



Flaring in a Carbon World

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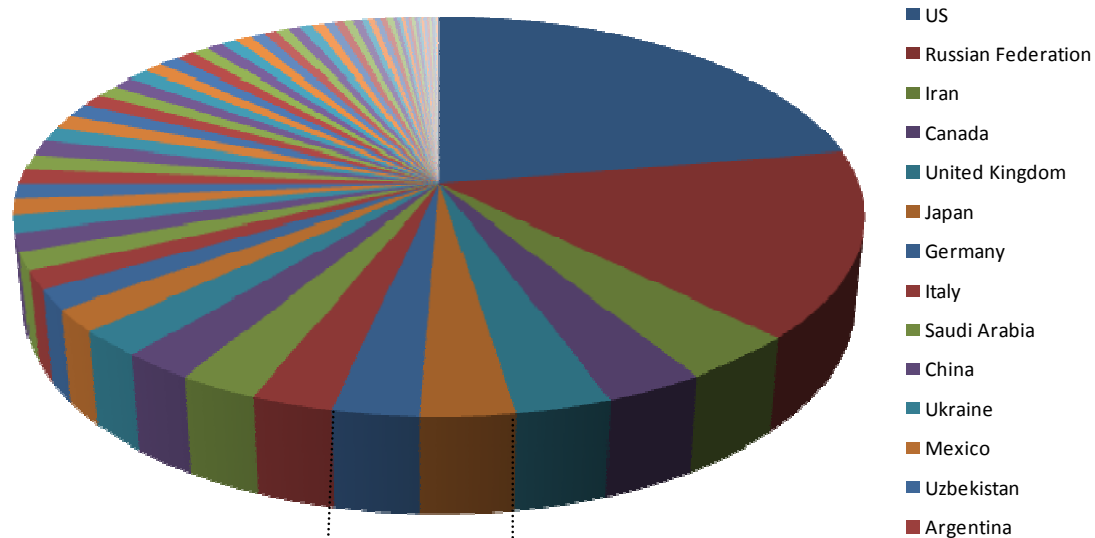
Outline

- Global Gas Flaring & Venting
 - A waste, and a major source of GHG's
- Lessons from Russia
- From problem through liability to opportunity

GLOBAL GAS FLARING & VENTING

Global Gas Flaring

Global Gas consumption 2007

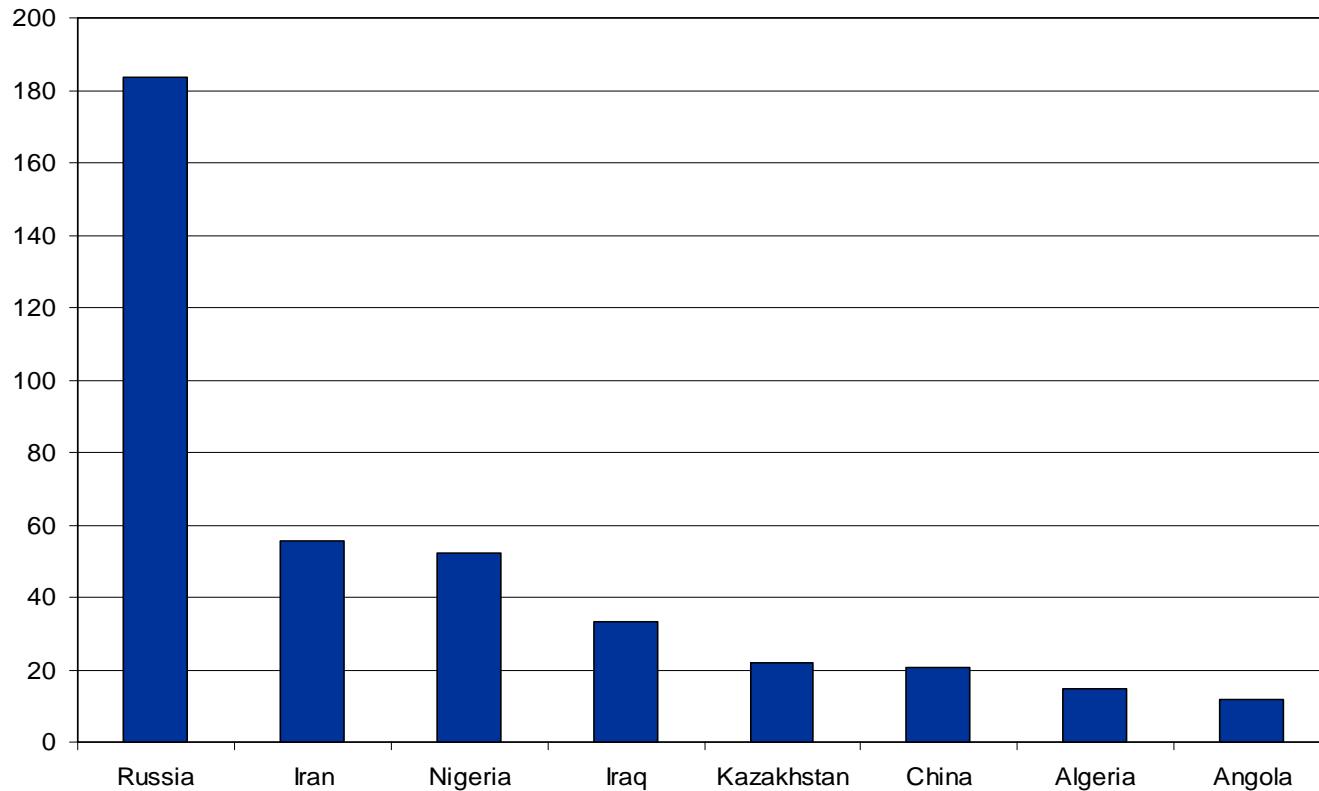


Global Flaring: Equivalent to total gas consumption of Japan & Germany

Magnitude of Gas Flaring and Venting

Flaring and Venting

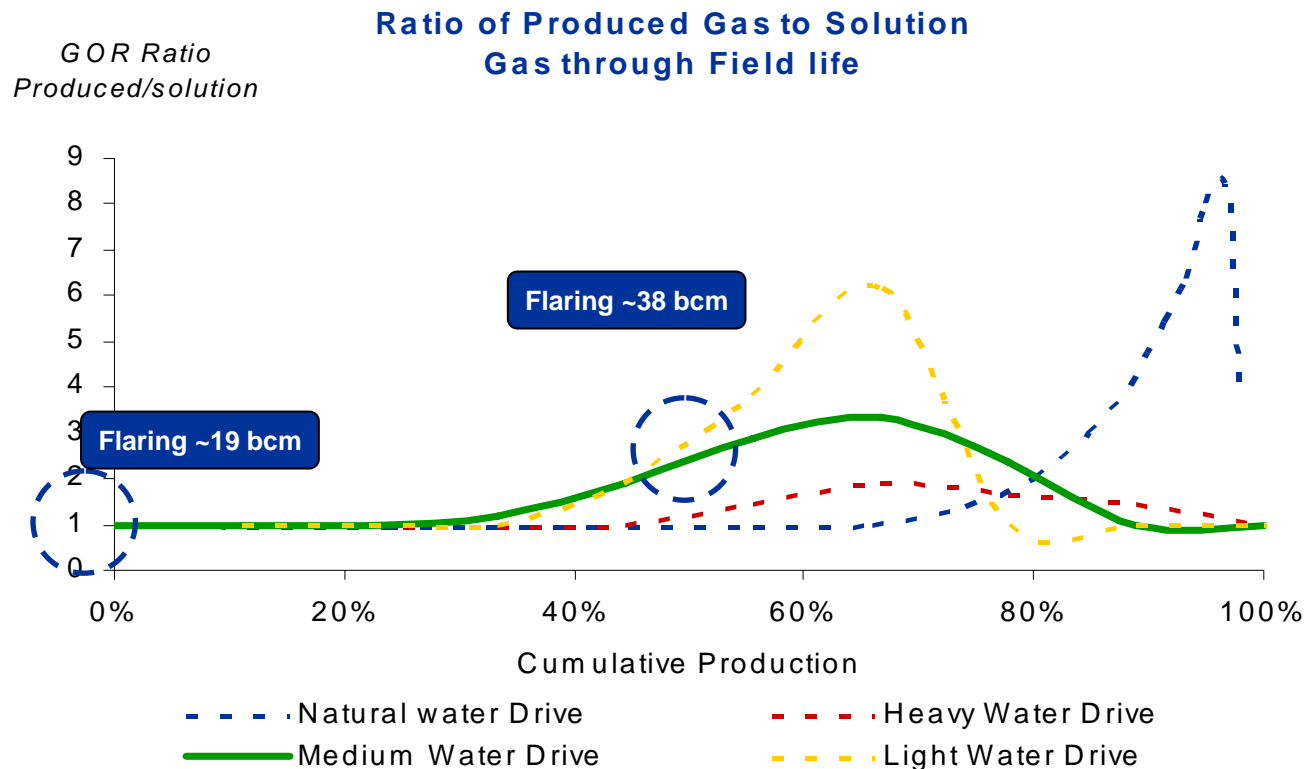
mmtpa CO₂e



Source: PFC Energy GGFR, NOAA and PFC Energy estimate

LESSONS FROM RUSSIA

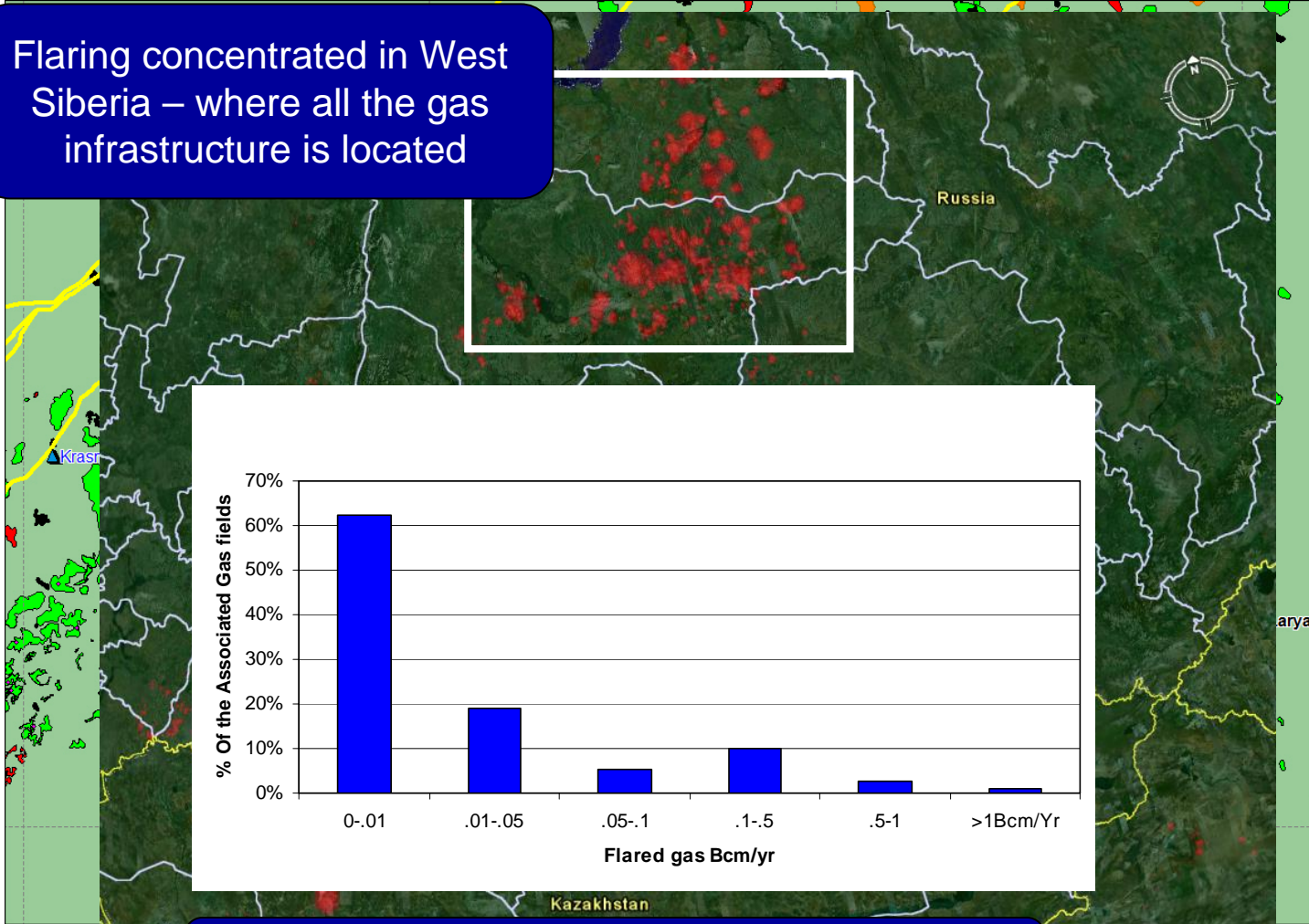
Russian Gas Flaring



- Official 19 BCM/yr
- Satellite imagery up to 60 BCM/yr
- Based on GOR levels, flaring is ~ 38 bcm/yr

Russian Gas Flaring – the Facts

Flaring concentrated in West Siberia – where all the gas infrastructure is located



640 km

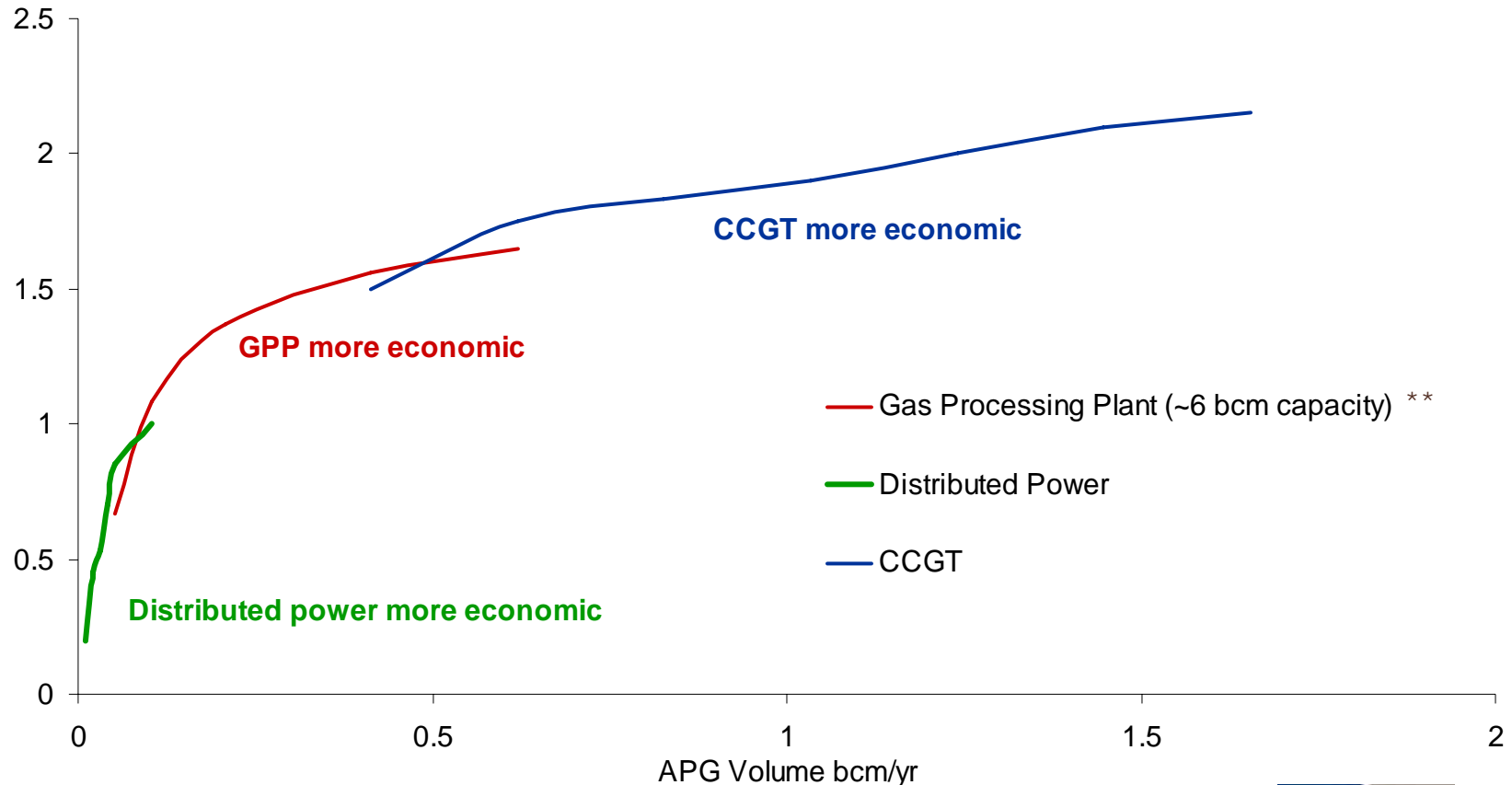
High number of fields flaring small volumes
Expensive to connect!

Russian Horses for Courses

Ability to pay

Equivalent
netback APG Price
\$/mmbtu*

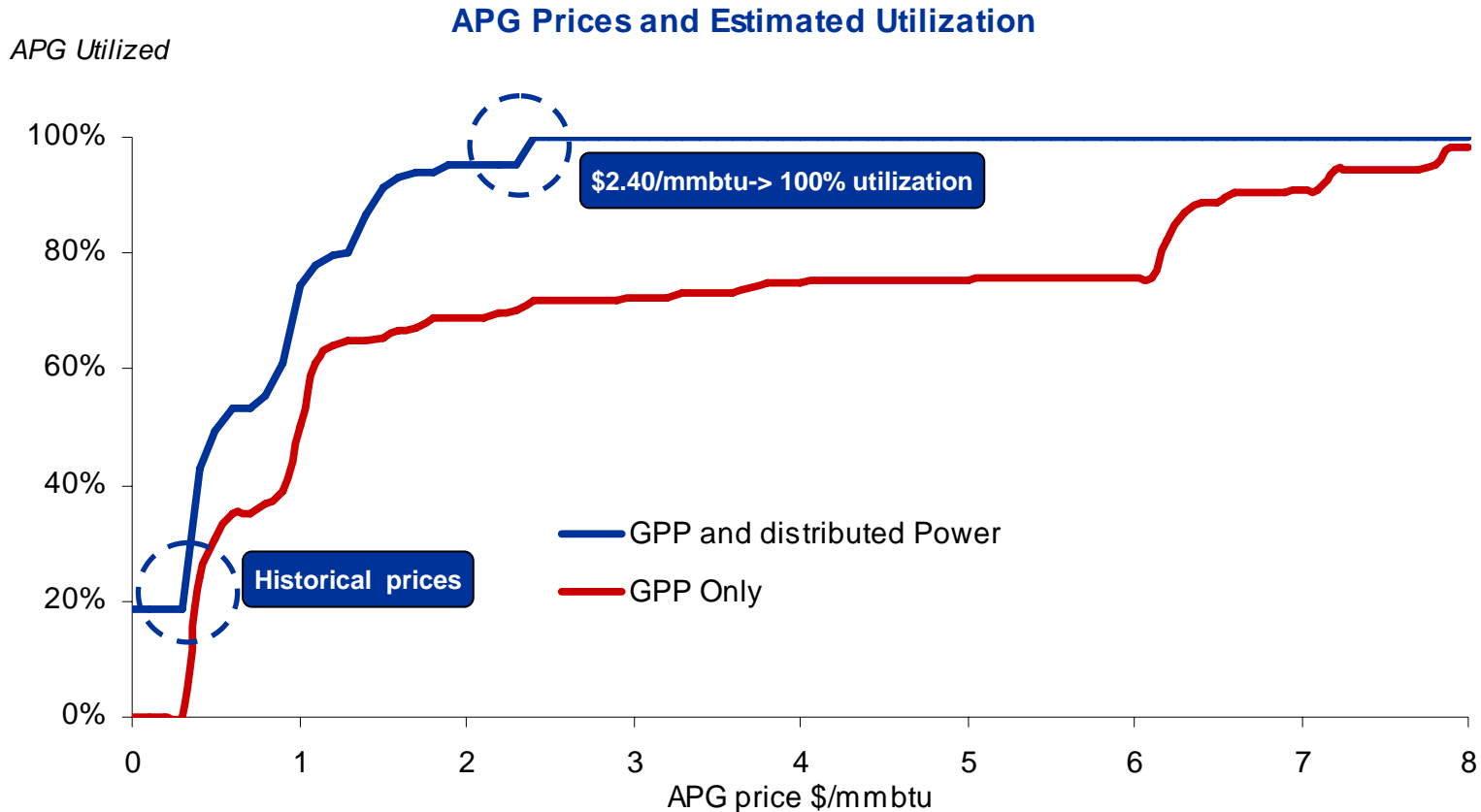
Preferred APG Utilization Envelope



*The maximum price that an owner of GPP, CCGT, Distributed power could pay the field owner after connections costs and still make a 10% real IRR

** At full Capacity. Larger plants will have better economics than shown - 4 -

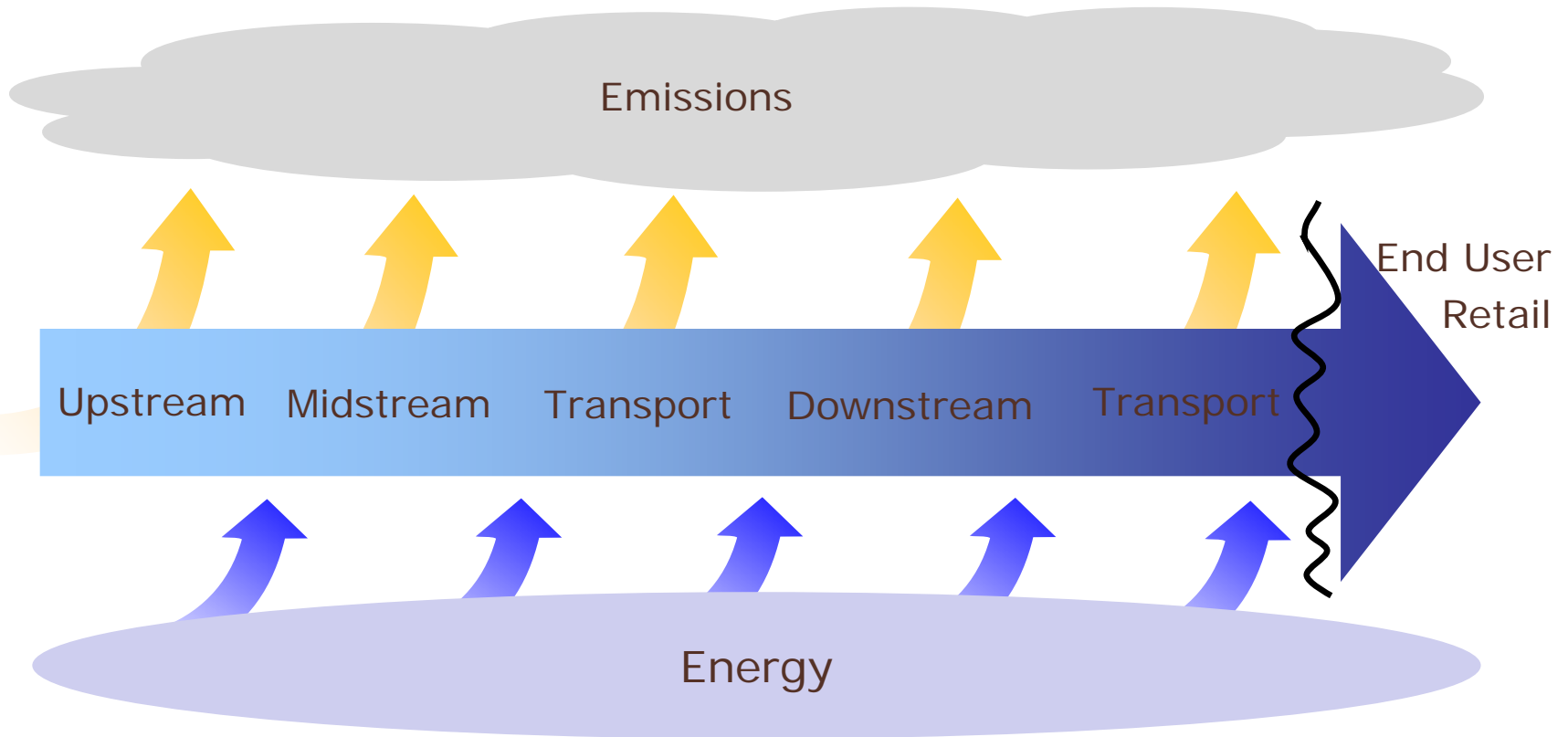
Russian Solutions



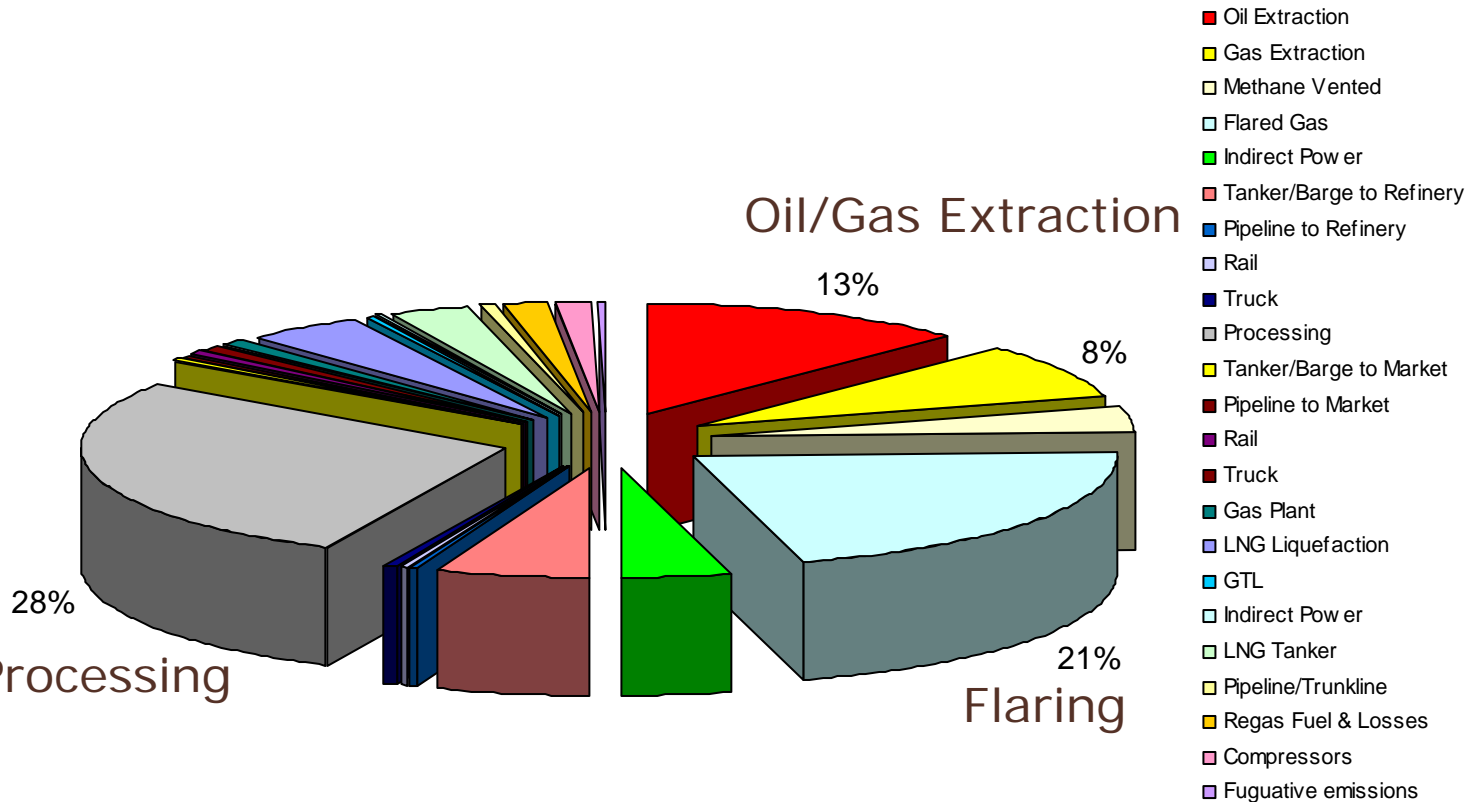
- GPP prices “liberalized” Feb 2008
- Ignores any benefits from carbon credits – eg Rosneft deal

FROM PROBLEM THROUGH LIABILITY TO OPPORTUNITY

Modeling the Total Value Chain

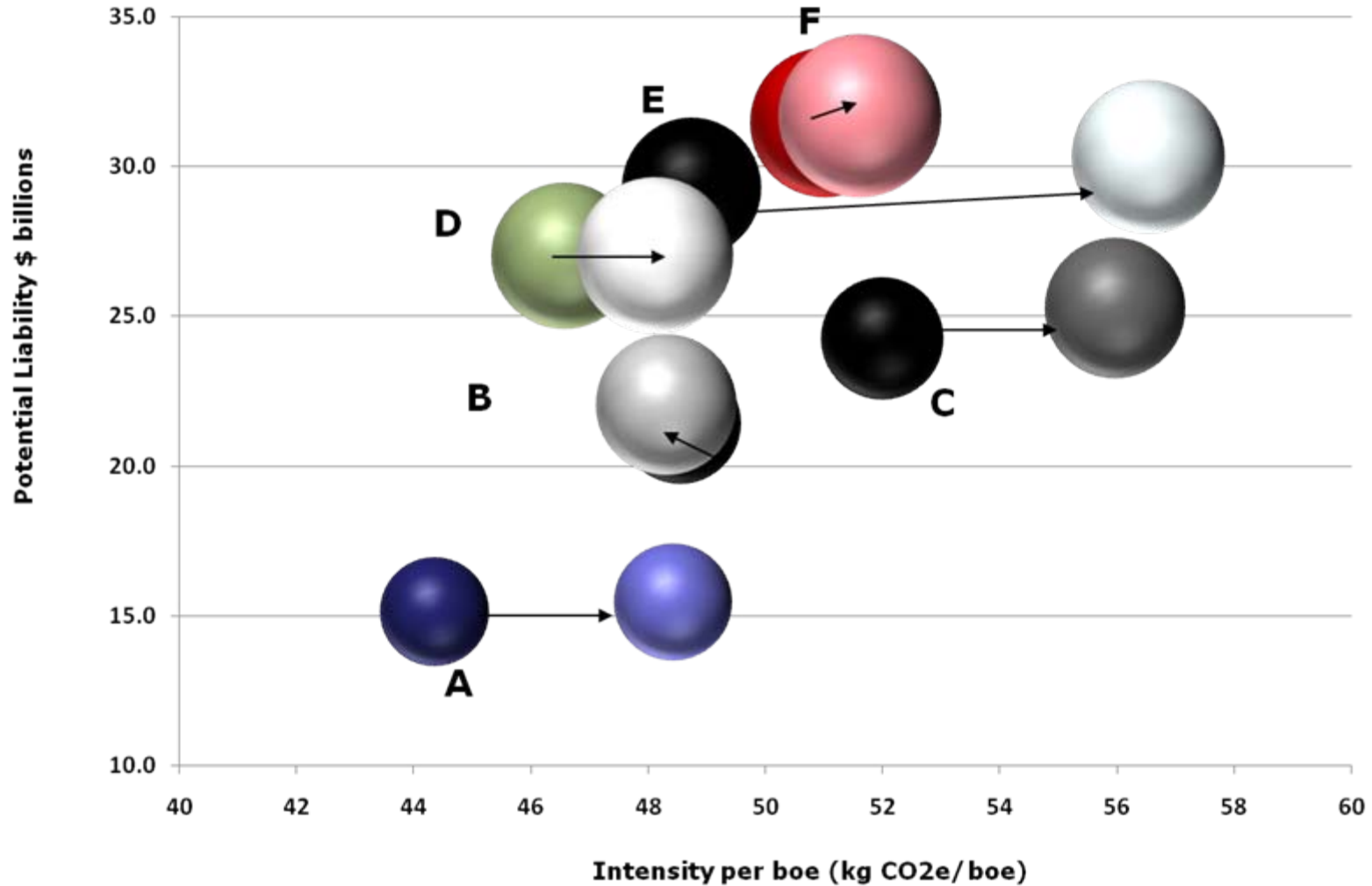


Flaring Nearly as Big as Refinery Emissions - 2007

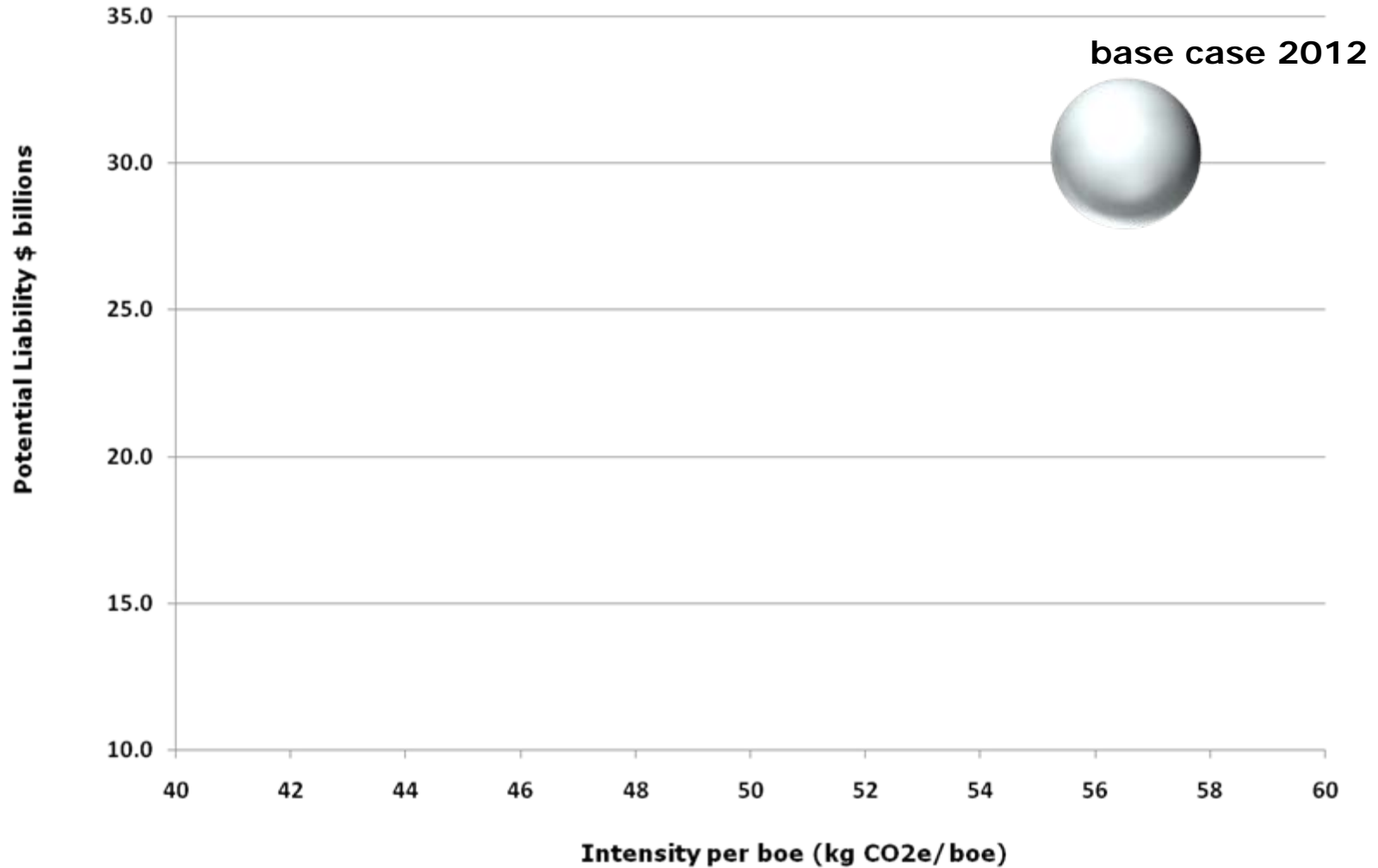


- IOC participation only. Excludes pure play NOC production
- Excludes retail or end use combustion

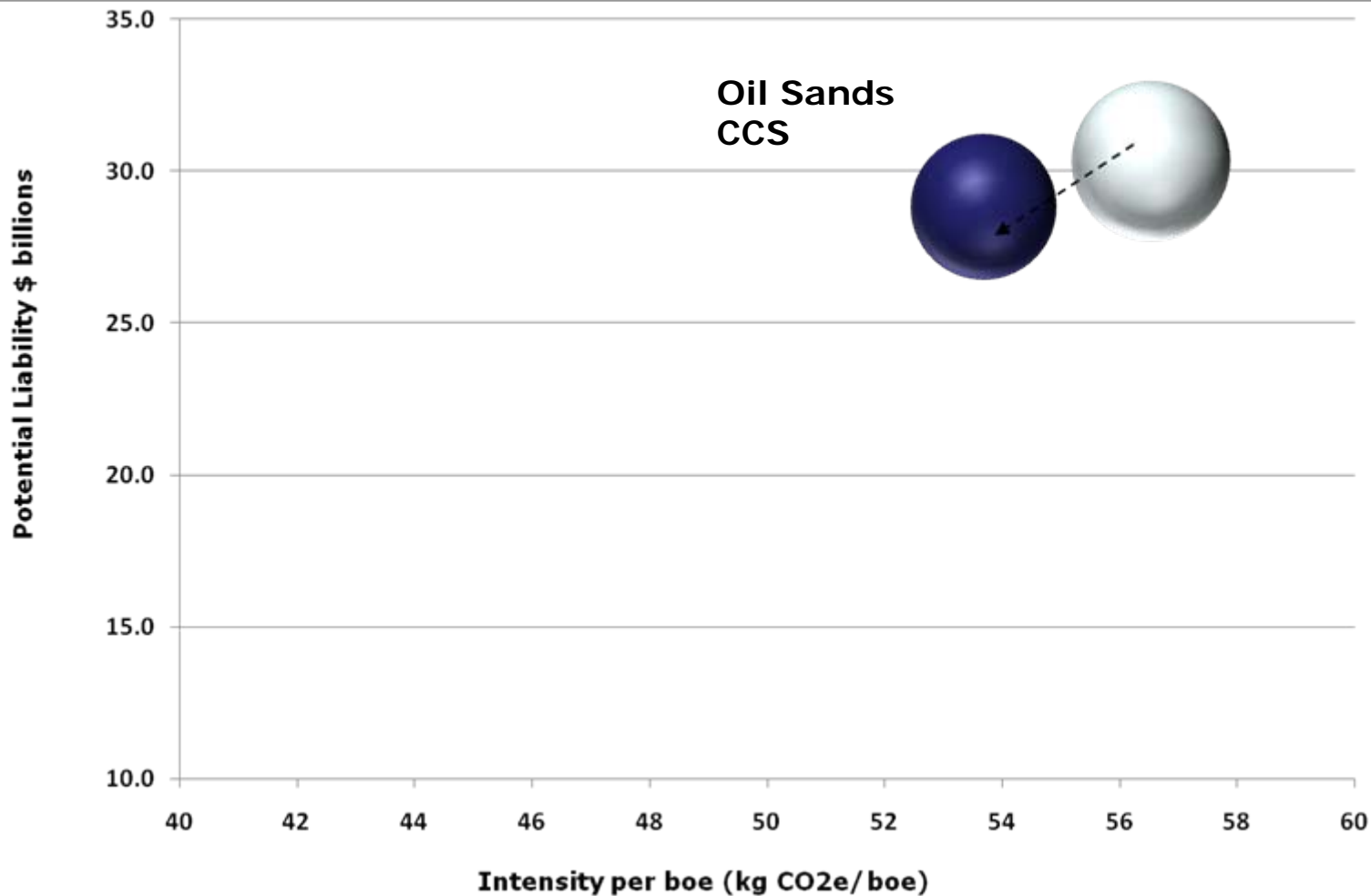
Value of Emissions: 2007 - 2012



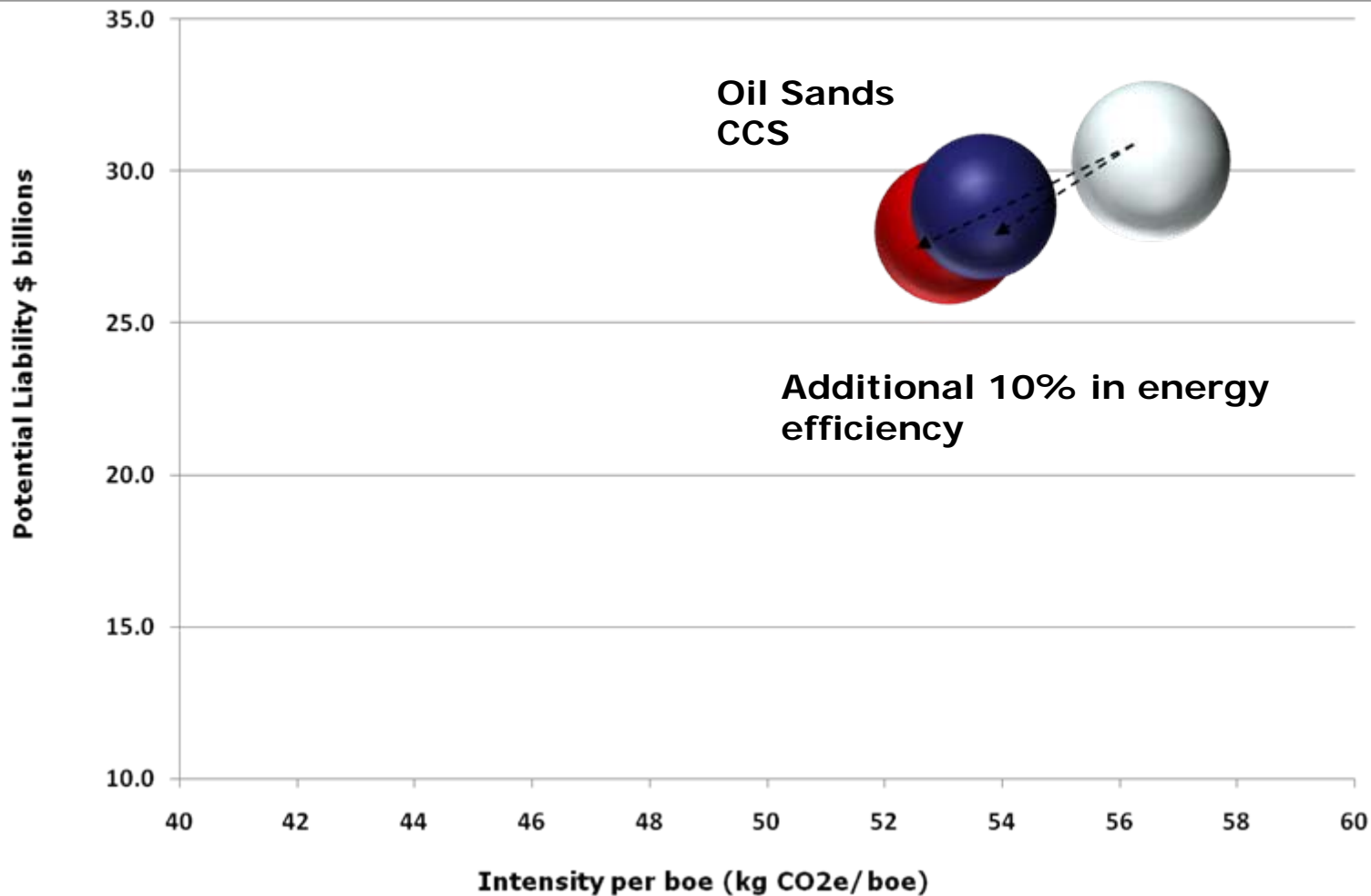
Value of Emissions



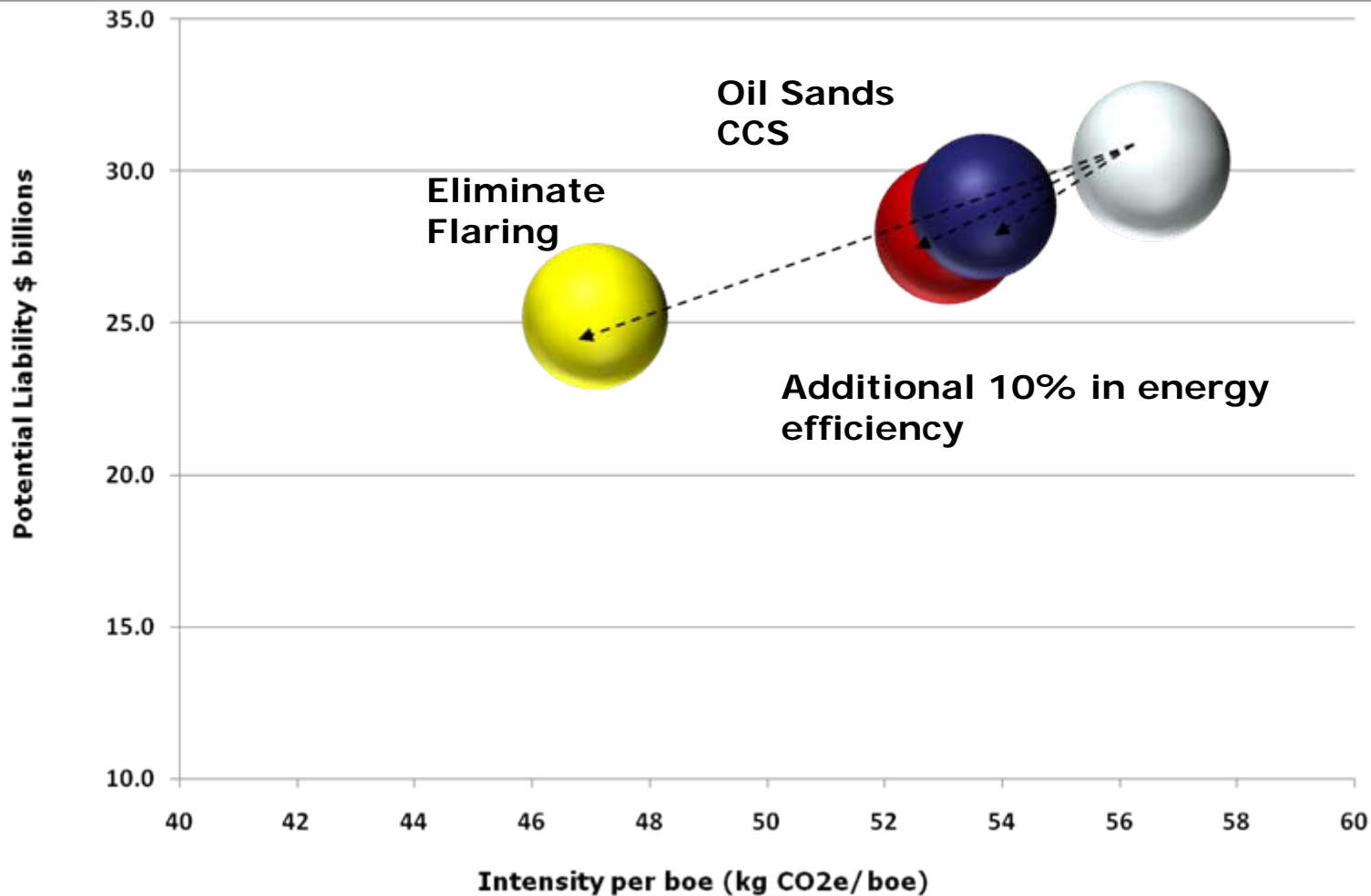
Value of Emissions



Value of Emissions



Value of Emissions



- Flaring is environmentally and economically irresponsible
- Flaring (and Venting) is a major contributor to global GHG's
- Wise government policies tailored to multiple lines of attack can provide major incentives
- Producers that flare highly exposed to future carbon regulation
- Reducing flaring has one of the largest, and quickest "returns" in a carbon constrained world

Thank You