

OCEAN CARBON SEQUESTRATION: A CASE STUDY IN PUBLIC AND INSTITUTIONAL PERCEPTIONS

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ABSTRACT

In December 1997, an international project agreement was signed at Kyoto for a collaborative study of the direct injection of carbon dioxide into the deep ocean. After a detailed site selection process, a site off the Kona coast of the big island of Hawaii was chosen in March 1998. The Natural Energy Laboratory of Hawaii Authority, a quasi-governmental organization, would host the project, partially due to the impression that permitting would be fairly straightforward in the Laboratory's ocean research corridor. A Hawaii-based project general contractor was hired, steering and technical committees were formed, and a multi-year public outreach program was planned to engage the Hawaiian public about the carbon sequestration project. Before the outreach program was set to begin, the public learned of the project through an article in the local newspaper. A few members of the community organized a group, the Coalition Against CO₂ Dumping, to protest the project. The group's concerns went well beyond the ocean environment and included sentiments ranging from "Not-In-My-Backyard" to native Hawaiian sovereignty and opposition to fossil fuels. Three major battles played out involving multiple agencies on the state and federal level. Each battle is reviewed although taken together the various battles can also be seen as a successful strategy of delay by the opposition. This paper summarizes key events in the project's evolution, discusses the lessons learned from the experience, and provides recommendations for dealing with public and institutional perceptions for future carbon sequestration projects.

INTRODUCTION

The United States Department of Energy (DOE), New Energy and Industrial Technology Development Organization of Japan (NEDO), and Norwegian Research Council (NRC) entered into a *Project Agreement for International Collaboration on CO₂ Ocean Sequestration* in Kyoto on December 4, 1997 [1]. By signing the agreement during the Third Conference of Parties to the United Nations Framework Convention on Climate Change (COP-3), the groups demonstrated their commitment to mitigating climate change, but also opened themselves to international scrutiny. DOE, NEDO and NRC agreed to an initial field experiment on ocean carbon sequestration via direct injection. These original "sponsors" were later joined by the Commonwealth Scientific and Industrial Research Organization (CSIRO) of Australia, Natural Resources Canada (NRCan) and the Swiss/Swedish firm Asea Brown Boveri (ABB). The sponsors created a Steering Committee (SC) to manage the direction of the project. In addition, a Technical Committee (TC) consisting of the participating research institutions was formed to guide scientific aspects. The purpose of the initial experiment was to secure reliable field data that could be applied to understand how the chemical environment of the deep ocean is

perturbed by direct injection. The data would be used to develop models to accurately predict chemical changes for a range of injection scenarios. This would be the first critical step in understanding the environmental impacts of the direct injection of CO₂ into the ocean. If the initial experiment was successful, it was hoped that there would be subsequent field evaluations of increasingly larger scale.

SITE SELECTION

The TC undertook a comprehensive study to determine the site that would best fulfill four experimental goals: (1) investigate carbon dioxide droplet plume dynamics through qualitative and quantitative methods; (2) clarify the effects of hydrates on the dissolution of carbon dioxide droplets through qualitative and quantitative methods; (3) trace the evolution of the carbon dioxide-enriched seawater by performing three-dimensional mapping of velocity and acidity; and (4) assess the biological effect, with special emphasis on bacterial biomass, production, and growth efficiency due to changes in seawater acidity [2]. Based on these goals, the TC sought a deep water location sufficiently close to shore in order to minimize transportation costs (for an on-shore CO₂ delivery system), temperature and density gradients representative of a future sequestration site, sufficient infrastructure to house and support the project, and a straightforward process for obtaining any required permits. The TC found that not only did Hawaii meet these criteria, but that it had other advantages. The project's general contractor, the Pacific International Center for High Technology Research (PICHTR) was able to facilitate extramurally funded research projects such as this internationally-funded field experiment. The Natural Energy Laboratory of Hawaii Authority (NELHA), where the project was to be housed, operated a designated "ocean research corridor" at Keahole Point in Kona, Hawaii. The location offered calm seas, practically all the time, but more importantly it was impressed on the TC that the designated corridor would offer an easier permitting process than other experimental locations. For example, a compliance certification permit from the United States Army Corps of Engineers was obtained in a matter of weeks. There were disadvantages of NELHA, the most important being a history of disputes with its neighbors, however the TC decided to move forward with the site [3][4].

CREATION OF A PUBLIC OUTREACH STRATEGY

With the help of a marine policy expert, the SC began to develop a public outreach strategy for the project. The goal was to create a gradual outreach program that would build a constituency and enable local citizens to participate in the design and progress of the project. Scientists would work with environmental groups and local stakeholders to build understanding and incorporate concerns into the experimental protocols. Although a draft public outreach proposal was developed in early 1998, it did not receive funding until nearly a year later. There was no provision in the initial project agreement for funding public outreach, therefore, an amended budget had to be agreed upon by all the sponsors. This funding bureaucracy moved slowly.

PROJECT GOES PUBLIC

On March 18, 1999, the first article about the experiment—a short, relatively balanced piece—was published in the local newspaper, *West Hawaii Today*, entitled, "Feds to Test Impact of Dumping CO₂ into Kona Waters"[5]. The project's public outreach program had not yet received funding by the time the article was published, and the project team had to face numerous inquiries from the public and press without adequate resources. With the help of a former representative to the Hawaii State Legislature, the project team analyzed the aftermath of the article. They found that the public felt left out of the discussion and would become increasingly skeptical unless actively engaged. The project team responded by accelerating the funding proposals for outreach, creating a new outreach plan, and establishing a website where the public could learn more about the proposed experiment.

THE BATTLES

Three “battles” pitted members of the project team against local activists. The project team consisted of the project’s sponsors, as well as scientists based in the sponsor countries. The sponsors had varying motivations for pursuing the project, ranging from developing novel approaches for addressing the climate change problem to pursuing some of the technical challenges arising from the fluid dynamics issues. The scientists saw the experiment as a scientific project to produce outputs for a scientific audience. The project opposition was led by a couple of local individuals and organized itself into the “Coalition Against CO₂ Dumping.” The opposition fell into three categories: (1) those opposed to the experiment itself; (2) those opposed to ocean carbon sequestration; and (3) those opposed to any form of carbon sequestration on principle. Those specifically opposed to the experiment consisted of native Hawaiians and members of the fishing community. Many were motivated by “NIMBY” (Not-In-My-Backyard) concerns, as well as a distrust of scientists due to past experiments in the area. The fishing community feared public perception problems. There were also some elements of xenophobia exhibited against the foreign members of the project team, especially the Japanese [6][7]. Those opposed to ocean sequestration felt that although geologic and terrestrial sequestration were acceptable, ocean sequestration was too much of a risk to marine fauna. Those opposed to sequestration in general felt that sequestration diverted attention and resources away from energy efficiency and renewable energy options.

Battle 1: NELHA

The project team chose to use NELHA’s ocean research corridor for the experiment, partly because of the impression, gleaned from discussions with NELHA, that obtaining permits would be quicker than if the project was located at an alternate site. In order to locate the experiment at NELHA’s facility, the project needed to submit a formal proposal to NELHA’s Board of Directors. After the project agreement was signed in Kyoto, the project team did not approach NELHA with great urgency to have the experiment approved. The project team’s main concern was to ensure the technical validity of the experiment. After the technical and public outreach details were finalized by the TC and SC, the project team planned to submit a proposal to NELHA for review.

After the project became public, the dynamics changed. Project management was now under a greater deal of public scrutiny, and there was pressure to gain NELHA approval. NELHA’s involvement was intended to be a symbol to the public that Hawaiian organizations were involved with and supported the experiment. On October 19, 1999, NELHA’s board approved the project.

The project team also wanted to respond to the public’s concerns about the experiment. A suggestion from businesses located in an adjacent research park managed by NELHA was for the experiment to take place further away from shore because of the perception that the experiment may harm historic and cultural preservation areas. The TC had already been discussing the option of an offshore CO₂ delivery system; a recent Norway deep spill experiment demonstrated that such a system was not only achievable, but also cost-effective. The TC changed the experimental protocol to a vessel-based system. As the project team moved further into the experiment, it came to see that NELHA’s ocean research corridor did not confer any permitting advantages. The experiment would still need to obtain federal, state and local permits; although NELHA offered to serve as a “go between” for obtaining permits, permits would still need to be obtained.

Throughout 2000, NELHA was coming under increasing pressure from the opposition to rescind its approval. The project team did not view this as a critical battle because the advantages of staying at NELHA were dwindling. Responding to the growing pressure from the opposition, NELHA’s board voted to rescind its approval on February 20, 2001. While some opposition groups spun the decision as NELHA’s disappointment with the technical merits of the experiment, the project team was able to put NELHA on public record that the withdrawal was not due to technical reasons, but rather contractual reasons—the decision to move from a shore-based CO₂ delivery system to a ship-based system constituted a major change in the project contract. Although

the project opposition fought hard to have NELHA rescind its approval, the project team did not put up much resistance. Thus it was a largely uncontested victory for the opposition.

Battle 2: Hawaii State Legislature

Riding on its NELHA “victory”, the opposition went to the Hawaii State Legislature to obtain a ban on the project. Four resolutions were introduced in the legislature in March 2001, three of which were killed in committee before discussions even took place. The resolution that was discussed at an Energy and Environmental Protection Committee hearing on March 22, 2001 “opposed any resumption of the proposal to conduct carbon dioxide experiments off the Kona coast”[8]. Proponents of the resolution (those against the experiment) offered testimony in oral and written forms. Among the reasons cited were NELHA’s denial of a permit to the project, the potential for “significant” damage to biological life, the cultural and religious sanctity of the ocean, economic liability due to decreased tourism, and the international nature of project funding. Unlike the NELHA battle, the legislative battle was one that the project team intended to fight and win. Testimony was gathered from twenty-four scientists throughout the world opposing the resolution, as well as the Executive Director of NELHA and the Chair of NELHA’s Research Advisory Board. The scientists testified on the importance of climate change research and the fact that there would be zero significant impact on the environment by the experiment.

After the committee hearing, it was clear that the legislature would not oppose the experiment. Proponents redrafted the resolution to make it more amenable to passage by the legislature. The new resolution called for the United States Congress to enact stronger energy efficiency and renewable policies, and for the experiment to comply with applicable regulations (which the project team was doing anyway). The revised resolution passed the committee unanimously and was adopted by the full legislature as HCR64 HD1 SD1 on April 25, 2001.

The project team felt that the initial resolution draft mischaracterized the events that transpired and did not address the purpose of the experiment accurately. Given the NELHA developments, the opposition sought to press harder to have the project driven out of Hawaii completely. In addition, a legislative success could lend the Coalition more legitimacy. The revised resolution was essentially neutral toward the experiment. The project team won this battle; it was able to get the first resolution draft that called for a ban of the experiment thrown out, and replaced by a resolution neutral to the experiment.

Battle 3: Permitting

The United States National Environmental Policy Act (NEPA) requires that federal agencies consider the environmental impacts of proposed actions through the preparation of an environmental assessment (EA) or environmental impact statement (EIS). If no significant impact is found during the NEPA process, the agency must prepare a Finding of No Significant Impact (FONSI); the FONSI presents reasons why an action will not have a significant effect on the human environment. Agencies may not be subject to an EA or EIS if they can obtain a categorical exclusion.

In January 1999, the project team was advised by DOE’s NEPA office that the project would not qualify for a categorical exclusion, and would therefore need to prepare an EA. The categorical exclusion was not obtained for two major reasons: (1) any experiment dealing with the ocean would raise eyebrows, and especially since the experiment was to take place near a marine sanctuary; and (2) DOE wanted to allay the fears of concerned citizens. The project team had anticipated that the categorical exclusion would be approved, and thus a one-year delay would be required to prepare the necessary permit documents. As part of the EA process, a public meeting was held in October 1999 that included representatives of the TC, DOE and PICHTR who made presentations to an audience of about thirty people. On August 8, 2000, a draft EA was released for public review and comment. The document outlined potential environmental consequences of the experiment at various locations, and tentatively did not see the ocean environment being significantly impacted by the experiment. The opposition had hoped that a significant impact would be found. Approximately two hundred

comments, both for and against the experiment, were received. DOE issued a final EA eight months later in April 2001, followed by a FONSI in May 2001. The FONSI was contingent on several mitigation measures and recommendations intended to further reduce perceived uncertainties and public concerns about the field experiment.

The result of the permitting battle was a draw. The project team lost its battle for a categorical exclusion, while the opposition lost its battle to deny a finding of no significant impact. Still, this and every other battle led to significant delays, which were important steps to victory by the opposition in the larger “war”.

LESSONS LEARNED

The Project Was a Lightning Rod

Even when some of the opposition leaders were asked about the project, they admitted that the field experiment would be environmentally benign. Why then did the discourse become so heated? A major reason was the experiment had several elements that stirred up strong emotions. The experimental site was not just any lab—it was the ocean. In Hawaii, the ocean attracts animated discourse because of the large fishing and tourism industries, as well as for indigenous religious reasons. In addition, carbon sequestration is viewed by some environmentalists as a way of perpetuating fossil fuels rather than introducing renewables or other forms of energy perceived as more benign. The project also showed concerns by some residents of Hawaii that foreigners may come into their communities to destroy their oceans.

Pay Attention to Local Benefits

With all the emotionally charged issues surrounding the experiment, Hawaii was clearly not the best place to serve as host. The combination of environmental and native Hawaiian groups and wealthy retirees means that people can mobilize around an issue very quickly. In addition, local residents perceived no benefits from the project, but saw many potential risks. One might have thought that problems associated with climate change (such as sea level rise or coral reef bleaching) would have been particularly salient for residents of Hawaii, but this was not so. They did, however, perceive a myriad of problems, such as harm to marine life and potential economic disruptions. This is representative of the climate change problem in general. The costs are concentrated, but the benefits are diffuse—and given the long-term nature of the problem, it is hard to stimulate action. Members of the project team have suggested that the project might have been better served at a location where there might be more tangible benefits deriving from the project, e.g., where permanent sequestration might take place or an area more receptive to carbon sequestration as a pathway to a climate change solution.

If You Want to Make a Splash, You Better Have Enough Resources

From the very beginning of the project, the sponsors intended to give the experiment high visibility. They signed the project agreement during COP-3 in Kyoto, the most visible place one could sign a cooperative research agreement. Unfortunately, the project team was not given enough resources to deal with the public. It was forced to pick and choose its battles; investing resources in public relations and outreach would be at the expense of science [9]. The battles that the project team chose to fight, it won. The project team was not able to fight every battle, and as a result it lost the war. One can debate the merits of going public versus not going public, however if a project decides to go public, it must be willing to put resources behind its decision.

The Public Can Become Fearful when a New Technology Is Not Explained and Skeptical when It Appears that the Public Has Been Excluded from the Decision-Making Process

While going public can open a project up to criticism from the public, problems can also result from staying silent. By the time the project team had its first public meeting, the local community had already been

“educated” about carbon sequestration by the opposition. A first encounter with a technology can often shape the perception of that technology. Many residents of Hawaii did not understand the nature of the carbon cycle—that much of the carbon dioxide currently being emitted worldwide will enter the ocean. In fact, some residents drove around with “Stop CO₂ Dumping” bumper stickers, with the bumper sticker placed squarely above the vehicle’s tailpipe [10]. Some members of the public thought that the entire Keahole ecosystem would be destroyed by the experiment, when in fact even Coalition leaders admitted that no catastrophe could possibly have happened. Residents also voiced the opinion that if the experiment was not dangerous, then the scientists would have told the public earlier. They thought that the project team must have been hiding something. If one intends to go public, then the outreach program should occur at the beginning of the process. If the opposition is able to reach the public first, it will be able to shape the debate on its own terms.

EPILOGUE

After the FONSI, DOE took steps to find an alternate site in Hawaii. It settled on a United States Environmental Protection Agency (EPA)-designated ocean dredged material disposal site in Nawiliwili, Kauai. The project team submitted an application for an EPA permit. However, it quickly became apparent that the time required to secure a permit “was becoming excessive”, and the project team decided to withdraw its permit application [11]. The team is implementing a contingency plan to hold the experiment in Norway in the summer of 2002.

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