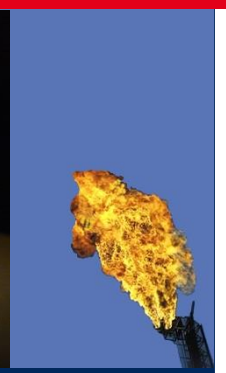






IX Congreso Internacional
Bolivia Gas y Energía 2016
Gas Natural, Medio Ambiente y Acuerdos COP 21

17 de Agosto, 2016

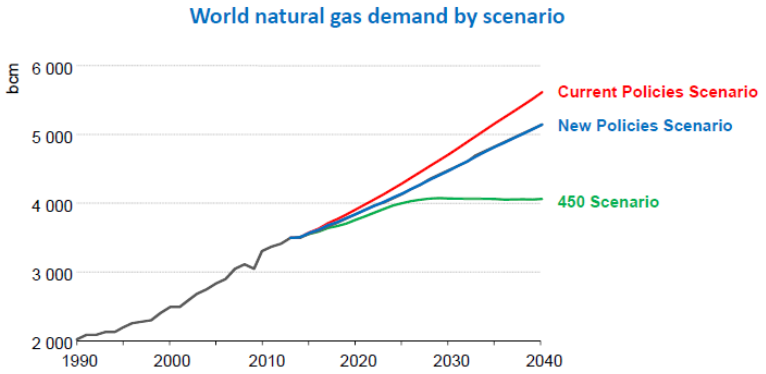
Francisco J. Sucre

Agenda

- Brief facts on natural gas
- Natural gas and environment
- Emissions reductions in natural gas
- UNFCCC Paris COP 21 and natural gas
- International efforts to improve the role of natural gas
- Conclusions

Role of natural gas – some facts

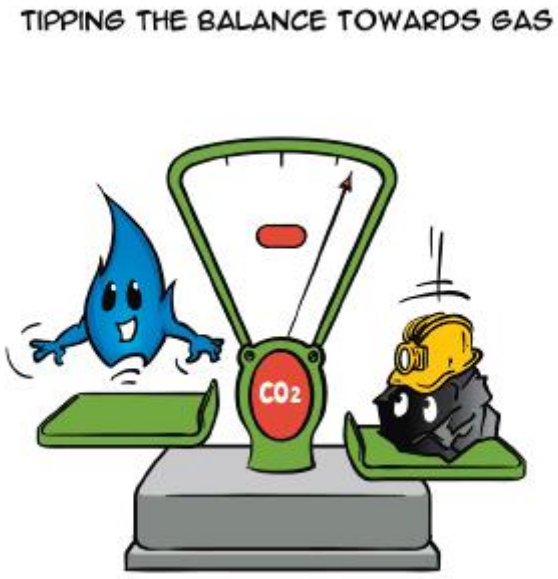
- Fastest growing fossil fuel to catch up with oil and coal in 20 year
  - Growing needs world's energy demand is projected to grow by around 35% by 2035 according to BP's Energy Outlook 2035
- Considered a main hydrocarbon component of a more sustainable energy mix, because:
  - **Abundance** many decades worth of reserves
  - World wants and needs **energy security**, and gas can help
  - As major contributor to **sustainable energy**, and unique role to play
    - Complementary flexible source of fuel in a lower carbon path
    - Cleanest fossil fuel (half emission of coal)



World Energy Outlook 2015

Natural gas and the environment

- What are some positives about natural gas?
  - Lower sulphur oxides and mercury (acid rain)
  - Reduces emissions of nitrous oxides considerably (urban smog)
  - Lower particles (health and visibility problems)
  - Support use of intermittent renewable energy sources
  - Energy efficiency (more energy content per CO2t)
  - Friendlier operation in energy systems

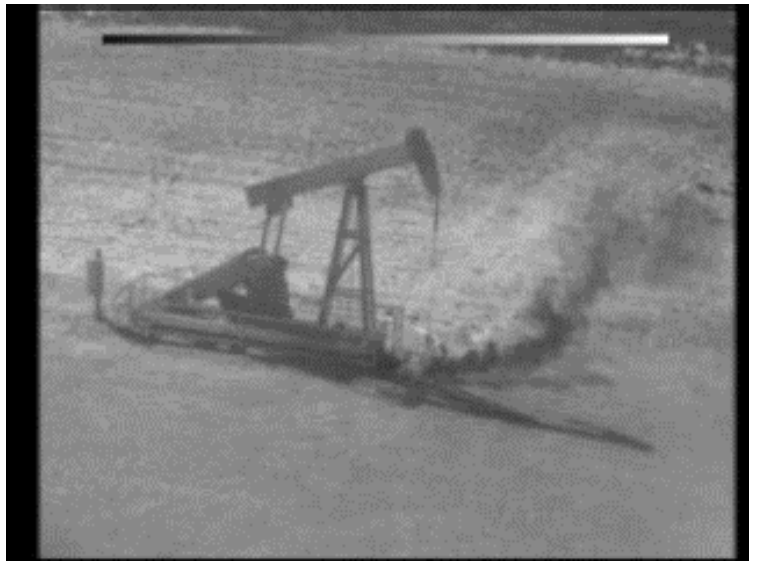


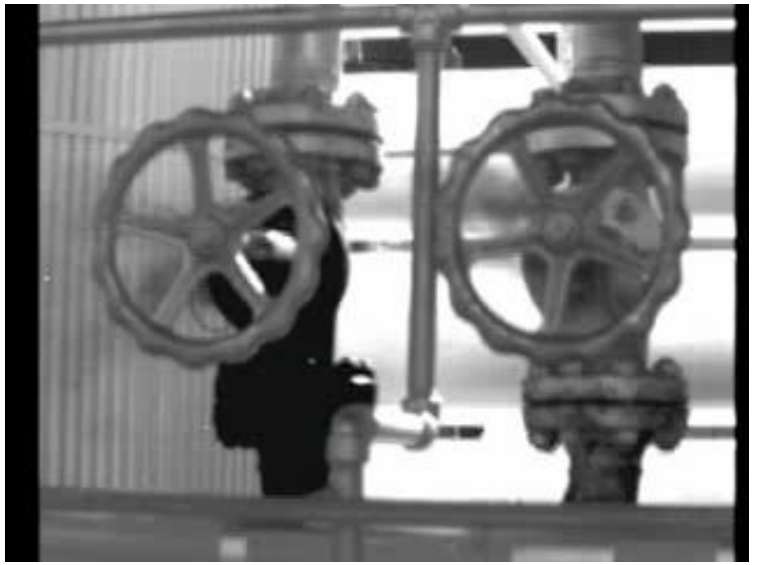
	CO_2 (carbon dioxide)	NOx (nitrogen oxide)	SOx (sulfur oxide)
Natural gas	60	40	0
Oil	80	70	70
Coal	100	100	100

Natural gas and the environment *(cont…)*

- What are the negative aspects?

Lets see unseen methane emission in typical oil and gas operations



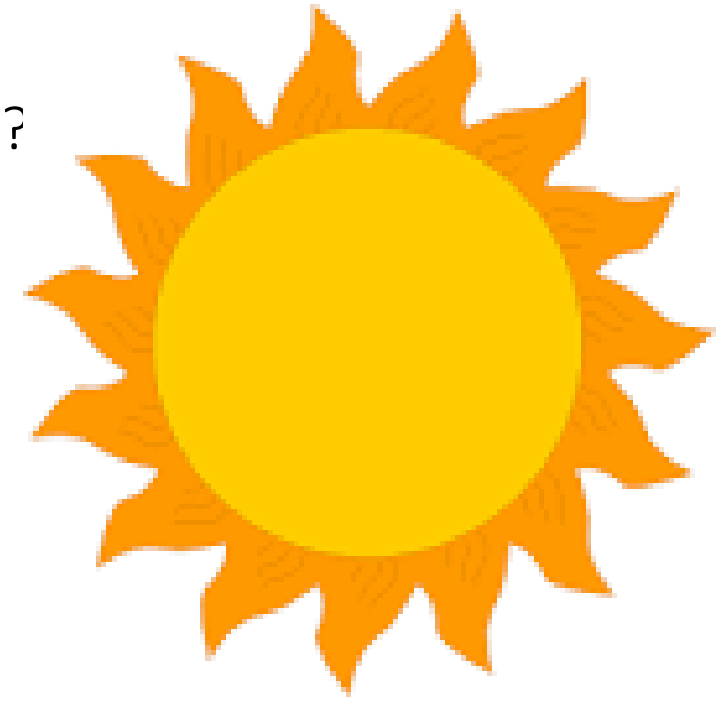


Natural gas and the environment *(cont…)*

- What are the implications of methane in the climate?

Kg per kg of methane traps 84 times more heat than over 20 years than CO2

About 25 percent of the man-made warming we are experiencing today is caused by methane



CH4

CO2

Natural gas and the environment *(cont…)*

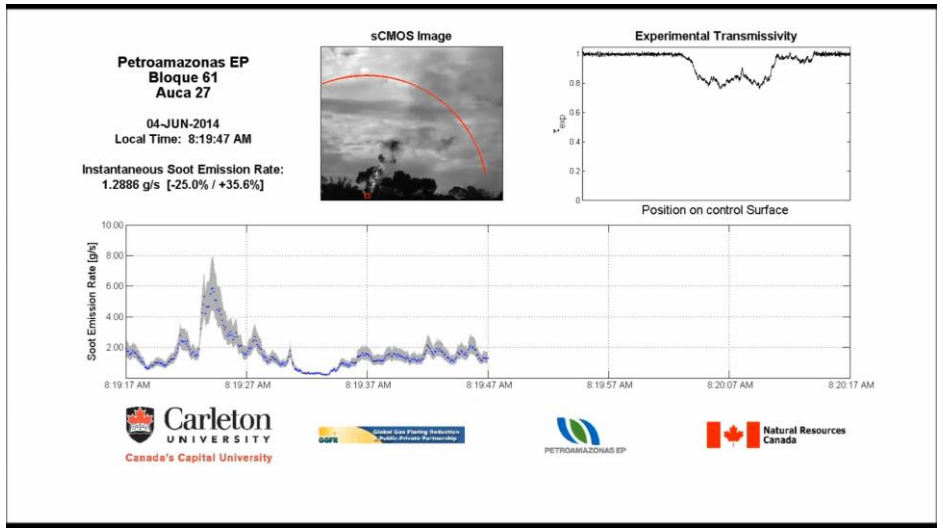
- Natural gas flaring
  - The large volumes
    - Globally about 140 billion cubic meters annually. Enough to produce 750 billion kWh power
  - CO2 emissions (+un-combusted methane)
    - Globally about 350 millions tons CO2 annually. Equivalent to about 77 million cars
  - Environmental pollution
    - Emission of Nitrogen oxides (NOx), sulfur and particulate
  - Black carbon from flares
    - Gas flaring may contribute 40% or more to the black carbon deposition on snow and ice in the Arctic, thus contributing to the reflective power, albedo effect. (2013 Study by Stohl et al)
    - Research on black carbon from flaring ongoing

…and health impacts when people live near flares

Natural gas and the environment *(cont…)*

- Emissions from combusted natural gas
  - Carbon dioxide (CO2)
    - Produces negligible amounts of sulfur, mercury, and particulates (black carbon)
    - Produces nitrogen oxides (NOx), precursors to smog (but at lower levels than gasoline and diesel used for motor vehicles)
    - Exposure can lead to health effects: respiratory symptoms, cardiovascular disease, and cancer

Latest research to quantify black carbon (particulate)
Currently supported by the World Bank Group




BLACK CARBON


Greenland (National Geographic)

Natural gas – emissions and operations

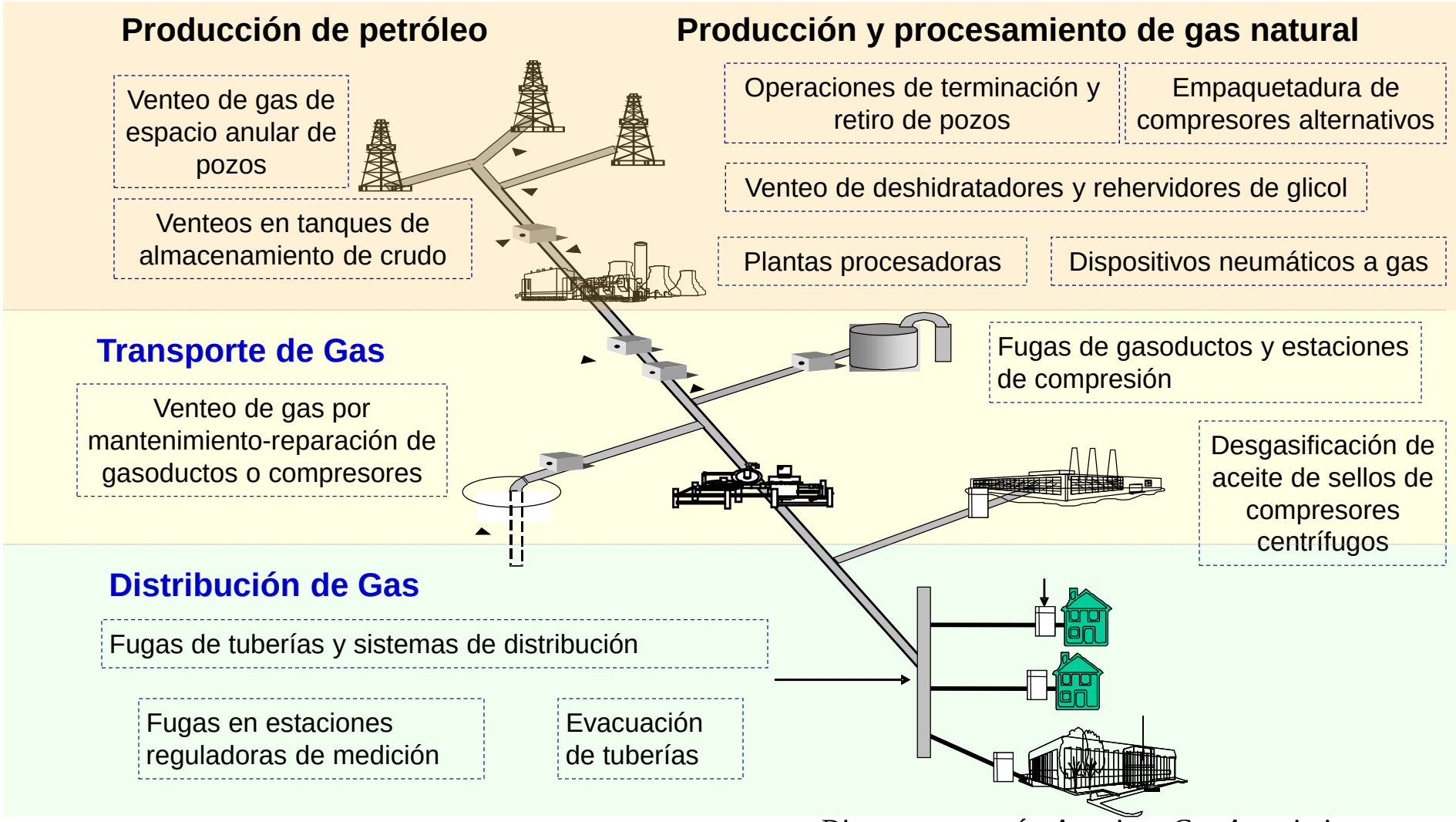


Diagrama cortesía American Gas Association

- All along value chain
- Multiple points to manage

Natural gas and the environment *(cont…)*

- Methane
  - Oil and gas represent 24% of global total methane (Waste equals Norway's emissions)
  - Top 30 countries account for 75 emissions
  - Greatly underestimated and vary widely due to proper data and inconsistent measurement
- GHG emissions equal to:
  - 164 million cars (65% of US Cars) and/or 205 coal-fired Power Plants (Almost 40% of US Coal Plants)
- Worth some US$12 to US$28 billions annually

Figure 1: Estimated Global Anthropogenic Methane Emissions by Source, 2020

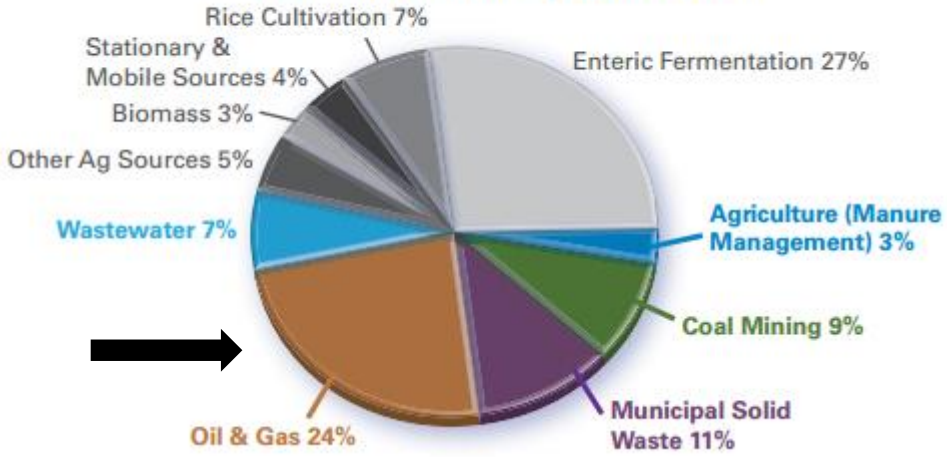
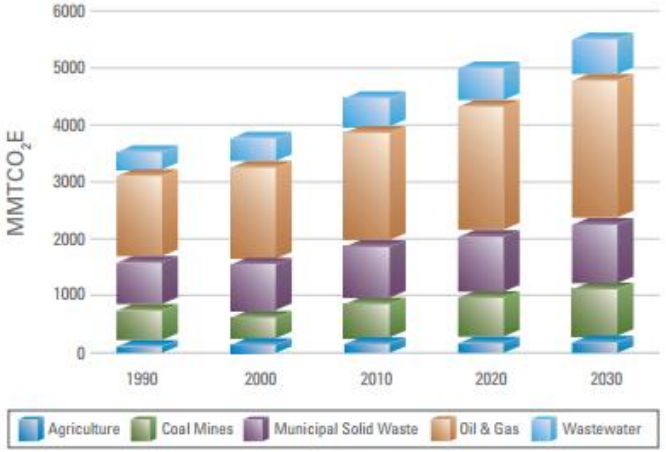


Figure 3: Global Anthropogenic Methane Emissions, 1990 - 2030

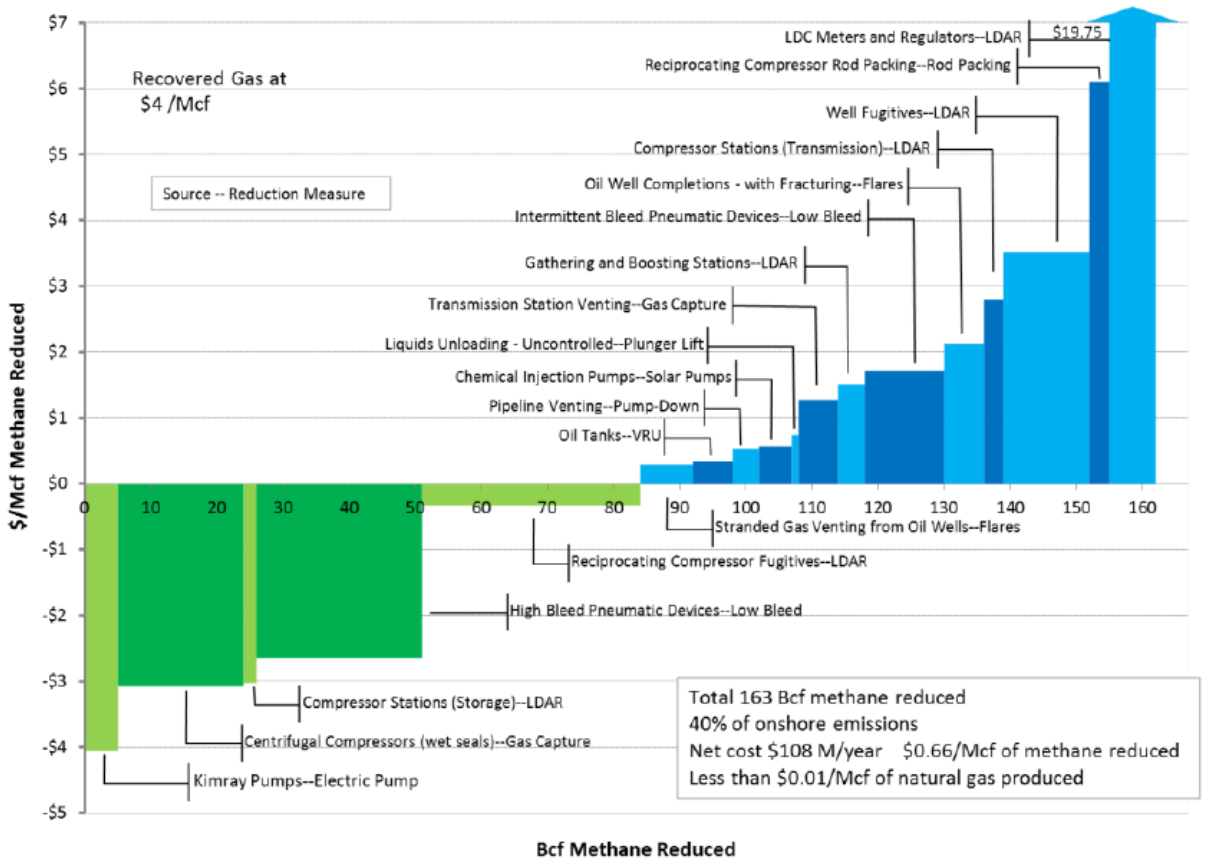


GMI US EPA

Natural gas – emissions reductions (US recent study)

- Abatement opportunities with existing tech.
  - Various volumes at different costs of mitigation with some at negative costs (green)
  - Leak detection and repair of fugitive emissions (LDAR) at facilities and gas compressors, reduced venting, replacement of high-emitting pneumatic devices
- Co-Benefits from mitigation
  - Reduce local pollutants (at no extra cost)
    - Study projected reductions would also result in a 44% reduction in volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) from the oil and gas industry

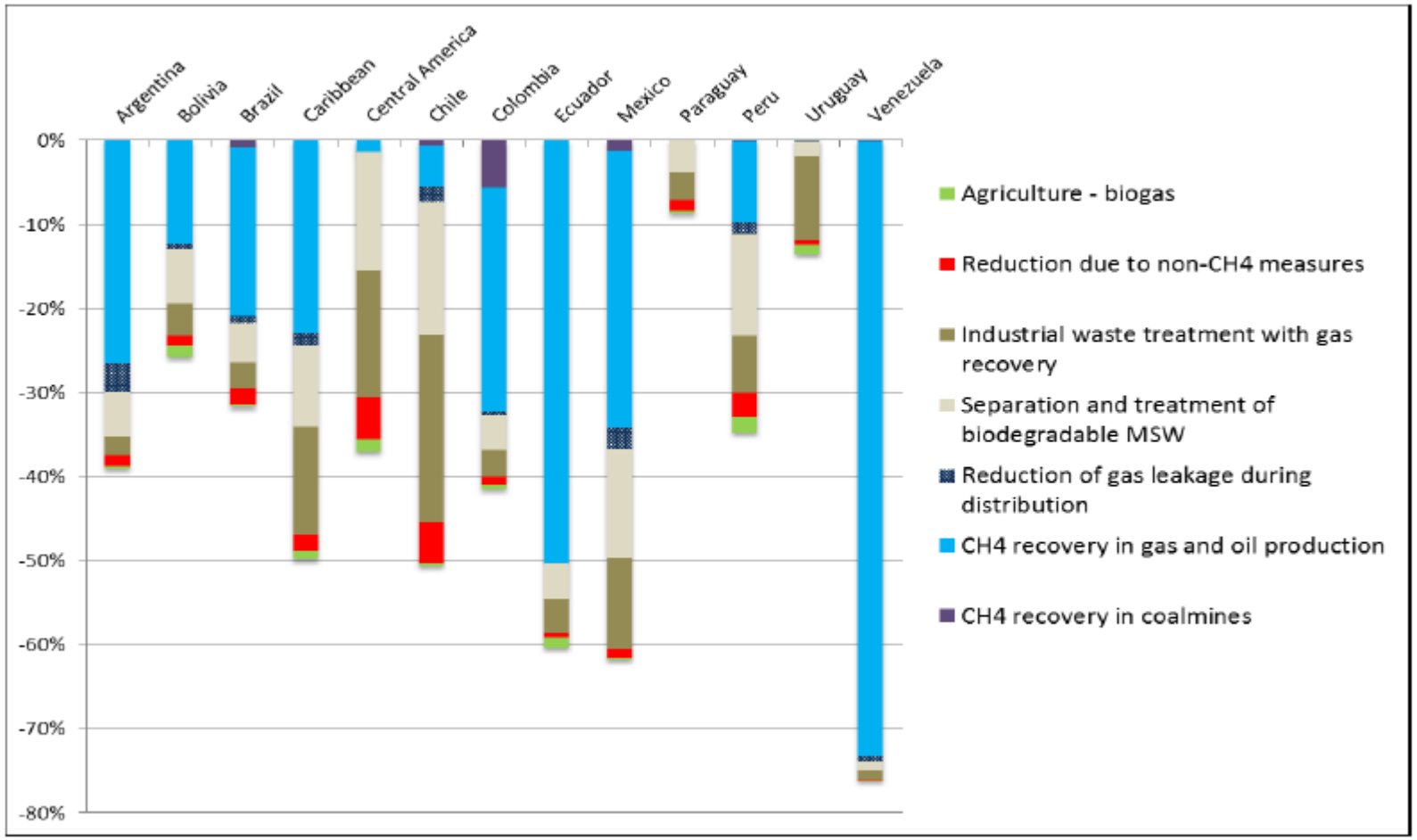
Figure 0-1 - Marginal Abatement Cost Curve for Methane Reductions by Source



ICF Study, 2015

40% reductions in onshore methane emissions **can be achieved** with existing technologies at a cost of $0.66/Mcf of methane reduced, or less than $0.01/Mcf of gas produced

Natural gas – emissions reductions opportunities in Latin America



SEI Stockholm Institute of Environment, 2014

- Methane emission reduction oppotunities in oil and gas has a very high potential in various countries in the region, e.g.
  - Venezuela
  - Mexico
  - Ecuador
  - Colombia
  - Argentina

UNFCC Paris COP21 Accord

- Total 196 countries have committed to building a thriving, clean economy
- UNFCCC Accord charted a new course of action in a two decade old climate change effort
- Culminated 4 year negotiations
- New treaty ends strict differentiation between developed and developing countries
  - Common framework that commits all countries to put forward their best efforts and to strengthen them in the years ahead
  - All parties report regularly on their emissions and implementation efforts, and undergo international review

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11


United Nations

FCCC/CP/2015/L.9/Rev.1

Framework Convention on Climate Change

Conference of the Parties
Twenty-first session
Paris, 30 November to 11 December 2015

ADOPTION OF THE PARIS AGREEMENT

Proposal by the President

Draft decision -/CP.21

The Paris Agreement.

Available from www.unfccc.int

UNFCC Paris COP21 Accord

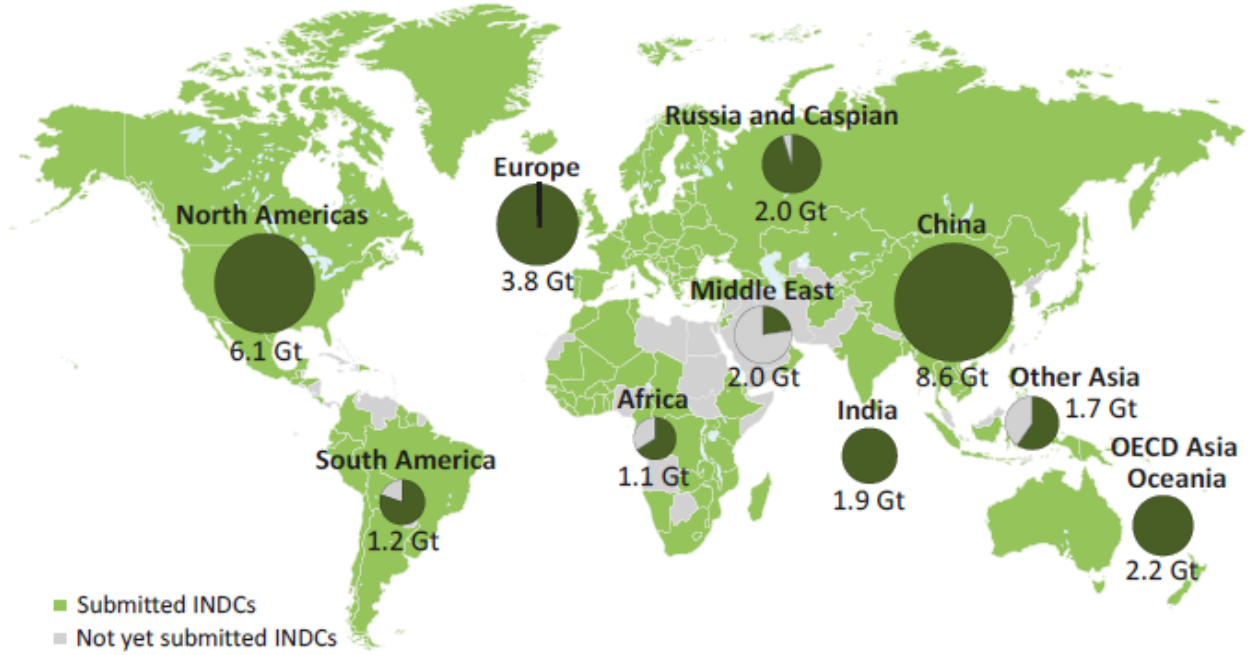
Outcomes and main decisions

- **Limit global temperature** increase well below 2 degrees Celsius, while urging efforts to limit the increase to 1.5 degrees
- **Binding commitments** by all parties to make "nationally determined contributions" (NDCs), and to pursue domestic measures aimed at achieving them
- **Report regularly** on their emissions and implementation efforts, and undergo international review.
- **Report regularly** on their emissions and "progress made in implementing and achieving" their NDCs, and to undergo international review;
- Commit all countries to **submit new NDCs every five years**, with the clear expectation that they will "represent a progression" beyond previous ones
- Binding **obligations of developed** countries to support the efforts of developing countries, while for the first time **encouraging voluntary contributions by developing** countries too
- Extend the goal of **mobilizing $100 billion a year** in support by 2020 through 2025, with a new, higher goal to be set for the period after 2025
- Extend a mechanism to **address "loss and damage"** resulting from climate change, which explicitly will not "involve or provide a basis for any liability or compensation
- Require parties engaging in international emissions trading to **avoid double counting**
- Call for a new market mechanism similar to the Clean Development Mechanism under the Kyoto Protocol, enabling emission reductions in one country to be counted toward another country's NDC

UNFCC Paris COP21 Accord - commitments

- 162 countries submitted Intentional national Determined Contributions (INDCs) pledges
  - Represent around 90% of global economic activity and global energy-related CO2 emissions (today) – how?
    - With absolute and intensity GHG targets, deviations from BAU, reduction or limitation of per capita emissions, statement regarding policies and measures
- INDCs most common measure is targets on renewables (40%) and all include energy sector
  - Others mention: improved energy efficiency, reduce use of inefficient coal, lower GHG in oil and gas sector, subsidy reform and carbon pricing
  - 47 refer to improvement in gas utilization levels
  - 11 mention gas flaring reduction

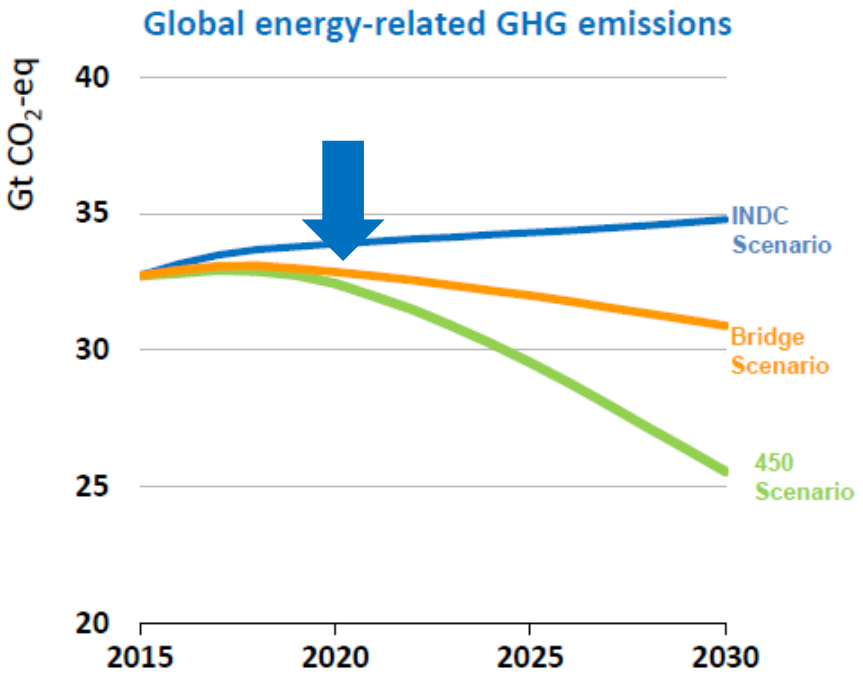
Figure 1 ▷ National climate pledges submitted for COP21 and coverage in terms of energy-related CO_2 emissions in 2013

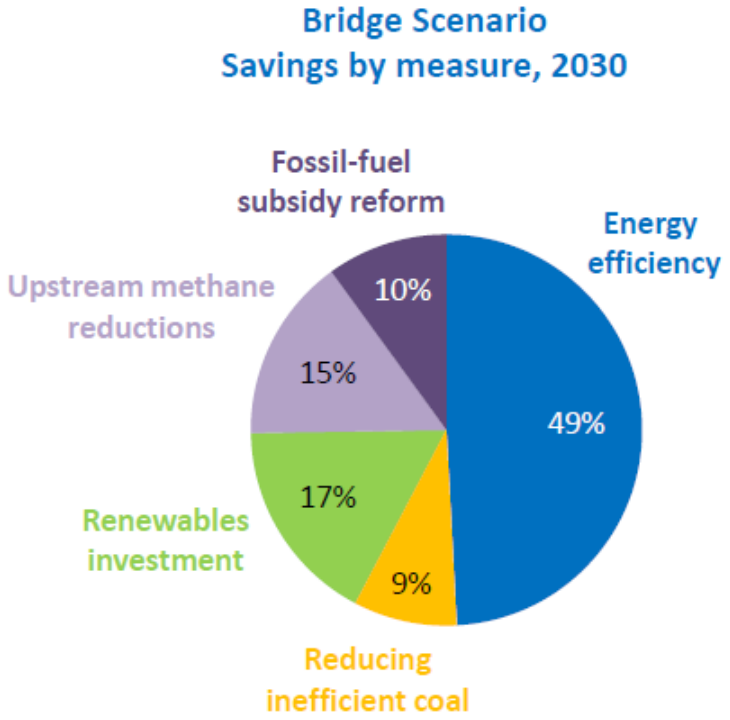


WEO 2015

Four countries mention methane emission:
USA: achieve a 40-45% reduction in methane emissions from 2012 levels by 2025 from oil and gas production
Canada, Mexico and Gabon: reduce methane emissions from oil and gas production

UNFCC Paris COP21 Accord





WEO 2015

- COP21 Bridge Scenario: peak in GHG emissions in next 5 years
- IEA proposed five measures – shown in a “Bridge Scenario” – using only proven technologies & without harming economic growth

Pledges accelerate the energy transition, but it is not yet fast enough
Reductions are achievable with existing technologies but implementation will take time

UNFCC Paris COP21 Accord – policy tools

- Climate change policies at UN and member countries
- Carbon price mechanism (ETS, carbon tax)
- Environmental standards (focus on industry and power), still not widely applied around the world
- Emissions standard for new coal power plants (e.g. US power sector to cut 30% from 2005 baseline)
- Clean air policies applied in cities or nationally to improve air quality by reducing SOx, NOx, particulates, smog
  - Samples Japan, Istanbul, Beijing (ban coal generation), India (CNG transport), Mexico (lower cost of CNG), Singapure, Germany, Netherlands (NG transport hubs), Bunker fuel for marine (new regulation in emissions from ships, Europe) (ECAs), Baltic, North sea, US, Canada,
- All these create a favorable context for natural gas that favor its sustainability

UNFCC Paris COP21 Accord – some challenges for gas

- Political dimension: gas value chain connects markets creating long lasting bonds and dependence (compared to oil). Resistant to accept that gas has a major role in providing global energy access, security and affordability
- Supply disruptions: although seen in limited cases, countries can favor flexibility and independence
- Control: important resources by reduced number of concentrated actors
- Price: perceived as too expensive and not cost competitive (case by case dependent on geology, regulations, geography, etc.)
- Environmental credentials: perceived as not green in a low carbon future. View that fossil fuels should not be in the energy mix (should phase out sooner than later)
  - Its abundance may slow transition to renewables

Natural gas emissions reductions – international efforts

CLIMATE & CLEAN AIR COALITION TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

- CCAC is a partnership of governments, civil society, and the private sector (50 countries, 16 IGO, 44 NGOs, and industry
- Goal: reduce short-lived climate pollutants (SLCPs) (CH4, black carbon, and hydrofluorocarbonsa in 7 sectors
- Facilitate cooperation to implement emission reduction measures (gas venting, leakage, and flaring)

Global Methane Initiative

- Promotes cost-effective, near-term methane recovery through partnerships between developed and developing countries (43 countries around the globe), over 100 private sector companies, development bank and Nongovernmental organizations

GGFR Global Gas Flaring Reduction A Public-Private Partnership

- Public-private initiative: international and national oil companies, national and regional governments, and international institutions. Goal: to increase use of associated natural gas associated (remove technical and regulatory barriers, research, best practices sharing, and developing country-specific gas flaring reduction programs

UNECE

- Focuses on methane management in extractive industries (i.e., coal, natural gas, and oil)

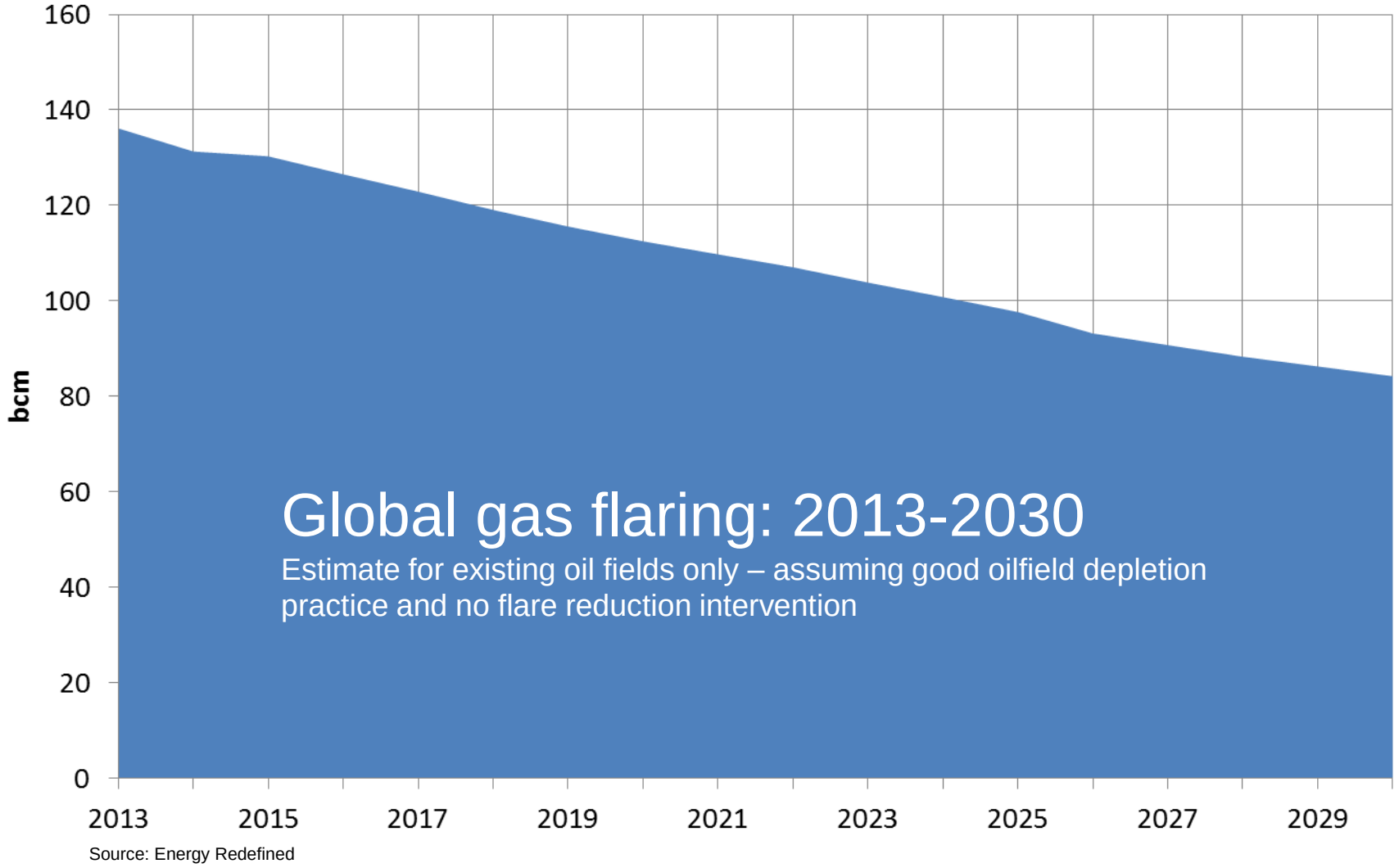
New global industry standard…

Zero Routine Flaring by 2030 Initiative

WORLD BANK GROUP

Launched on April 17, 2015
By UN Secretary and World Bank President

Will natural oil field depletion take care of the flaring problem? Not really



Source: Energy Redefined

"Zero Routine Flaring by 2030" Initiative - recap of its essence

- *Oil companies* to plan for zero routine flaring in new oil field developments
- Seek economic solution to end routine flaring at existing oil fields as soon as possible and no later than 2030

- *Governments* to provide legal/regulatory/investment/operating environment conducive to upstream investments and energy infrastructure and market development. No flaring in new oil developments; end legacy flaring by 2030

- *Development institutions* to facilitate cooperation and implementation – and consider the use of financial instruments and other measures

"Zero Routine Flaring by 2030" Initiative – current endorsers (53)

Countries:

- Angola
- Azerbaijan
- Bahrain
- California (USA)
- Cameroon
- Canada
- Republic of Congo
- France
- Gabon
- Germany
- Kazakhstan
- Mexico
- Netherlands
- Norway
- Peru
- Russian Federation
- Turkmenistan
- United States
- Uzbekistan

+2 !

Companies:

- BP
- Eni
- Entreprise Tunisienne d'Activités Pétrolières (ETAP – Tunisia)
- Galp Energia
- KazMunayGas (Kazakhstan)
- Kuwait Oil Company
- MOL Group
- Niger Delta Petroleum Resources Ltd. (Nigeria)
- ONGC (India)
- Petroamazonas EP (Ecuador)
- Repsol
- Royal Dutch Shell
- Seven Energy (Nigeria)
- Societé Nationale des Hydrocarbures (SNH – Cameroon)

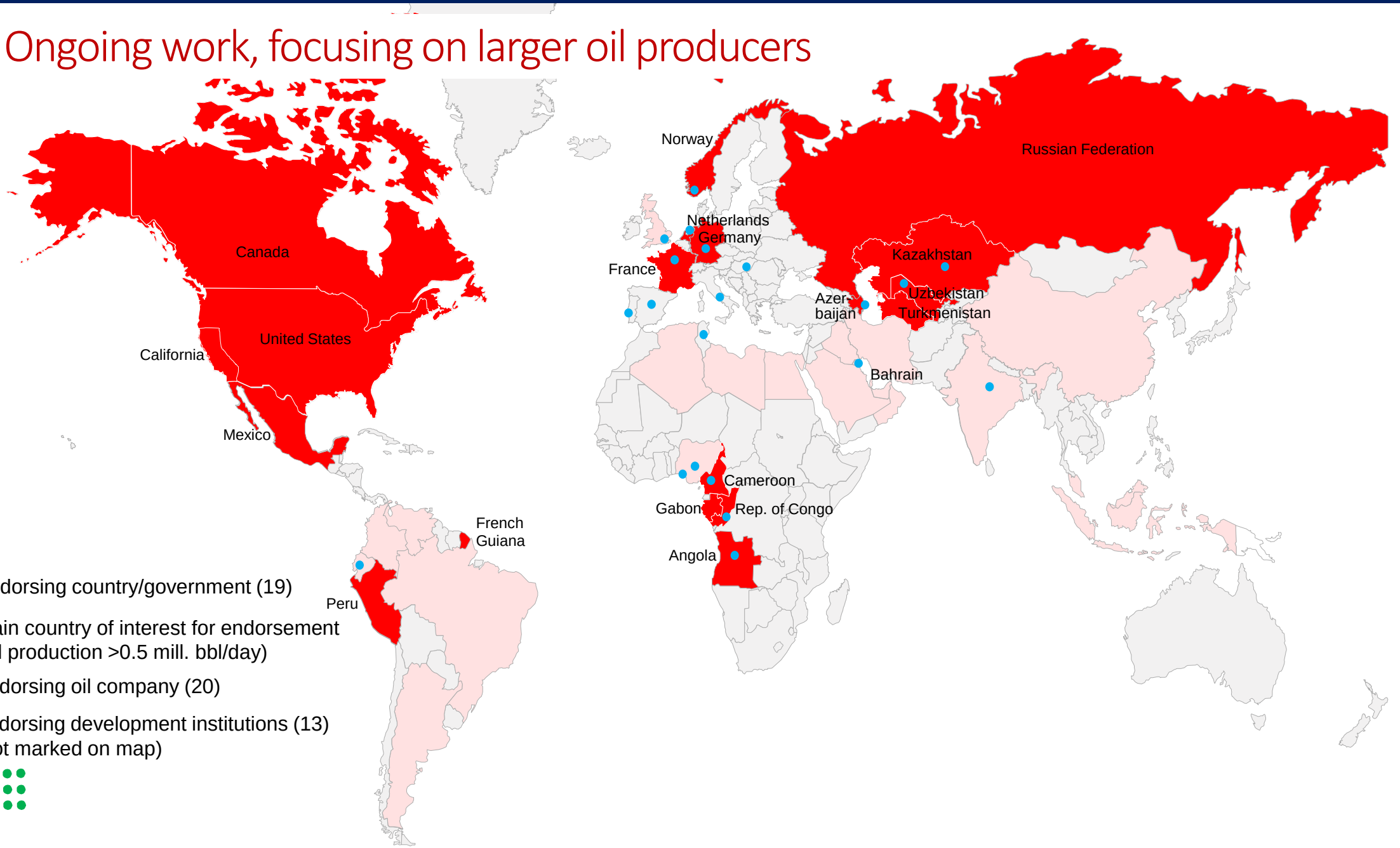
Companies:

- Societé Nationale des Petroles du Congo (SNPC)
- Sonangol (Angola)
- State Oil Company of the Azerbaijan Republic (SOCAR)
- Statoil
- TOTAL
- Uzbekneftegaz (Uzbekistan)
- Wintershall

Development Institutions:

- African Development Bank (AfDB)
- Agence Française de Développement (AFD)
- Asian Development Bank (ADB)
- East African Development Bank (EADB)
- ECOWAS Bank for Investment and Development (EBID)
- European Bank for Reconstruction & Dev. (EBRD)
- European Investment Bank
- Inter-American Development Bank (IDB)
- Islamic Development Bank (IsDB)
- OPEC Fund for International Development (OFID)
- United Nations Sustainable Energy for All (SE4ALL)
- West African Development Bank (BOAD)
- World Bank

Ongoing work, focusing on larger oil producers



Recapitulating

- Gas is abundant and has ample opportunity to become one of the world's most important energy sources
- Natural gas has a major role to play in the climate change agenda… but it needs to be produced and consumed in cleaner ways to demonstrate its benefits
- Most gas emission reductions solutions exist today at no cost or at affordable prices, particularly under a context that prices carbon
- Industry, governments and civil society need to cooperate to make gas part of a sustainable future
- Gas was relevant a COP21 and will continue to be, since is all ready part of INDC in various countries
- Nevertheless, gas can be more protagonist in countries INDC plans as part of the path to a lower carbon transition

Muchas gracias por su atención!

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