WESTCARB Annual Business Meeting

EPRI Perspectives on CCS Technology Issues and Role in Greenhouse Gas Mitigation

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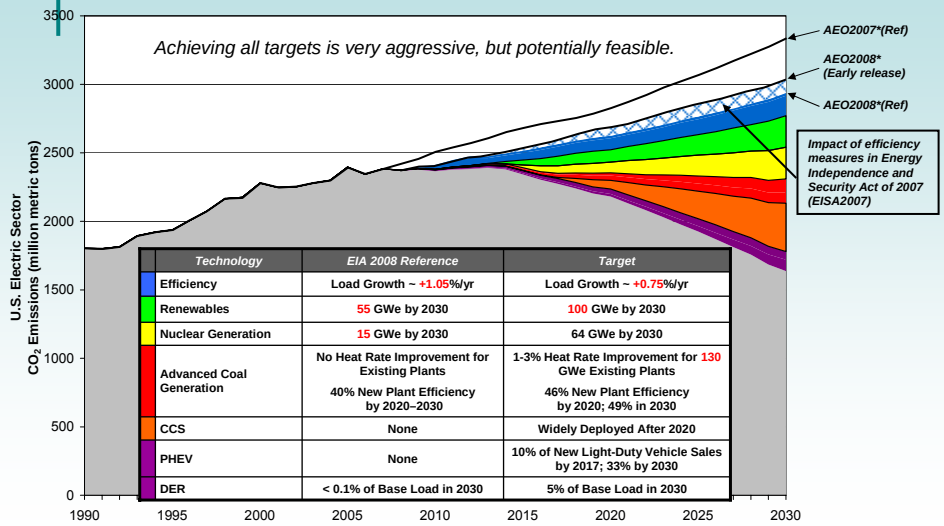
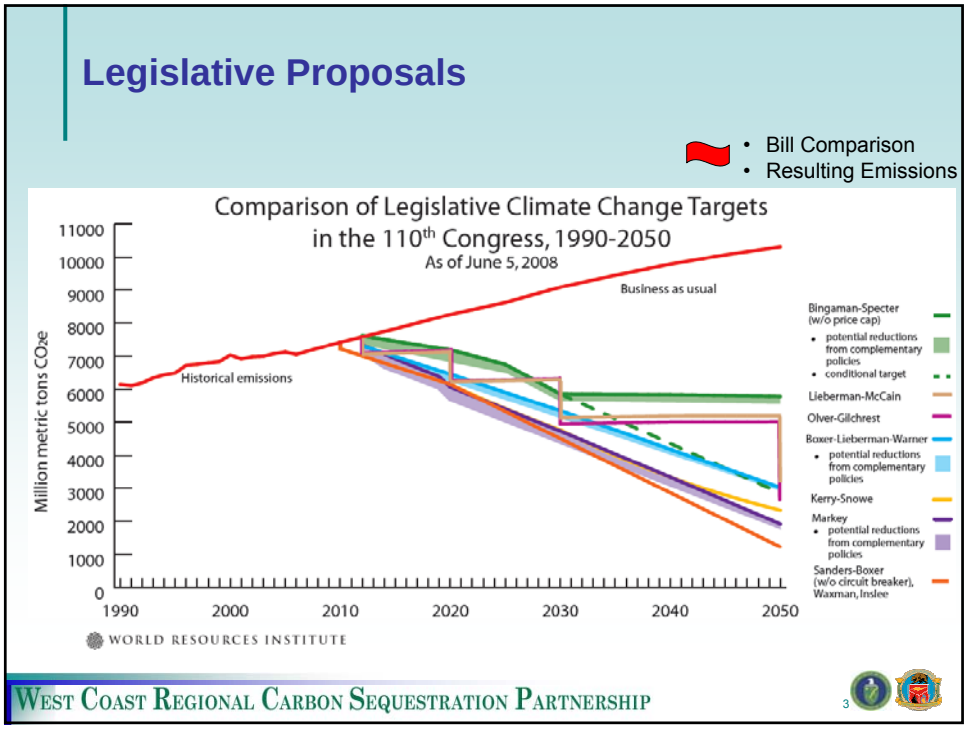
2008 Prism...Technical Potential for CO_2 Reductions



Technology	EIA 2008 Reference	Target
Efficiency	Load Growth ~ +1.05%/yr	Load Growth ~ +0.75%/yr
Renewables	55 GWe by 2030	100 GWe by 2030
Nuclear Generation	15 GWe by 2030	64 GWe by 2030
Advanced Coal Generation	No Heat Rate Improvement for Existing Plants 40% New Plant Efficiency by 2020–2030	1-3% Heat Rate Improvement for 130 GWe Existing Plants 46% New Plant Efficiency by 2020; 49% in 2030
CCS	None	Widely Deployed After 2020
PHEV	None	10% of New Light-Duty Vehicle Sales by 2017; 33% by 2030
DER	< 0.1% of Base Load in 2030	5% of Base Load in 2030

**Energy Information Administration (EIA) Annual Energy Outlook (AEO)*

West Coast Regional Carbon Sequestration Partnership 2


Legislative Proposals
• Bill Comparison
• Resulting Emissions
Comparison of Legislative Climate Change Targets
in the 110th Congress, 1990-2050
As of June 5, 2008
Business as usual
Historical emissions
Million metric tons CO2e
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1990
2000
2010
2020
2030
2040
2050
Bingaman-Specter (w/o price cap)
• potential reductions from complementary policies
• conditional target
Lieberman-McCain
Olver-Gilchrest
Boxer-Lieberman-Warner
• potential reductions from complementary policies
Kerry-Snowe
Markey
• potential reductions from complementary policies
Sanders-Boxer (w/o circuit breaker), Waxman, Inslee
WORLD RESOURCES INSTITUTE
WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP
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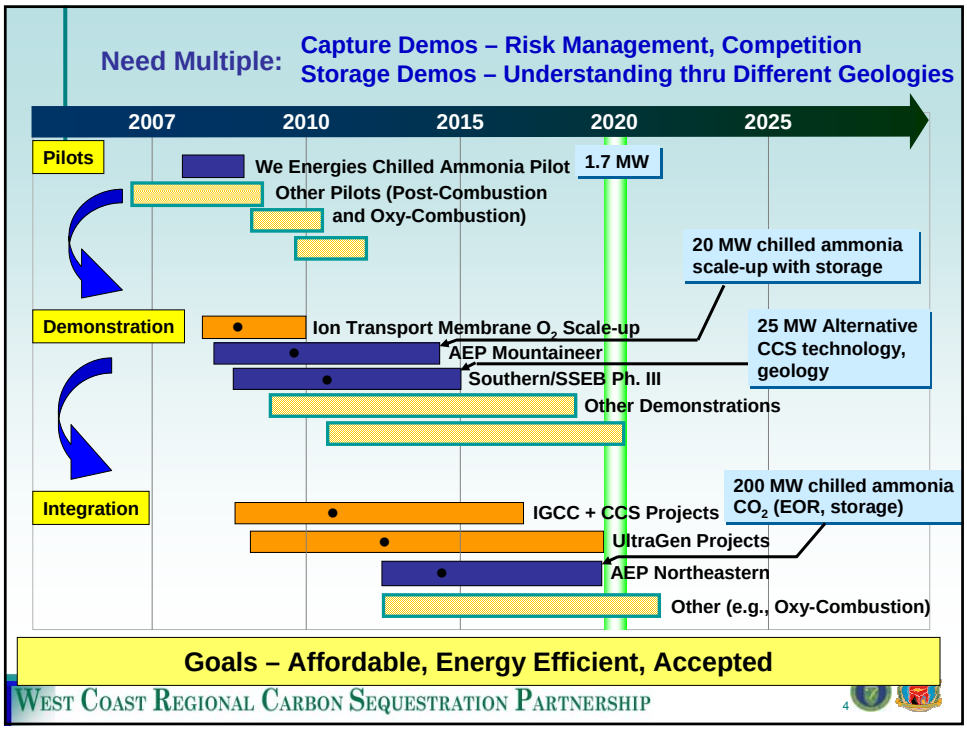
Need Multiple:
Capture Demos – Risk Management, Competition
Storage Demos – Understanding thru Different Geologies
2007
2010
2015
2020
2025
Pilots
We Energies Chilled Ammonia Pilot
1.7 MW
Other Pilots (Post-Combustion and Oxy-Combustion)
20 MW chilled ammonia scale-up with storage
Demonstration
Ion Transport Membrane O2 Scale-up
AEP Mountaineer
Southern/SSEB Ph. III
25 MW Alternative CCS technology, geology
Other Demonstrations
Integration
IGCC + CCS Projects
200 MW chilled ammonia CO2 (EOR, storage)
UltraGen Projects
AEP Northeastern
Other (e.g., Oxy-Combustion)
Goals – Affordable, Energy Efficient, Accepted
WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP
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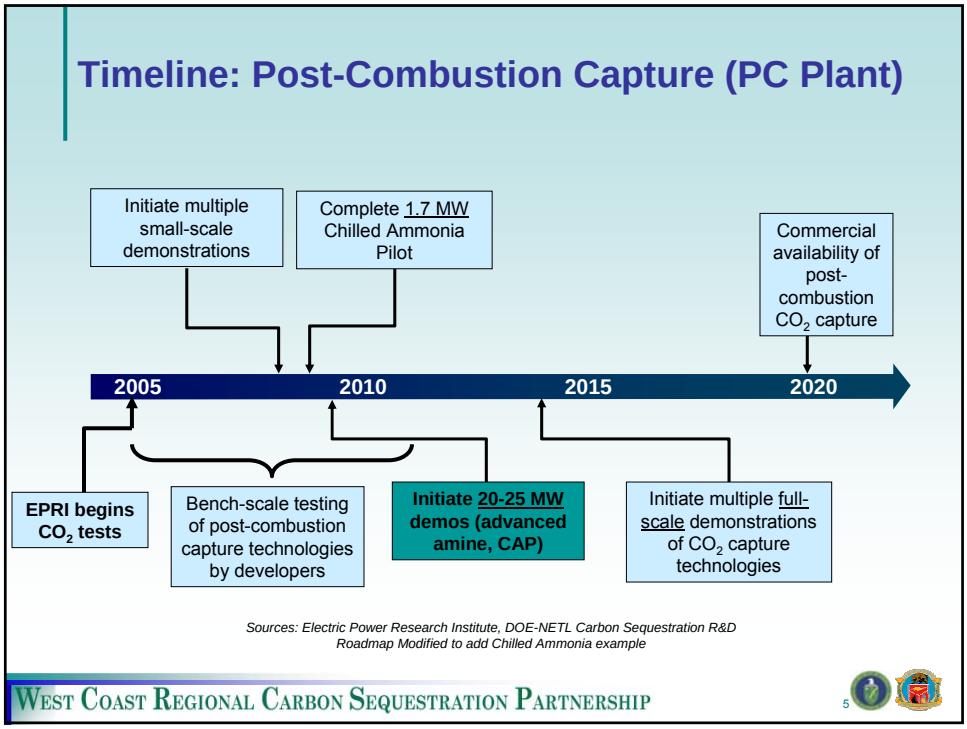
Timeline: Post-Combustion Capture (PC Plant)
Initiate multiple small-scale demonstrations
Complete 1.7 MW Chilled Ammonia Pilot
Commercial availability of post-combustion CO_2 capture
2005
2010
2015
2020
EPRI begins CO_2 tests
Bench-scale testing of post-combustion capture technologies by developers
Initiate 20-25 MW demos (advanced amine, CAP)
Initiate multiple full-scale demonstrations of CO_2 capture technologies
Sources: Electric Power Research Institute, DOE-NETL Carbon Sequestration R&D Roadmap Modified to add Chilled Ammonia example
West Coast Regional Carbon Sequestration Partnership
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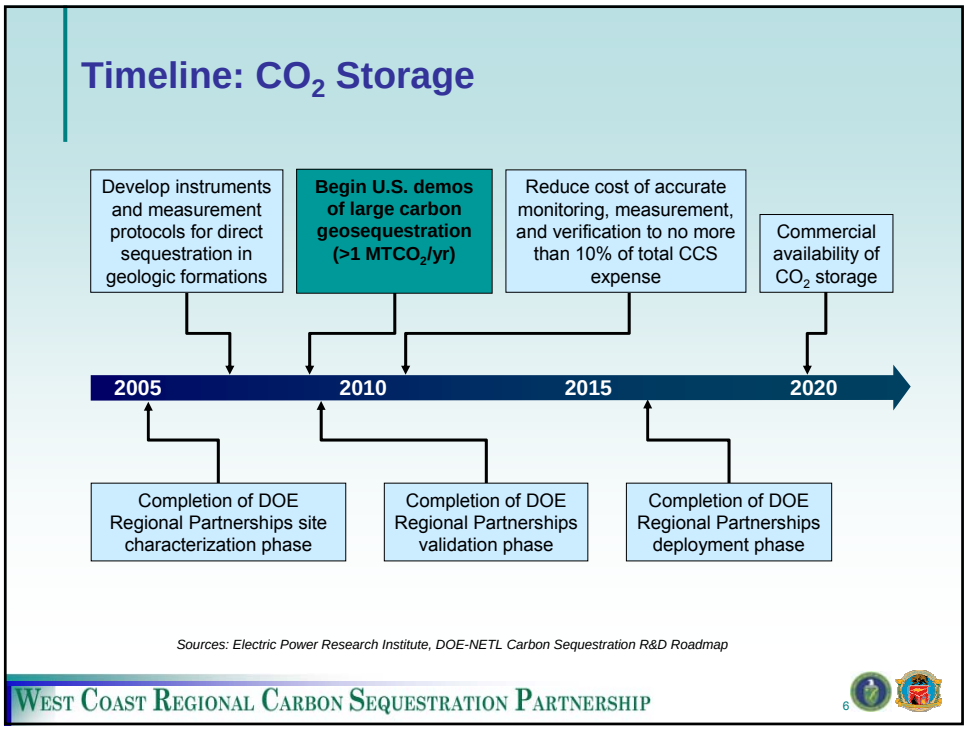
Timeline: CO_2 Storage
Develop instruments and measurement protocols for direct sequestration in geologic formations
Begin U.S. demos of large carbon geosequestration (>1 $MTCO_2$/yr)
Reduce cost of accurate monitoring, measurement, and verification to no more than 10% of total CCS expense
Commercial availability of CO_2 storage
2005
2010
2015
2020
Completion of DOE Regional Partnerships site characterization phase
Completion of DOE Regional Partnerships validation phase
Completion of DOE Regional Partnerships deployment phase
Sources: Electric Power Research Institute, DOE-NETL Carbon Sequestration R&D Roadmap
West Coast Regional Carbon Sequestration Partnership
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