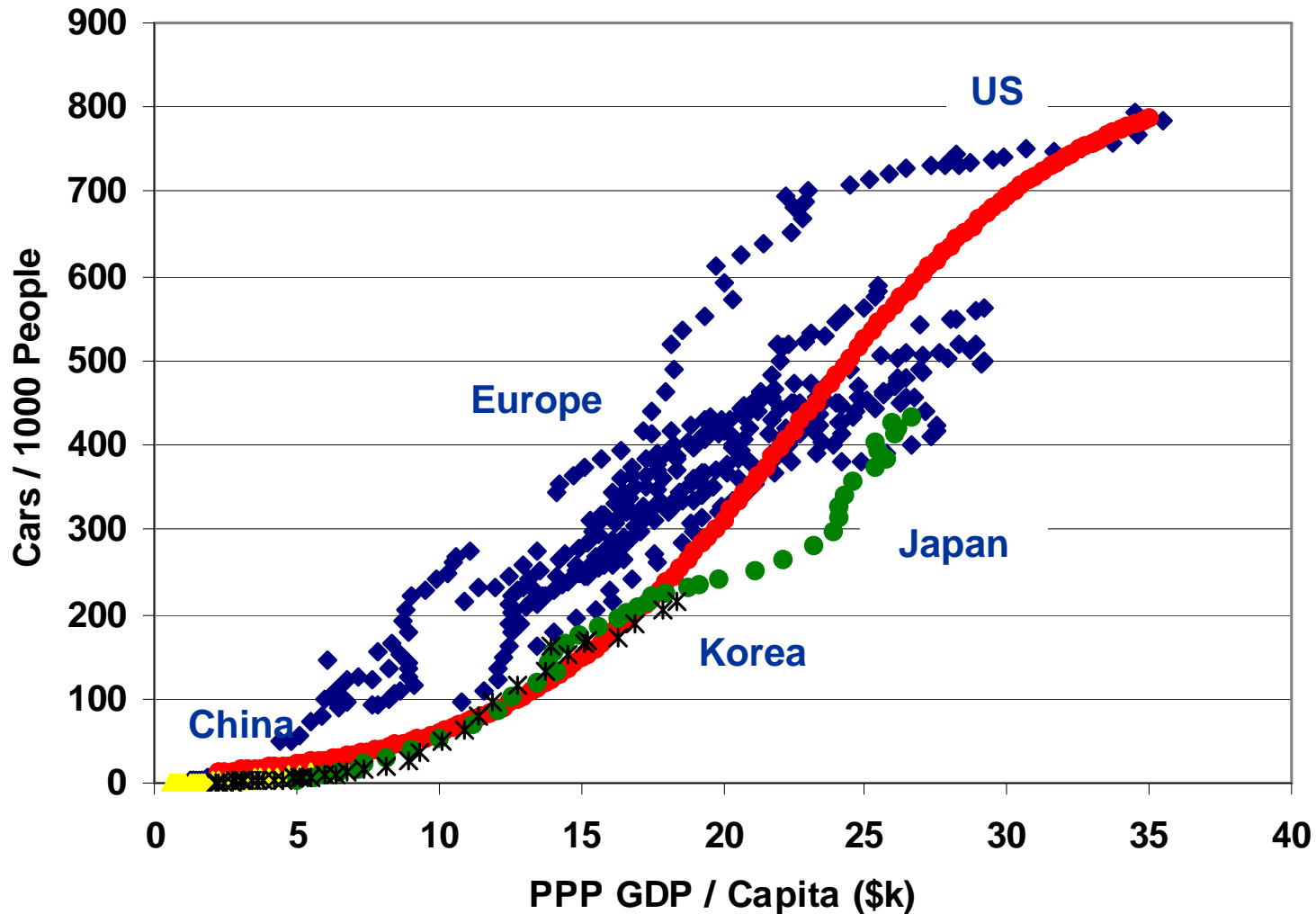


# Private Vehicles—the Heart of the Problem

Growth in Non-OECD Car Fleet Just Beginning

## Cars per 1000 People

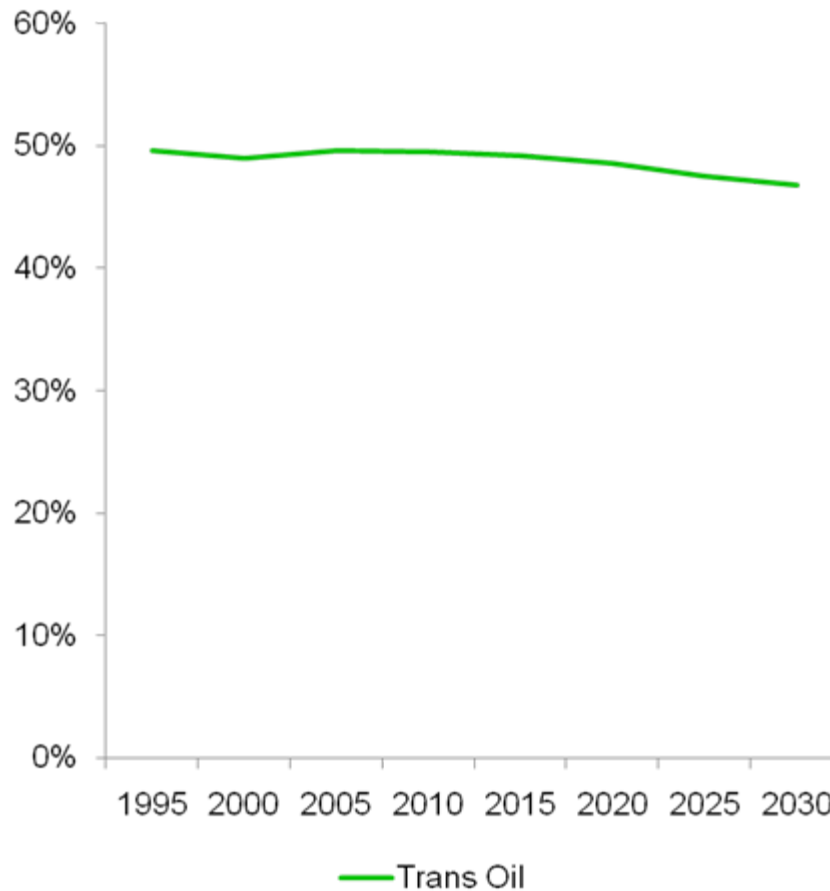
Historical Data through 2003/04



# Running Hard Just To Keep Pace

*With Heroic Efforts, Transport's Share of Oil Use Could Fall a Bit*

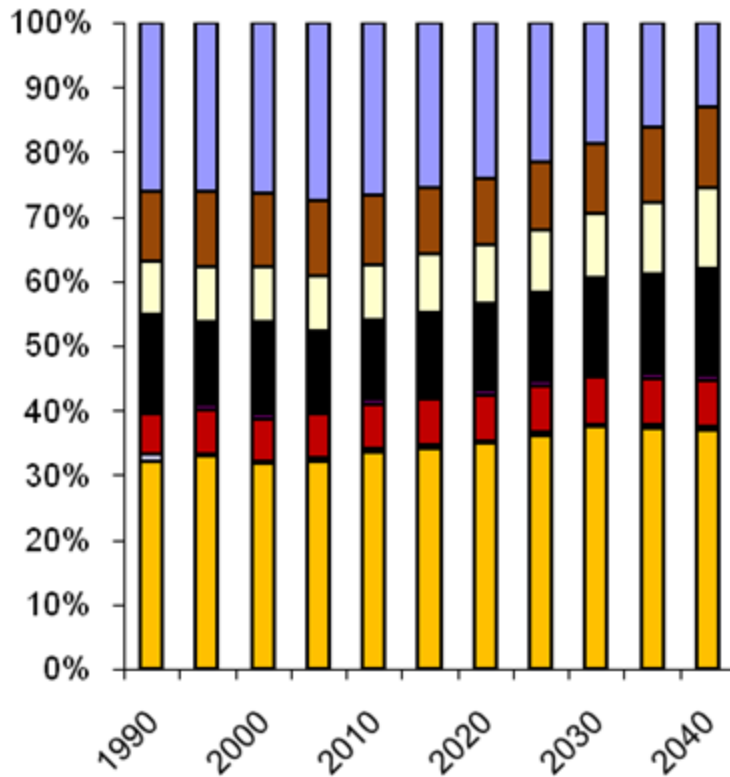
## Share of Transportation in Total Oil Use



# How Declining Oil Might Change the Energy Slate

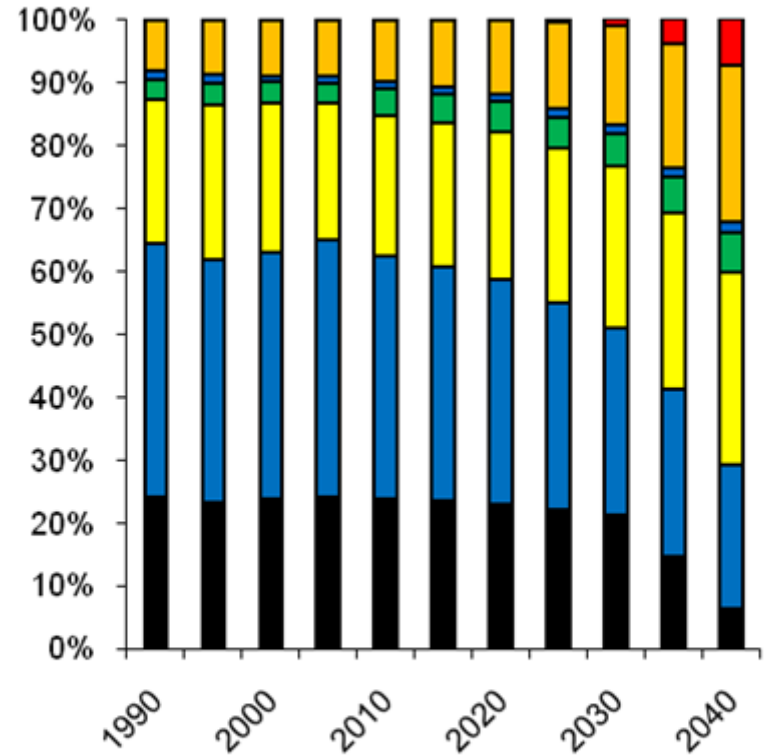
US Primary Energy by End Use and Fuel

## US Primary Energy by Use



■ Power Gen    ■ Other    ■ Non-En  
■ Agr    ■ Ind    ■ Com  
■ Res    ■ Trans

## US Primary Energy by Fuel



■ Coal    ■ Oil    ■ Gas    ■ Biomass    ■ Hydro    ■ Nuc    ■ Solar

Note: In these charts “solar” is a proxy for all non-combustible renewables, including wind

- **Vehicle electrification is especially appealing for the United States:**
  - Geography and infrastructure make heavy reliance on personal transportation vehicles extremely resistant to change
  - Unlike Europe and Japan, public opinion still seems to prefer supply solutions to the possibility of tempering lifestyles
  
- **Could be achieved politically:**
  - Through imposition of adjustments on industry—as the Obama administration has just done with CAFE standards
  - Through a combination of subsidies and penalties designed to encourage switch to an electrical vehicle fleet



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*Main regional offices are shown in blue.*

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