

ICAC Overview of the Status of GHG Control Technologies

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Presentation Overview

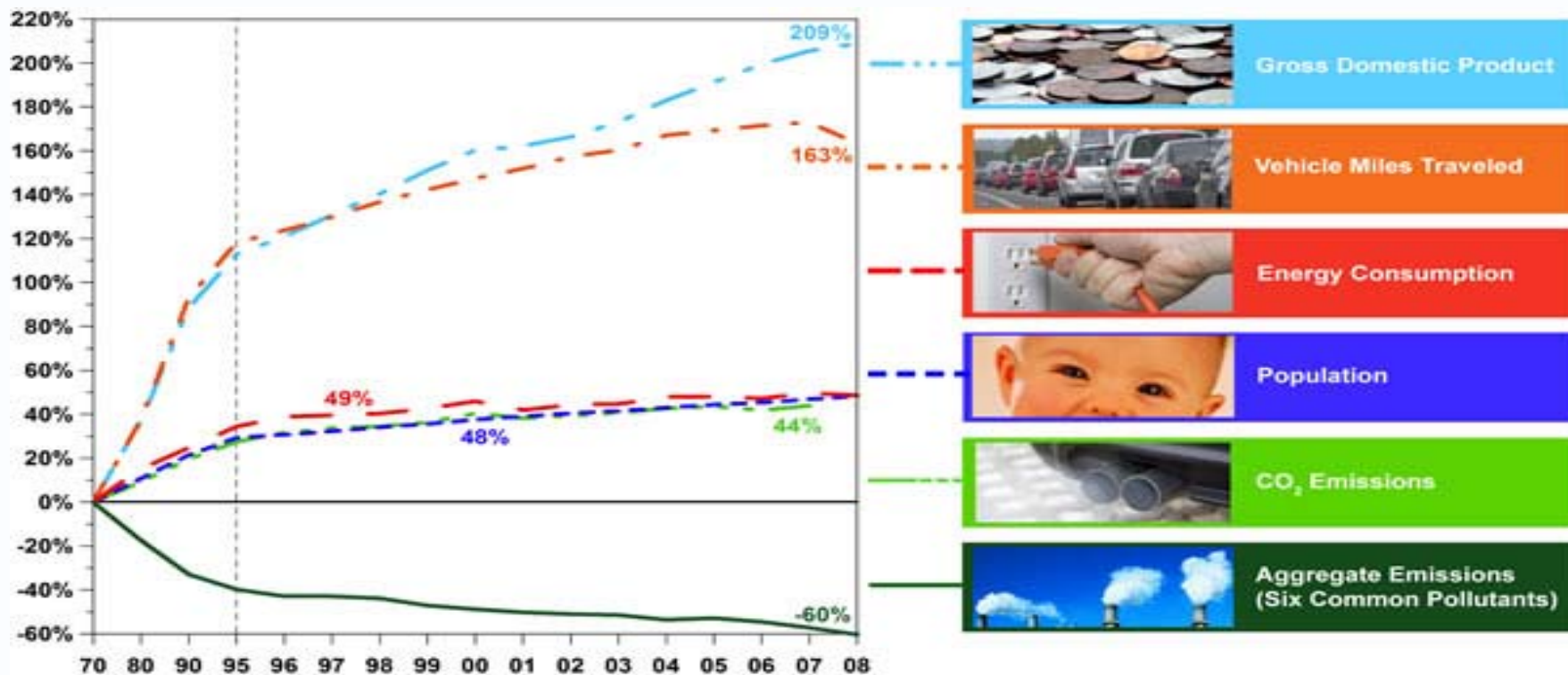


- Who is ICAC
- Drivers for Emission Control Technology
- Stages of CCS Technology Development
- What is Needed in the Short, Medium and Long Terms
- Summary

- The National Association for Air Pollution Control Manufacturers
 - More than 100 Leading Manufacturers
 - Emissions Control (FGD,SNCR,SCR, ESP, FF) and Measurement Technologies
 - OEMs, A&Es, Component Suppliers, Reagent Providers
- Promote Air Pollution Control Industry and Suppliers
 - Affected Industry, Regulators, and other stakeholders
- Stationary Source Emissions Controls
 - Electric Power and Industrial Sectors
- Promote Understanding of Technology and Industry Capabilities
 - Technical Publications, Workshops, Trade Journals, etc.

Drivers for Emission Control Technology

- Regulations drive technology investment, innovation and implementation
- Government sponsored R&D critical to overcoming “chicken & egg” dilemma
- Improvements in emission control technology result after technology has been installed and operated



Stages of CCS Technology Development



- Laboratory testing: provides a cost effective means to determine general feasibility and test a variety of parameters
 - Concept verification (laboratory)
- Pilot-scale: test under actual flue gas conditions but at reduced scale of equipment
 - Scale-up to verify concept (0.25 – 5 MW)
 - Pleasant Prairie, chilled ammonia, 1.7 MW
 - Burger, ECO2 multi-pollutant, 1 MW
- Demonstration field tests: scale up the size of the equipment and perform tests under optimum operating conditions to define capabilities and limits of the technology (20+ MW)
 - Moutaineer, chilled ammonia, 20 MW - 100,000 tpy
 - Plant Barry, advanced amine, 25 MW

Stages of CCS Technology Development (cont.)



- Demonstration field tests at multiple sites: each new site represents new operating conditions and new challenges
 - Recent announcement of B&W and Fluor strategic alliance to jointly market and provide project execution for Fluor's Econamine FG PlusSM technology to existing coal-fired power plants
- Demonstration projects:
 - Mountaineer, with CCPI III funding, 200 MW next by 2014 – 1.5 million tpy
- Commercial deployment:
 - problems will still be found at new sites, but most of the fatal flaws will have already been discovered and resolved

What is Needed in the Short Term



- ICAC Carbon Capture Control Focus Paper:
 - 6-8 demonstration projects needed by 2015 to establish commercial marketability of CCS technology
 - A demonstration project process flue gases from 200-300 MW and captures at least 50% of the CO₂
 - Financial incentives and regulatory certainty will accelerate the timeline to achieve commercial marketability
 - First movers galvanize the commercialization of CC technology, and they face higher costs than those who wait
 - Therefore, it is an appropriate use of federal funds to spur the advancement of CC technology and to offset the financial penalty that first movers face for taking the initiative
 - Early distribution of funding is paramount to meet the 2015 date as the lead time to complete demonstration projects is 3-5 years

What is Needed in the Medium Term



- IEA “Technology Roadmap”:
 - The next decade is a key “make or break” period for CCS
 - OECD governments will need to increase funding for CCS demonstration projects to an average annual level of \$3.5 to 4 billion from 2010 to 2020
 - Incentives for commercialization beyond 2020 in the form of mandates, GHG reduction incentives, tax rebates or other financing mechanisms
 - CCS development will start in the industrialized countries but is expected to rapidly shift to developing regions after 2020

What is Needed in the Long Term



- EPRI Prism / MERGE Analyses 2009 Update
“Full Portfolio”:
 - Completed pilot and demonstration projects for post-combustion capture, IGCC capture, oxygen separation, and oxy-firing
 - 90% CO₂ capture for all new coal and NGCC plants built after 2020
 - CCS retrofit for 60 GW of existing coal generation in the U.S. at 90% capture efficiency
 - Existing coal units >500 MW capacity and <12,00 Btu / kWh heat rate with all installed environmental controls (SO₂, NO_x, and HAPs), and placed in service after 1970, are viable candidates for CCS retrofit

Summary



- As with the conventional pollutant pathway, CCS cost reductions will be achieved by:
 - Learning by doing
 - Engineering and construction
 - Learning by using
 - Operations and Maintenance
 - Supply chain improvements
 - Shop capacity
 - Mass production
 - Competition
 - More sub-vendors for major equipment
 - Economies of scale
 - Optimal unit sizing

Summary (cont.)



- There are numerous technology options on solid paths to commercialization in the next 5 years
- Several emerging technologies with great promise to improve the economics of CO₂ capture in the next decade

For More:



Institute of Clean Air Companies
The national trade association for air pollution
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