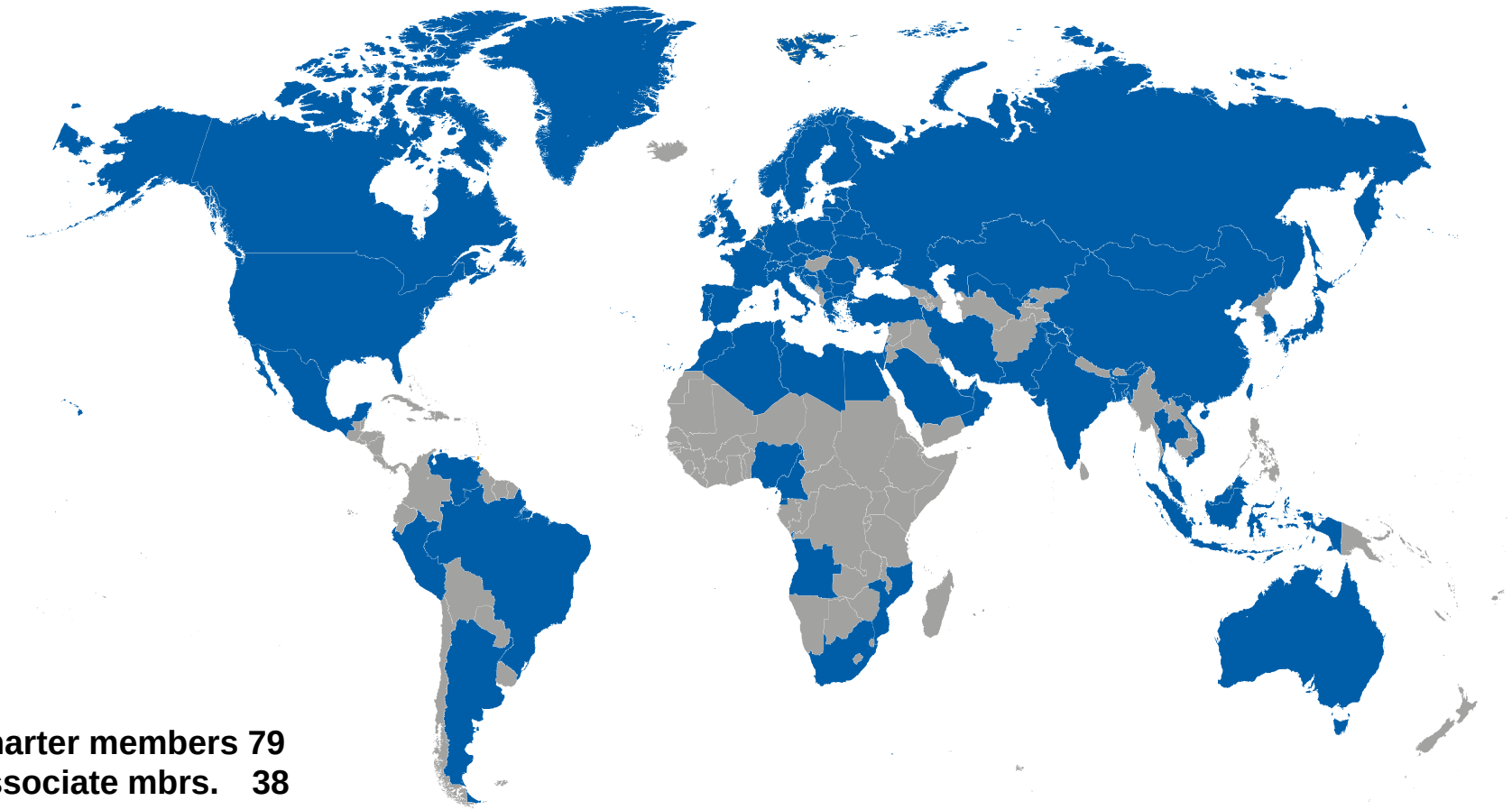
Global Vision for Gas

The Pathway towards a Sustainable Energy Future

Caspian Gas Forum 2012

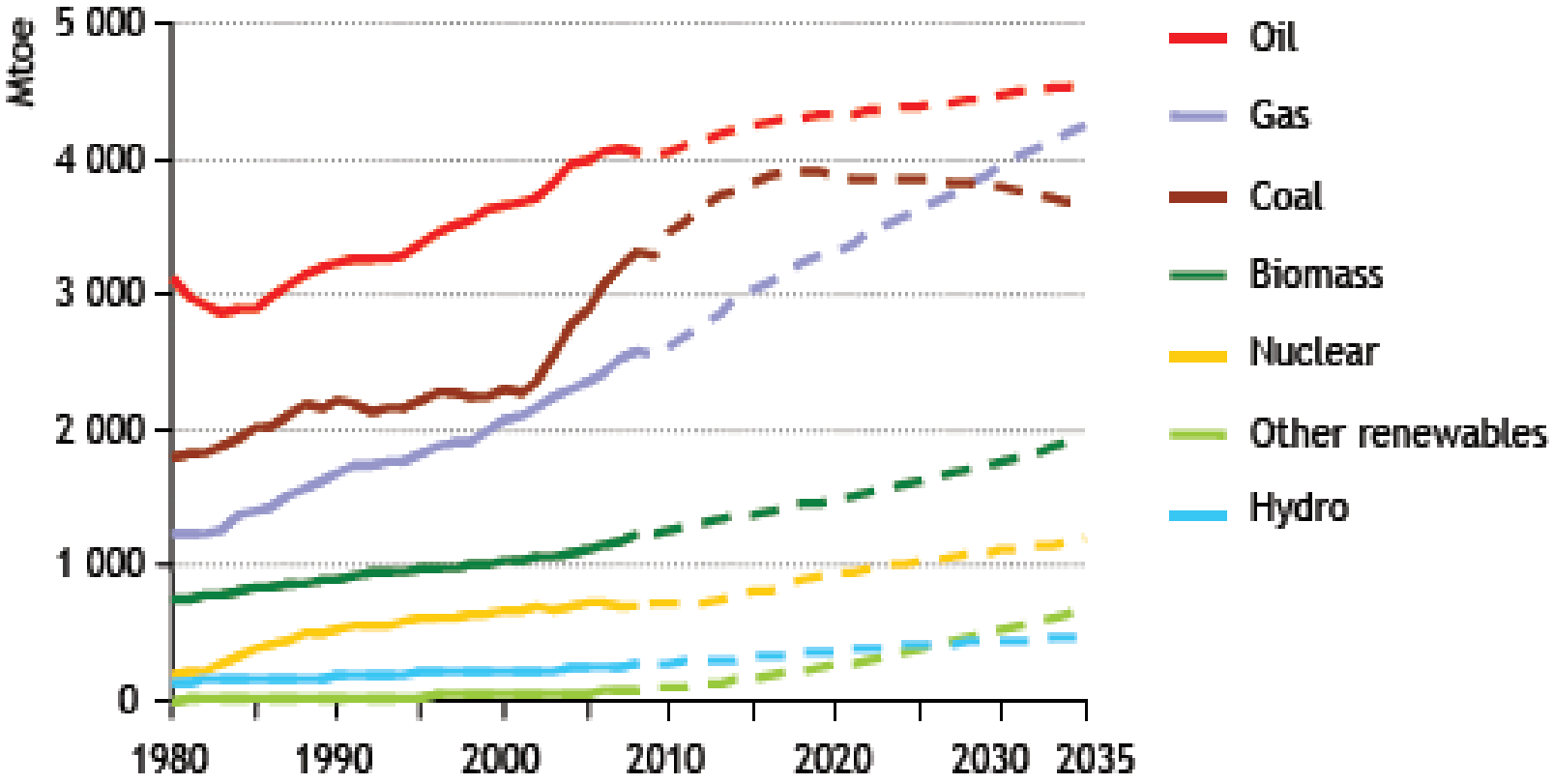
Hans Riddervold
Director, IGU Secretariat

International Gas Union



- **Charter members 79**
- **Associate mbrs. 38**

Growing energy demand – need for all energy sources available



Source: IEA, The Golden Age of Gas, 2011 (the GAS scenario)

Natural Gas:
Addressing the World's Challenges

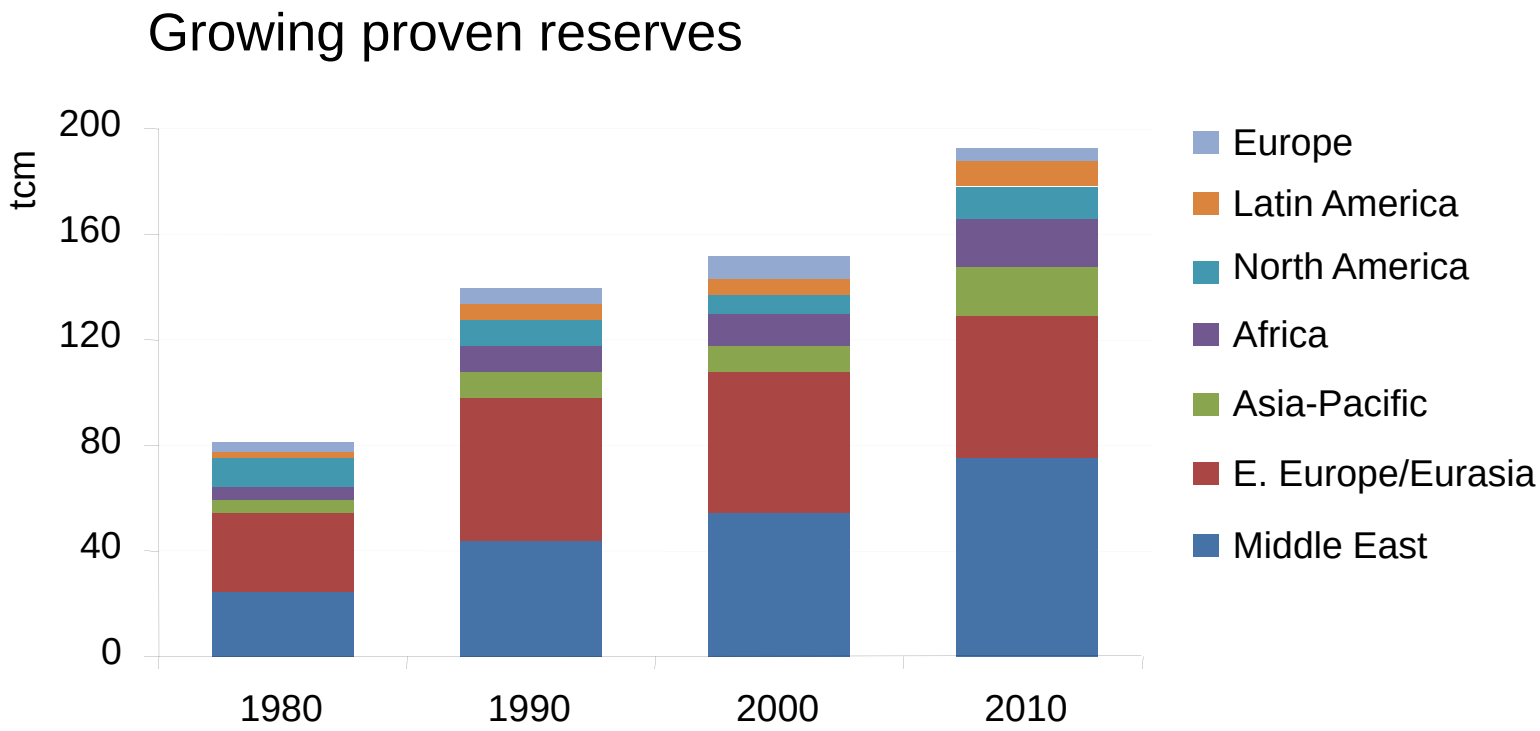
Key Global Challenges	Role of Natural Gas
Population Growth & Resource Availability	**Abundant**
Economic Development & Employment	**Feedstock and employment**
Energy Poverty & Public Health	**Reduce smog and pollution**
Air Quality & Climate Change	**Low SO_x, NO_x and CO_2**
Mobility	**LNG and CNG for transport**
Affordability	**CCGT low cost**

Global Vision for Gas

Lays out a clear pathway towards a sustainable energy future

- Abundant
- Available & Accessible
- Affordable
- Adaptable
- Acceptable:
  - Sharply reduced greenhouse gas emissions.
  - Improved air quality and public health

Conventional reserves: plenty and more to come



Global proven gas reserves have more than doubled since 1980, reaching 190 trillion cubic metres at the beginning of 2010

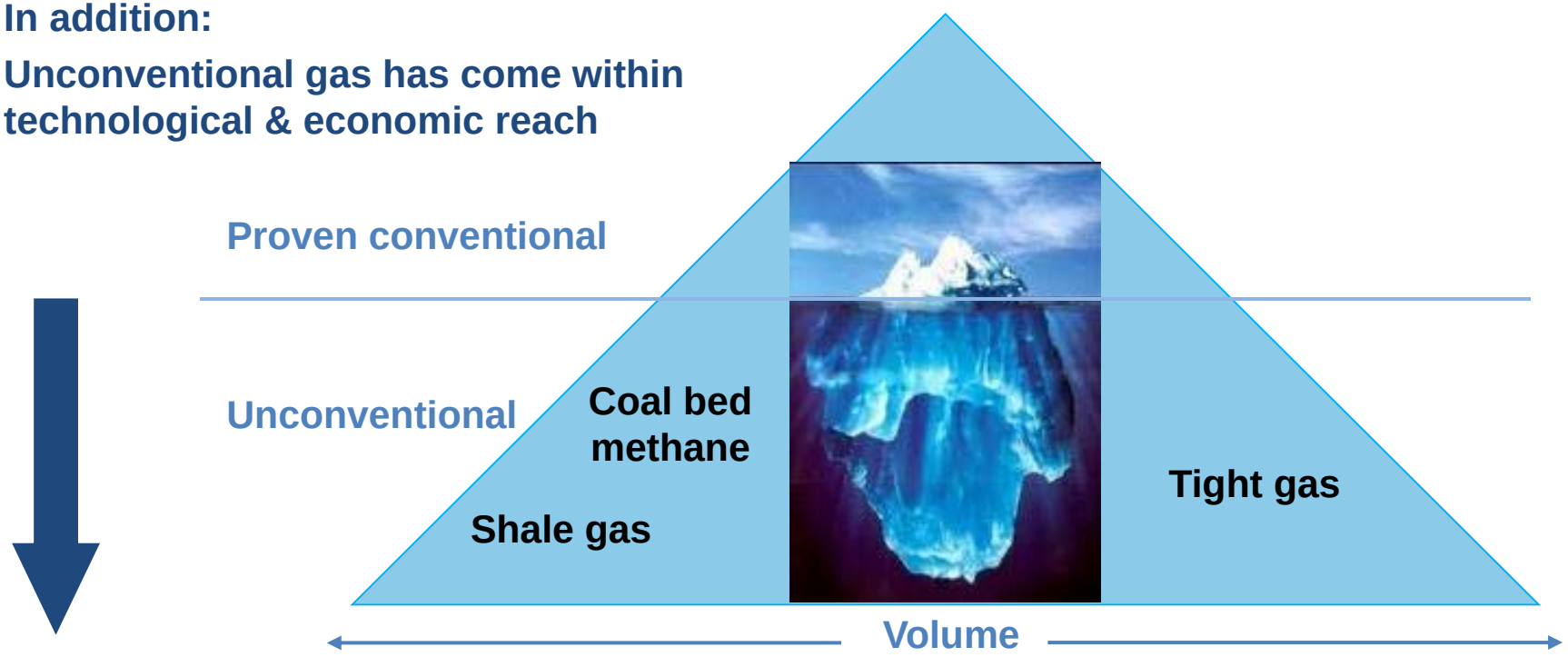
Source: IEA 2011

Natural gas reserves: plenty & more to come

Proven conventional reserves* are growing

In addition:

Unconventional gas has come within technological & economic reach



The total long-term recoverable conventional gas resource base is more than 400 tcm, another 400 tcm is estimated for unconventionals: only 66 tcm has already been produced. ***- IEA-Golden Age of Gas 2011-***

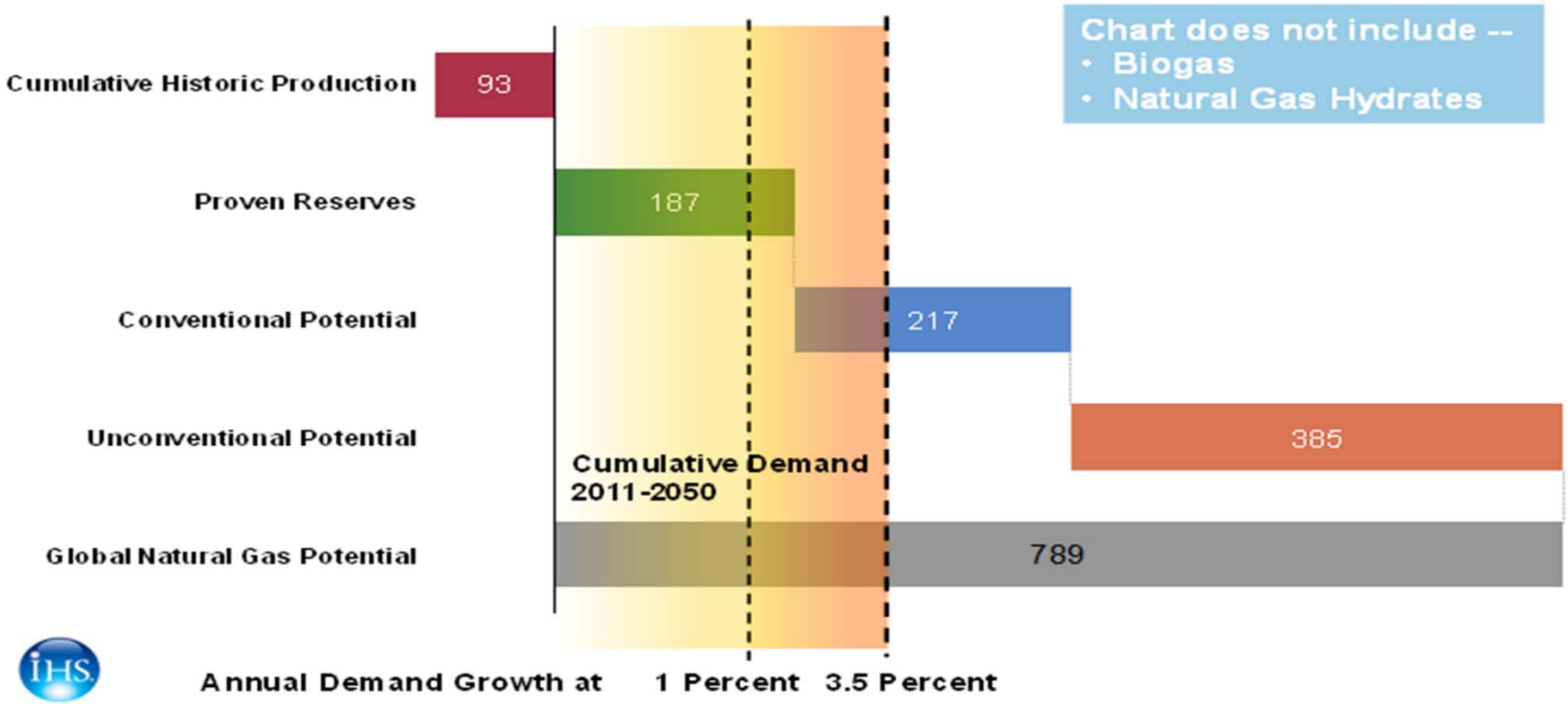
* 190 tcm in 2010

Resource Availability

What is the Global Availability of Natural Gas?

Global Natural Gas Recoverable Resources vs Demand

(Trillion Cubic Meters)

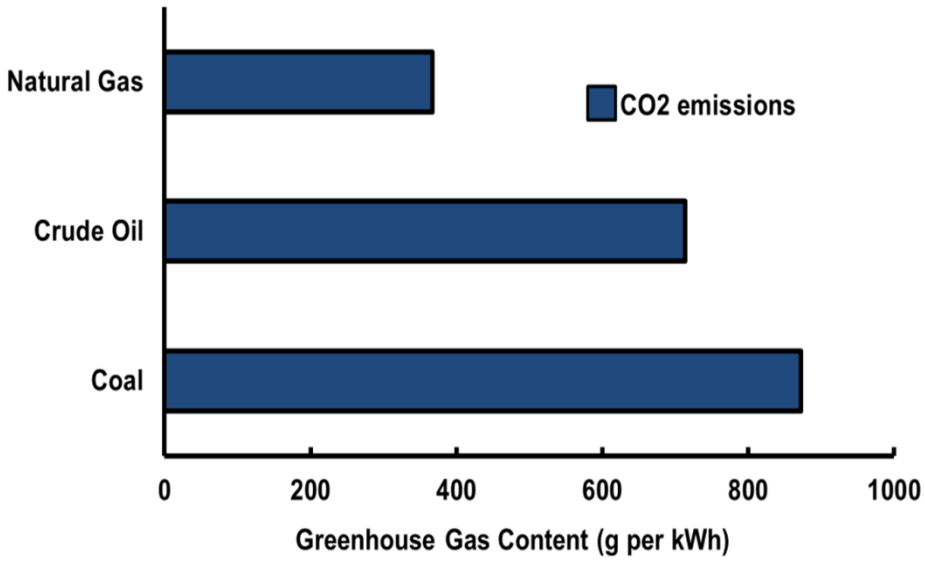


Source: BP, IHS CERA, IEA.

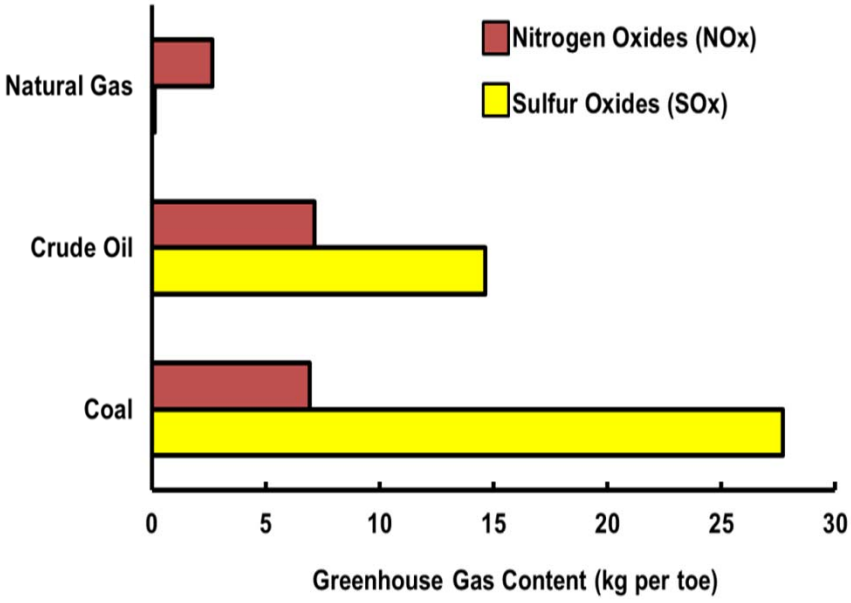
Natural gas can contribute to better air quality and to mitigating climate change

Natural gas is a clean-burning and low carbon fuel

Carbon Dioxide Emitted During Electricity Generation by Fuel*



NOx AND SOx CONTENT BY FUEL



Ad *: Power generation efficiencies assumed: Natural gas 55%, crude oil 37%, coal 39%

Gas for pairing with renewables

Fabulous renewable resources:

- **Windpower needs wind**
- **Solar power needs sun**

Ideal pairing resource

- **Gas quickly in place when sun and wind temporarily is gone**

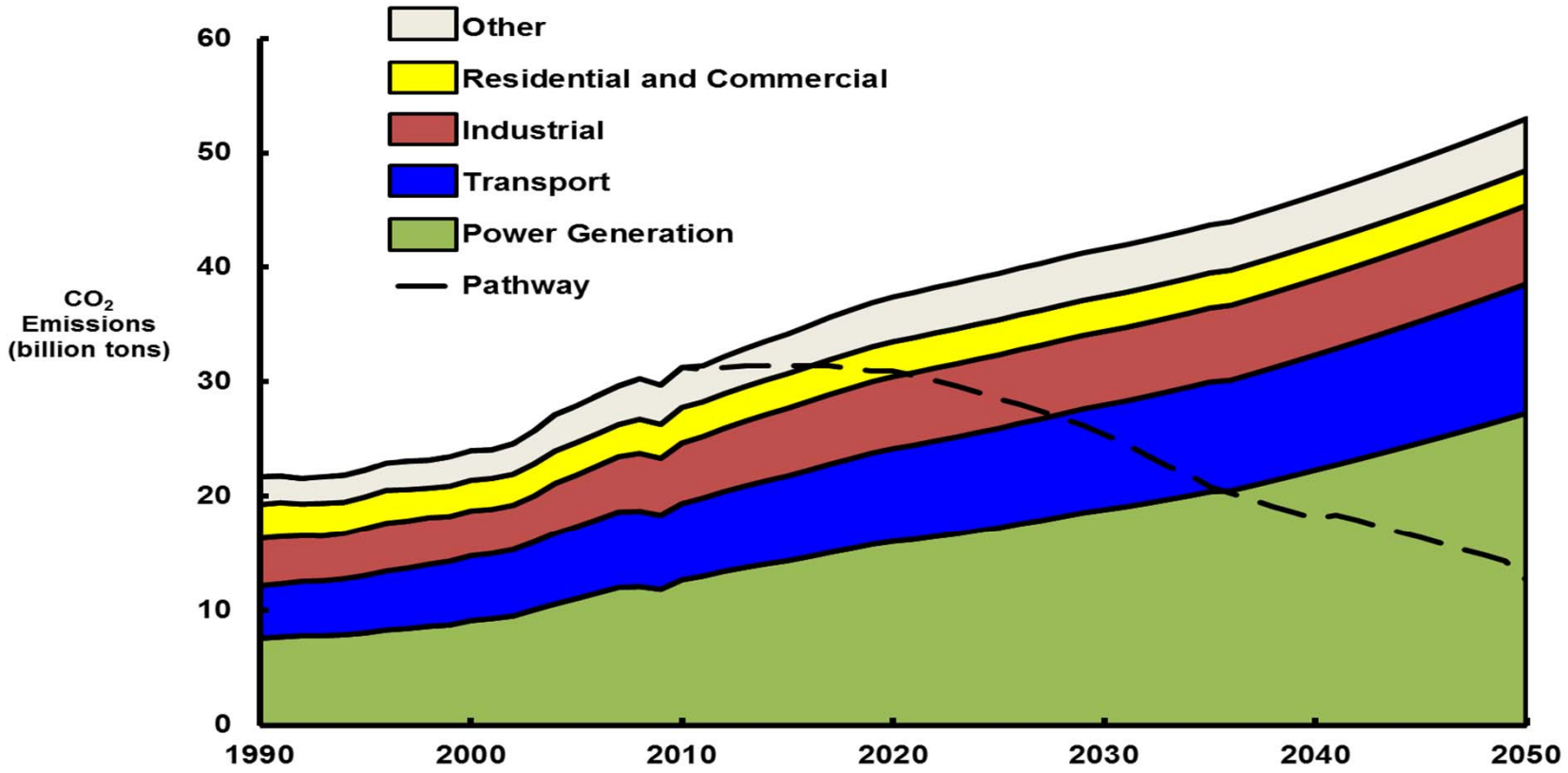
Natural gas for transportation

Natural gas is applicable for most kinds of transportation

The Pathway towards a Sustainable Future

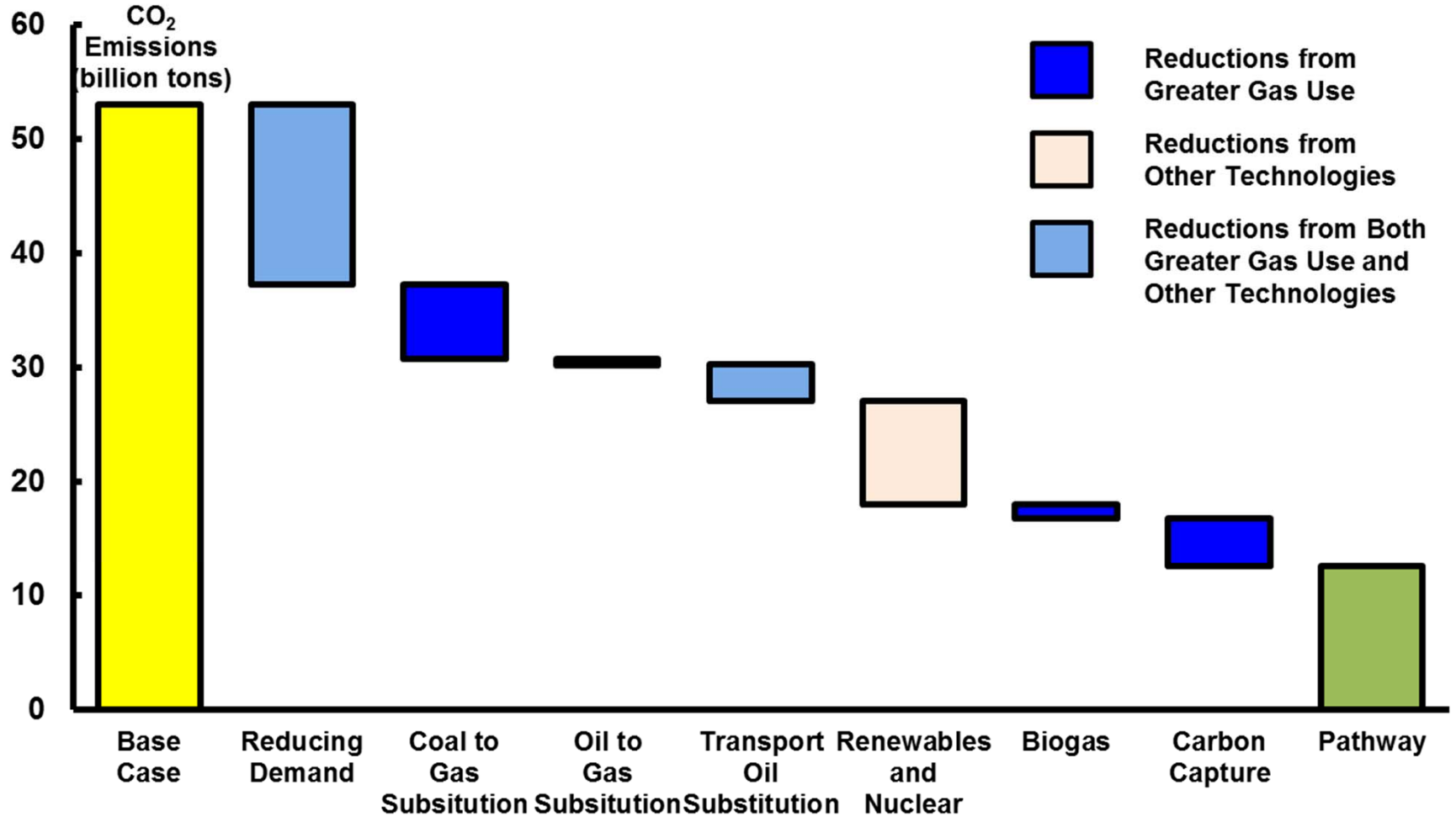
Meeting future global energy needs
whilst addressing air quality and climate change concerns

Global Emissions Trajectory Base Case

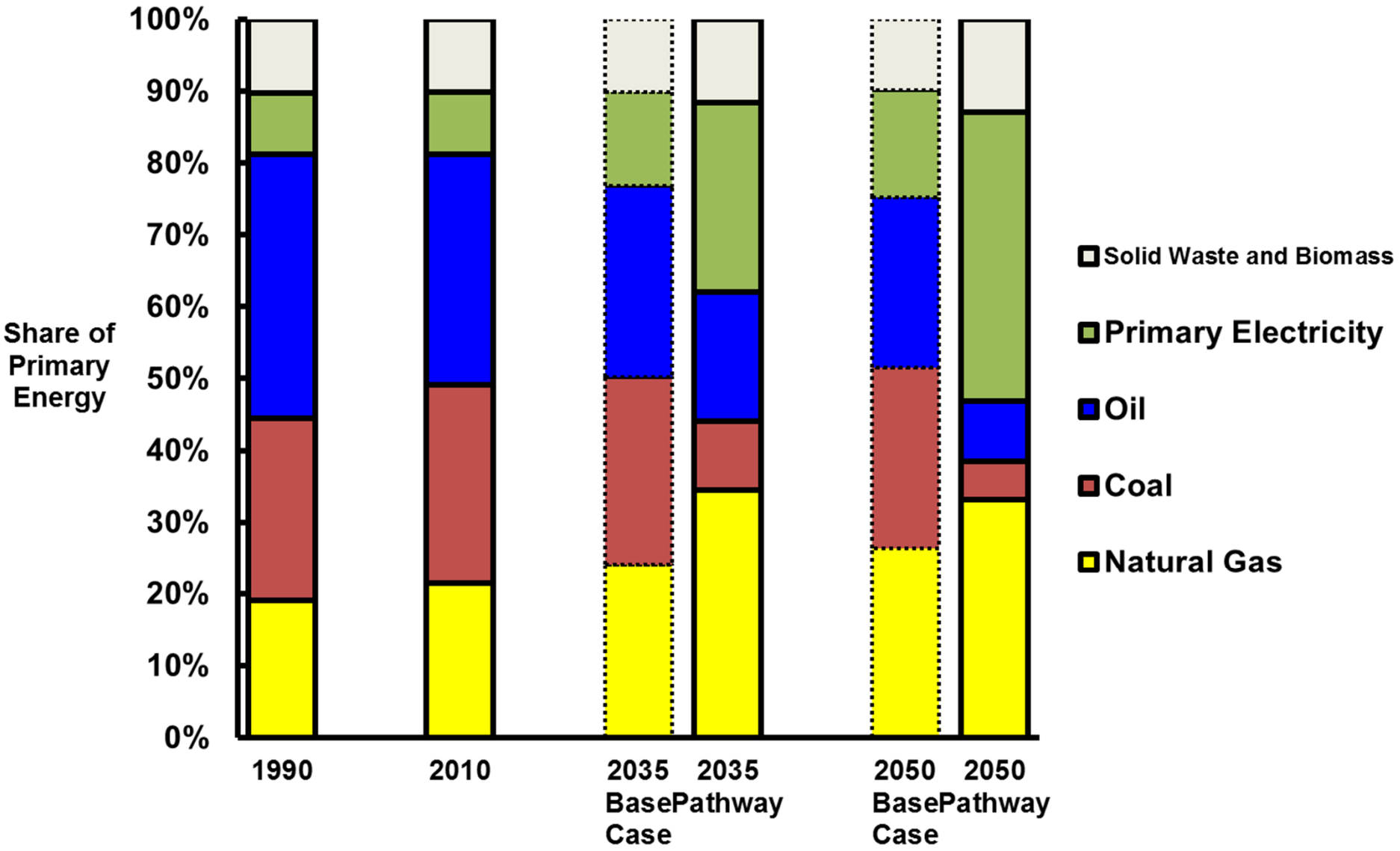


Vision Pathway highlights various CO_2 abatement options and technology choices

Calculation for 2050

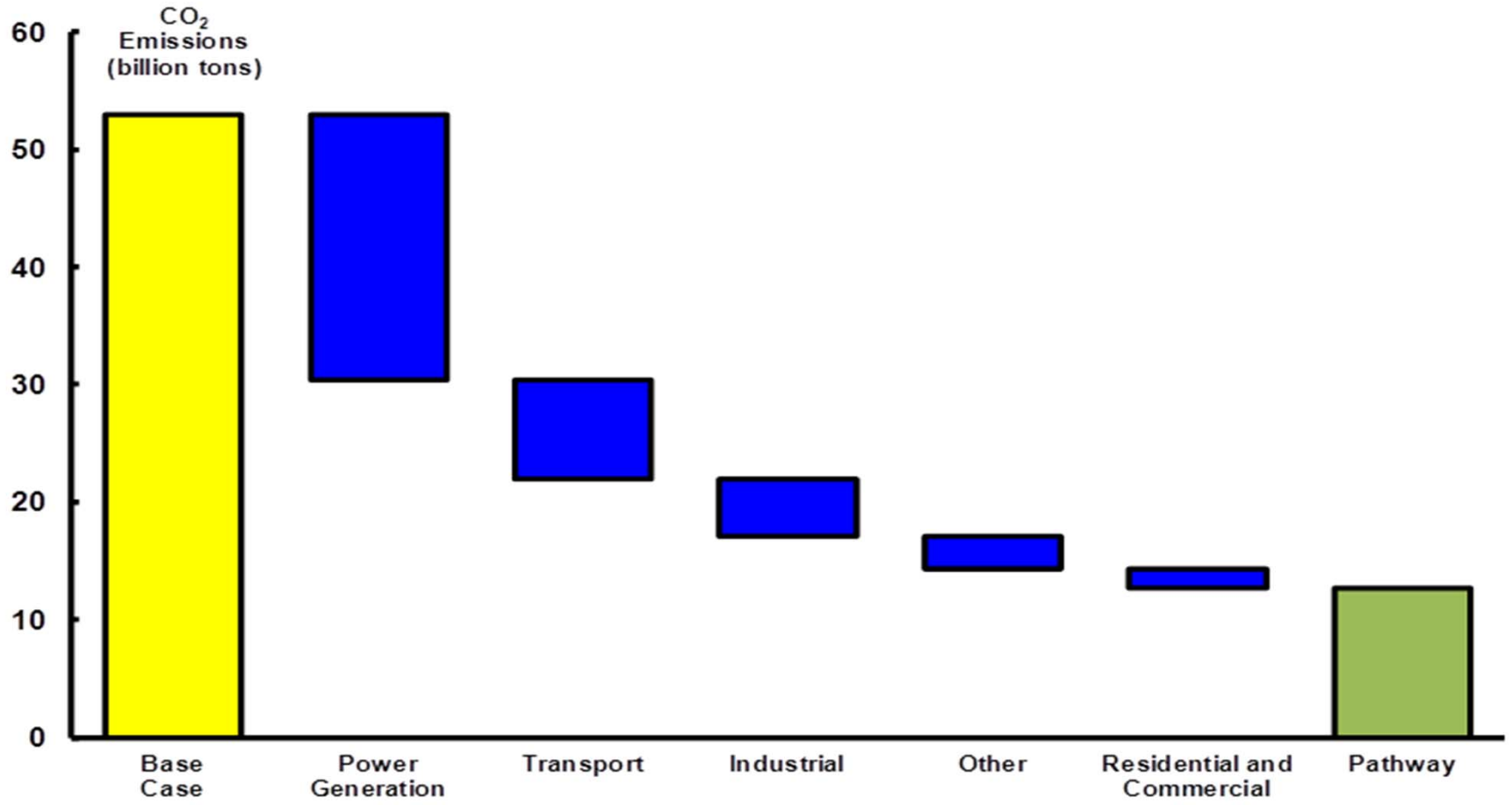


Gas Market Share of Primary Energy



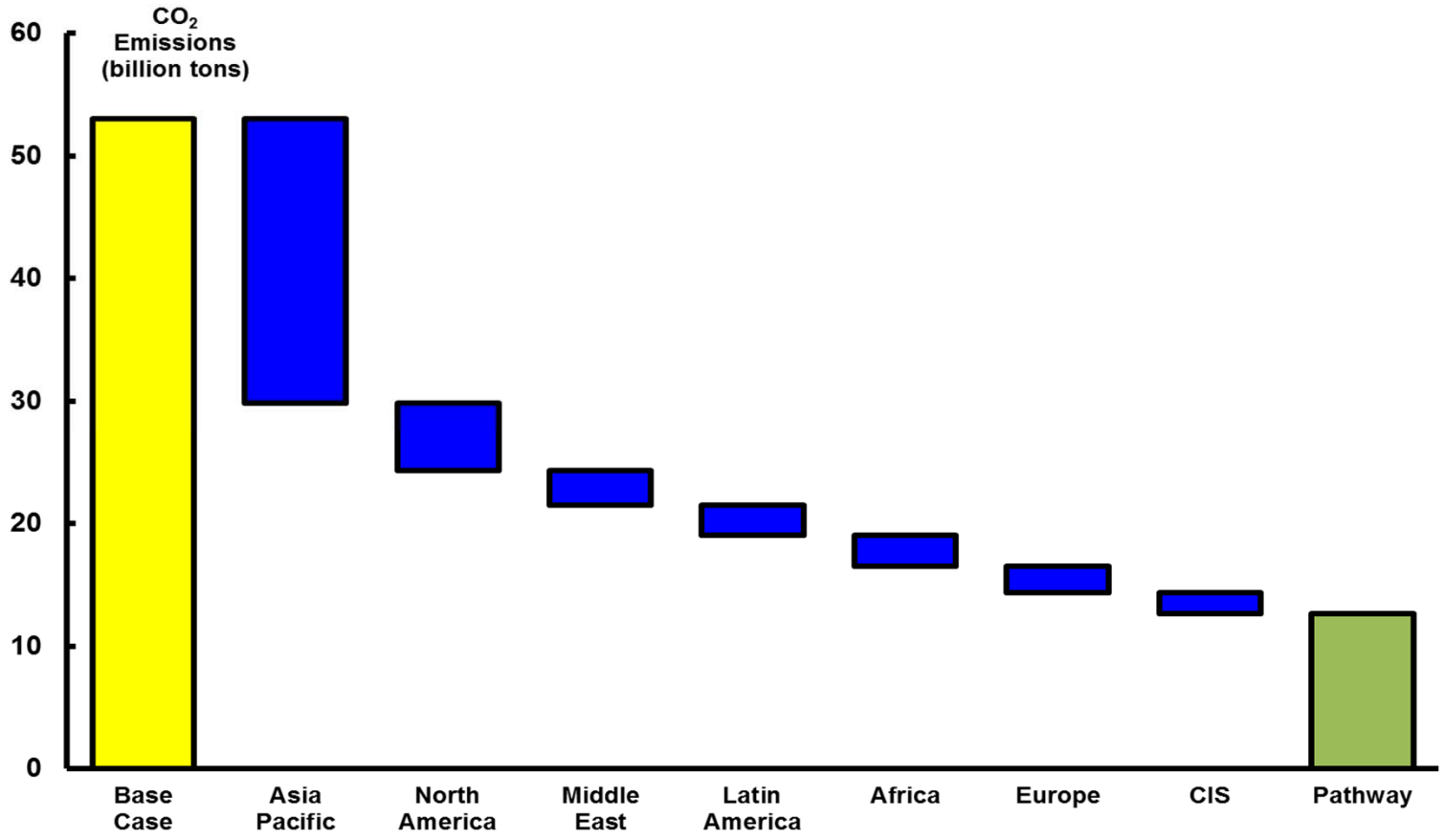
The Vision Pathway Trajectory

Global Emissions Reductions by Sector



The Vision Pathway Trajectory

Global Emissions Reductions by Region



Requirements to realise the potential of gas / LNG for the future

Politics

- Conducive policy and regulatory framework
- Stable and predictable
- Consideration of cost of carbon

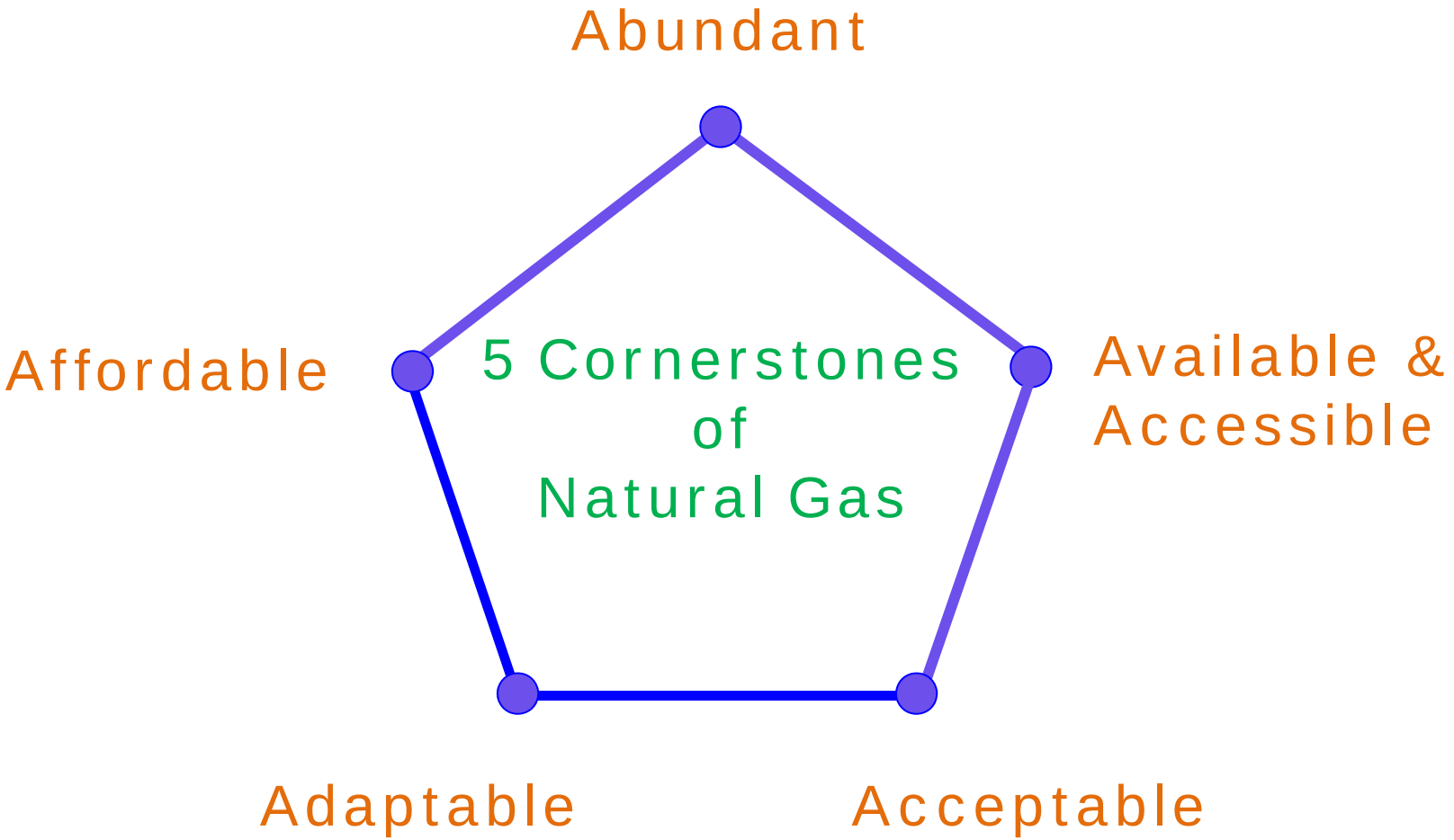
Industry

- Improve technologies used
- Establish trust with all stakeholders

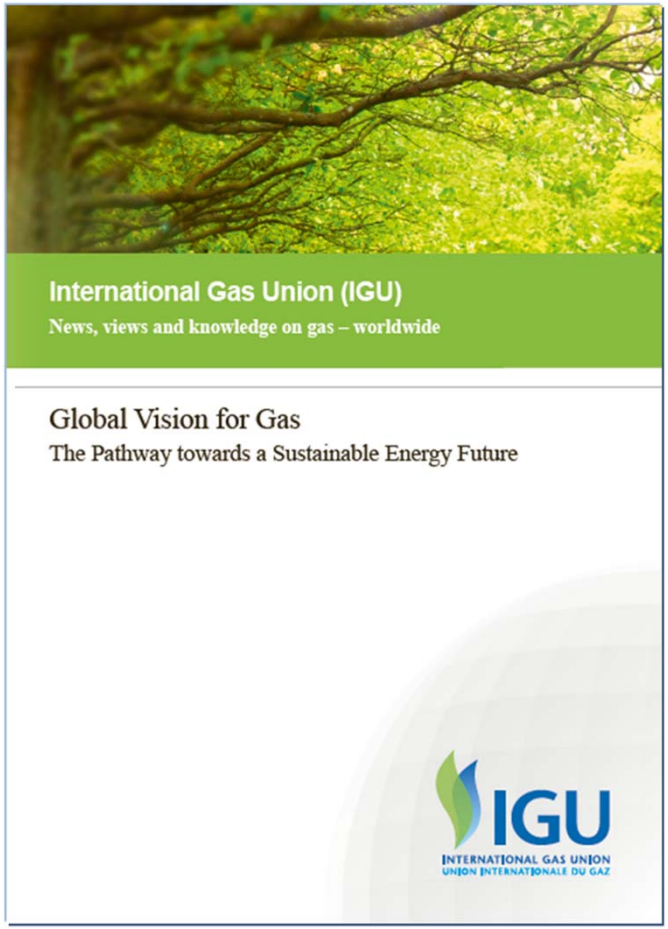
All

- Realise the benefits and synergies of integrated energy concept solutions

Conclusion


Abundant
Affordable
5 Cornerstones of Natural Gas
Available & Accessible
Adaptable
Acceptable

Global Vision for Gas:
The Pathway towards a Sustainable Energy Future



Download from:

http://www.igu.org