HUNTON& WILLIAMS

Carbon Sequestration leadership forum
www.cslforum.org

Finance Roundtable

September 15, 2014,

Hunton & Williams LLP, 2200 Pennsylvania N.W. Washington D.C.

Fred Eames, Partner, Hunton & Williams LLP

Bernard Frois, Chair, CSLF Finance Task Force

47 participants, North America, Europe, Asia


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What are the implications of these proposed rules?
Legal: Each proposed rule raises significant legal issues that will have to be resolved by the courts.
Political: The proposals are, and will continue to be, a political lightening rod and could serve as a catalyst for legislative action.
Practical: The proposals represent an unprecedented convergence of energy and environmental law/policy with signific plications for how energy is generated and use e United States.

8:30 am Welcoming Remarks
Fred Eames, Partner, Hunton & Williams LLP,
Bernard Frois, Chair, CSLF Financing Task Force

8:45 am Perspectives on CCS from the U.S. Department of Energy
Julio Friedmann, Deputy Assistant Secretary for Clean Coal

9:15 am The Growing Potential of CCUS
Mike Moore, Vice President, Energy Commodities and Advisory Services, Fearnoil

10:50 am Case Studies – Developing Projects
Karl Moor, Senior Vice President, Southern Company

12:15 pm Working lunch
U.S. Environmental Protection Agency Proposals: Encouraging or Discouraging Investment? *Bill Wehrum, Chairman, Administrative Law Group, Hunton & Williams*

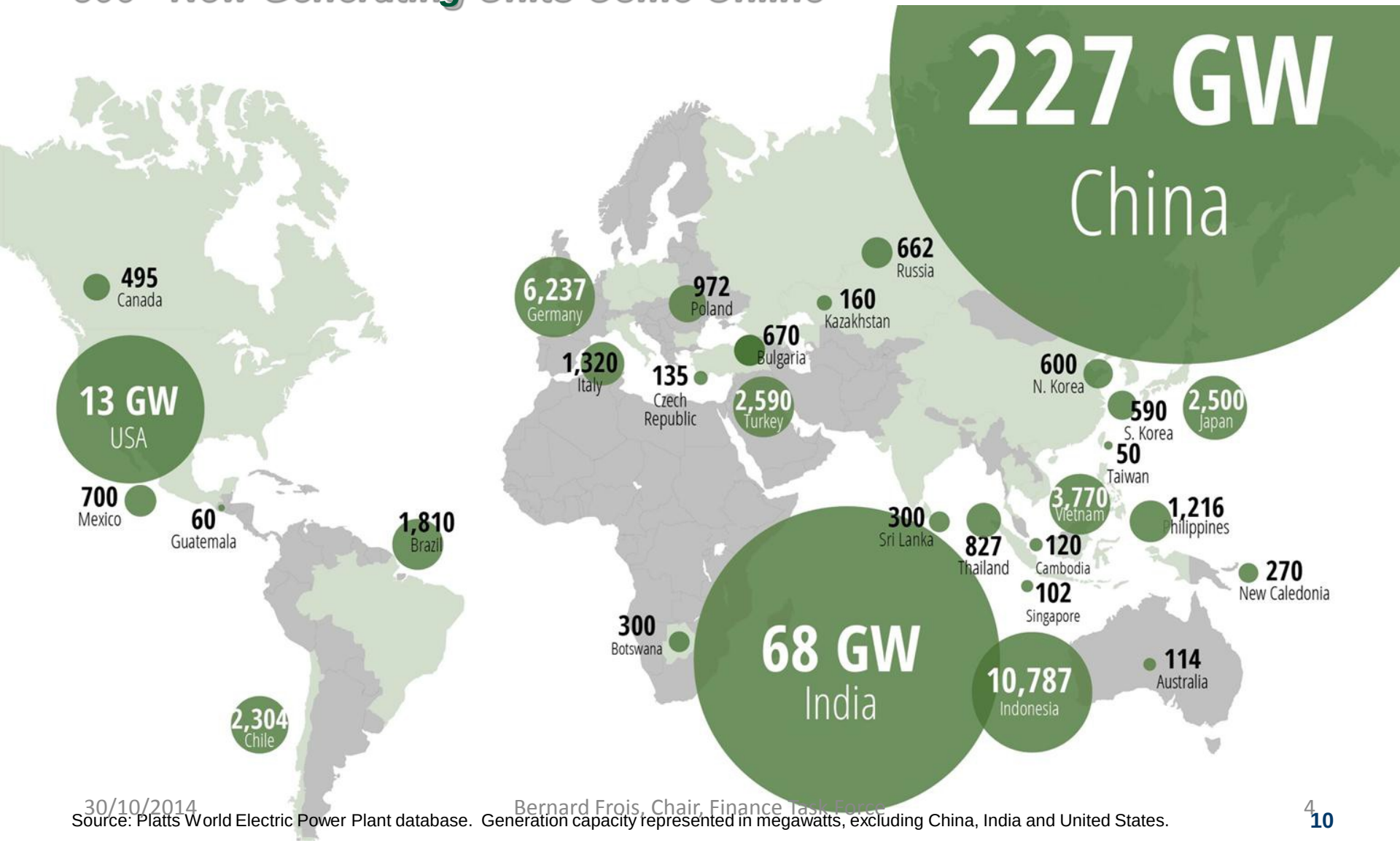
1:15 pm Financing Projects
Allan Baker, Global Head of Power, Société Générale

2:45 pm Progress in Asia
Jim Wood, Director, Advanced Coal Technology Consortium at West Virginia University

4:00 pm – 4:45 pm Roundtable Discussion: Takeaways

30 Countries Add 348 GW of New Coal Generation Capacity Since 2010

800+ New Generating Units Come Online

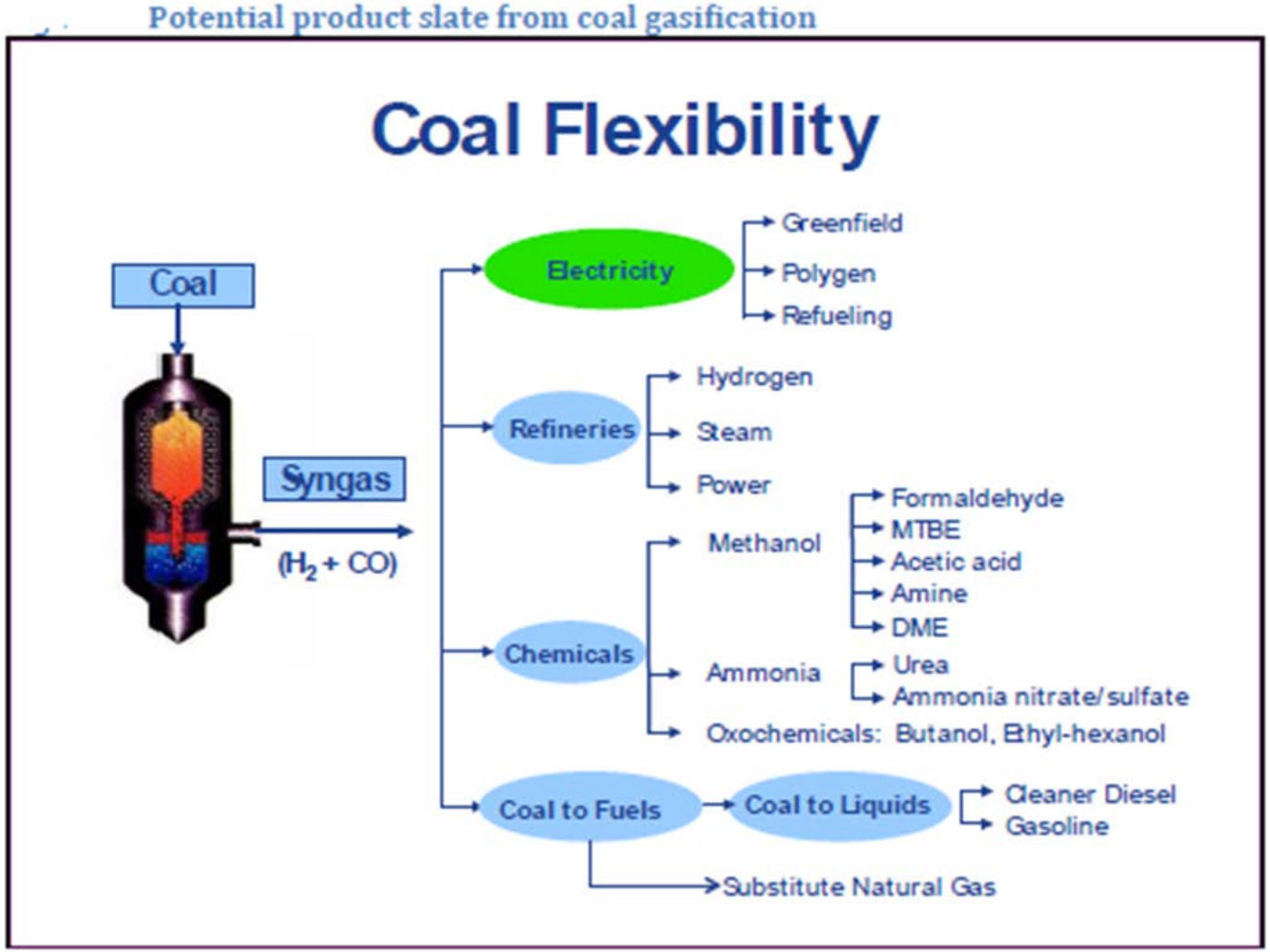


Source: Platts World Electric Power Plant database. Generation capacity represented in megawatts, excluding China, India and United States.

Perspectives

- The use of coal is increasing
- Renewables need baseload power
- CCS may take time. Growing interest for CCUS.
- Significant economic impact of CCUS projects (EOR, Water, Chemical products)
- Success stories encourage investments. Banks become more interested. Significant impact of SaskPower success.
- Broad suite of financing mechanisms exists
- Government assistance is essential
- China has the drive and the will to become a key player in CCS. Developing Clean Air Technologies is a top priority.

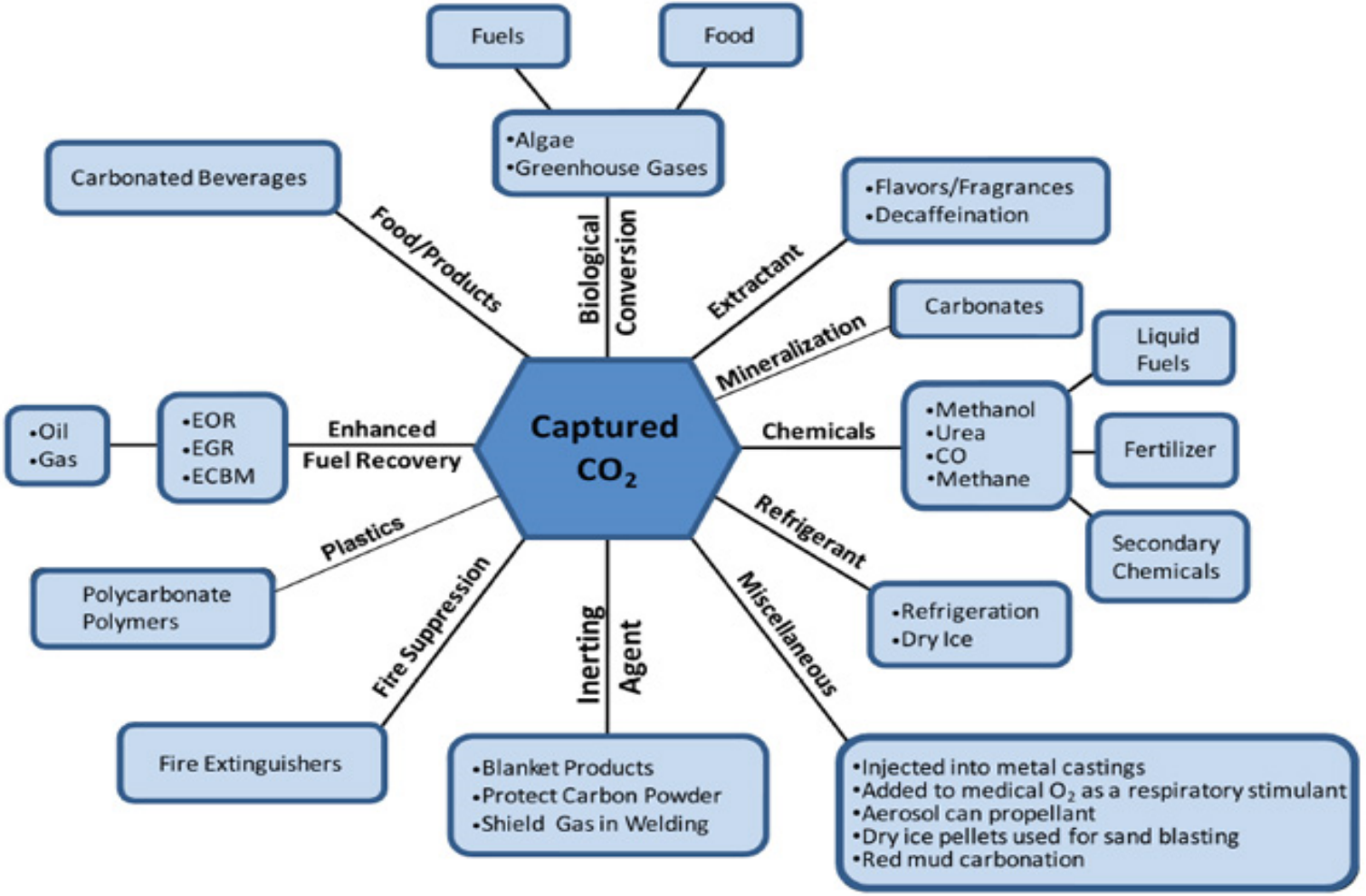
Value of coal is considerable



CO_2

Above picture source: The CURC-EPRI Tech Roadmap pg. 24

CO_2 Utilization



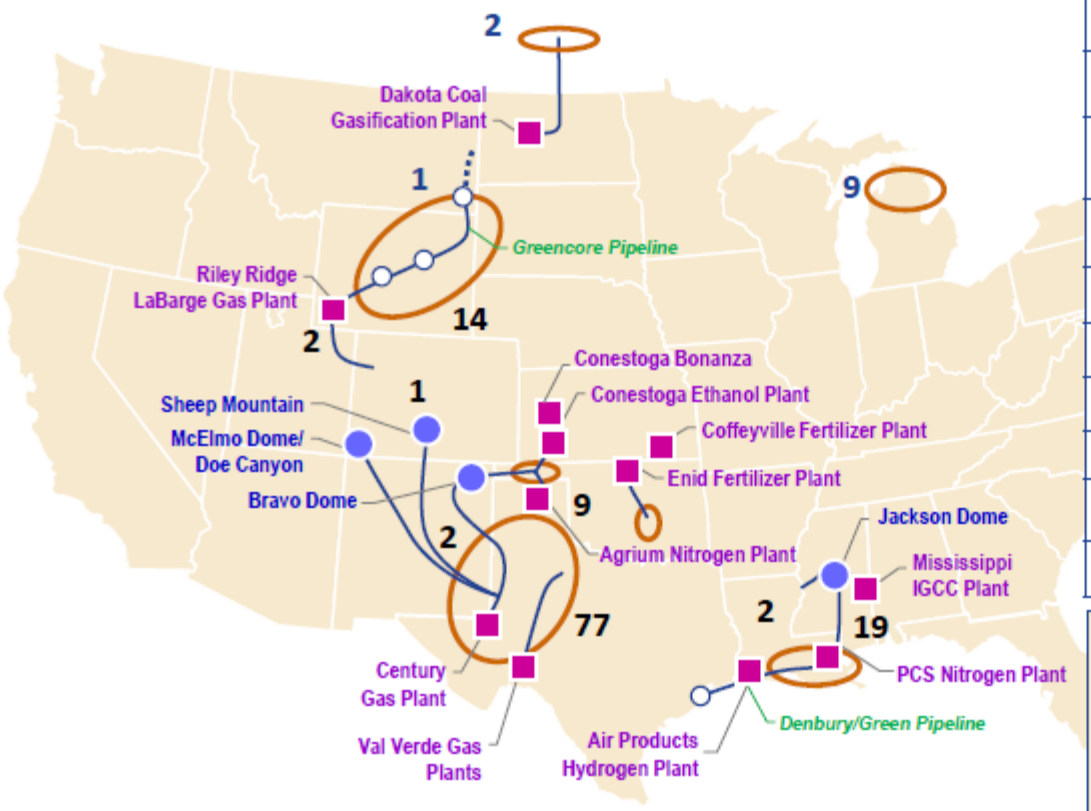
Growing potential of CCUS

Michael Moore

- There is a market for CO_2 (as opposed to pay for its disposal. CO_2 is no longer a waste
- Bakken Shale in North Dakota shows that micro fracturing would allow a significant increase in oil recovery
- A number of companies are looking for residual oil zones
- More interest in building pipelines

Current CO_2-EOR Operations and CO_2 Sources (2014)

Currently, CO_2-EOR provides 300,000 B/D of oil using 3.5 Bcfd of CO_2.



Oil Production (2014)	
CO2-EOR Projects	136
Oil Production (MBbl/d)	300
CO2 Supplies (2014)	
Number of Sources	17
▪ *Natural*	*5*
▪ *Industrial*	*12*
CO2 Supply (Bcf/d)	3.5
▪ *Natural*	*2.8*
▪ *Industrial*	*0.7*

136 No. of U.S. CO_2-EOR Projects
Natural CO_2 Source
Industrial CO_2 Source
CO_2 Pipeline
CO_2 Proposed Pipeline

Source: Advanced Resources International, Inc., based on Oil and Gas Journal, 2014 and other sources.

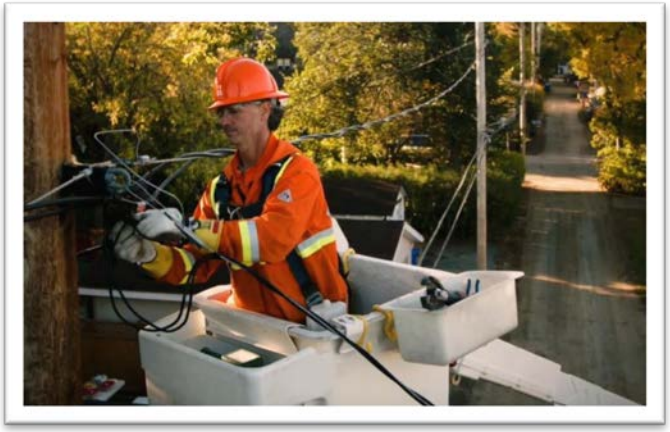
Source: The CO2-EOR Oil Recovery and CO2 Utilization "Prize". Prepared for: Global Technology Exchange Session: Subsurface and EOR Task Area Challenge Prepared/given By: Mr. Vello A. Kuuskraa, President, Advanced Resources International, Inc. April 2014

Case studies

Karl Moor

- Southern Company's Kemper County facility and SaskPower's Boundary Dam project. Utility customers will finance an amount of costs under an agreement with regulators
- Summit Power's Texas Clean Energy Project, a "merchant" power plant that will receive 75% of its revenue from sources other than the sale of power.
- The NRG-PetraNova project at the Parish Plant in Texas. Not only will this project avoid the cost of disposal of CO_2 by using the CO_2 to produce oil, but the oil production is part of the project, as the developers also will own the produced oil.
- White Rose UK. The availability of both grant and the CfD mechanism has provided a potentially financeable framework

SASKPOWER
A CCS SUCCESS STORY



Province's Power Utility

The Business Case

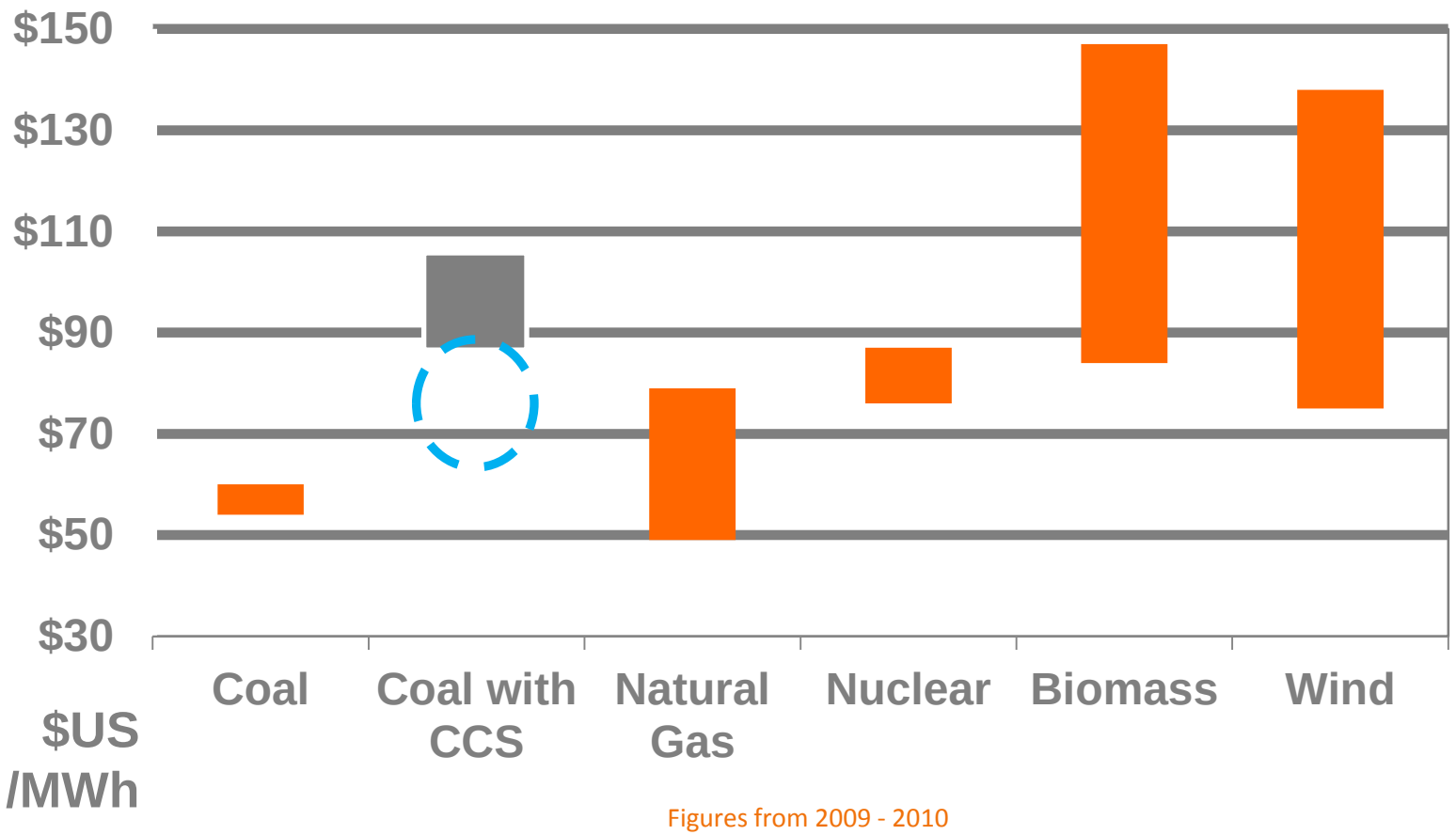
Government Approval

A World's First

BOUNDARY DAM UNIT 3

Emission Change	Pre-CCS	Post-CCS	Reduction
CO_2	1094	120	90%
SO_2	11	0	100%
NO	1.5	1.1	27%
PM10	.2	.02	90%
PM2.5	.1	.03	70%

GENERATION COSTS.



Figures from 2009 - 2010

Data Source: 2010 Electrical Power Research Institute, Program on Technology Innovation: *Integrated Generation Technology Options*

SECURING OFF-TAKERS.

- Sale of sulphuric acid, used primarily for industrial purposes including fertilizer.

- Sale of flyash for concrete production 100%.

- Sale of CO_2 to oil company for EOR.

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- **Practical:** The proposals represent an unprecedented convergence of energy and environmental law/policy with significant implications for how energy is generated and used in the United States.

Financing Projects

- U.S. lenders have been hesitant to provide long enough terms for project financing. CCS is still seen by many as experimental.
- The Department of Energy's loan guarantee program is seen as a vital mechanism to reduce risk for commercial lenders.
- Asian entities have proven willing to provide long-term financing suitable for merchant projects, which accounts for recent partnerships with Asian entities financing U.S. projects.
- The World Bank provides guarantees to projects in developing countries. The bank must evaluate projects based on the likelihood that its guarantees will be called upon

Financing in the EU

- The European Investment Bank is the most CCS-savvy lending entity in Europe, and is eager to be the leading edge of funding for CCS projects.
- Norway is willing to fund projects outside of Norway. There are few opportunities for CCS projects in Norway itself.
- In Eastern Europe, building major energy infrastructure is a challenge. Better understanding of financing is needed.
- The U.K.'s contract for differences mechanism is successful, and may be a model for others in Europe.

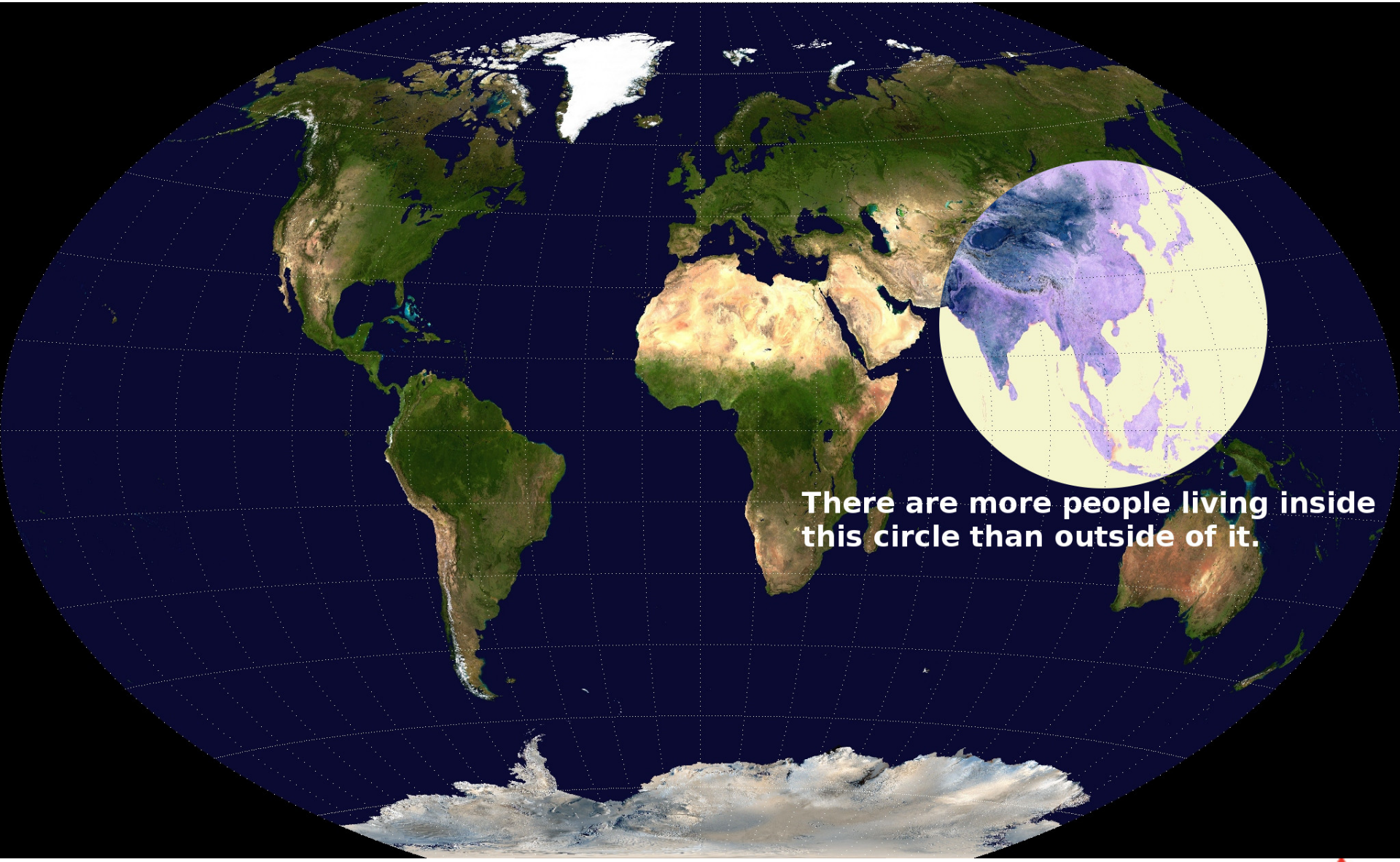
CCS Financing in the UK: a successful story

- The bank sounding process for the UK projects has further raised the profile of the opportunity - 12-15 institutions engaged, all of whom have reacted positively to the potential opportunity.

- For White Rose the approach to the finance community has been very structured, focused and is in many respects an education process designed to deliver committed finance when it's required, even if this may be two years in the future.

Increased interest for CCS from the Finance World

- May not be debt financed yet but the fact that operating plants exist employing a range of technology has started to create the "precedent" base they need to get comfortable with the industry.
- Also contributing in Europe is the UK CCS Competition. The availability of both grant and the CfD mechanism has provided a potentially financeable framework (subject to risk allocation) and both projects have blue chip sponsors with strong rationale


There are more people living inside
this circle than outside of it.

Japan and Korea

- Japan and Korea seem to be making small equity investments in companies with promising developments in order to further develop the technology.
- Korea hopes for large demonstrations by 2020. For now, it has 2 pilot projects. Hadong (which is a 10 MW potassium capture system) reports 85% capture and 95% purity; Boryeong (which is a 10 MW amine capture system) reports 90% capture and 99% purity.
- Coal-fired capacity in each country does not appear sufficient to encourage an indigenous industry.

INDIA - INDONESIA

- India clearly believes, and has publicly stated, it should not bare costs of de-carbonization. It is plagued by many other issues that together will tend to keep it from leading any large pilot projects for a long time.
- Indonesia exports 75% of its coal and does not have an interest in hosting large projects, even if financially supported by others.

CCS CHINA

- China's priorities are related to criteria pollutants (NOx, SOx, Pb, PM2.5, CO, Hg). Clean air is the central issue.
- China uses coal for 75% of its electricity generation which creates a lot of potential for future CCS projects.
- 500 GW of installed coal and 200 GW of coal under construction.
- 17 nuclear reactors in operation, 31 under construction and about 25 under development.
- GreenGen, in Tianjin, is a large scale project. Goal is to develop 2 x 400 MW IGCC units. The joining of Peabody Energy, the world's largest private sector coal company, is seen as very important for this project

CCS in CHINA

- A recent report on an ultra-supercritical plant owned and operated by Gouardian suggests the plant my be half way to achieving the CO2 emissions of a natural gas fired power plant, just on thermal efficiency.
- China's participation in large scale projects will be directed and funded approved by the central government in accordance with decisions related to business opportunities in developed economies.
- The likelihood of any large demonstration projects outside China is modest to unlikely.

Conclusions

- Lessons learned from existing projects have an important impact.
- Government support and success stories have triggered interest from Investors.
- The two Finance Round Tables held this year in Paris (Société Générale) and Washington (Hunton & Williams) confirm significant advances in understanding how to finance CCS.
- The dialog between Industry, Governments and Investors needs to be increased to accelerate the deployment of CCS. Trust in technology, management, solid financing plans is the key to open the future.