

CSLF Project Data Sheet Template

Sample Text in Blue

PROJECT TITLE

The Weyburn Carbon Sequestration Project

PROJECT LOCATION

Country
State/Region
Province
City

CSLF PROJECT TYPE

Categorization based on several factors. Should reflect input from CSLF staff

Terrestrial sequestration for enhanced oil recovery.

PROJECT TECHNOLOGIES

This section will vary in length and complexity depending on the project. Consult CSLF staff for input

1. Long distance CO₂ transport
2. Sequestration with EOR

PROJECT GOAL

Simple and to the point. The "goal" should be easily understood by anyone reading it with no prior knowledge of the project.

The goal of the Weyburn CO₂ Sequestration Project is to enhance the knowledge base and understanding of the underground sequestration of CO₂ associated with EOR. The Weyburn site provides a unique and cost effective opportunity to obtain data to model and predict the impact of long-term storage of CO₂ in a geologic formation.

PROJECT OBJECTIVES

A breakdown of the "goal" into the constituent steps comprising the whole. Use bullet points to separate step.

- To show that sequestration into geologic formations can provide long-term storage of CO₂.
- To determine how much CO₂ is actually stored during EOR operations.
- To monitor and verify the amount of CO₂ that is sequestered.
- To study the dependence of CO₂ storage on geology.
- To find ways to increase CO₂ sequestration without compromising EOR operations.

PROJECT TIMELINE

Use most realistic timeline available. Use official (contract signing, etc.) start date. Completion date should reflect contractual timeline if possible. Update estimates regularly.

Start date:

Milestone events: (list chronologically)

End date:

TEAM MEMBERS

Principal Team Members

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Affiliated Team Members

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

KEY CONTACTS

Project Point of Contact

Name
Telephone Number
Fax Number
Email Address

CSLF Point of Contact

Name
Telephone Number
Fax Number
Email Address

Government Point of Contact

Name
Telephone Number
Fax Number
Email Address

Website
Include any project related private or public sites as well

PROJECT DESCRIPTION

Target audience: Policy makers, press, adult non-scientific community. This description should give a synopsis of the program (who, what, why, where and how) with easily understandable descriptions of the project, the associate science and goals

The Weyburn carbon dioxide (CO2) sequestration project is intended to expand the knowledge base on formation capacity, transport, fate, and storage integrity of CO2 injected into geologic formations. Use of new reservoir mapping and predictive tools (surface seismic and tracer injection) to develop a better understanding of the behavior of CO2 in a geologic formation in conjunction with the Weyburn unit is being addressed by EnCana and Dakota Gasification Company.

Weyburn Field, in southwestern Saskatchewan, Canada, was discovered in 1954. Starting in 2001, several tons per day of CO2 have been pumped into this reservoir to produce incremental oil in a procedure known as enhanced oil recovery (EOR). The CO2 is being transported by pipeline 330 km from the Great Plains Synfuels Plant in Beulah, North Dakota. It is expected that approximately 50% of the CO2 will remain locked up with the oil that remains in the ground. The 50% that comes to the surface with the produced oil will come out of solution as the pressure drops and be recycled back to the injection wells. This work will examine the way CO2 moves through the reservoir rocks, the precise quantity that can be stored in a reservoir, and how long the CO2 could be expected to remain trapped in the underground formation

PROJECT BACKGROUND AND TECHNICAL DESCRIPTION

Target Audience: CSLF Technical Committee. This description is exhaustive and inclusive of all significant information regarding the project.

The location of the project is the Weyburn oilfield, first discovered in 1954. It covers an area of some 52,000 acres and has a current oil production rate of ~3,067 m³/day. This comes from a total of 963 active wells made up of 534 vertical wells, 138 horizontal wells, and 171 injection systems. There are also 146 abandoned wells. Current production consists primarily of medium-gravity crude oil with a low gas-to-oil ratio.

In October 2000, EnCana began injecting significant amounts of carbon dioxide into a Williston Basin oilfield (Weyburn) in order to boost oil production. EnCana is operator of the oilfield and holds the largest share of the 37 current partners. Initial CO₂ injection rates amounted to ~5,000 tonnes or 95 million scf/day (2.7 million m³/d); this would otherwise have been vented to the atmosphere. Overall, it is anticipated that some 20 Mt of carbon dioxide will be permanently sequestered over the lifespan of the project. The gas is being supplied via a 205 mile long pipeline (costing 100 million US\$) from the lignite-fired Dakota Gasification Company synfuels plant site in North Dakota.

The company is a subsidiary of Basin Electric Power Co-operative. EnCana is taking ~40% of the synfuels plant's capacity. At the plant, CO₂ is produced from a Rectisol unit in the gas cleanup train. The CO₂ project adds about \$30 million of gross revenue to the gasification plant's cash flow each year.

This is the first instance of cross-border transfer of CO₂ from the USA to Canada. While there are emissions trading projects being developed within countries such as Canada, the Weyburn project is essentially the first international project where physical quantities of CO₂ are being traded for purposes of minimising climate change.

Another key feature of the project is that the CO₂ comes from fossil fuel use. There are currently 74 CO₂-EOR projects operating in the USA, however, most of these rely on naturally-occurring sources of CO₂. Thus, the Weyburn project represents a significant increase in the use of anthropogenic CO₂ in EOR projects in both the USA and Canada. It is estimated that 50% of the injected CO₂ will be permanently sequestered in the oil that remains in the ground, the remainder coming to the surface with the produced oil. From here, it is being recovered, compressed and reinjected.

During its life, the Weyburn project is expected to produce at least 122 million barrels of incremental oil, through miscible or near-miscible displacement with CO₂, from a field that has already produced 335 million barrels since its discovery in 1955. This will extend the life of the Weyburn field by approximately 20-25 years. It is estimated that ultimate oil recovery will increase to 34%. CO₂ sequestration carried out on the scale of the Weyburn Enhanced Oil Recovery Project is potentially a low-cost, practical and long-term management option for national and international carbon dioxide emissions.

It has been estimated that, on a full life-cycle basis, the oil produced at Weyburn by CO₂ EOR will release only two-thirds as much CO₂ to the atmosphere compared to oil produced using conventional technology. The level of effectiveness of this technology makes it an attractive option for reducing national levels of CO₂ emitted. Many of the oil fields in the Williston Basin, and indeed, other sedimentary basins throughout the world, could capitalise on the EOR techniques in use at Weyburn, substantially increasing the levels of CO₂ that could be sequestered in this way.

In operation, two large compressors are used to transport CO₂ through the pipeline. During normal operations, CO₂ is transported in the pipeline in a gaseous form, but in a supercritical state; this means that it behaves much like a liquid. During the pipe-filling process, the CO₂ remains in a gaseous state, however, as the pipeline fills and its pressure increases, the CO₂ enters a liquid phase. Subsequently, as pressure continues to increase, the CO₂ returns to the gaseous phase and enters the supercritical state.

PRESS RELEASE

Press releases are the vehicle by which the project enters the "real" world of news and journalism. The project must compete with other news, related or not, for the attention of editors and others who will scrutinize the project based on press releases they receive – not the efficacy of the project or the nobility of its goals. Generally speaking, the impression the press and public will have of the project will be based in large measure on the press releases used to promote it. This point cannot be emphasized enough. Use professionals if possible. Note example:

Successful Sequestration Project Could Mean More Oil and Less Carbon Dioxide Emissions

Weyburn Project Breaks New Ground in Enhanced Oil Recovery Efforts

Washington, DC – Secretary Samuel Bodman today announced that the Department of Energy (DOE)-funded "Weyburn Project" successfully sequestered five million tons of carbon dioxide (CO₂) into the Weyburn Oilfield in Saskatchewan, Canada, while doubling the field's oil recovery rate. If the methodology used in the Weyburn Project was successfully applied on a worldwide scale, one-third to one-half of CO₂ emissions could be eliminated in the next 100 years and billions of barrels of oil could be recovered.

"The success of the Weyburn Project could have incredible implications for reducing CO₂ emissions and increasing America's oil production. Just by applying this technique to the oil fields of Western Canada we would see billions of additional barrels of oil and a reduction in CO₂ emissions equivalent to pulling more than 200 million cars off the road for a year," Secretary of Energy Bodman said. "The Weyburn Project will provide policymakers, the energy industry, and the general public with reliable information about industrial carbon sequestration and enhanced oil recovery."

In the first phase of the research project, co-funded by the Department of Energy, carbon dioxide was injected into the Weyburn Oilfield in Saskatchewan, Canada. The CO₂ increased the underground pressure of the field to bring more oil to the surface. The project increased the field's oil production by an additional 10,000 barrels per day and demonstrated the technical and economic feasibility of permanent carbon sequestration – the capture and permanent storage of carbon dioxide in geologic formations.

To compare, primary oil recovery, which uses natural underground pressure to bring oil to the surface, typically produces only 10 percent of an oilfield's reserves. In secondary efforts, operators flood the field with water to force the oil into the wellbore and increase recovery to 20 percent to 40 percent.

Enhanced oil recovery (EOR), the technique used in the project, has the potential to increase an oil field's ultimate oil recovery up to 60 percent and extend the oilfield's life by decades. Scientists project that, by using knowledge gained from the Weyburn Project, the Weyburn Oilfield will remain viable for another 20 years, produce an additional 130 million barrels of oil, and sequester as much as 30 million tons of carbon dioxide.

The CO₂ used in the project is piped from the Great Plains Synfuels Plant near Beulah, N.D., and is a byproduct of the plant's coal gasification process. Before the Weyburn Project, much of the CO₂ used in similar U.S. EOR projects has been taken at considerable expense from naturally occurring reservoirs. Using an industrial source of CO₂ sequesters this emission that would normally be vented into the atmosphere.

Now the Weyburn Project will move into Phase II where researchers will compile a best practices manual to serve as a world-class industrial reference in the design and implementation of CO₂ sequestration in conjunction with enhanced oil recovery projects. They will also expand their efforts to the neighboring Midale Unit, develop more rigorous risk-assessment modeling techniques, improve injection efficiencies, and monitor CO₂ flooding and storage with a variety of methods, including seismic wave technologies and geochemical surveys.

The Weyburn CO₂ Storage and Monitoring Project is a multinational effort led by Canada's Petroleum Technology Research Centre in Regina, Saskatchewan, and cosponsored by the oilfield operator, EnCana Corporation of Calgary, Alberta. The project receives funding from the U.S. Department of Energy, as well as industry and government organizations in Canada, Japan, and the European Commission.

The Weyburn Project is endorsed by the Carbon Sequestration Leadership Forum, an international climate change initiative focused on carbon capture and storage as a means to accomplish the long-term stabilization of CO₂ levels in the atmosphere. Announced by the U.S. Secretary of Energy and Under Secretary of State for Global Affairs in February 2003, the Forum has attracted 22 member nations, including the European Commission, and joint projects have demonstrated a wide range of CO₂ capture, transport, and storage techniques.