



# Addressing Carbon Asset Risk

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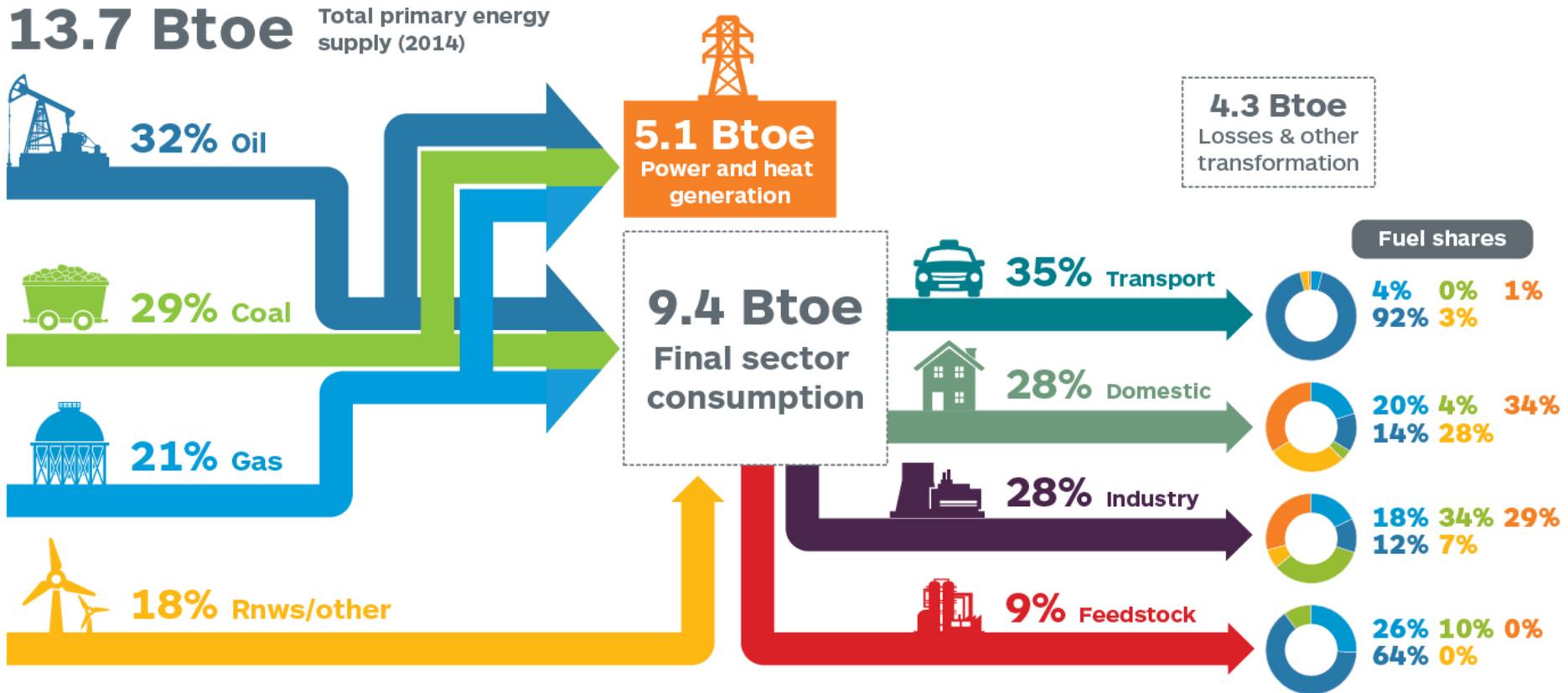
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# Carbon Asset Risk- Our Understanding and Perspective

- **Energy Supply and Use** is an important system, largely fueled by fossil fuels today
- **Premise of divestment** is that 58% of fossil fuel reserves should “stay in the ground”
  - Publicly traded companies are overvalued; not paying attention to the issues
- **Analysis shows flaws** in this premise
  - Publicly traded companies own 17% of oil and gas reserves: 6% of future fossil fuel emissions
  - 2° scenarios include oil and gas in the portfolio mix for the long term
  - Oil and gas companies are taking action:
    - Reducing emissions
    - Addressing carbon intensity – technology investments and efficiency
    - Assessing portfolio resiliency to carbon constrained scenarios
- **Benefits of Engagement**: companies, consumers, policymakers... have a role to play
  - Companies including ConocoPhillips are engaged in policy and stakeholder dialog

# Energy Importance, Supply, Use and Efficiency

Substitution by non-carbon fuels has been minimal for transportation and feedstock uses



**Notes:** IHS Energy estimated total global primary energy supply and demand by market segment and fuel type in 2014, including the shares of total primary consumption of oil, coal, natural gas, and "other" energy types (nuclear/renewables/hydro/biomass and waste). Fuel inputs into the production of power and heat are captured as well as losses associated with the transformation of the primary fuels. The simplified chart focuses on the main end-user segments: transport; the domestic sector, which includes the residential and commercial subsectors; industry; and feedstocks, and the contributions of different energy types in meeting those segment needs today. Substitution by non-carbon fuels has been minimal for transportation (92% oil) and industrial feedstocks (100% oil, gas, and coal).

Source: IHS

© 2015 IHS: 1640048

- **Largest 50 publicly traded oil and gas companies:**
  - 38% of global oil & gas production
  - 17% of remaining oil and gas reserves (on boe basis)
  - but only **6%** of remaining total energy related fossil fuel emissions
    - compared to National Oil Companies (NOC's) and coal
  - Listed oil and gas companies produce at a faster rate than NOC's:
    - will have to produce **196%** of proven oil reserves, and
    - **245%** of proven gas reserves to meet demand to 2100
- **Proved reserves are produced in a relatively short period of time**
  - Industry realizes ~ 90% of net present value within 10-15 years

# Long Term Role of Fossil Fuels

## Energy Growth 2010-40

Current Policies 57%

New Policies 44%

450 Scenario 23%

## Oil & Gas Growth 2010-40

Current Policies 47%

New Policies 34%

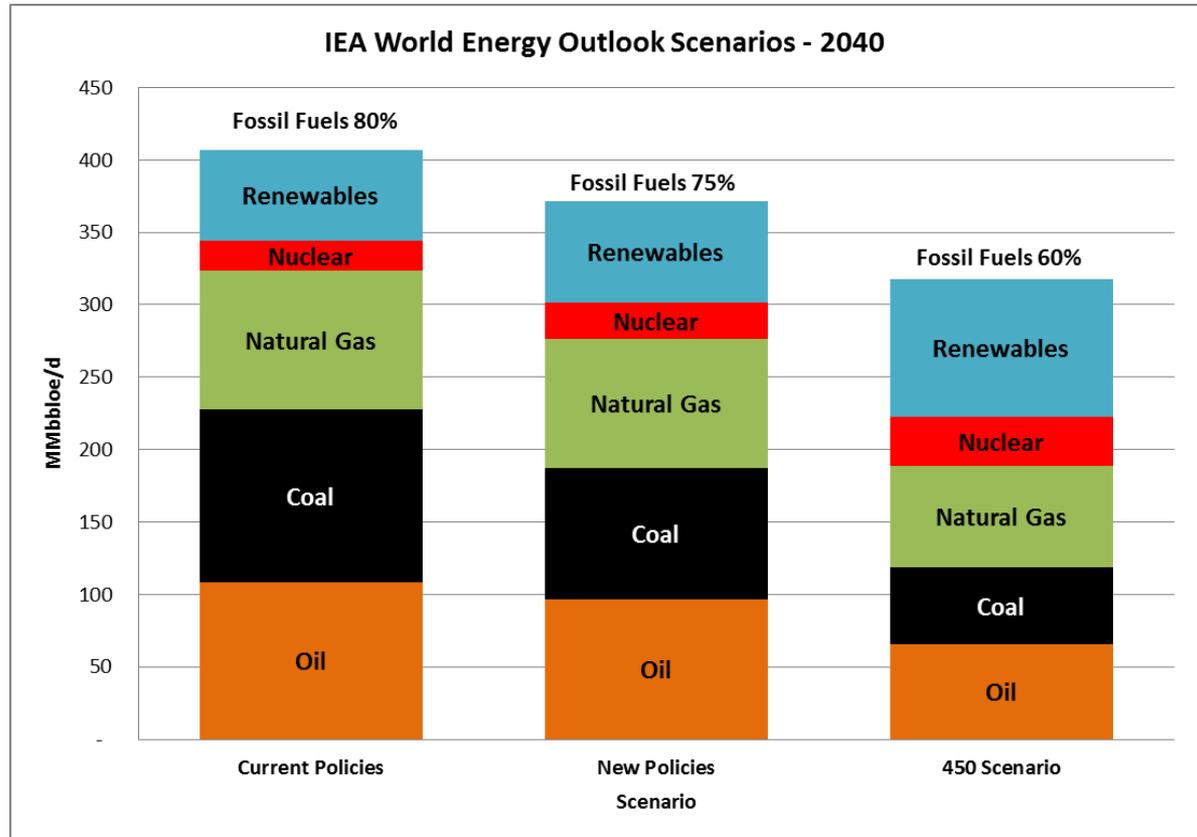
450 Scenario (2%)

## Fossil Fuel Share 2040

Current Policies 80%

New Policies 75%

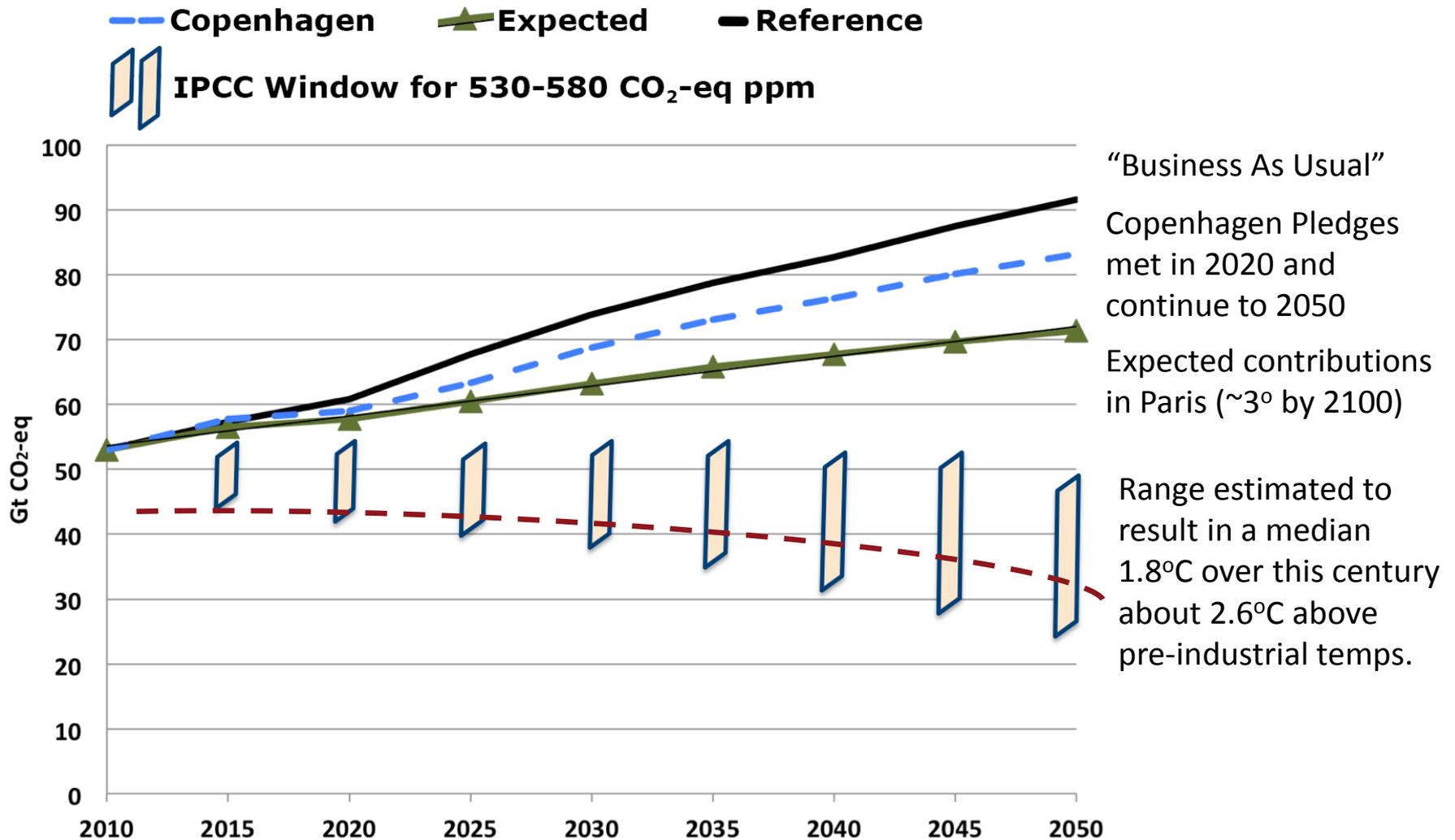
450 Scenario 60%



Source : © OECD/IEA 2014 *World Energy Outlook*, IEA Publishing. Licence: <https://www.iea.org/t&c/termsandconditions/>

# Global Policy Outcomes are Uncertain

## Emissions projections



Note: Includes Land Use Change and Forestry. Source: **Expectations for a New Climate Agreement** Henry D. Jacoby and Y.-H. Henry Chen – August 2014 Report No 264 [http://globalchange.mit.edu/files/document/MITJPSPGC\\_Rpt264.pdf](http://globalchange.mit.edu/files/document/MITJPSPGC_Rpt264.pdf)

# Change is Challenging

Each of these changes would reduce emissions by 1 GtCO<sub>2</sub>e



Install this many wind turbines...

**275,255**

doubling the current number of installed turbines worldwide

**x2**



or...



Install at least this much solar PV capacity...

**514 GW**



...requiring 3,850,000 acres, an area that is...



**12x** the size of Los Angeles

**Notes:** IHS Energy determined the carbon dioxide emissions avoided per wind turbine installed by applying the national average CO<sub>2</sub> displacement rate for non-baseload grid electricity to the average annual electricity generated by a typical wind turbine. The US Environmental Protection Agency estimates that the national average CO<sub>2</sub> emissions displacement rate for non-baseload zero-carbon grid electricity is 690 tons per GWh. IHS Energy estimated the electricity generated annually by a typical wind turbine using average nameplate capacities and capacity utilization factors published by the US Department of Energy of 1.94 MW and 31%, respectively. On this basis, an average wind turbine installed in the US in 2012 displaced 3,633 metric tons of CO<sub>2</sub> so that 275,255 turbines would be required to avoid 1 GtCO<sub>2</sub>. According to the Global Wind Energy Council, there were 241,100 installed wind turbines worldwide at the end of 2013.

IHS Energy calculated the amount of solar PV capacity that would be required to avoid one GtCO<sub>2</sub> emissions from coal-fired electric generation based on the assumption that a typical coal-fired power plant emits 900 tCO<sub>2</sub>/GWh and that 1 GW of solar PV capacity can generate 1,760 GWh per year under typical insolation conditions. On this basis, avoiding 1 GtCO<sub>2</sub> emissions would require 514 GW of solar PV installations. IHS Energy assumed that solar PV installations require an average of 7.5 acres per MWh of capacity, so that 514 GW would require approximately 3.85 million acres. The area of the city of Los Angeles is 503 square miles or about 0.32 million acres.

Source: IHS

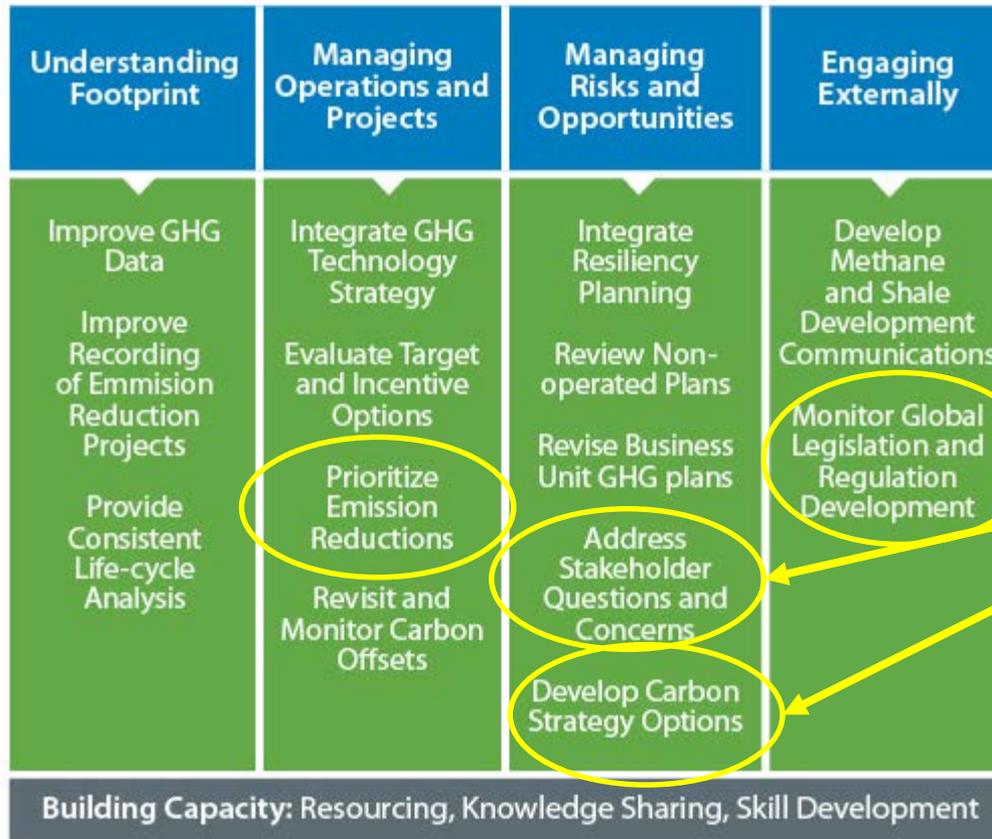
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- Carbon intensity slightly up
  - Mature fields, unconventional reserves, heavier oil, LNG, more remote locations
- Reducing emissions
  - Reducing methane venting, flaring, replacing equipment
  - Cogeneration, fuel switching and innovative energy management
- More companies focus on reducing emissions in specific businesses
  - ... rather than company-wide GHG emissions targets
- Industry advancing carbon capture and storage
  - Involved in 9 of the 13 large-scale operational CCS projects globally

# ConocoPhillips' Climate Change Action Plan

- Delivering performance on key priorities

- Reduced ~ 1 million tonnes / year total > 6 MM tonnes CO<sub>2</sub> equivalent



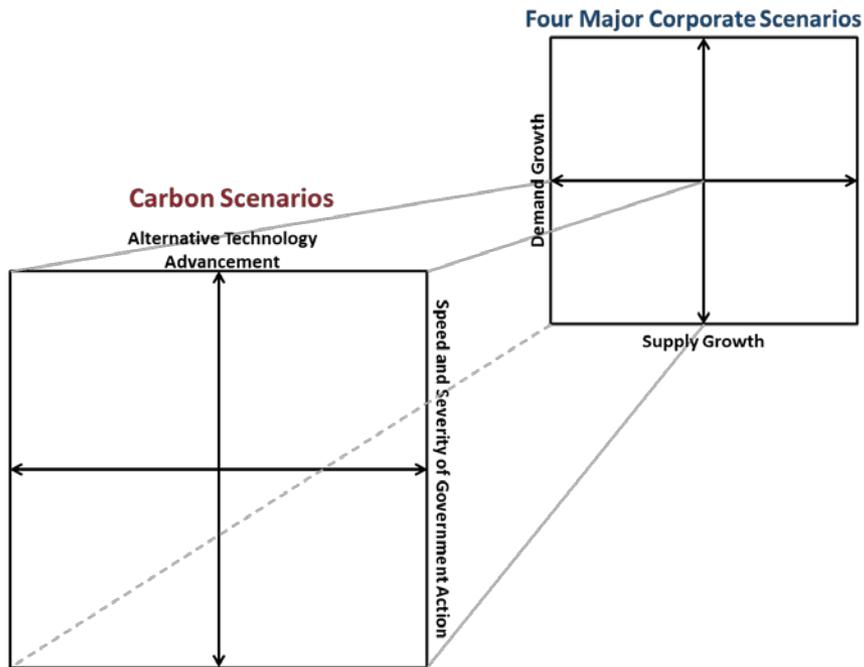
Addressing carbon asset risk management and stakeholder questions



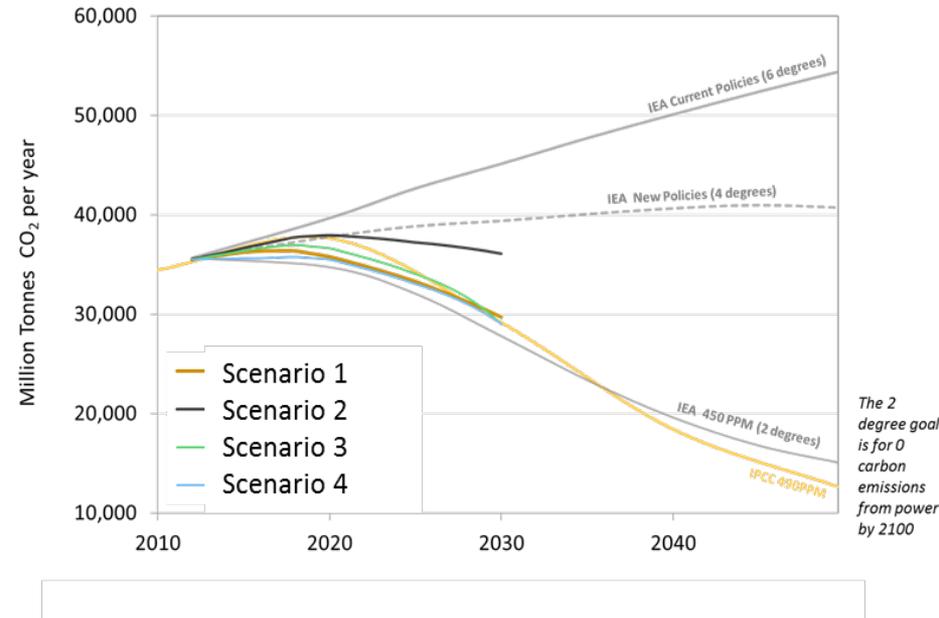
- **Understanding our Footprint and Reducing Emissions**
  - Kept GHG emissions flat since 2009: ~ 28 million tonnes CO<sub>2</sub> equivalent
- **Focusing Reduction Efforts** using Global Prioritization
  - Key areas for reductions are methane, flaring, and fuel switching
  - Investing in oil sands technology
- **Supporting New Solutions**
  - **Carbon Capture & Storage:** CO<sub>2</sub> from Lost Cabin Gas Plant for enhanced oil recovery (700,000 tonnes CO<sub>2</sub> per year)
  - [Skyonic](#) and **Capitol Skymine:** producing useful products from CO<sub>2</sub>
  - [COSIA's Xprize](#): oil sands industry seeking innovative solutions to CO<sub>2</sub> emissions

- Comprehensive, integrated, practical approach
- Developed carbon strategy options and scenarios
- Stress tested our portfolio against the scenarios
- Updated information in Sustainable Development Report
- Investor and stakeholder dialogues
- Further industry dialogues and factsheets

## Building resiliency to a range of possible outcomes



## Emission Trajectories



Source: IEA (International Energy Agency), IPCC (Intergovernmental Panel on Climate Change), COP Primary Energy Model

3 scenarios follow the IPCC\* 2 degree trajectory - we use these scenarios to 'stress test' our portfolio

- Providing details of our emission reduction projects & set goals

<http://www.conocophillips.com/sustainable-development/environment/climate-change/managing-operations-and-projects/Pages/default.aspx>

- Publishing details of our carbon scenario & strategy process

<http://www.conocophillips.com/sustainable-development/environment/climate-change/managing-risks-and-opportunities/Pages/carbon-asset-risk.aspx>

- Describing assumptions and our use of internal carbon pricing

<http://www.conocophillips.com/sustainable-development/environment/climate-change/managing-operations-and-projects/Pages/integrating-the-cost-of-greenhouse-gas-emissions-into-project-economics.aspx>

- Addressing carbon intensity of our operations

<http://www.conocophillips.com/sustainable-development/our-performance/results/Pages/default.aspx#climate>

- Engaging in policy and stakeholder dialog

<http://www.conocophillips.com/sustainable-development/environment/climate-change/Pages/engaging-externally.aspx>

- Building understanding: IPIECA 'Unburnable Carbon' Factsheet

<http://www.ipieca.org/news/20140612/ipieca-releases-fact-sheet-unburnable-carbon>

...effective climate change policy must be aligned with the following principles:

- Recognize that climate change is a **global issue which requires global solutions** – economy-wide governmental GHG management frameworks should be linked to binding international agreements comprising the major GHG contributors
- Result in the **stabilization of global GHG atmospheric concentrations** at safe levels
- **Coordinate with energy policy** to ensure a diverse and secure supply of affordable energy
- Utilize **market-based mechanisms** rather than mandates
- Create a level, **competitive playing field among energy sources** and between countries
- Match the pace at which new **technology** can be developed and deployed
- Encourage **efficient use of energy**
- Avoid **undue harm to the economy**.

[Full list of COP Public Policy Principles](#)

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## Definitions

*The 'Unburnable Carbon'* concept asserts that the potential emissions from proven reserves exceed the carbon budget for the specified temperature rise and would thus remain unburnt.

-- IPIECA Unburnable Carbon Fact Sheet

*'Carbon Asset Risk'* refers to the risk to producers of hydrocarbons that some reserves, or resources may become 'stranded' at some point in the future due to the imposition of policies that are aligned with complying with such a carbon budget.

-- adapted from CERES.org

# Carbon Asset Risk - The Mathematical Premise

- For < 50% probability of not exceeding 2° by 2100
  - **Emissions < 1,075 GtCO<sub>2</sub> “burnable”** to 2050 (Carbon Tracker, similar numbers to IPCC 5AR)
- Total proven fossil fuel reserves ‘contain’ emissions of **2,546 GtCO<sub>2</sub>**  
(BP Statistical Review 2015, similar numbers to IEA WEO 2014)
- That would leave 58% “stranded” as “unburnable” 1,471 GtCO<sub>2</sub>

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## Total Proven Fossil Fuel Reserves (2,546 GtCO<sub>2</sub>)



Source: BP Statistical Review 2015 using EIA WEO 2014 carbon intensities

# Publicly Traded Companies' Reserves only 6% of Emissions

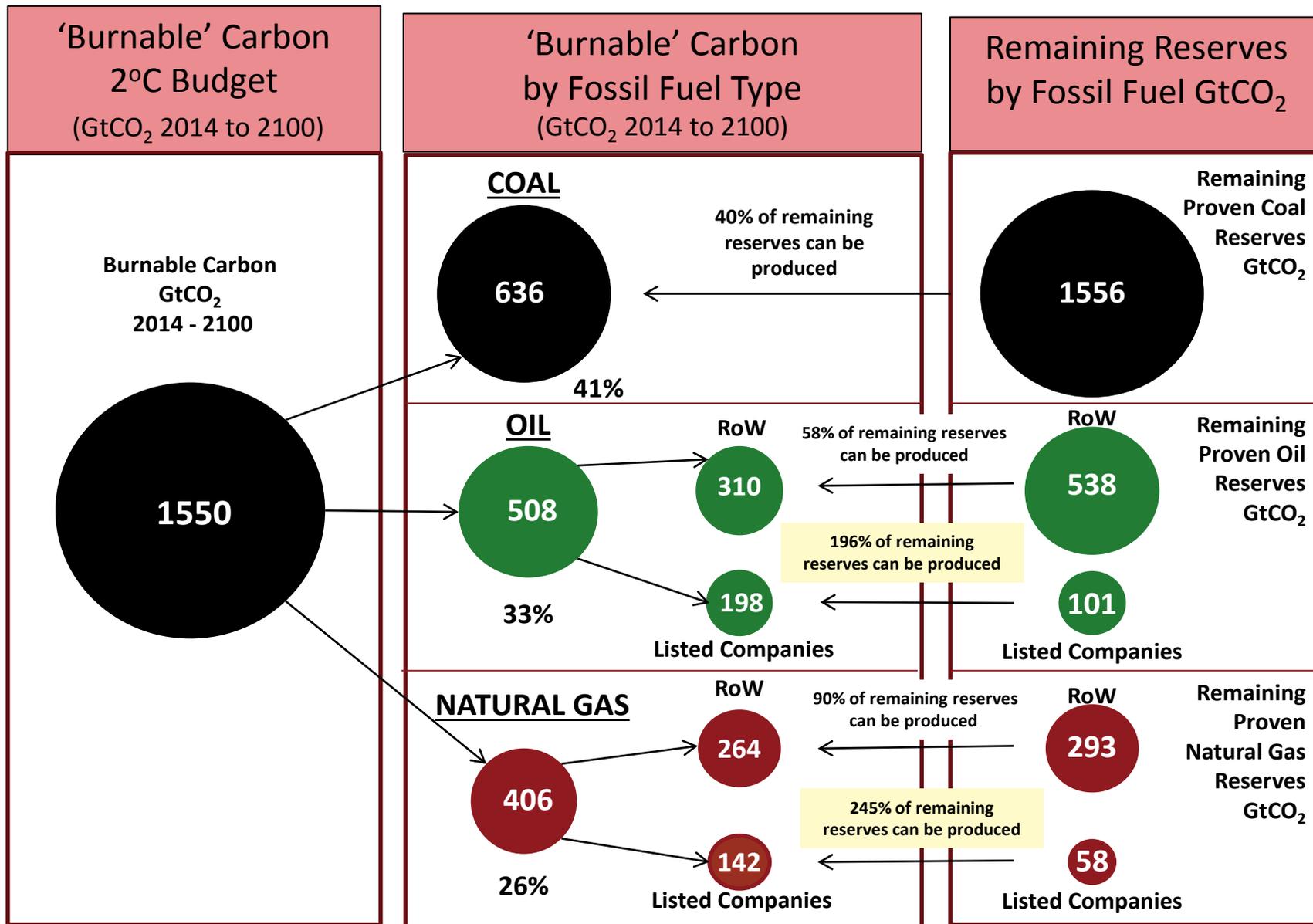
Fuel	'Listed Co's' GtCO <sub>2</sub>	RoW GtCO <sub>2</sub>	World GtCO <sub>2</sub>	'Listed' %	RoW %
Oil	101	538	639	16%	84%
Gas	58	293	351	17%	83%
<i>Sub-total Oil &amp; Gas</i>	<i>159</i>	<i>831</i>	<i>990</i>	<i>16%</i>	<i>84%</i>
Coal	-	1556	1556	-	100%
<b>Total</b>	<b>159</b>	<b>2387</b>	<b>2546</b>	<b>6%</b>	<b>94%</b>

- Largest 50 publicly traded oil and gas companies:

- 38% of global oil & gas production
- 8% of remaining oil and gas reserves (boe)
- but only **6%** of remaining total energy related fossil fuel emissions
  - compared to National Oil Companies (NOC's) and coal ("Rest of World"= RoW)
- Listed oil and gas companies produce at a faster rate than NOC's
  - will have to produce **196%** of proven oil reserves and **245%** of proven gas reserves to meet demand to 2100

Source: BP Statistical Review 2015, Bernstein

# Pace of Production – Listed Co's Gain a Greater Budget Share



Source: Bernstein (updated from IEA WEO 2014, BP Statistical Yearbook 2015)