

A white silhouette of a world map is centered on a blue gradient background. The map shows the outlines of all continents.

# Refuse Truck Fleets: Pioneers on the Path to Sustainable Transportation

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Energy Vision**

**Greater Philadelphia Clean Cities**

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# Energy Vision



**Founder: Joanna D. Underwood, former President of the national environmental research NGO, INFORM: pioneer in innovative business practices and preventive solutions**

**Focus of Energy Vision: Sustainable Energy and Transportation**

**Role: Research, Public education, and Collaboration with Government, Business and Environmental Organizations in promoting change**

# A FOCUS ON REFUSE TRUCKS



# REFUSE TRUCKS

## WHY WE FOCUSED ON THESE VEHICLES IN 2000

Despite a decade of growing concern about vehicle impacts - emissions, greenhouse gases, reliance on foreign oil and its economic costs - the huge refuse truck sector remained invisible!

- How many trucks were there and how old?
- What were their environmental/health impacts?
- How much fuel were they using?
- What alternative fuel options did they have?

# REFUSE TRUCKS

## WHAT DID WE FIND IN 2002 IN *GREENING GARBAGE TRUCKS?*

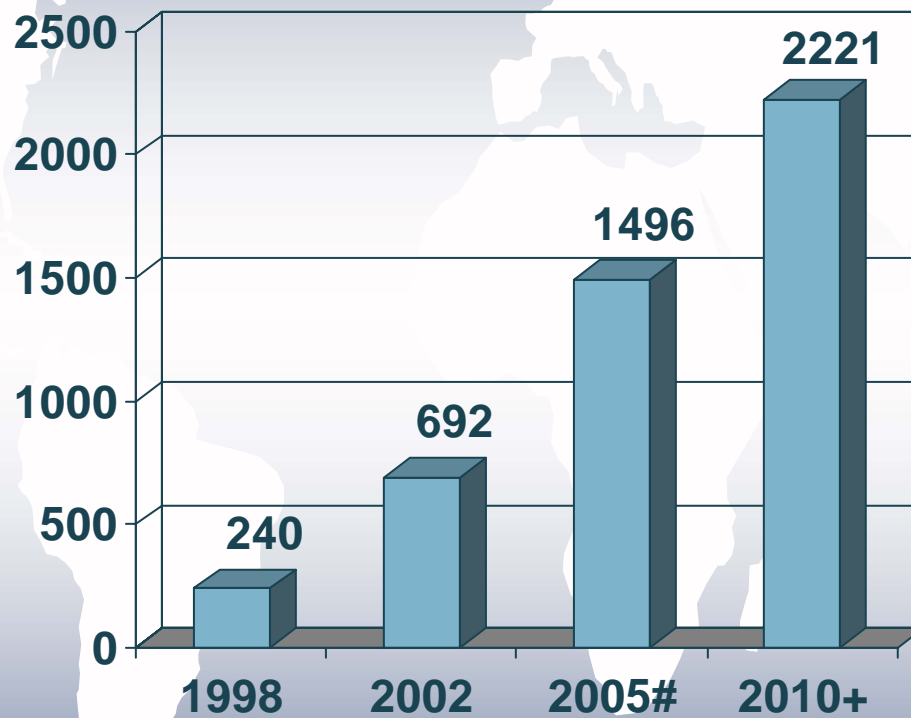
- ✓ **180,000 trucks: refuse, recycling, waste transfer (3x number of transit buses)**
- ✓ **Largely old: some 10-15 years**
- ✓ **Among most concentrated pollution sources in cities: particulates (PM), nitrogen oxides (NOx) & toxic substances-threatening the health of 170 million Americans**
- ✓ **Heavy fuel using duty cycle: just 2.8 miles per gallon!**
- ✓ **692 natural gas trucks found: In 26 US cities, The Netherlands and Yokohama, Japan**
- ✓ ***NGVs – LNG & CNG – CLEANER & QUIETER!***

# REFUSE TRUCKS

## Two Years Later? *Greening Garbage Trucks II*

- ✓ **Natural Gas Trucks doubled to almost 1,500**
- ✓ **Communities Involved doubled: 26 to 57**
- ✓ **Trucks were found in 4 States & beyond:**
  - ✓ **California**                      **1,268 (most LNG)**
  - ✓ **New York City/Texas**              **26/7 CNG**
  - ✓ **Washington DC/Boston**              **3/2 CNG**
  - ✓ **Paris/ Madrid**                      **300/379 CNG**
- ✓ **Downside: Incremental Costs**
- ✓ **Upside: Operators, Drivers, Communities Upbeat**

# EXPANDING USE OF NATURAL GAS REFUSE TRUCKS



# 1,071 identified by fleets; rest by third parties  
+ Industry forecast

# NATURAL GAS TRUCKS

## Near Term Benefits

- **Reliable Performance**
- **Clean – Natural Gas engine meets 2010 NOx standards & 12+% greenhouse gas reductions today**
- **Quiet Trucks – Community wellbeing**
- **Fuel Security – One NG truck displaces 8,900 gallons/yr of diesel with a domestic fuel**
- **Ease of Implementation – Industry Planning and Fuel Infrastructure Support**
- **Affordable - Price Improving/ Gov't Economic incentives**

# 1st 100% NATURAL GAS EAST COAST FLEET

Smithtown, NY Jan. 2007 - 22 trucks



# A Satisfied Truck Seller and Fleet Manager!



# NATURAL GAS TRUCKS VEHICLES FOR A NEW ERA



## LONG TERM BENEFITS

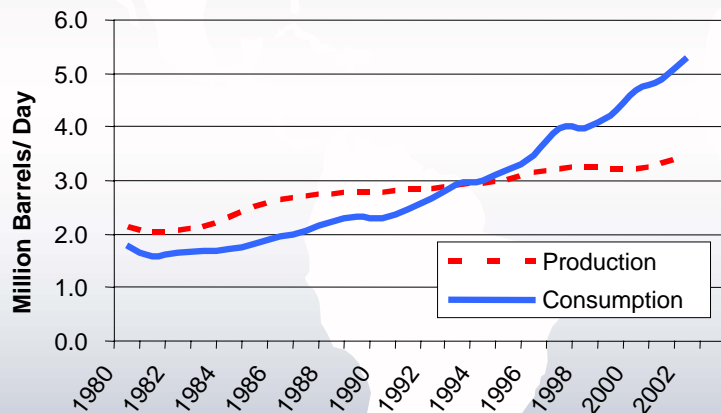
**LEAVING BEHIND THE US'S RISKY RELIANCE ON FOREIGN OIL – TODAY MORE THAN 62% OF CONSUMPTION:**

- **Political Turmoil in the Persian Gulf Region  
(source of 25% of US oil)**
- **Competition for global supplies by China, India, and other parts of Industrializing Asia**
- **World Oil Peaking**

# THE WORLD OIL CRUNCH!

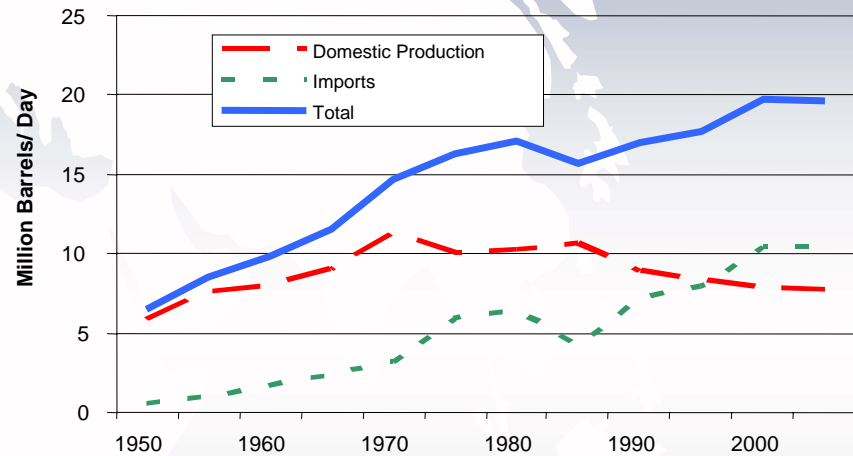
3 Countries (1/3 of all people), with Rising Consumption, vie for Imports

CHINA

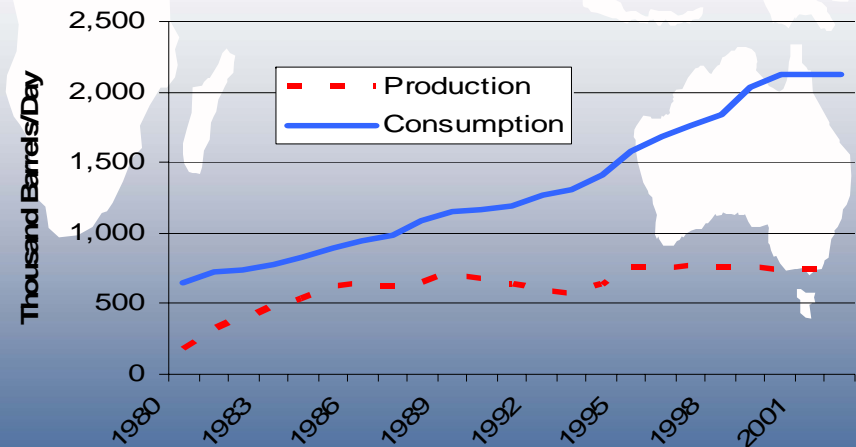


Source: EIA

USA

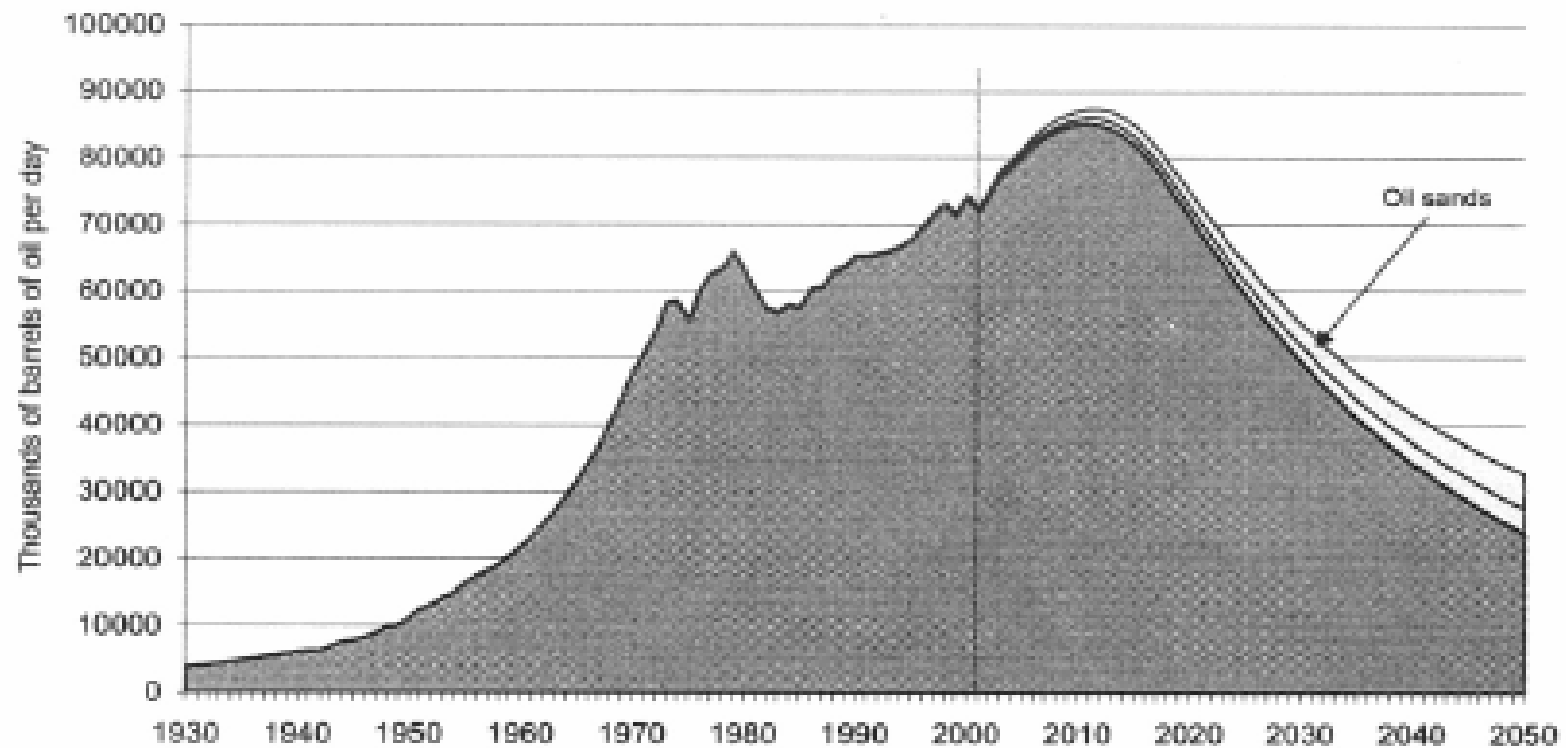


INDIA



# WORLD OIL Extraction Rate Peaking

## Recent Oil Production Forecast



Source: Douglas Westwood

# NATURAL GAS TRUCKS VEHICLES FOR A NEW ERA



## LONG TERM BENEFITS

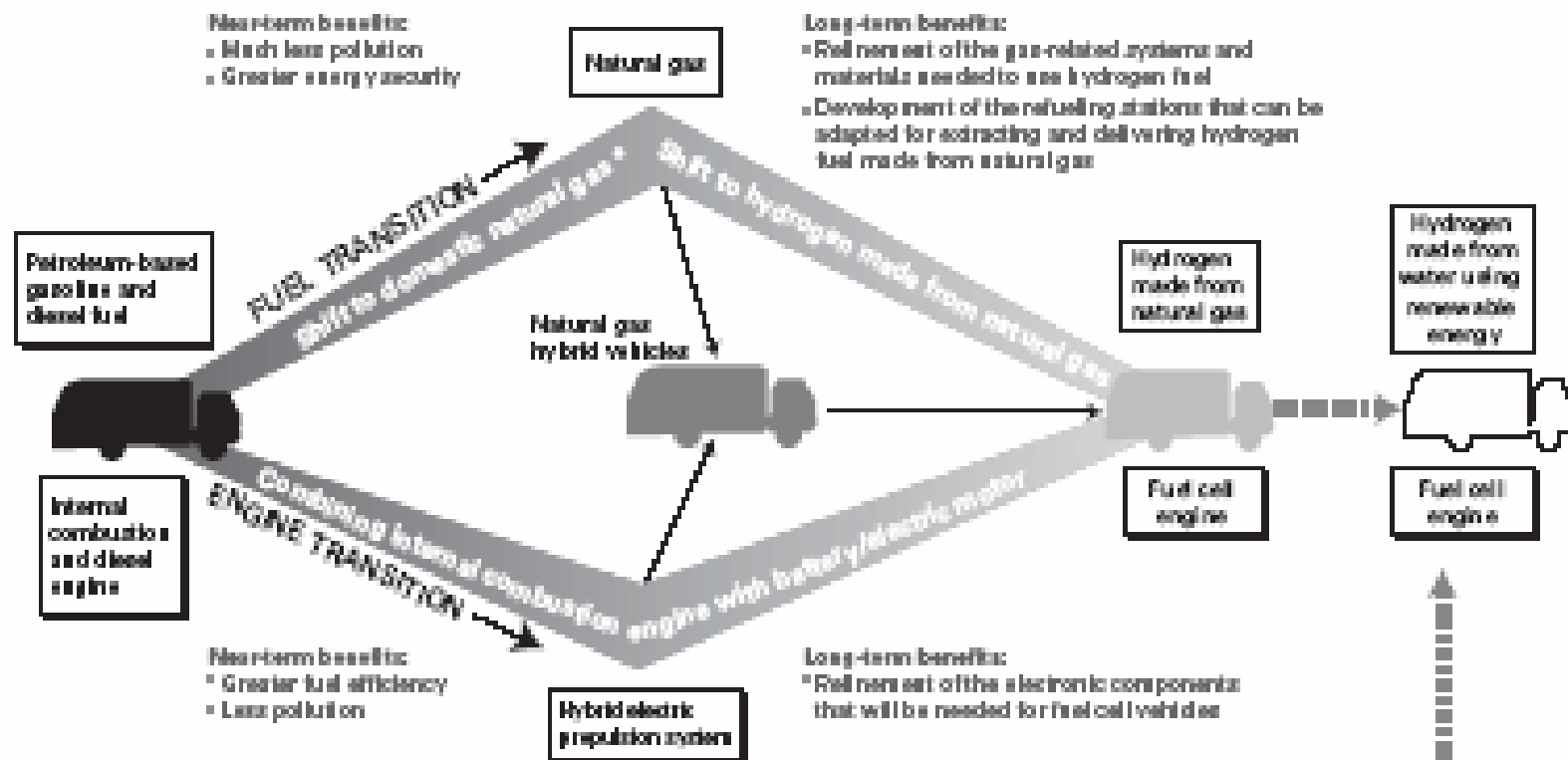
### NATURAL GAS VEHICLES PAVE THE WAY TO HYDROGEN

- Using natural gas and bio methane
- Combining NG & Hybrid-electric technology
- Using "Hythane" fuel
- Developing systems and materials for hydrogen use
- Requiring refueling infrastructure that can deliver hydrogen tomorrow

# GOAL FOR THE 21<sup>ST</sup> CENTURY

## Getting To Hydrogen

Figure 4 A Viable Transition Path to Pollution-Free Hydrogen Fuel Cell Vehicles



\*Especially in urban fleet vehicles

Taking this final step will require a stronger focus today by the Department of Energy on research and demonstration of distributed solar and other renewable energy resources so that, in one to two decades, renewable energy will be available as the power source to generate hydrogen by splitting the water molecule.

# NATURAL GAS REFUSE TRUCKS FOR PHILADELPHIA?

## AN OPTION TO REVISIT

351 TRUCKS – 200 OPERATE DAILY  
8.2 YEARS OLD  
HORSEPOWER 180-250  
OPERATE 40 HRS A WEEK – 2080 A YEAR  
EMISSIONS PER 1998 TRUCK: 2.45 TONS OF PM / NO<sub>x</sub>/YR!

ESTIMATED TOTAL 200 TRUCK FLEET EMISSIONS A YEAR: 490 TONS A YEAR!

NEW NG TRUCK? .21 TONS OF PM / NO<sub>x</sub>/YR

REPLACE 50? Eliminate 112 TONS OF PM/NO<sub>x</sub>  
REPLACE 50/yr for 3 yrs? Eliminate 672 TONS BY END OF 3 YEARS!

*REDUCING POLLUTION BY A FACTOR OF 25!*

A stylized world map in white and light blue, serving as a background for the text.

For further information, articles &  
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