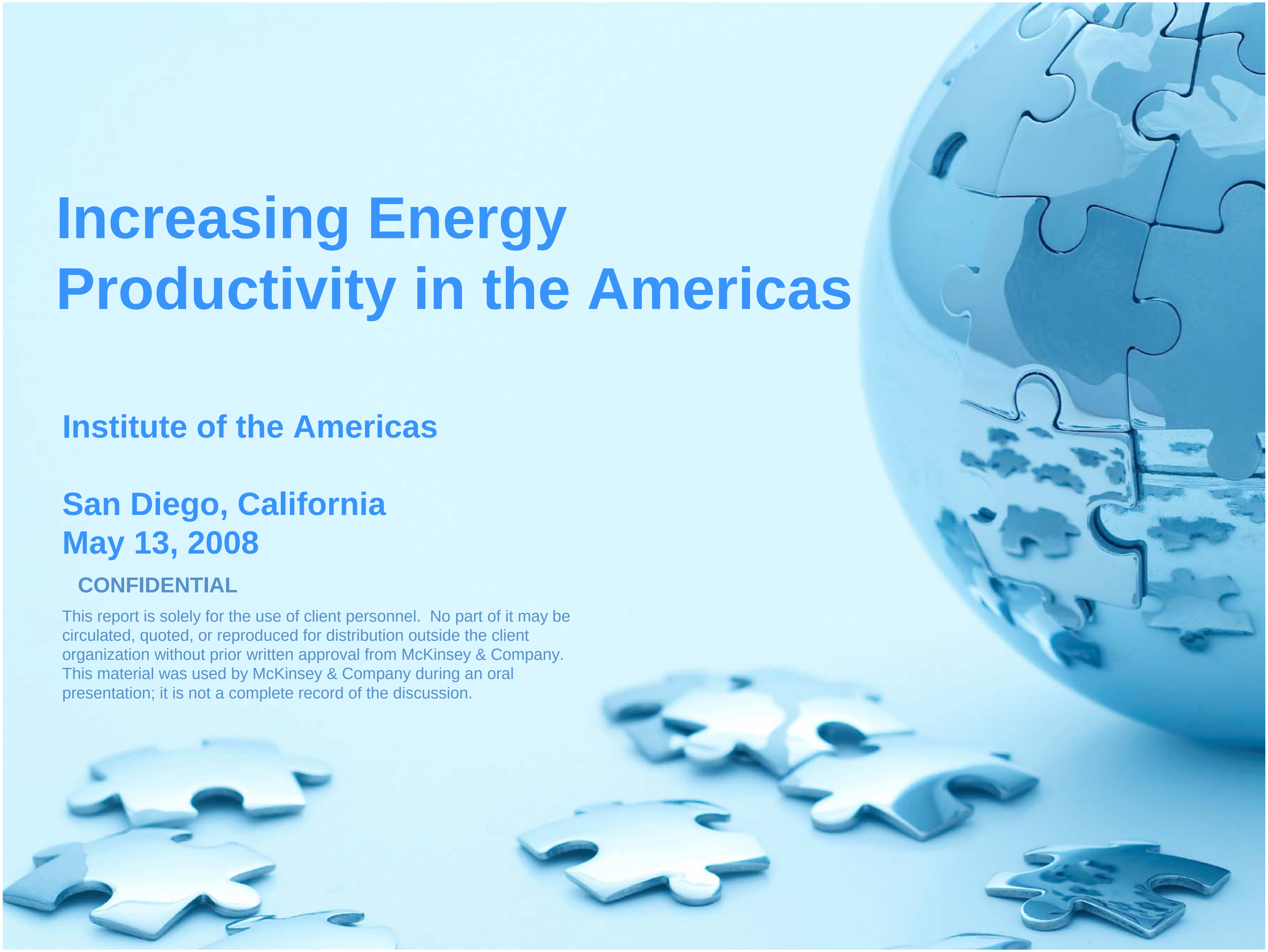


Increasing Energy Productivity in the Americas

Institute of the Americas

San Diego, California
May 13, 2008

CONFIDENTIAL

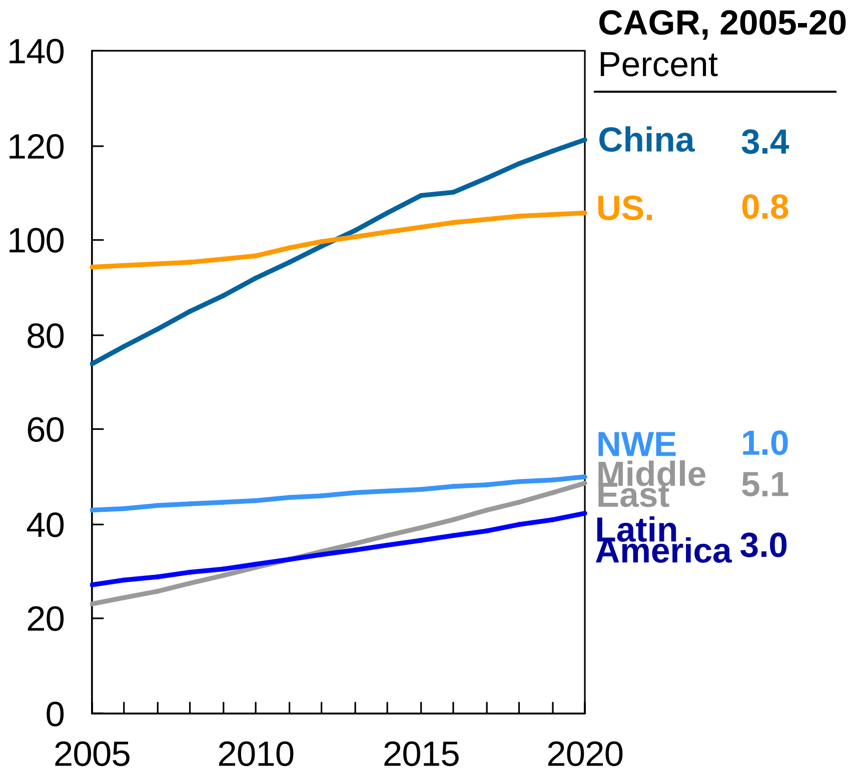
The energy paradox in the Americas—high prices, growing demand, but structural weaknesses and an uncertain future

- **Growing energy demand**—What could energy productivity deliver?
- **Crude oil supply struggles** to keep pace with demand growth
  - Does the region have the capabilities to handle increased resource complexity?
  - What if someone kills the goose that lays the golden eggs?
- **Refining capacity and complexity falling behind**--Are downstream infrastructure and incentives aligned?
- **Natural gas demand growing and resources available**--What would it take to develop a supply and distribution infrastructure to meet clean energy demand?
- **CO_2 growing rapidly**, but from different sources North and South--Do the Americas need a regional policy approach?
- **Opportunity**--What would be required to build the leading energy sector globally?

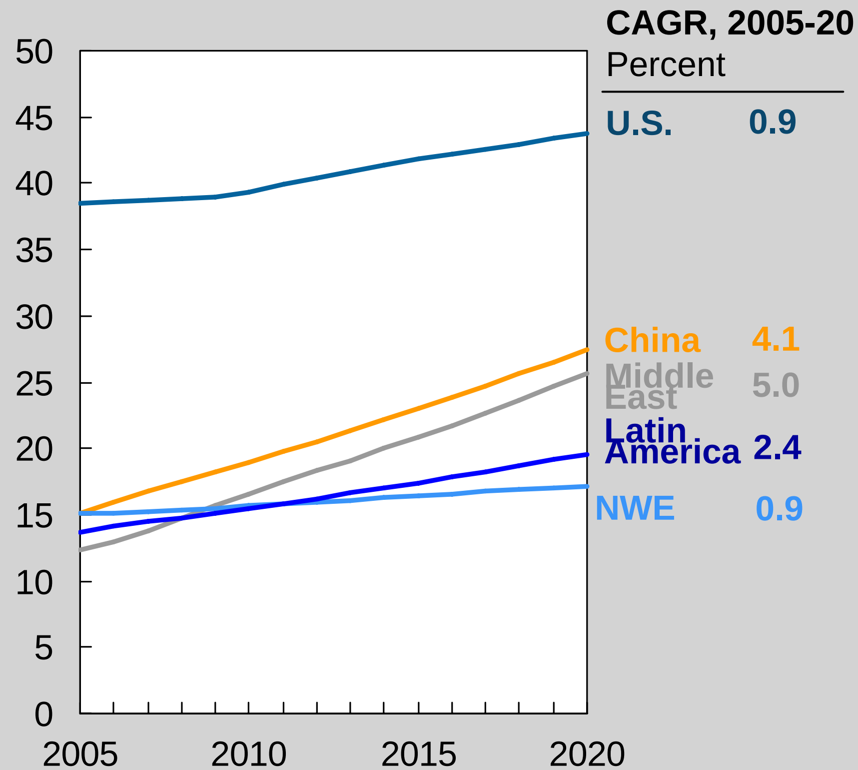
Economic growth drives up energy demand—China passes US and Latin America and Mid East catch Europe by 2020

QBTU

Total primary energy demand



Total petroleum product demand

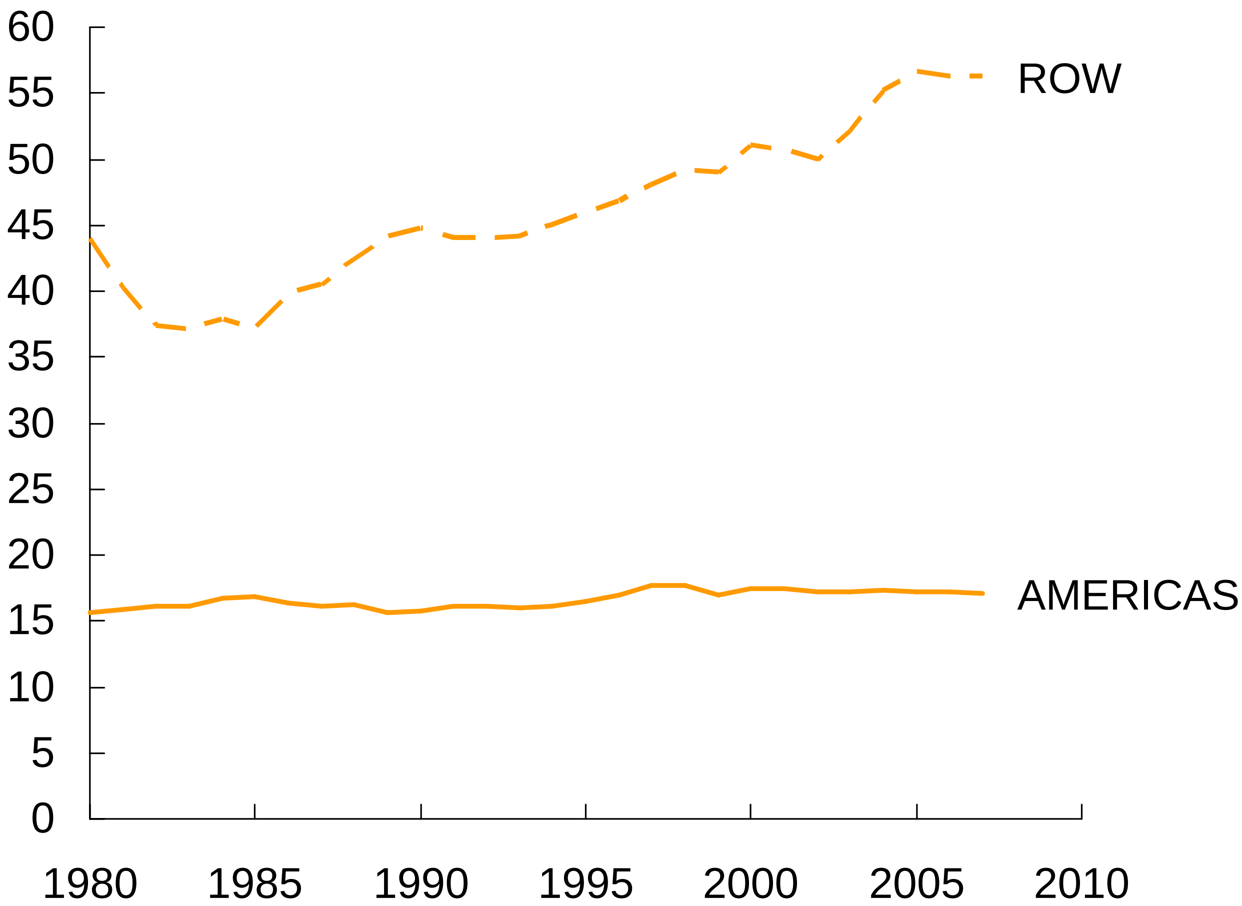


Energy productivity investments could cut demand growth to 0% in US and to 1% in Latin/South America at a positive returns

Source: MGI Global Energy Demand Model

Americas crude oil production struggles to stay flat, even at a time of extraordinary oil prices—up in Brazil and Canada, but….

Crude oil* production, millions of barrels per day



Supply challenge

- **Complexity up 4x**
- **Average depth up 6x**
- **Cost up 70-80%**
- **Lead time 2x**
- **Plus delay 12 mo**
- **Constraint = People**

* Includes crude and condensate

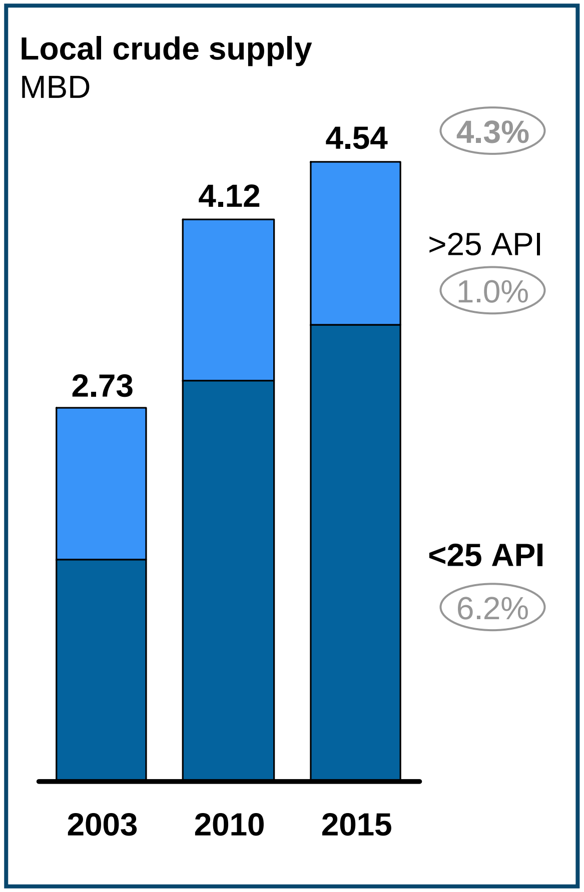
Source: EIA

Latin America refining capacity falling short of product demand and crude complexity requirements

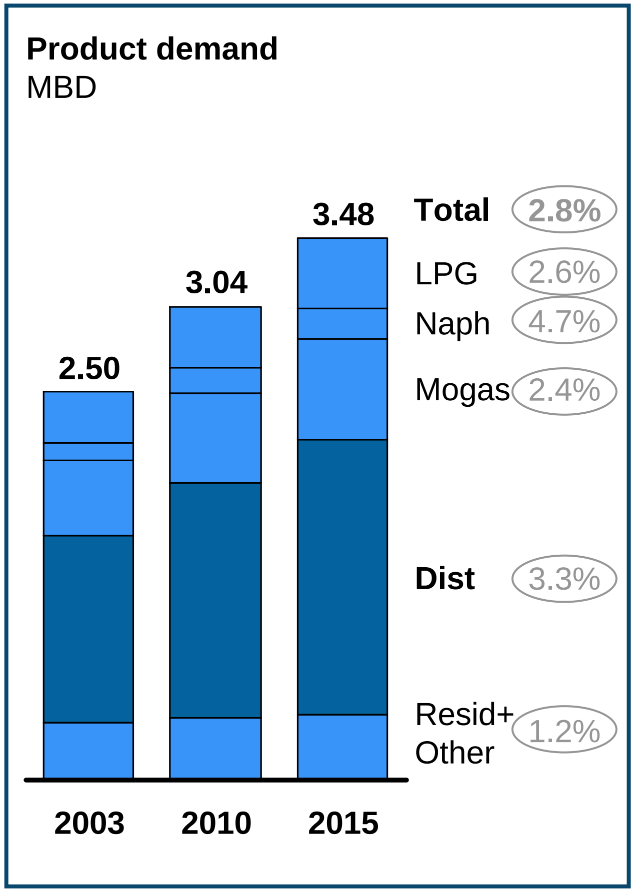
PRELIMINARY

CAGR

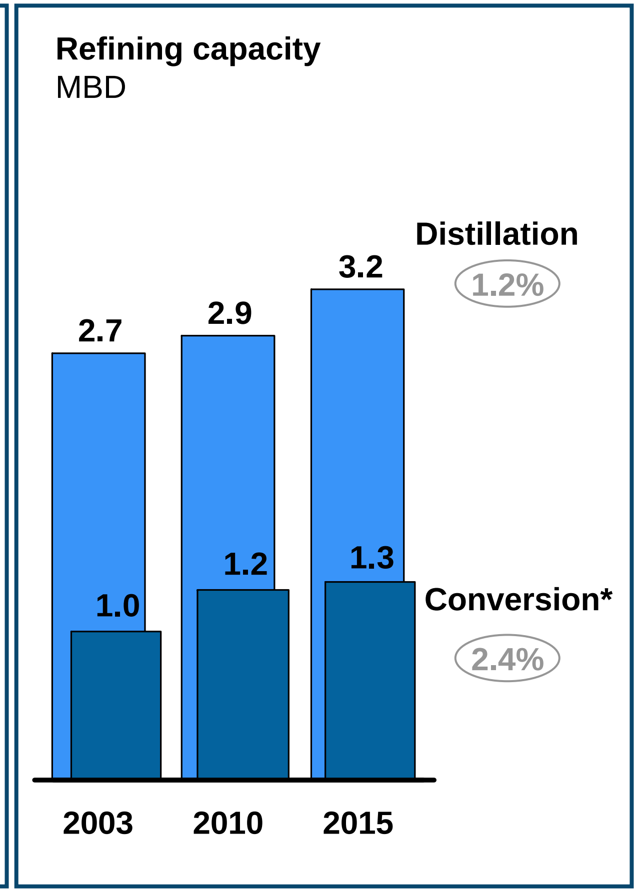
Local crude production growing, but mix becoming heavier



Demand growth still strong, with an increase share of distillates



The gap to demand and feed quality is increasing, requiring expensive imports



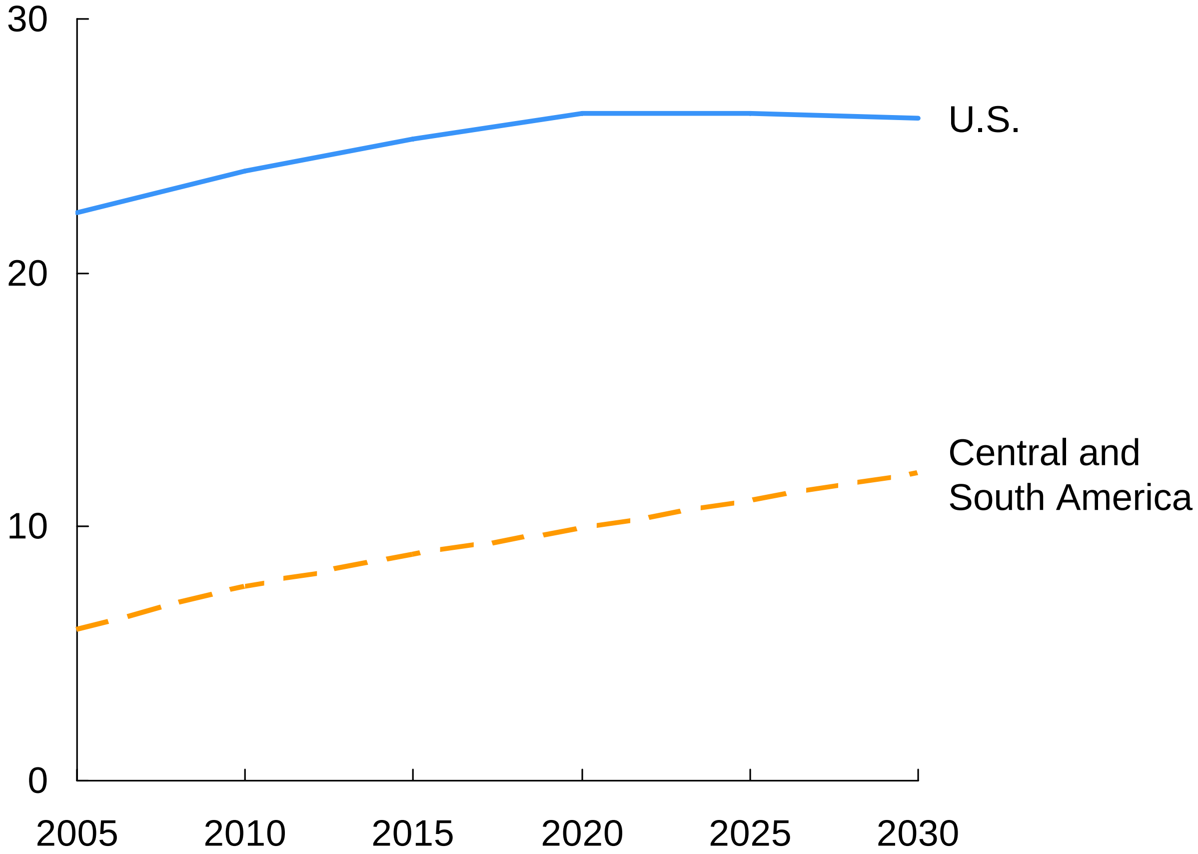
Major opportunity for value chain integration and infrastructure development

* Includes FCC, RCC, Coking, HDK and VBU

Source: Global Petroleum Simulation Model; 2003, 2010 Base Case, 2015, Base Case

Natural gas demand growing and supplies abundant, but major challenges in developing resource and delivering to market

Crude oil* production, millions of barrels per day



Natural gas opportunity

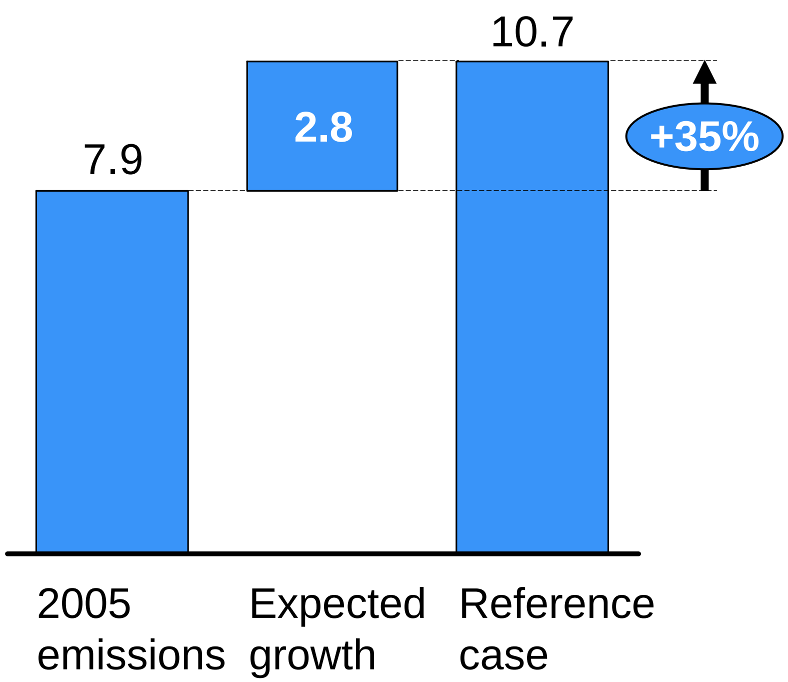
- **Plentiful resource**
- **New technologies play in regions favor**
- **Growing demand**
- **Environmental and operational benefits**
- **Deep infrastructure challenges**
- **And, too often prices do not reflect market**

Source: EIA

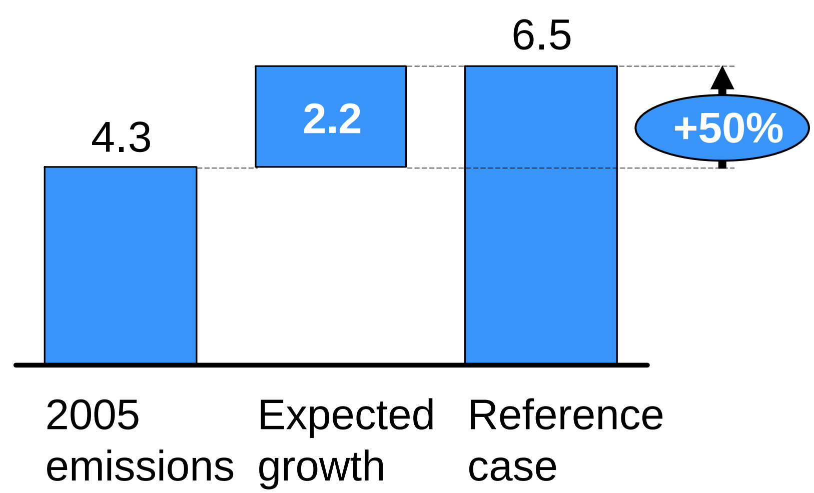
Government agencies forecast GHG emissions to rise across the Americas by 2030

Gigatons CO2e

Projected GHG emissions – U.S. and Canada



Projected GHG emissions – Mexico plus Latin and South America



- **80% energy in the U.S. and Canada – mostly a consumer story**
- **65% Forestry and Non-energy GHG in Latin/South America**

Source: EIA Annual Energy Outlook (2007) "Reference case", U.S. EPA; Pew Center On Global Climate Change; McKinsey analysis

Conclusions

- **Attractive resources**—lots of resource, but more complex, requiring more technology and innovation to bring to market
- **Capability building**—aligning the people capabilities is key to success—organizing for growth, expanding capabilities and investment to find and develop
- **Infrastructure dependent**—significant opportunities for infrastructure growth, but spot prices provide limited incentives for solving infrastructure bottlenecks
- **Significant energy and carbon productivity opportunities**
  - Energy prices have not followed the market across the region
  - Energy will get blamed if CO_2 issues grow
- **The opportunity**: Could be the big upside surprise on both supply and demand, if investment, infrastructure, and org capacity increase quickly?