Sino-US Advanced Biofuels Forum

# GM's Perspective on Advanced Biofuels

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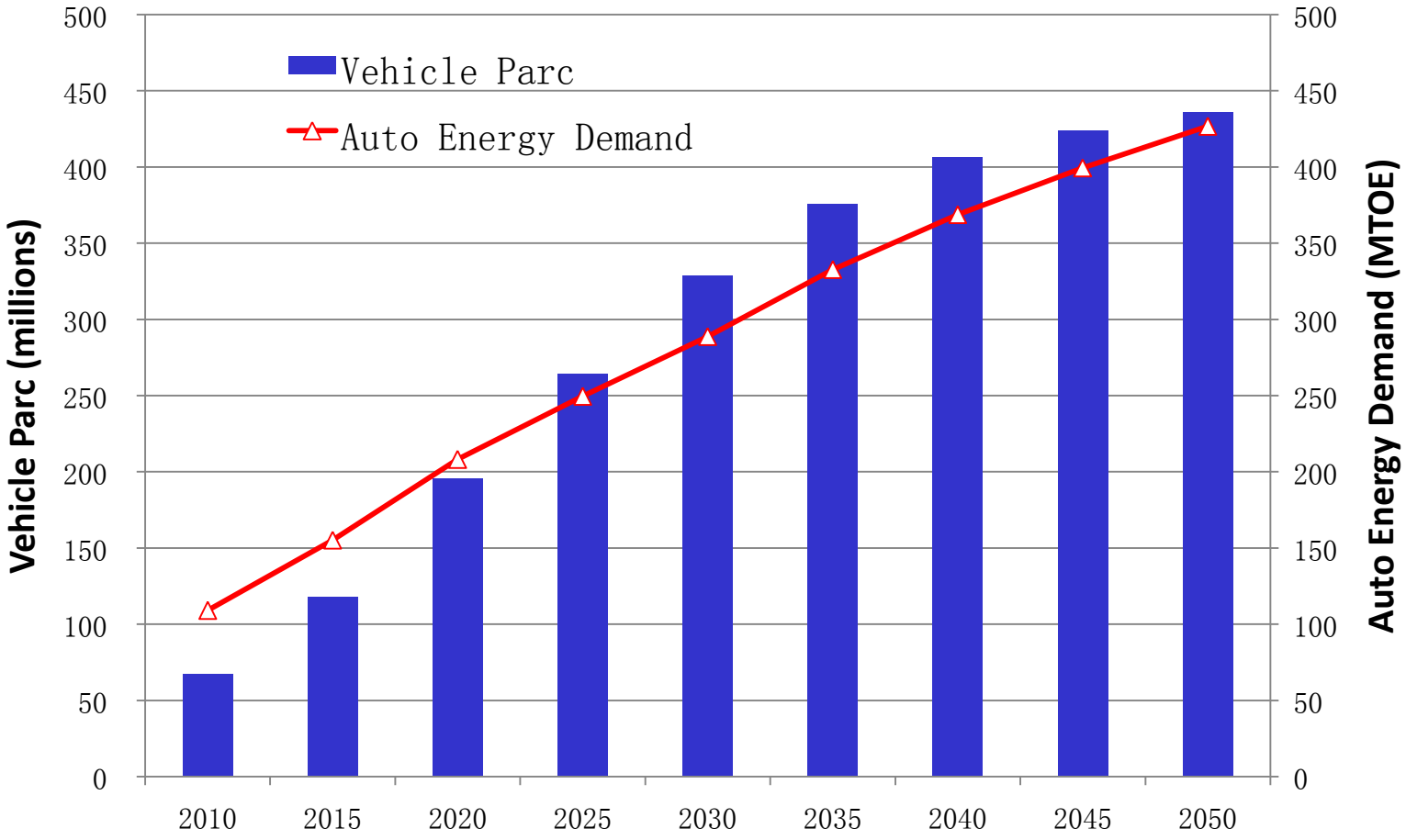
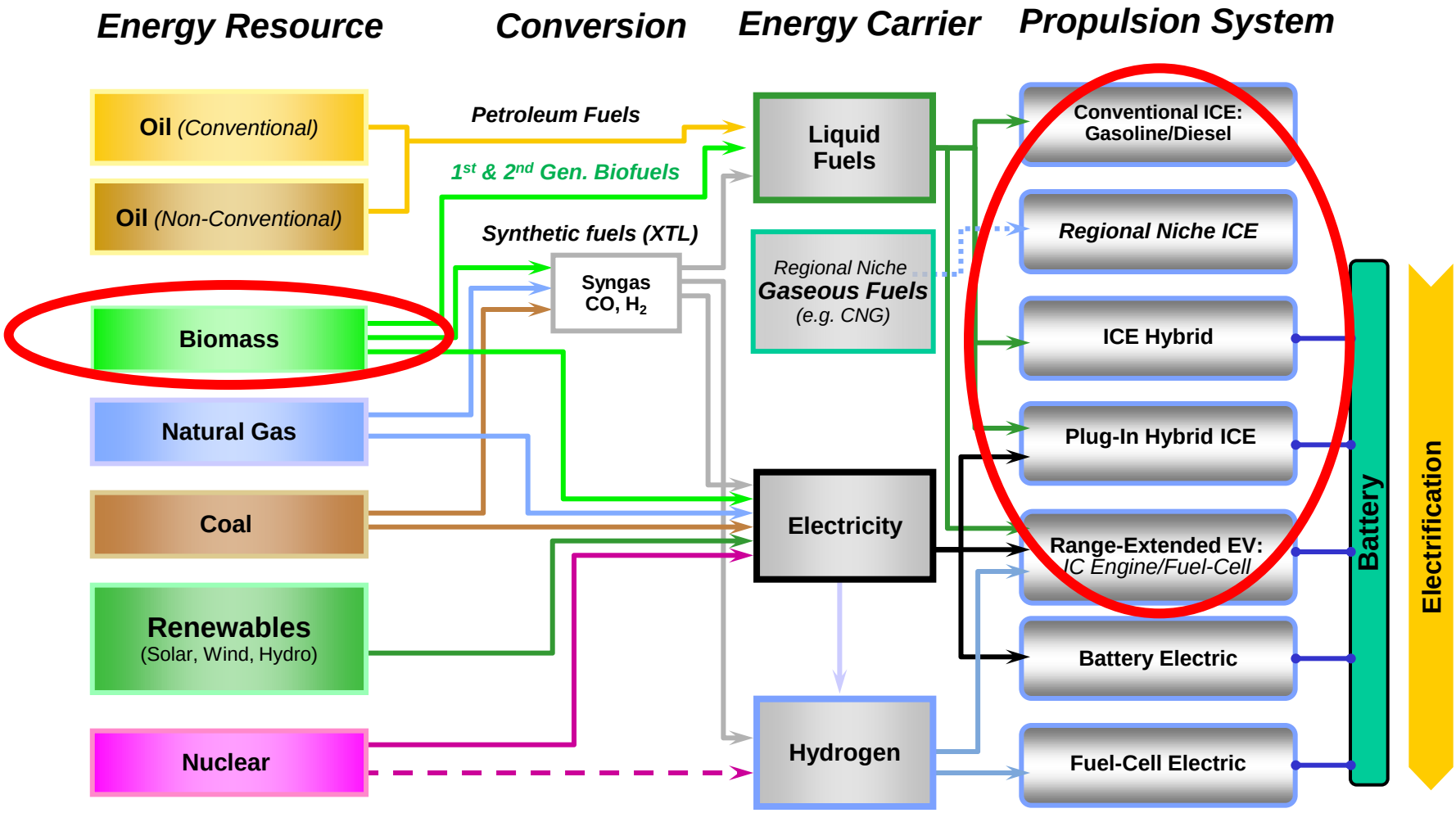
# Rapid Growth of Auto Industry & Energy Demand in China

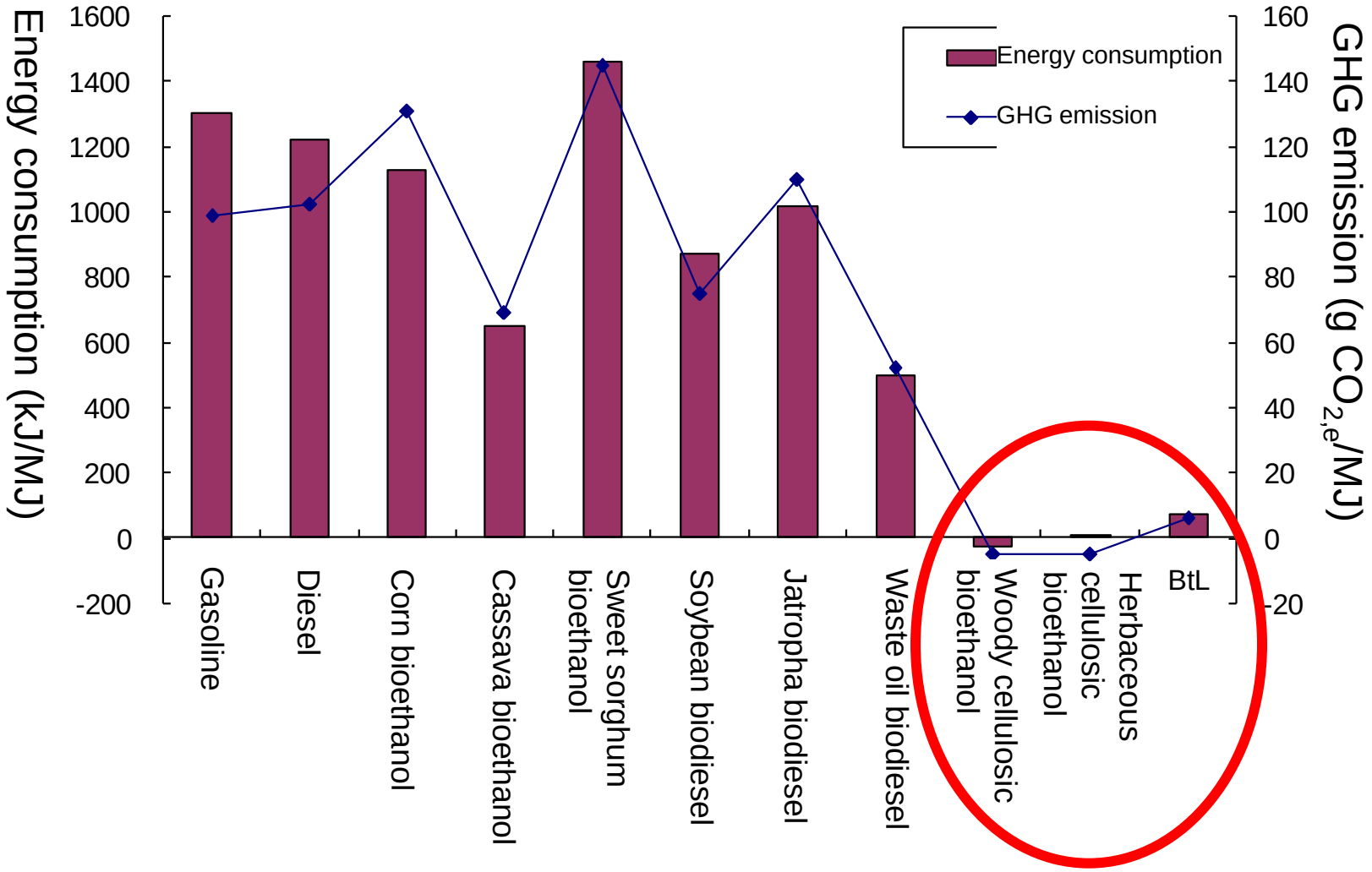



Source: CAERC, 2010

# Biofuels in Automotive Energy Systems

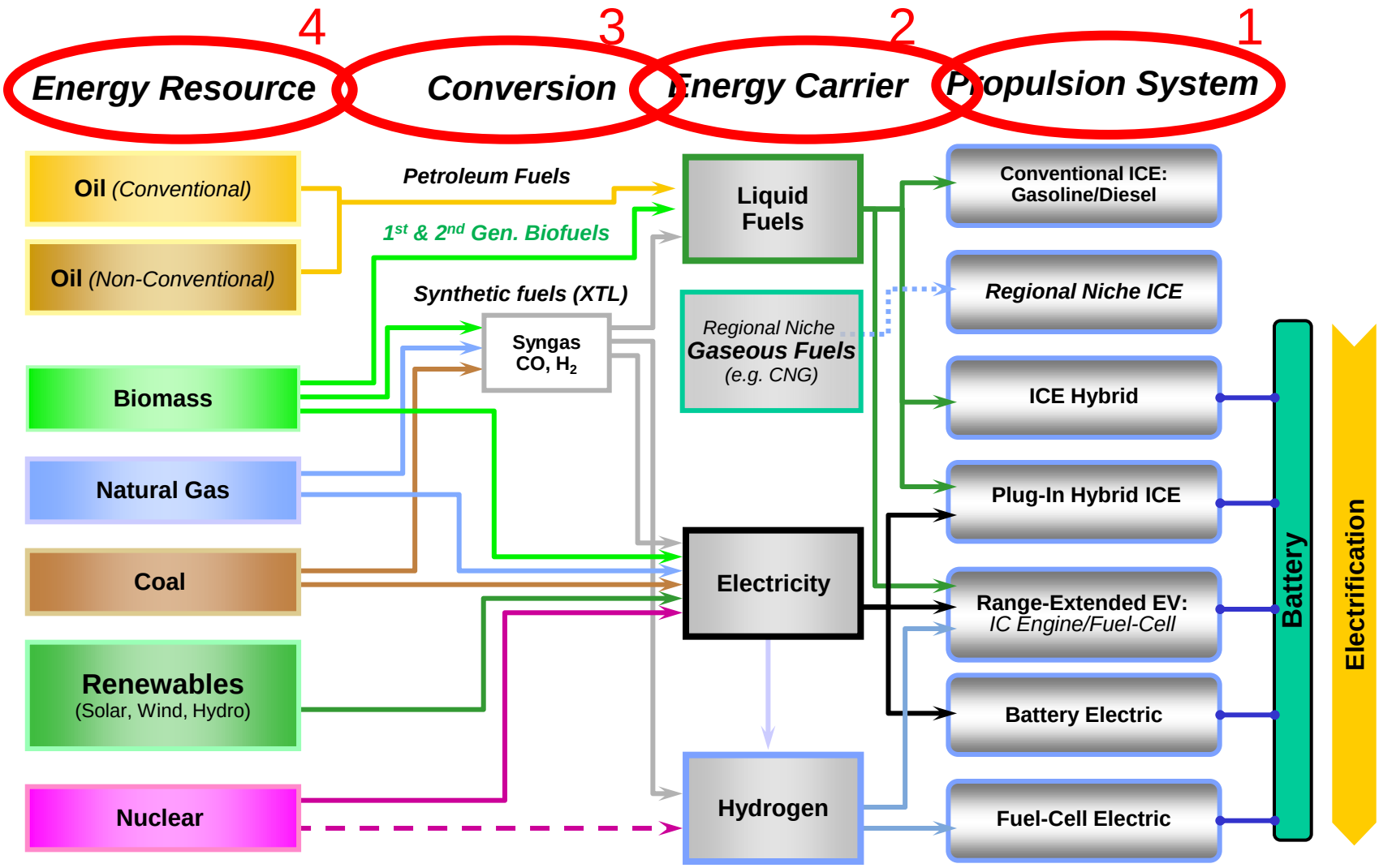


# Significant Potential to Reduce GHG Emissions

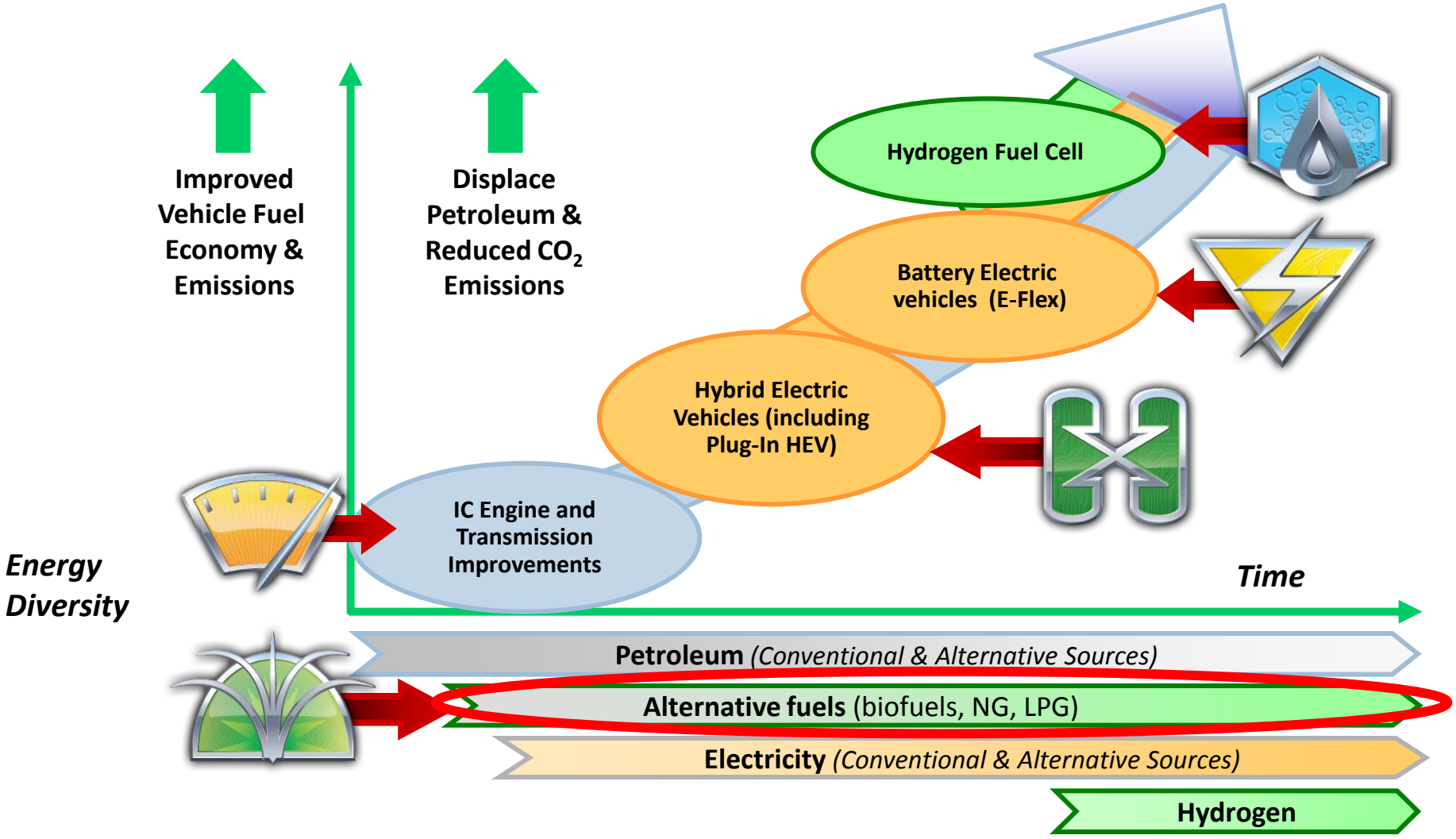



Source: CAERC, 2010

# Value Chain of Biofuels



# GM's Advanced Propulsion Technology Strategy



# Millions of Vehicles on Biofuels

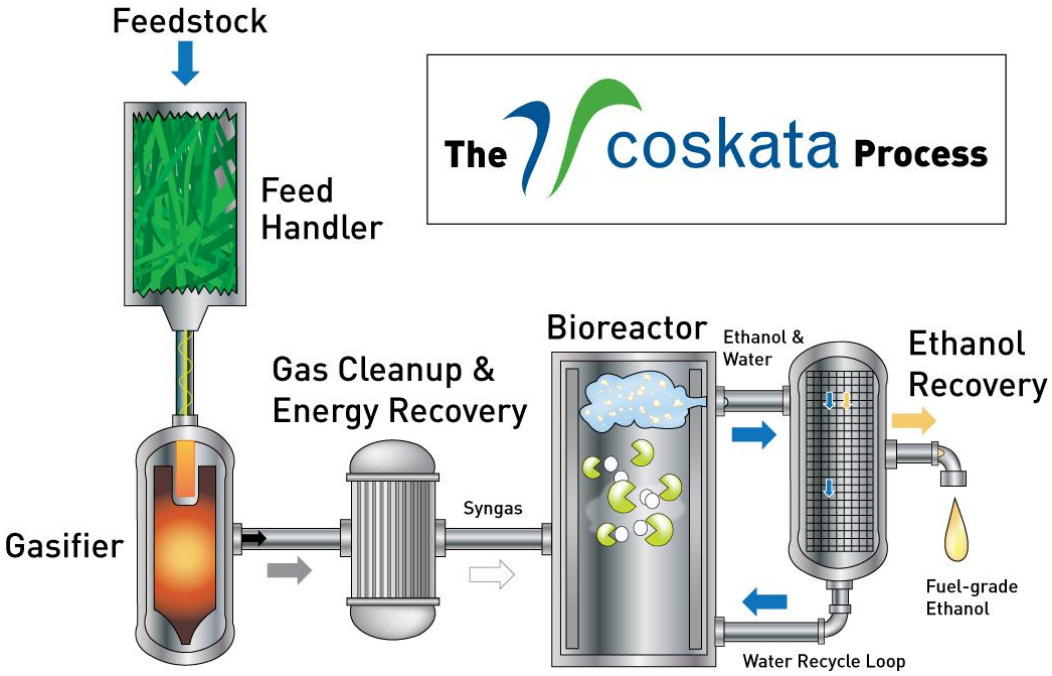
- GM has built 5.5 M FFVs on the road globally
- GM is offering 17 Flex Fuel models in North America for 2010
- GM is committed to having 50% of our models E85 capable by 2012
- Future FFVs include Direct-Injected and Turbocharged Engines, Extended-range

# Infrastructure: Mature Experience Globally


- Partnering to increase the expansion of E85 stations – 350 stations
- Currently, ~ 2,272 fueling stations in the US (~ 1.5 %) offer E85

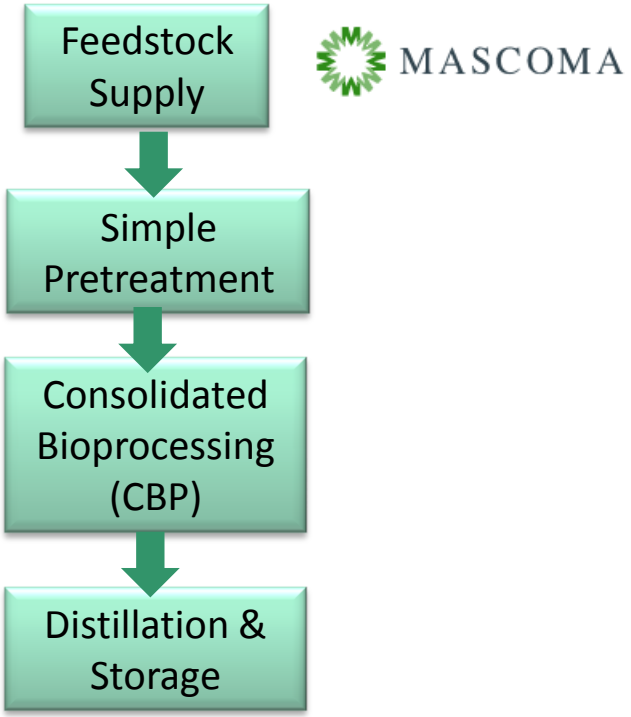
# Focus: Biofuel Conversion Technology

## Coskata's Leading Flexible Feedstock Process




- Pilot (Pennsylvania, 40k gal/year) running
- 1st commercial plant (SE USA, 55M gal/year) planned in 2012
- Production cost under $1/gallon

## Mascoma's Consolidated Bioprocessing




- 200k gal/year pilot (Rome, NY) running
- pre commercial plant (Michigan, 40M gal/year) planned in 2012

# A Variety of Feedstocks

Switchgrass

Corn Stover

Forest Waste

Municipal Solid Waste

Wood Chips

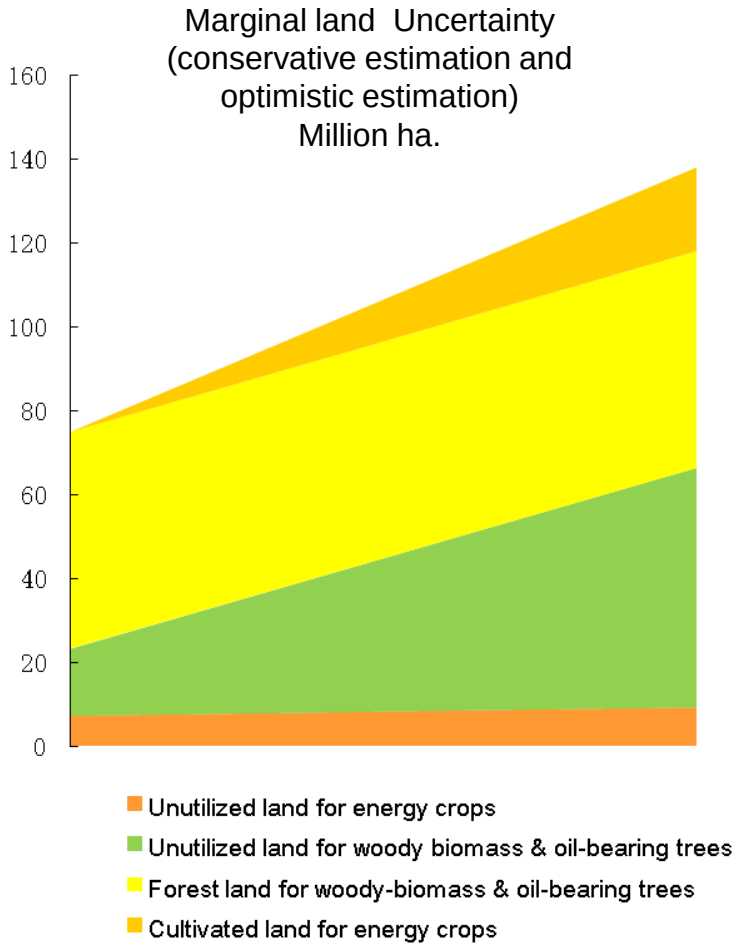
Corn Cobs

Bagasse (Sugar Cane Residue)

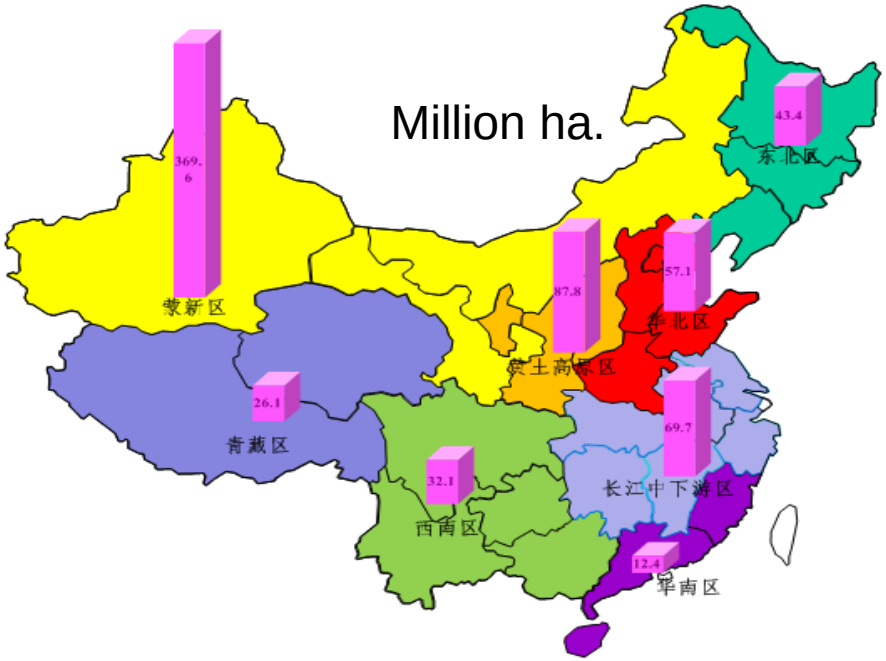
Wheat Straw

Poplar Trees (Fast Growing Woody Biomass)

# Biomass Potential Investigation in China



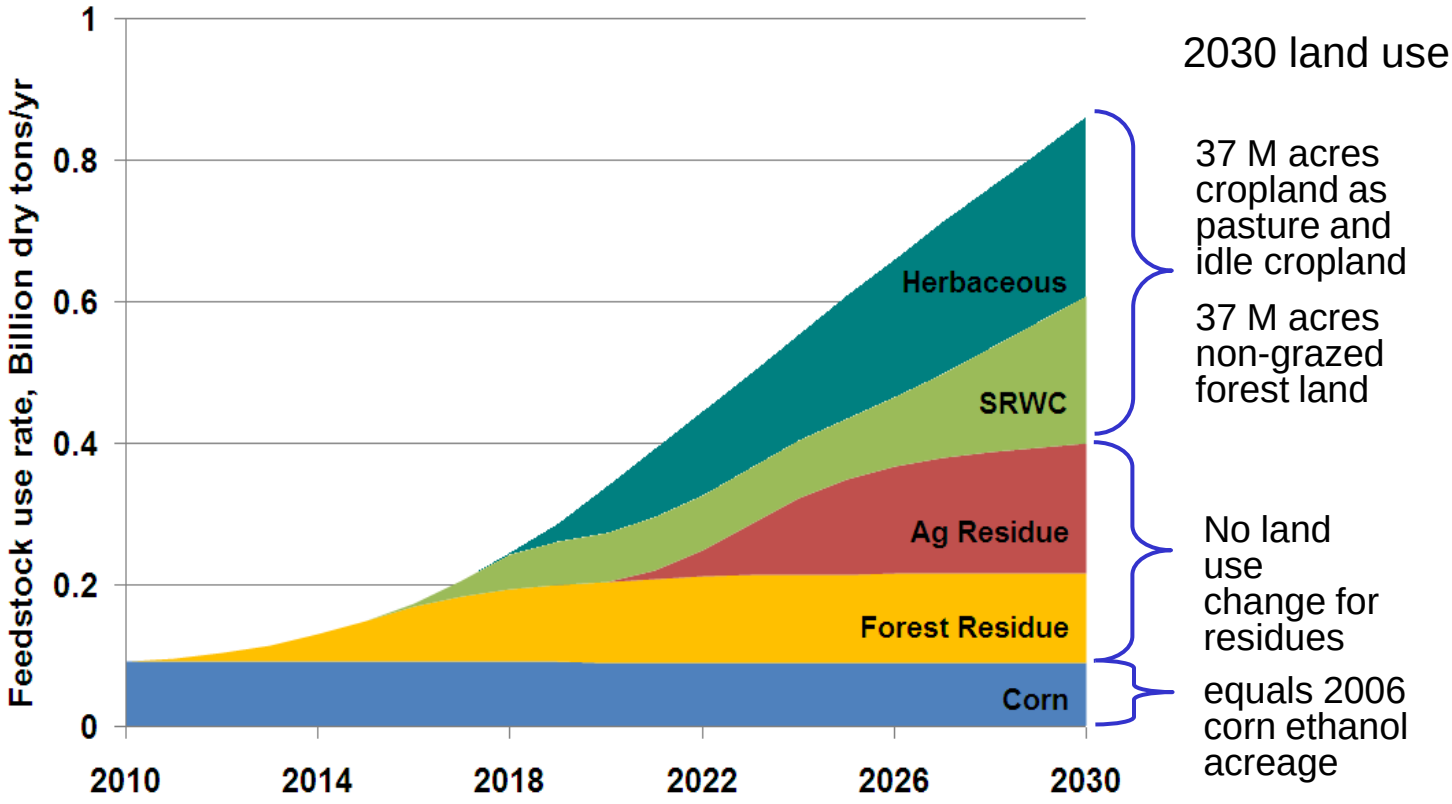

Unutilized land in China for energy crops




Data source: Research group of Sustainable development of energy crops in the People's Republic of China, 2009

# GM/Sandia 90B Gallon Biofuel Deployment Study

- Sandia/GM 90-Billion gallons biofuel by 2030 deployment study
  - RFS2 could be achieved by successful deployment of cellulosic biofuels (in addition to corn ethanol), without displacing current crops grown



# Summary & Suggestions

- GM believes biofuels, including cellulosic ethanol and other advanced biofuels, are the most significant near-term solution to reducing petroleum usage and greenhouse gas emissions
- The next 2-3 years will prove critical for advanced biofuels as pilot/demo plants become operational and first commercial plants are constructed
- Continued government support (mandates & incentives) are important to launch the biofuel ramp-up until commercial competitiveness takes over
- Suggestions
  - Clear national roadmap for biofuels
  - Favorable policy (approval, subsidy) for demo/pilot programs and research
  - International collaboration on research and technology transfer
  - Cooperation among industries such as standards

# Thanks For Your Attention!