



International  
Energy Agency

# *Golden Rules for a Golden Age of Gas*

**May 29, London**

*World Energy Outlook  
Special Report on Unconventional Gas*

# The context

- **Advances in technology have led to a surge in unconventional gas supply in North America**
  - *Intensive process, generally requiring hydraulic fracturing & more wells than conventional gas*
- **Many countries are lining up to emulate this success; notably in China, Australia, Europe & Latin America**
- **But concerns remain that production might involve unacceptable environmental & social damage**
  - *Major implications for local communities, land use & water resources*
  - *Serious hazards include the potential for air & water pollution*
- **Improperly addressed, these concerns threaten to hold back, & perhaps halt, the unconventional gas revolution**

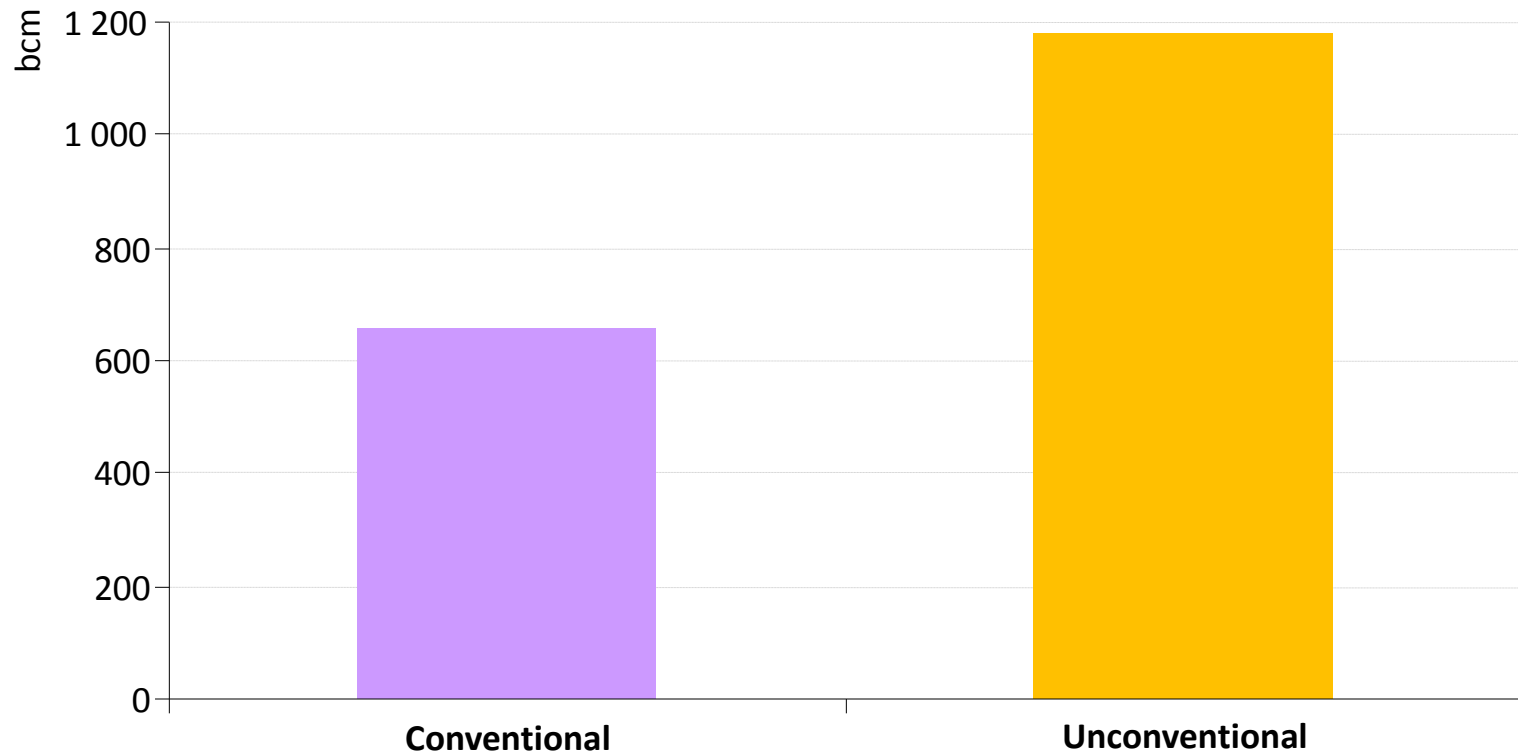
# ***Golden Rules for a Golden Age of Gas***

The “Golden Rules” are principles that can allow governments, industry & other stakeholders to address these environmental & social impacts:

- 1. Measure, disclose & engage**
- 2. Watch where you drill**
- 3. Isolate well & prevent leaks**
- 4. Treat water responsibly**
- 5. Eliminate venting, minimise flaring & other emissions**
- 6. Be ready to think big**
- 7. Ensure a consistently high level of environmental performance**

They are “Golden Rules” because their application can ensure operators have a “social license to operate”, paving the way for a golden age of gas

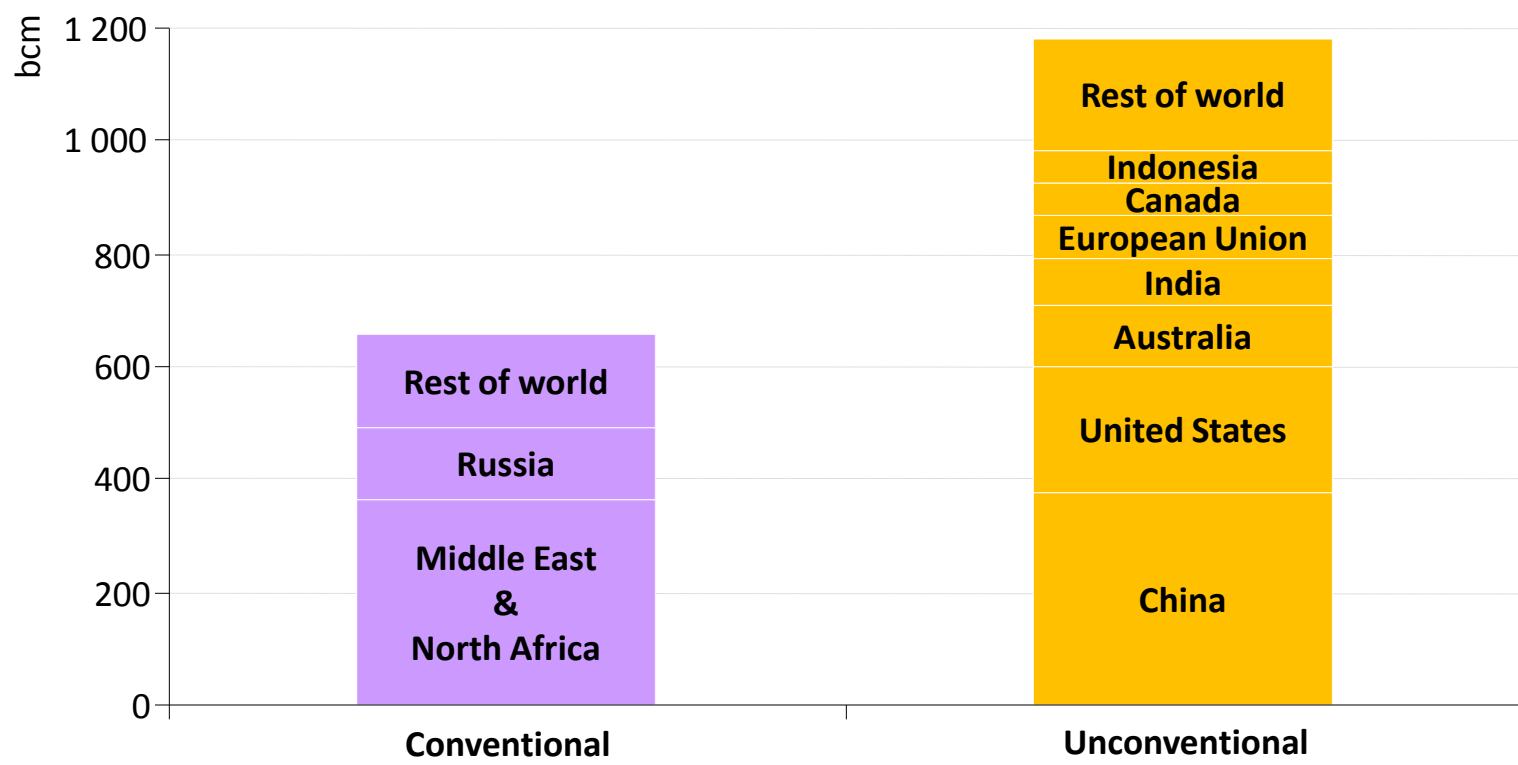
## Natural gas supply growth in the Golden Rules Case, 2010-2035



**Total gas production grows by 55% to 2035; unconventional gas accounts for nearly two-thirds of the growth & its share in total output rises from 14% today to 32% in 2035**

# Fracturing the status quo

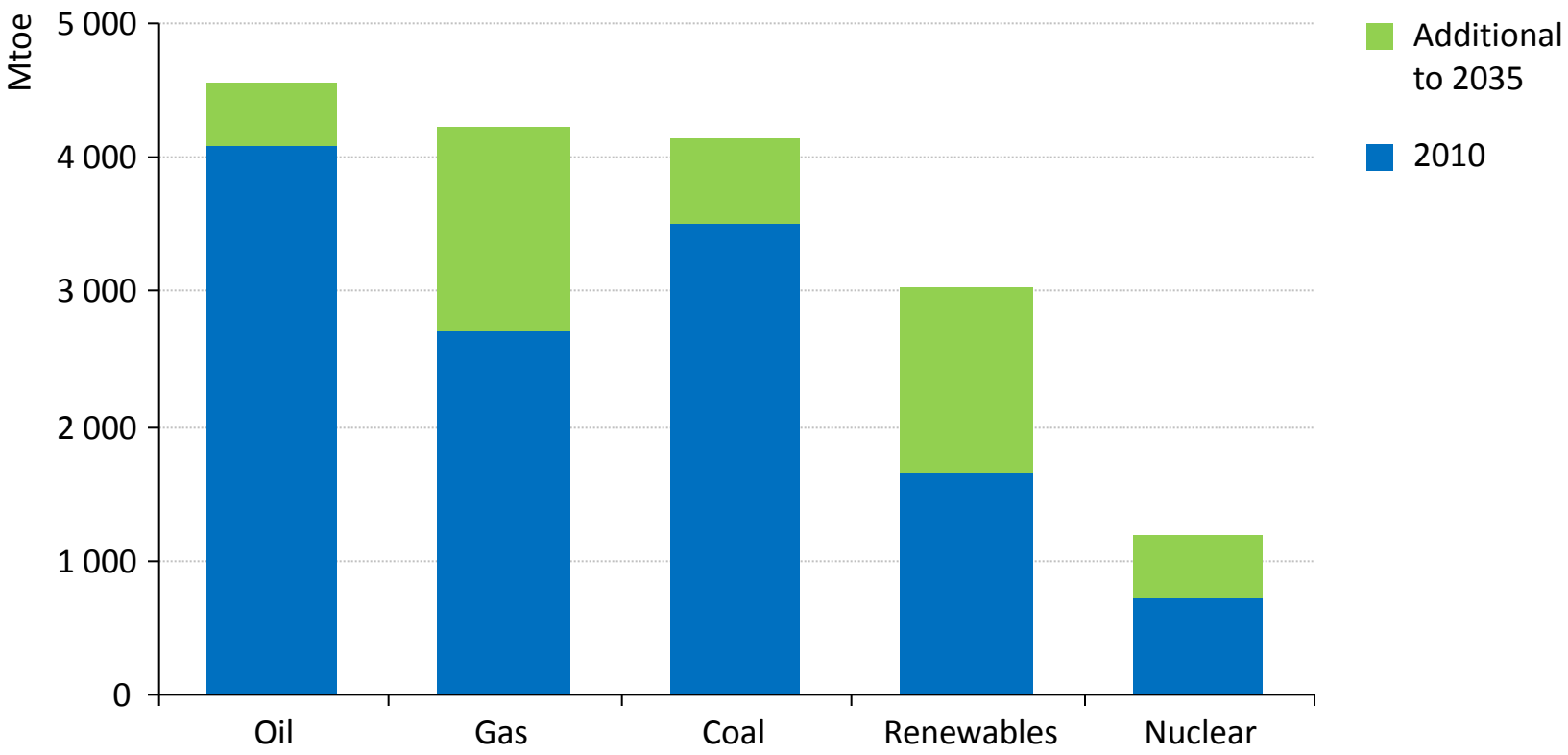
Natural gas supply growth in the Golden Rules Case, 2010-2035



**Combined unconventional gas output growth from the United States, China & Australia surpasses that of all conventional producers - mainly the MENA region & Russia**

# Natural gas poised to enter a golden age

### Global energy demand in the Golden Rules Case

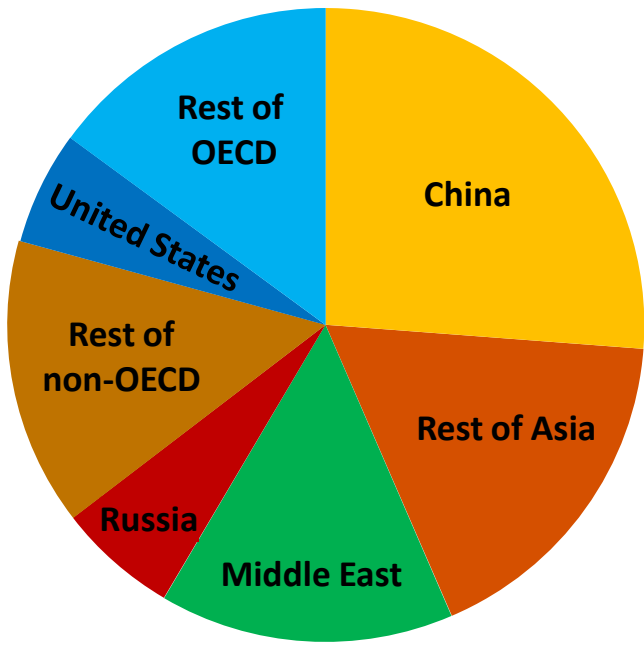


**Global natural gas demand growth equals the combined increase from coal, nuclear & oil; resulting in gas overtaking coal as the second most important fuel**

# Emerging economies take the lead

## Natural gas demand growth in the Golden Rules Case, 2010-2035

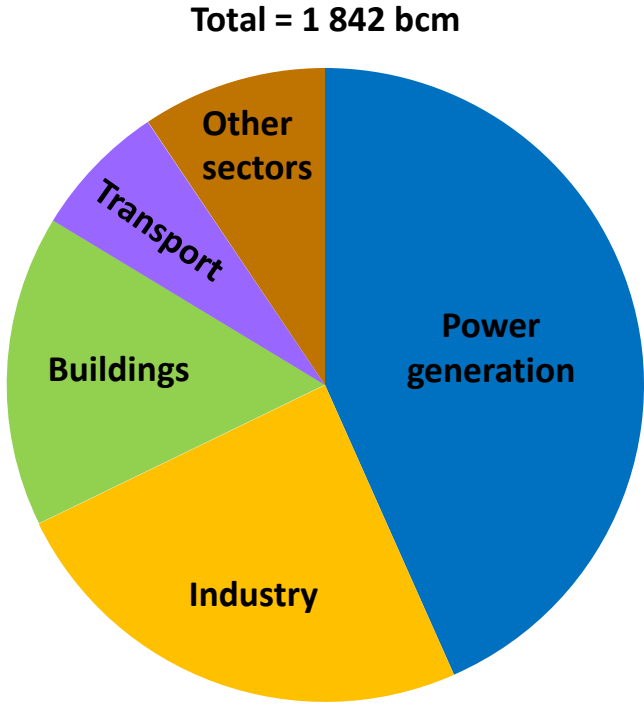
Total = 1 842 bcm



*80% of growth in gas use comes from outside the OECD; chiefly in Asia & the Middle East ...*

# Emerging economies take the lead

## Natural gas demand growth in the Golden Rules Case, 2010-2035

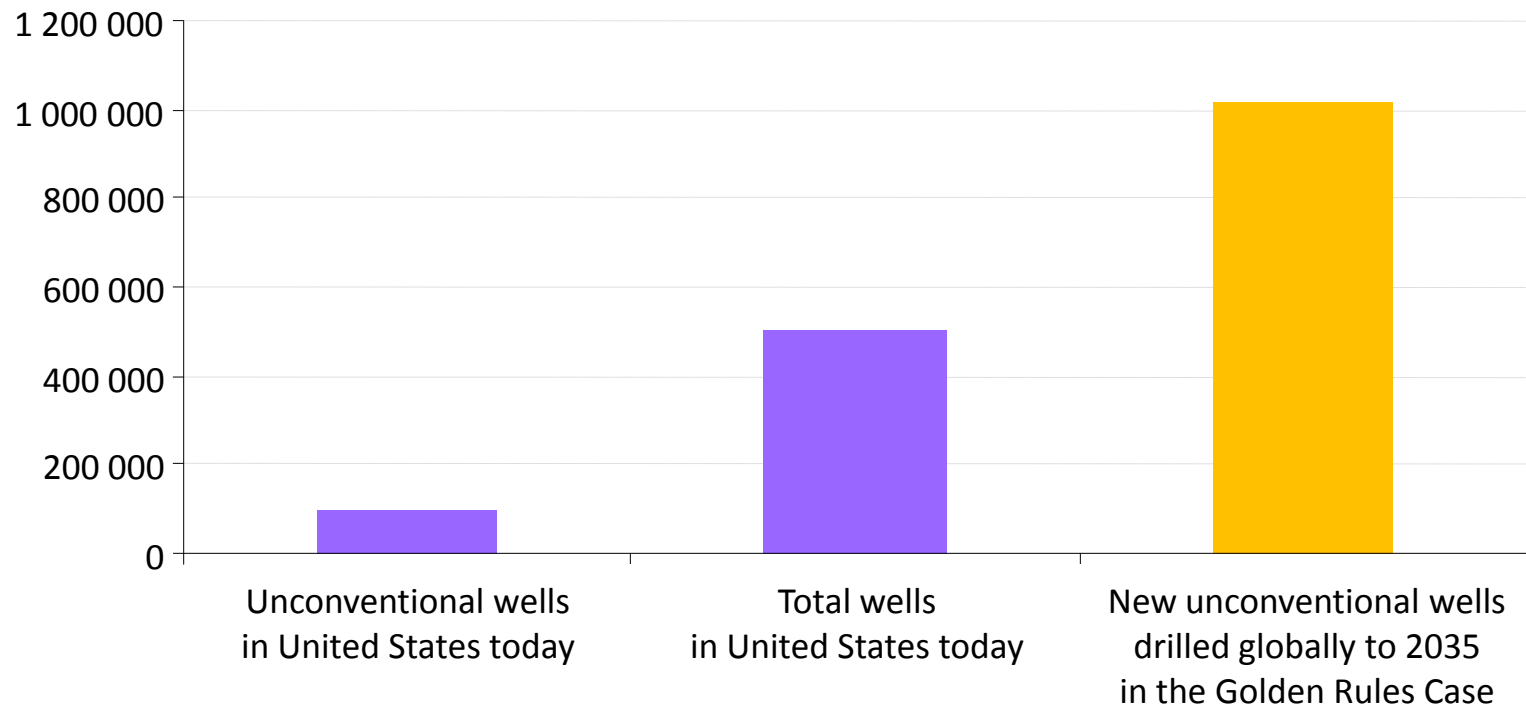


**80% of growth in gas use comes from outside the OECD; chiefly in Asia & the Middle East ...  
... driven largely by demand for electricity and from industry**



# A huge task for industry & regulators

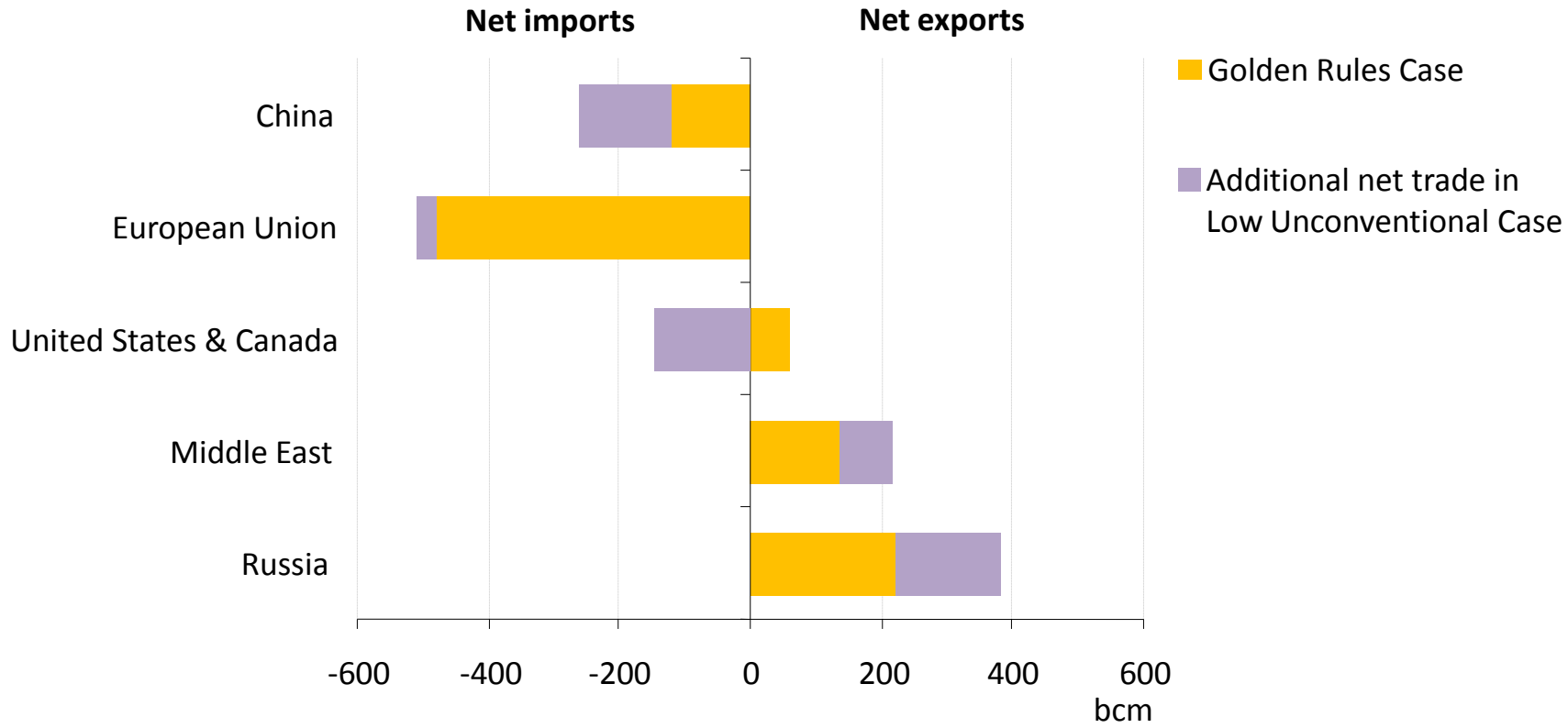
Number of gas wells



**More than one million new unconventional gas wells would be needed globally to 2035: applying the “Golden Rules” could raise costs slightly, by 7% for a typical shale-gas well**

# What if the tide turns?

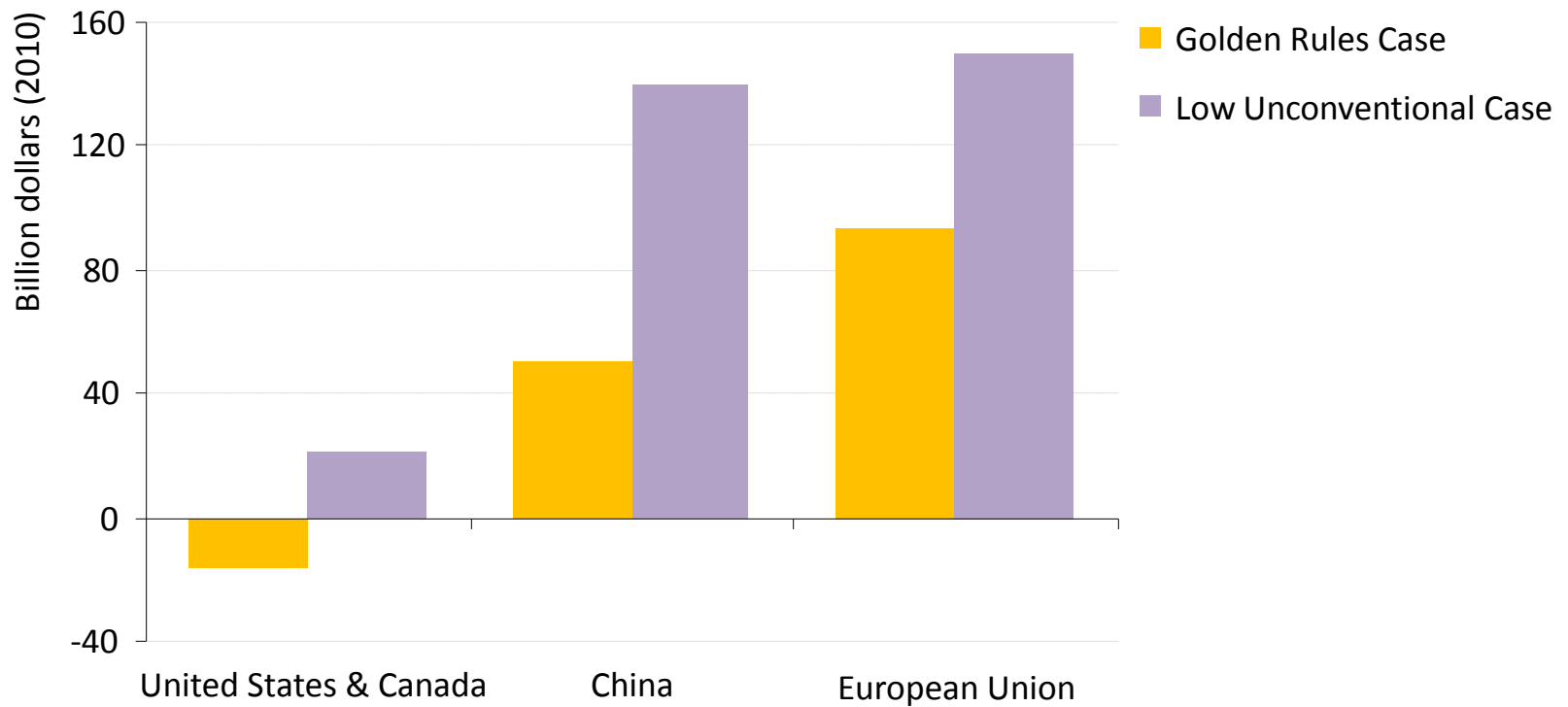
Selected natural gas trade volumes, 2035



**Gas trade in the Low Unconventional Case is up 30%, some trade patterns are reversed, gas prices are higher & the position of the main conventional exporters reinforced**

# Economic costs & benefits

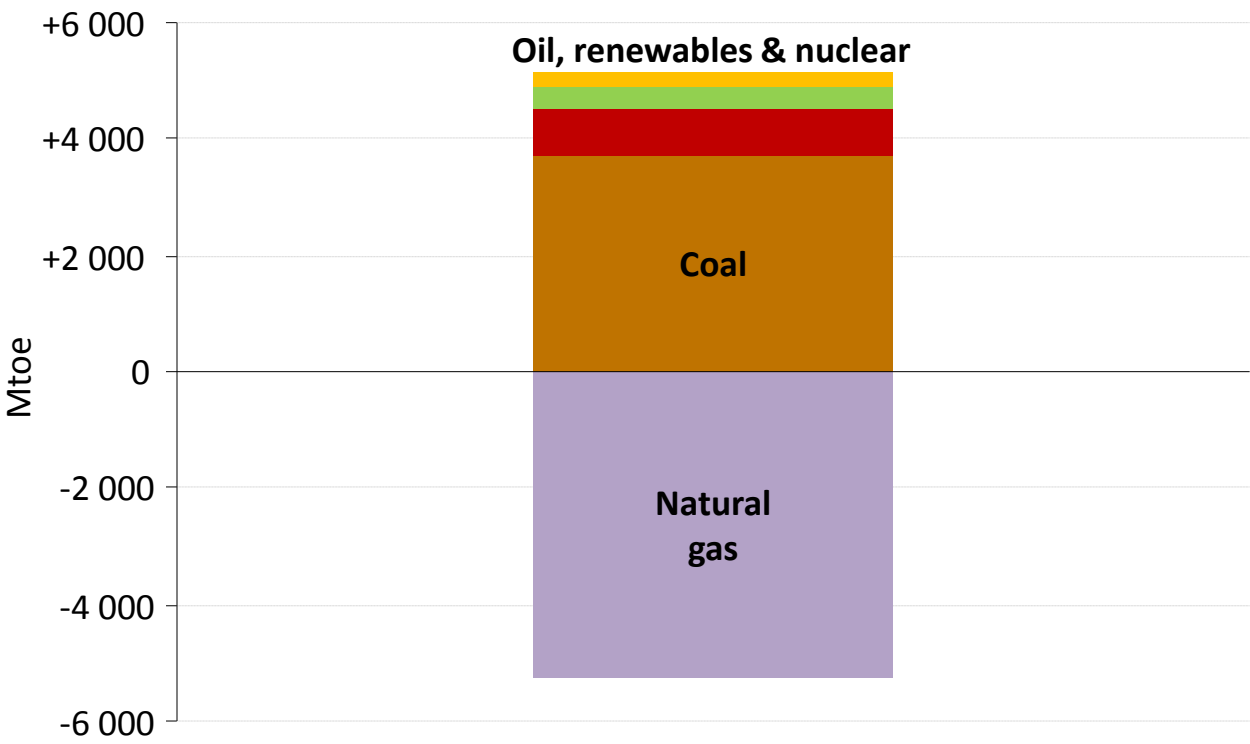
### Increase in natural gas-import bills by 2035 relative to 2010



***Benefits to gas importers from improved energy trade balances & lower prices disappear in a Low Unconventional Case, where worldwide gas import bills by 2035 are 60% higher***

# Coal fills the gap left by gas

Change in primary energy demand  
in the Low Unconventional Case relative to Golden Rules Case, 2010 to 2035



**Emissions are 1.3% higher in 2035 than in the Golden Rules Case, offsetting the claim that a reduction in unconventional gas output brings net environmental gains**

## Key messages

- The “Golden Rules” can address the environmental & social impacts of unconventional gas – making the golden age of gas a reality
- Continuous drive needed from governments & industry to improve performance if public confidence is to be earned or maintained
- Unconventional gas can transform energy markets by:
  - *putting downward pressure on prices*
  - *broadening diversity & security of gas supply*
- Natural gas has a role to play in a low-carbon energy economy, but increased use in itself is not sufficient to reach the 2°C goal
- IEA creating a high-level platform on the key policy & regulatory issues to build on the “Golden Rules” & respond to G8 leaders’ request