WORLD BANK GROUP

Global Gas Flaring Reduction - Proposed New Initiative

Sustainable Energy For All Forum, New York, June 4, 2014

These are Not Cities – They are Gas Flares

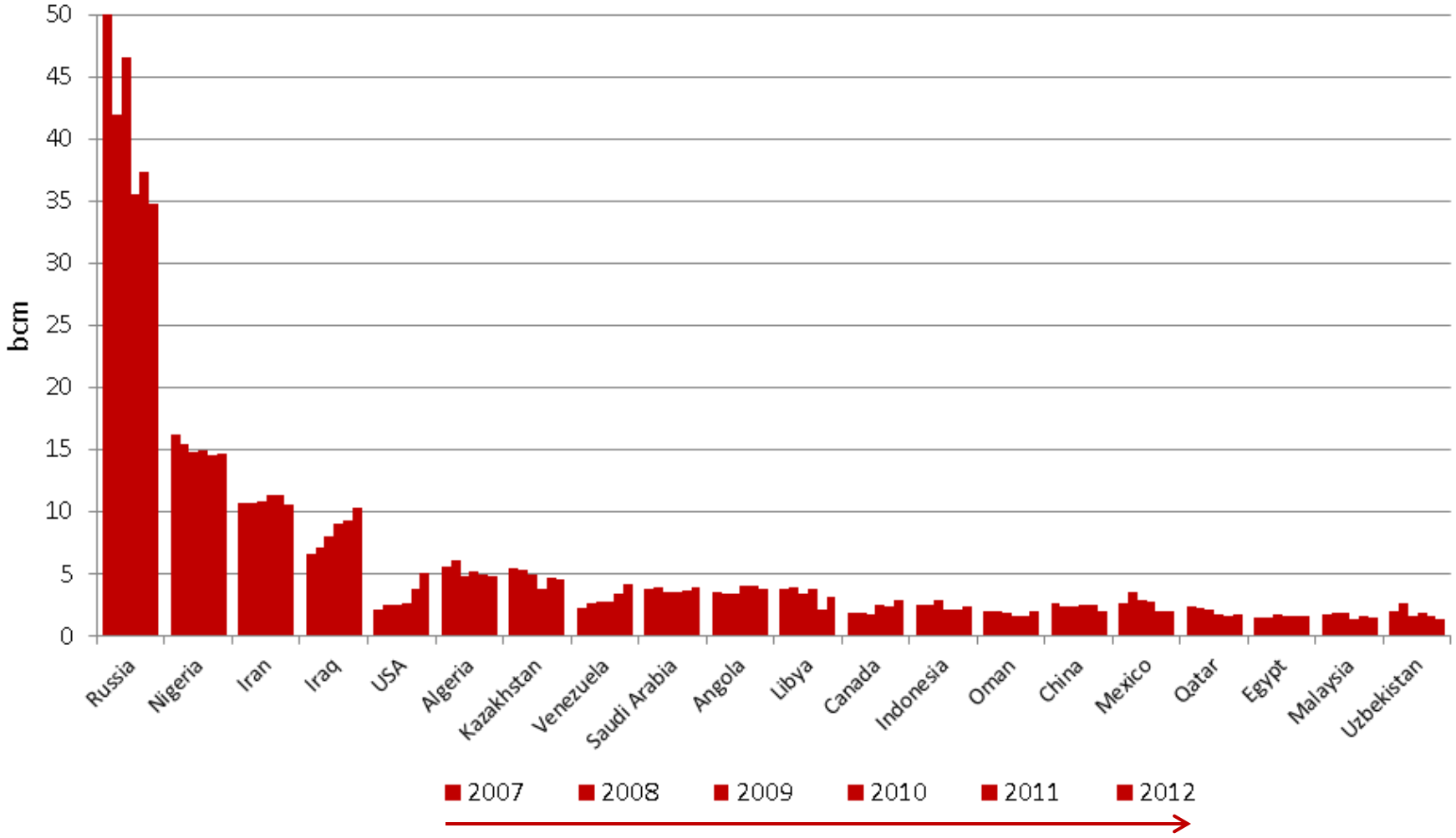
Gas flaring – what is it?

- What kind of gas?
  - Gas that is produced in association with oil, but flared instead of used
  - This “associated gas” is a blend of
    - Natural gas used in gas networks – mostly methane gas
    - Heavier types of gas – mostly butane and propane
- What could the gas be used for?
  - Fuel for power plants
  - Sent into gas pipeline networks
    - Heating, cooking, industrial processes
  - Distributed in pressurized tanks
    - Butane, propane
  - Feedstock for industry
    - Petrochemical, fertilizer

Gas flaring – why does it happen?

- Infrastructure and markets that are under-developed and poorly functioning discourage investments in flare elimination
- Policy environment: Legal, regulatory, investment, and operating environment often not conducive
- Distance from energy users, gas pipelines, and power networks may make investments in gas utilization less attractive
- Gas characteristics for the flared gas may be less favorable
  - Often small, scattered, declining, uncertain gas volumes
- Still – utilizing associated gas is in most cases "investment" rather than "cost"

Who flares gas?
Top 20 countries



Gas flaring – why should it stop?

Example Nigeria

- 150 million people with only 6500 MW power generation capacity
- Of which nearly 2000 MW stands idle for lack of gas and adequate infrastructure
- Only half the population has electricity network access
  - and it's unreliable
  - Coping mechanism: 4000 MW of household-size diesel generators
- …While flaring 13 billion cubic meters of gas (2013)
  - Enough to feed 6500 MW of power

Gas Flaring – Why Should It Stop?

Example Iraq

- 32 million people with only 6000 MW power generation effective capacity
  - Power is scarce and unreliable
- Power plant fuel – mostly liquids
  - Fuel oil, diesel, crude oil
- Only 2000 MW fueled by gas
  - The whole demand (18000 MW) could be met by current gas production
- Flaring about 12 billion cubic meters of gas
- Yearly economical loss estimate
  - $4 billion direct; $40 billion indirect (for society)
- *"Oil will fund Iraq's development; gas will fuel it"*

Gas flaring – why should it stop?

Globally

- The large volumes
  - About 140 billion cubic meters annually
  - Enough to produce 750 billion kWh power
    - More than the continent of Africa's power use

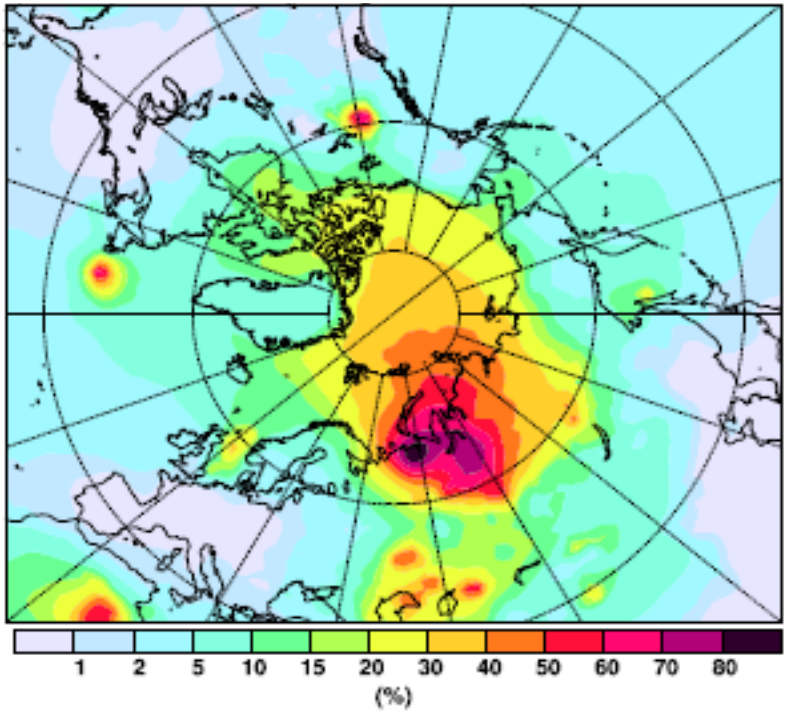
- The CO_2 emissions
  - About 350 million tons annually
  - Equivalent to about 77 million cars

- The black carbon from flares…

Gas flaring – why should it stop?

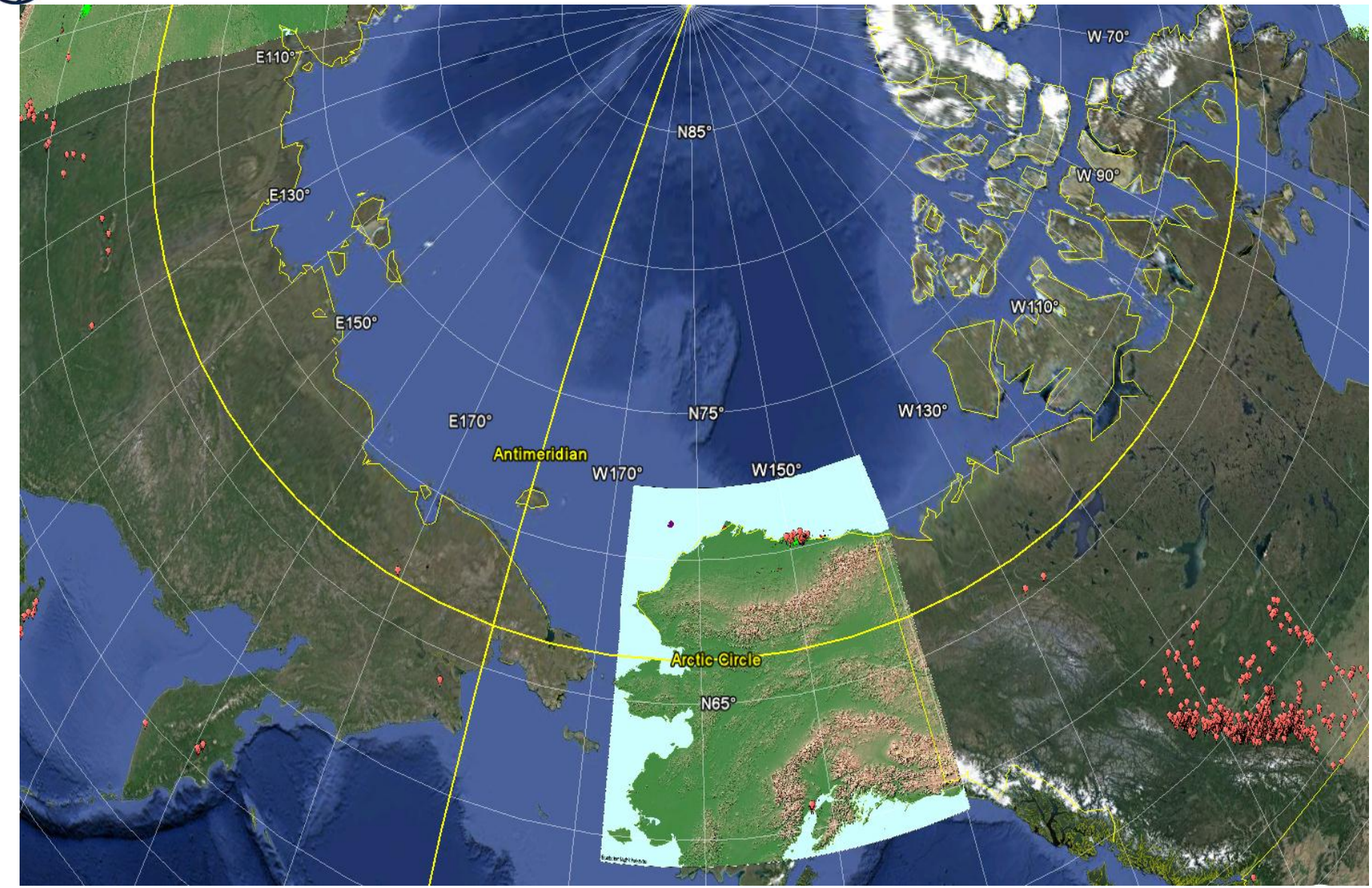
- Black Carbon (BC) has strong influence on radiative forcing in the Arctic
  - Albedo changes after BC deposition on snow and ice
  - Highest rate of global warming is occurring in the Arctic
  - BC is a short-lived climate forcer – reduction would have an immediate benefit
  - See paper by Stohl et al (Sep. 2013) in "Atmospheric Chemistry and Physics" on BC emissions and their impact in the Arctic

- New model seems to better match on-ground observations of BC after improved inclusion of gas flaring and refining the model for household BC emissions
- Gas flaring *may* contribute 42% (study result) to the annual mean BC surface concentrations in the Arctic (i.e. north of 66 degrees). However, the report says: *"Better quantification of gas flaring emissions of BC is urgently needed"*



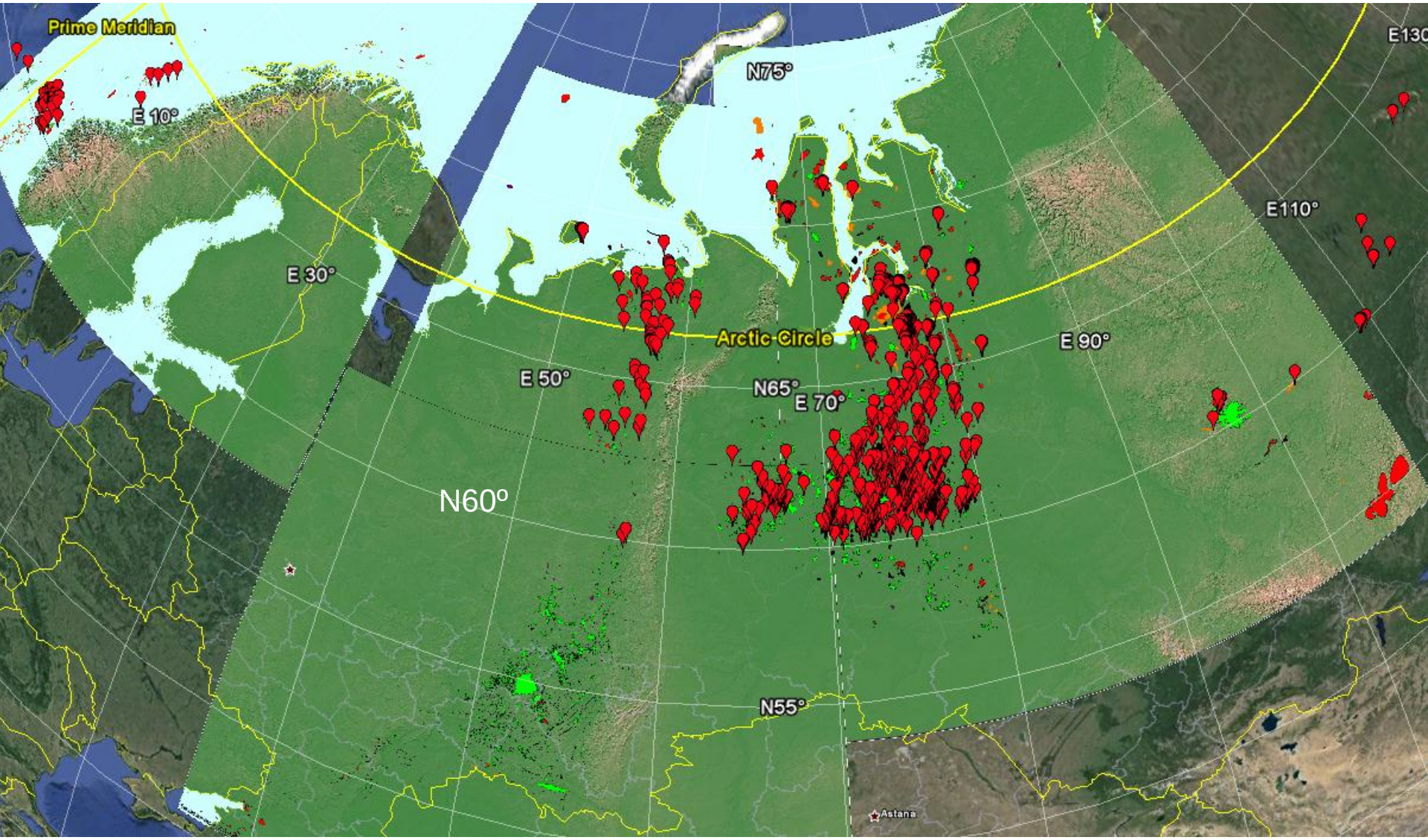
Model estimates of the percent contribution of gas flaring to total surface concentrations of Black Carbon (Stohl & al (2013))

The Arctic – Satellite flare detections



Source: NOAA and Energy Redefined

The Arctic/near Arctic: Satellite flare detections



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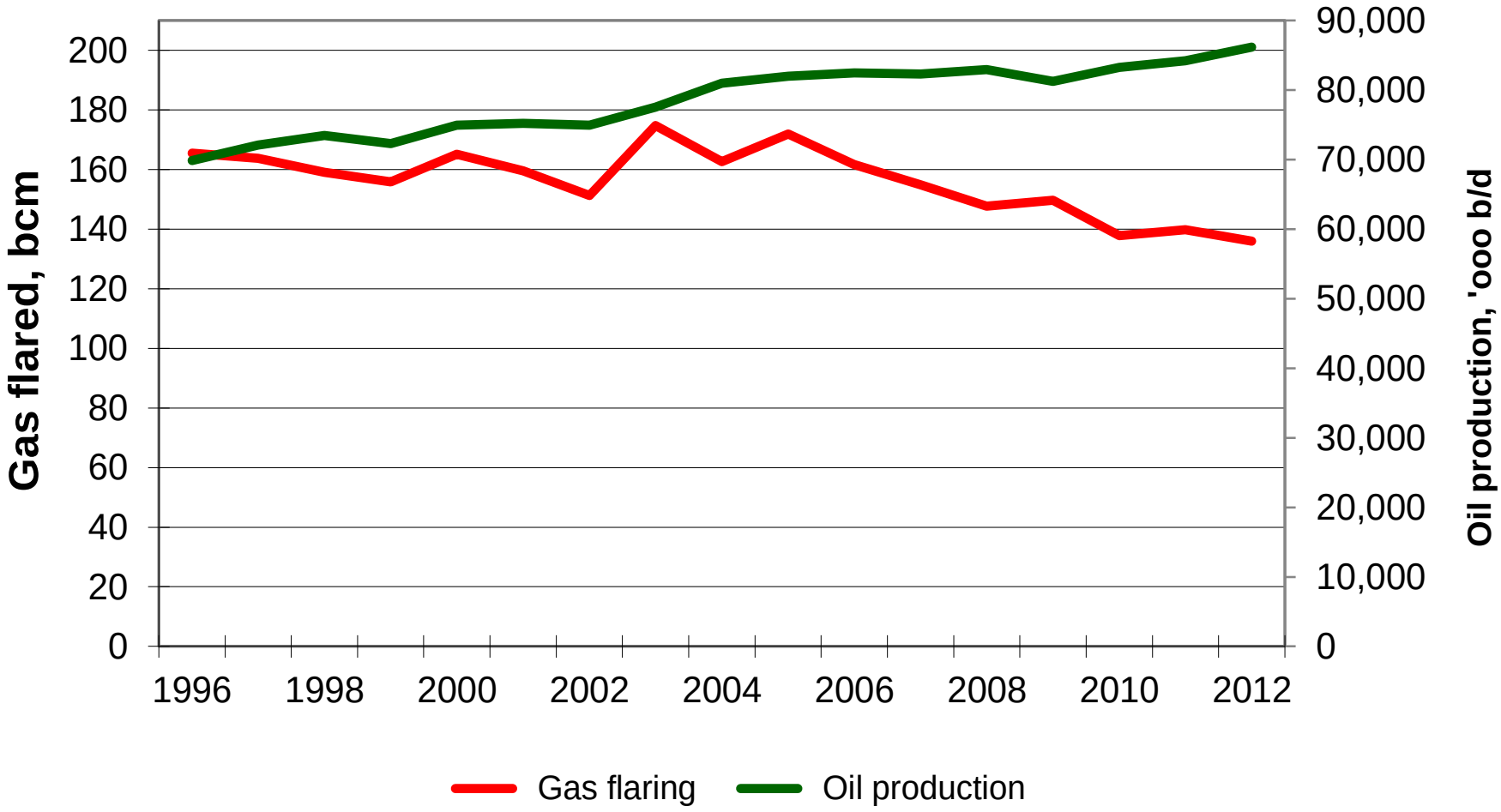
Gas flaring – how are we doing?

Global gas flaring and oil production



Satellite detection of gas flares. Compilation for 2013 (VIIRS Satellite)

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Who works on reducing flaring?

Companies, countries… and GGFR

The Global Gas Flaring Reduction Partnership – Members:

Oil companies

- BP
- Chevron
- Eni
- ExxonMobil
- Kuwait Oil Company
- Pemex (Mexico)
- Qatar Petroleum
- Shell
- SNH (Cameroon)
- SOCAR (Azerbaijan)
- Sonatrach (Algeria)
- Statoil
- TOTAL

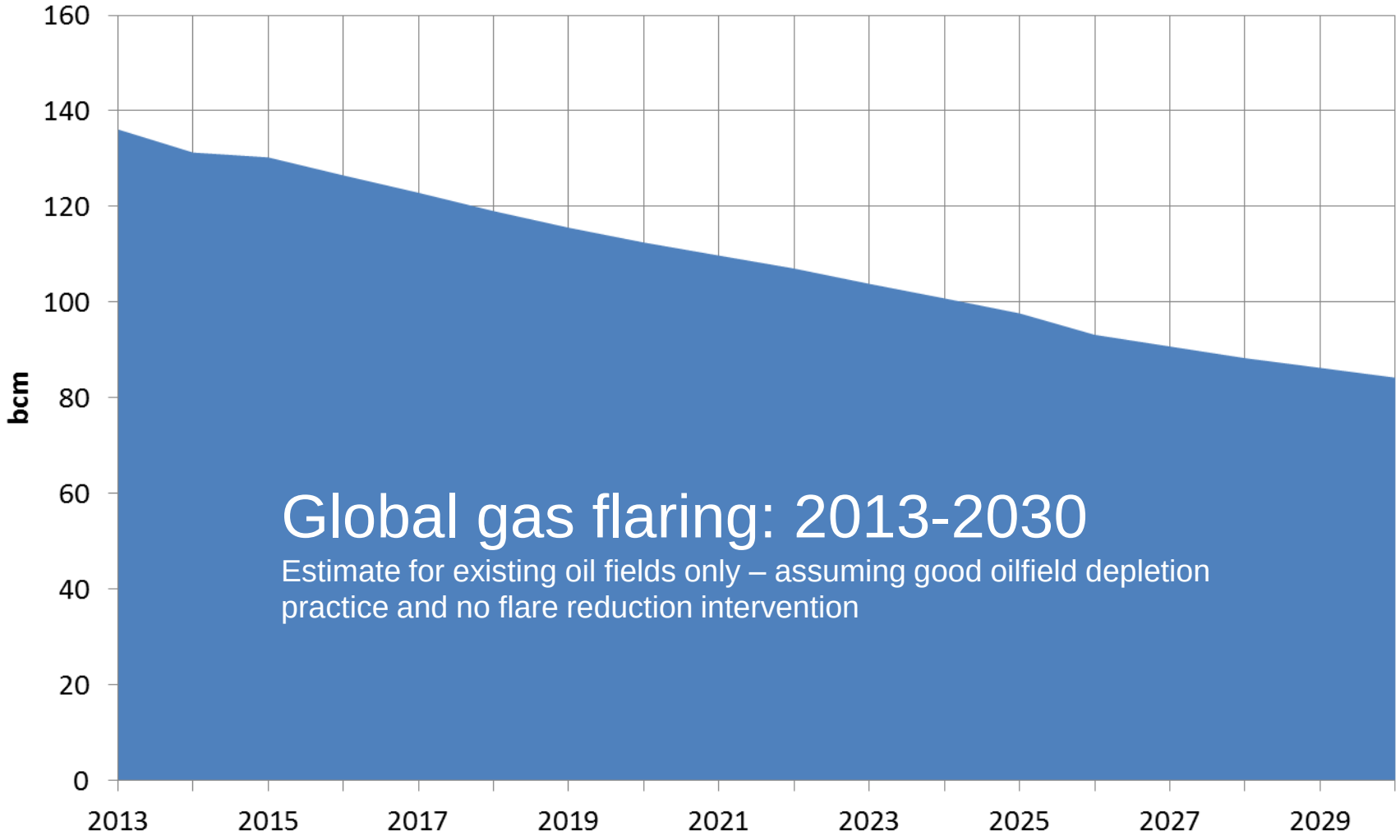
Governments

- Alberta (Canada)
- Republic of Congo
- France
- Gabon
- Indonesia
- Iraq
- Kazakhstan
- Khanty-Mansiysk (Russia)
- Mexico (SENER)
- Nigeria
- Norway
- USA
- Uzbekistan
- Yamal-Nenets AO (Russia)

Institutions, other

- EBRD
- European Commission
- World Bank

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



Source: Energy Redefined

World Bank's proposed global gas flaring reduction initiative

Zero Flaring Globally by 2030

- Zero flaring or venting in new oil field developments
- Cease legacy flaring no later than 2030
- Governments provide conducive investment/regulatory/operating environment for developing efficient energy networks
- Initiative to be endorsed by governments and oil companies

Note: Initiative pertains to routine flaring and not to flaring for safety reasons

Next Steps – 2030 Initiative

- Complete the document for endorsement
- Consultations/feedback
- Seek endorsements of the Initiative
  - Governments, oil companies, institutions/others
- Timeline
  - 2014-2015

Towards a world free of flares

WORLD BANK GROUP

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