CSLF Recognized Projects

1. **Alberta Enhanced Coal-Bed Methane Recovery Project**
   Nominators: Canada (lead), United States, and United Kingdom
   This pilot-scale project is aimed at demonstrating, from both economic and environmental criteria, the overall feasibility of coal bed methane (CBM) production and simultaneous CO2 storage in deep unmineable coal seams. Specific objectives of the project are to determine baseline production of CBM from coals; determine the effect of CO_2 injection and storage on CBM production; assess economics; and monitor and trace the path of CO_2 movement by geochemical and geophysical methods.
   Recognized by the CSLF at its Melbourne meeting, September 2004

2. **CANMET Energy Technology Centre (CETC) R&D Oxyfuel Combustion for CO_2 Capture**
   Nominators: Canada (lead) and United States
   This is a pilot-scale project that will demonstrate oxy-fuel combustion technology with CO_2 capture. This goal of the project is to develop energy-efficient integrated multi-pollutant control, waste management and CO_2 capture technologies for combustion-based applications and to provide information for the scale-up, design and operation of large-scale industrial and utility plants based on the oxy-fuel concept.
   Recognized by the CSLF at its Melbourne meeting, September 2004

3. **CASTOR**
   Nominators: European Commission (lead), France, and Norway
   This is a multifaceted project that has activities in three main areas: strategy for CO_2 reduction, post-combustion capture, and CO_2 storage performance and risk assessment studies. The goal of the project is to reduce the cost of post-combustion CO_2 capture and to develop and validate, in public/private partnerships, all the innovative technologies needed to capture and store CO_2 in a reliable and safe way.
   Recognized by the CSLF at its Melbourne meeting, September 2004

4. **China Coalbed Methane Technology/CO_2 Sequestration Project** *(Completed)*
   Nominators: Canada (lead), United States, and China
   This is a pilot-scale project that aims to successfully demonstrate that coal seams in this part of China are premeable and stable enough to absorb CO_2 and enhance methane production, leading to a clean energy source for China. The project will evaluate reservoir properties of selected coal seams of the Qinshui Basin of eastern China and carry out field testing at relatively low CO_2 injection rates.
   Recognized by the CSLF at its Berlin meeting, Seipember 2005

5. **CO_2 Capture Project**
   Nominators: United Kingdom (lead), Italy, Norway, and United States
   This is a pilot-scale project that will continue the development of new technologies to reduce the cost of CO_2 separation, capture, and geologic storage from combustion sources such as turbines, heaters and boilers. The goal of the project is to reduce cost

of CO_2 capture from large fixed combustion sources by 60-80% while addressing critical issues such as storage site/project certification, well integrity and monitoring.
Recognized by the CSLF at its Melbourne meeting, September 2004

6. **CO$_2$ CRC Otway Project**
Nominators: Australia (lead) and United States
This is a pilot-scope project that involves transport and injection of approximately 100,000 tons of CO_2 into a depleted natural gas well over a two year period. Besides the operational aspects of processing, transport and injection of a CO_2-containing gas stream, the project also includes development and testing of new and enhanced monitoring, and verification of storage (MMV) technologies, modeling of post-injection CO_2 behavior, and implementation of an outreach program for stakeholders and nearby communities. Data from the project will be used in developing a future regulatory regime for CO_2 capture and storage (CCS) in Australia.
Recognized by the CSLF at its Paris meeting, March 2007

7. **CO$_2$ Geonet**
Nominators: European Commission (lead) and United Kingdom
This multifaceted project is focused on geologic storage options for CO_2 as a greenhouse gas mitigation option, and on assembling an authoritative body for Europe on geologic sequestration. Major objectives include formation of a partnership consisting, at first, of 13 key European research centers and other expert collaborators in the area of geological storage of CO_2, identification of knowledge gaps in the long-term geologic storage of CO_2, and formulation of new research projects and tools to eliminate these gaps. This project will result in re-alignment of European national research programs and prevention of site selection, injection operations, monitoring, verification, safety, environmental protection, and training standards.
Recognized by the CSLF at its Berlin meeting, September 2005

8. **CO$_2$ Separation from Pressurized Gas Stream**
Nominators: Japan (lead) and United States
This is a small-scale project that will evaluate processes and economics for CO_2 separation from pressurized gas streams. The project will evaluate primary promising new gas separation membranes, initially at atmospheric pressure. A subsequent stage of the project will improve the performance of the membranes for CO_2 removal from the fuel gas product of coal gasification and other gas streams under high pressure.
Recognized by the CSLF at its Melbourne meeting, September 2004

9. **CO2 SINK**
Nominators: European Commission (lead) and Germany
This is a pilot-scale project that will test and evaluate CO_2 capture and storage at an existing natural gas storage facility and in a deeper land-based saline formation. A key part of the project will be monitoring the migration characteristics of the stored CO_2. The goal of the project is to advance understanding of the science and practical processes involved in underground storage of CO_2 and to provide real case experience for use in development of future regulatory frameworks for geological storage of CO_2.
Recognized by the CSLF at its Melbourne meeting, September 2004

10. CO$_2$ STORE *(Completed)*

Nominators: Norway (lead) and European Commission
This project is a follow-on to the Sleipner project and involves monitoring of CO$_2$ migration (involving a seismic survey) in a saline formation beneath the North Sea and additional studies to gain further knowledge of geochemistry and dissolution processes.

There will also be several preliminary feasibility studies for additional geologic settings of future candidate project sites. The goal of the project is to develop sound scientific-based methodologies for the assessment, planning, and long-term monitoring of underground CO$_2$ storage, both onshore and offshore.
Recognized by the CSLF at its Melbourne meeting, September 2004

11. ENCAP

Nominators: European Commission (lead), France, and Germany
This is a multifaceted project consists of six sub-projects: Process and Power Systems, Pre-Combustion Decarbonization Technologies, O$_2$/ CO$_2$ Combustion (Oxy-fuel) Boiler Technologies, Chemical Looping Combustion, High-Temperature Oxygen Generation for Power Cycles, and Novel Pre-Combustion Capture Concepts. The goals of the project are to develop promising pre-combustion CO$_2$ capture technologies (including O$_2$/ CO$_2$ combustion technologies) and propose the most competitive demonstration plant technology, design, process scheme, and component choices.
Recognized by the CSLF at its Berlin meeting, September 2005

12. Feasibility Study of Geologic Sequestration of CO$_2$ in Basalt Formations of (Deccan Trap) in India

Nominators: India (lead) and United States
The feasibility of CO$_2$ storage in India's basalt formations will be established using mainly noninvasive technologies like 2D/3D and MT studies, physical and chemical characterization of formations, kinetic studies, wire logging for temperature and pressure profiles, and detailed modeling. Subsequent detailed schemes will be developed for CO$_2$ injection and monitoring in these basalt formations.
Recognized by the CSLF at its Berlin meeting, September 2005

13. Frio Project

Nominators: United States (lead) and Australia
This is a pilot-scale project that will demonstrate CO$_2$ sequestration in an on-shore underground saline formation. The project involves injecting relatively small quantities of CO$_2$ into the formation and monitoring its movement for several years thereafter. The goals of the project are to verify conceptual models of $_{CO2}$ sequestration in such geologic structures, demonstrate that no adverse health, safety or environmental effects will occur from this kind of sequestration, demonstrate field-test monitoring methods, and develop experience necessary for larger scale CO$_2$ injection experiments.
Recognized by the CSLF at its Melbourne meeting, September 2004

14. Geologic CO$_2$ Storage Assurance at In Salah, Algeria

Nominators: United Kingdom (lead) and Norway
This multifaceted project will develop the tools, technologies, techniques and management systems required to cost-effectively demonstrate, safe, secure, and verifiable CO$_2$ storage in conjunction with commercial natural gas production. The

goals of the project are to develop a detailed dataset on the performance of CO_2 storage; provide a field-scale example on the verification and regulation of geologic storage systems; test technology options for the early detection of low-level seepage of CO_2 out of primary containment; evaluate monitoring options and develop guidelines for an appropriate and cost-effective, long-term monitoring methodology; and quantify the interaction of CO_2 re-injection and hydrocarbon production for long-term storage in oil and gas fields.
Recognized by the CSLF at its Berlin meeting, September 2005

15. IEA GHG Weyburn-Midale CO_2 Monitoring and Storage Project

Nominators: Canada and United States (leads) and Japan
This is a commercial-scale project that will utilize CO_2 for enhanced oil recovery at a Canadian oil field. The goal of the project is to determine the performance and undertake a thorough risk assessment of CO_2 storage in conjunction with its use in enhanced oil recovery. The work program will encompass four major technical themes of the project: geological integrity; wellbore injection and integrity; storage monitoring methods; and risk assessment and storage mechanisms. Results from these technical themes, when integrated with policy research, will result in a Best Practices Manual for future CO_2 Enhanced Oil Recovery projects.
Recognized by the CSLF at its Melbourne meeting, September 2004

16. ITC CO_2 Capture with Chemical Solvents

Nominators: Canada (lead) and United States
This is a pilot-scale project that will demonstrate CO_2 capture using chemical solvents. Supporting activities include bench and lab-scale units that will be used to optimize the entire process using improved solvents and contactors, develop fundamental knowledge of solvent stability, and minimize energy usage requirements. The goal of the project is to develop improved cost-effective technologies for separation and capture of CO_2 from flue gas.
Recognized by the CSLF at its Melbourne meeting, September 2004

17. Regional Carbon Sequestration Partnerships

Nominators: United States (lead) and Canada
This multifaceted project will identify and test the most promising opportunities to implement sequestration technologies in the United States and Canada. There are seven different regional partnerships, each with their own specific program plans, which will conduct field validation tests of specific sequestration technologies and infrastructure concepts; refine and implement (via field tests) appropriate measurement, monitoring and verification (MMV) protocols for sequestration projects; characterize the regions to determine the technical and economic storage capacities; implement and continue to research the regulatory compliance requirements for each type of sequestration technology; and identify commercially available sequestration technologies ready for large scale deployment.
Recognized by the CSLF at its Berlin meeting, September 2005

18. Regional Opportunities for CO_2 Capture and Storage in China

Nominators: United States (lead) and China
This project will characterize the technical and economic potential of CO_2 capture and storage technologies in China. The goal of the project is to compile key characteristics of large anthropogenic CO_2 sources (including power generation, iron and steel plants, cement kilns, petroleum and chemical refineries, etc.) as well as

candidate geologic storage formations that exist across China, and to develop estimates of geologic CO_2 storage capacities in China.
Recognized by the CSLF at its Berlin meeting, September 2005

19. Zama Acid Gas EOR, CO_2 Sequestration, and Monitoring Project
Nominators: Canada (lead) and United States
This is a pilot-scale project that involves utilization of acid gas (approximately 70% CO_2 and 30% hydrogen sulfide) derived from natural gas extraction for enhanced oil recovery. Project objectives are to predict, monitor, and evaluate the fate of the injected acid gas; to determine the effect of hydrogen sulfide on CO_2 sequestration; and to develop a "best practices manual" for measurement, monitoring, and verification of storage (MMV) of the acid gas. Acid gas injection was initiated in December 2006 and will result in sequestration of about 25,000 tons (or 375 million cubic feet) of CO_2 per year.
Recognized by the CSLF at its Paris meeting, March 2007

Note: "Lead Nominator" in this usage indicates the CSLF Member which proposed the project.