Prioritization Score Sheet INSTRUCTIONS

- Each Registered Attendee is Entitled to Submit 1 Scoresheet file:
  - the total number of points for the scoresheet file must sum to 100 points
  - the points may be distributed freely among the different topics
  - topics will be ranked according to the highest number of points

- Complete your personal information here:

  Name:

  Email:

  Phone:

- Save this file as a Powerpoint 2000-2003 or compatible (not 2007)
- Use the file name: <your last name>-CO2 Scoresheet.ppt
- Email the Powerpoint file to Ron Wolk: (WOLKINTTS@aol.com)

Prioritization Score Sheet

R&D Categories	Score	R&D Projects Suggested to Support Achievement of Goal To Significantly Reduce Capture and Transportation Costs
Properties of CO2 and Co-constituents		Perform more gas properties measurements of CO2 mixtures • Collect experimental PVT and VLE data and develop correlations for systems with 60-100% CO2, 0-40% H2S, 0-5% Ar, and 0-5% N2, H2O • Develop an understanding of the impact of Ar and N2 and the pressure required to obtain dense phase supercritical CO2 • Thermodynamic properties of CO2 and ranges of impurities expected in CCS applications within vapor dome is liquid (also supercritical) • Variable speed of sound pulsation models (real gas effects) • Provide experimental data of CO2 and co-constituents properties including (NH3,)2) at pressures ranging from 5-2500psia and then develop simulation model with experimental data

Prioritization Score Sheet

R&D Categories	Score	R&D Projects Suggested to Support Achievement of Goal To Significantly Reduce Capture and Transportation Costs
Properties of CO2 and Co-constituents		Improve Equations of State • Equation of State predictions at all pressures with water present at various concentrations • Establish standard equations of state usage in analysis • Refine equation of state near critical point and with mixtures • from 1psia up to 11,000 psia ?
		Define compositions/pressures for power plants, reinjection recycle, pipeline

Prioritization Score Sheet

R&D Categories	Score	R&D Projects Suggested to Support Achievement of Goal To Significantly Reduce Capture and Transportation Costs
Integration of CO2 Capture and Compression		Evaluate cost/benefits for various CO2 capture options based on various CO2 impurity specs (10 ppm, 50 ppm, 100 ppm, 1000 ppm)
		Optimized integration of a CO2 capture/compression systems together with the power plant
		IGCC Demonstration project with CO2 capture to reduce risk and enhance workability
		Evaluate alternate CO2 compressor drives (steam and gas turbines)
		Integrate utilization of waste heat to improve cycle efficiency

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R&D Categories	Score	R&D Projects Suggested to Support Achievement of Goal To Significantly Reduce Capture and Transportation Costs
Pipeline issues		Perform optimization of pipeline booster stations Station spacing, liquid vs. gas, driver selection
		Perform further corrosion studies on the effects of moisture on pipeline corrosion
		Establish allowable levels of contaminants in CO2 pipeline and/or compressors
		Install test coupons in existing CO2 pipelines to obtain corrosion data, then develop CO2 product specifications including H2O, O2, NH3, TEG, Amines
Other		Determine practical effects of new legislation on CCS (after new legislation is in place)

Prioritization Score Sheet

R&D Categories	Score	R&D Projects Suggested to Support Achievement of Goal to Significantly Reduce Compression Investment and Power Requirements
Compression Systems Machinery and Components		Design very large axial compressors to provide initial stages of compression followed by conventional HP compressors
		Axial compression system demonstrator for 13 k ton/day
		Integrated back-pressure steam turbine and CO2 compressor
		Comparison and evaluation of compression-liquefaction and pumping options and configurations
		Advanced rotating equipment clearance control and sealing technology demonstration
		Improve reliability of recip EOR recycle compressors, i.e. valve reliability, lubrication
		Compressor heat exchanger data for power plant applications including supercritical fluids
		Document duty cycle requirements for reference plant

Prioritization Score Sheet

R&D Categories	Score	R&D Projects Suggested to Support Achievement of Goal to Significantly Reduce Compression Investment and Power Requirements
Electric Drive Machinery		Advanced Stator and Rotor cooling schemes
		Improved materials for high speed rotors, advanced design tools
		Tighter integration of compressor, motor and drive components and engineering.
		Determine optimal machine types, speeds, needed voltages, etc. for CO2 compressors
		Advanced Stator and Rotor materials to handle corrosive gases
		Improved drive electronics • higher fundamental frequencies for high speed machines • improved controls and bandwidth to provide low torque ripple
		Higher voltage, higher power, and speed machines and drives.

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R&D Categories	Score	R&D Projects Suggested to Support Achievement of Goal to Significantly Reduce Compression Investment and Power Requirements
Drive Electronics and Components		Development of SiC components and inverter modules for cost effective variable speed drive and cost effective electrically driven compressors • Manufacturing and cost reduction for SiC power modules • Determine and develop optimal device type for CO2 compression application
		Development and demonstration of high voltage, high frequency motor drives
		High voltage, high current module packaging • Better thermal performance • Better reliability
		High frequency transformer magnetic materials: nano-crystiline magnetic materials

Prioritization Score Sheet

R&D Categories	Score	R&D Projects Suggested to Support Achievement of Goal to Significantly Reduce Compression Investment and Power Requirements
Drive Electronics and Components		Integration of pipeline pumping station motor drive with electrical grid
		Integration of CO2 compression electric drive with power plant electrical system

Prioritization Score Sheet Total Score Points and Scoring Comments

Please Sum Your Total Points of all Scores Must = 100	Mark your total points here

Comments on topics and scoring: