

United States Environmental Protection Agency

Office of the Chief Financial Officer

Center for Environmental Finance

Meeting Summary

Environmental Financial Advisory Board (EFAB)

August 10 - 11, 2009

Omni San Francisco Hotel

San Francisco, CA

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August 10-11, 2009

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Environmental Financial Advisory Board (EFAB)

Meeting Summary

August 10-11-2009

Monday, August 10, 2009

EFAB Board Meeting (1:30 p.m.)

Opening Remarks and Meeting Overview

Stan Meiburg, EFAB Designated Federal Official (DFO) welcomed members and guests to the Environmental Financial Advisory Board (EFAB or the Board) semi-annual meeting in San Francisco. *DFO Meiburg* commented that four members were not able to be present: Chiara Trabucchi, Don Correll, Justin Wilson, and George Butcher. The Board has approved the report on the Voluntary Environmental Improvement Bonds and the report is now under review by the Environmental Protection Agency (EPA or the Agency).

James Barnes, Chair of EFAB, and Professor of Public and Environmental Affairs, Indiana University, welcomed Board members, Environmental Finance Center Network (EFCN) Directors, and guests and said that he was impressed with the workgroup efforts since the last session and the well-informed discussion in the workgroup meetings this morning.

DFO Meiburg noted the meeting was open to the public and public comment can be given at the end of the second day. The agenda for the first day will include a welcome by *Jane Diamond, Acting Deputy Regional Administrator for Region 9*, who serves as the Chief Operating Officer overseeing a workforce of 900 people, a regional budget of \$870 million and a \$2.3 billion grants program. Ms. Diamond has worked in the Hazardous Waste Program and the Border Wastewater Infrastructure Program.

Welcome to San Francisco

Jane Diamond, Acting Deputy Regional Administrator, Region 9

Ms. Diamond welcomed the EFAB Board to San Francisco. She noted that this has been a busy year for EPA across the country with the new administration and other changes, including the American Recovery and Reinvestment Act (ARRA). The Region's ARRA program has provided 85 percent of the money to state, tribal and local recipients and to a Superfund program to help to make improvements in the environment and revitalizing the economy. With the proposed 2010 President's Budget, Region 9 would receive \$10 billion more in infrastructure funding than in previous years. In Region 9, all states have staff on furlough and many programs are fee-based. The fees have diminished with the economic downturn.

The main concern is about operation and maintenance of facilities for small communities, particularly the 147 Indian tribe communities. Another concern is improving private and public partnerships at the Federal level. EPA is working with other federal agencies and will cooperate with them on environmental programs. The climate change bill under discussion and carbon capture and sequestration bill also have financial issues.

In Region 9, there are water infrastructure needs in the Pacific Territories, such as Guam and American Samoa, and creative financial programs, (e.g., bond bank), are being discussed. An Interagency Taskforce is working on meeting the water and wastewater infrastructure needs due to the military moving troops from the Philippines to Guam. Over a five to seven-year period, there will be a population increase of 45,000 people or 25 percent over the present population. Ideas from EFAB on how to finance the needed infrastructure would be welcome. Also, there will be an increase in the energy demands and Guam would like to focus on building energy efficient projects. The Department of Energy has \$30 million dollars for these programs.

In the Southwest, there are opportunities in developing energy programs on Indian lands. In San Francisco, the delta ecosystem that provides water to 2/3 of California is in danger of collapse, so the estuary needs to be improved. The fisheries industry, agriculture, and urban communities' needs cannot always be met. She congratulated EFAB and their work on climate change, green energy, renewables, and providing jobs for the green economy.

Questions:

Michael Curley asked about water desalinization and solar energy. *Ms. Diamond* said that some communities were working on desalinization, but that it is very expensive to get drinkable water from salt water. *Mr. Curley* added that many areas are using the ARRA funds to build solar energy programs. *DFO Meiburg* discussed the need for looking at the problem of leaking pipes where water loss is significant. *Jennifer Hernandez* asked about carbon sequestration program in Region 9.

DFO Meiburg next reviewed the meeting agenda which would include report outs of projects that are underway, plus some potential new projects. In the transition phase of the new Administration, more projects will probably be proposed, but for now EPA is getting new appointees for various programs, such as air, water, pesticides and toxic substances, and enforcement. There is no confirmed Deputy Administrator at EPA yet. The first report out is on Carbon Capture and Sequestration and the next is on Financial Assurance. Tomorrow the agenda will include an update on the EFCN, Financial Incentives for Environmental Technology, project report outs on Water Loss Reduction, SRF Investment Options, and the proposed new projects under the Strategic Action Agenda.

Report Out on Carbon Capture and Sequestration

Jim Tozzi, Workgroup Chair, said that Carbon Capture and Sequestration (CCS) is symbolic of a lot of what EPA and EFAB have been involved in. Consensus may be difficult, because viewpoints will differ, so minority viewpoints may be needed for the report. The Workgroup was started in December 2008 and the endpoint is not yet established. New regulations are being drafted on Title VI wells, which the workgroup has reviewed. The workgroup has held several meetings and many phone conferences and all committee members have been involved.

Under the first authority, EPA wants to amend their Title VI regulations and has asked EFAB how to strengthen these regulations regarding financial assurance; however, the regulations are limited to the statutory authority of EPA. The workgroup felt that this constraint was too restrictive, because the nature of CCS was broader; yet, the Workgroup is trying to bring recommendations to the Board in December. The second authority has no time frame. The third

authority is on the financial assurance mechanisms, which are vital to EFAB, and need to be looked at from a broader point of view.

Jim Tozzi reviewed the handout, Table 1. *Matrix of Financial Instruments and Potential Carbon Capture and Sequestration Risks*, dated July 25, 2009. Table 1 includes potential impacts of CCS on Human Health and Welfare, Ecology, Damages to Property, Atmospheric Releases, and on Water Resources. The columns include the financial instruments that could be considered including Private Sector Trust Funds, Public Sector Trust Funds, Letters of Credit, Escrow Accounts, Certificates of Deposit, Surety Bonds, Insurance, Lines of Credit, Financial Tests, and Corporate Guarantees.

The workgroup is asking EFAB to discuss whether the categories in the rows are accurate and if the items in the columns representative of the totality of financial instruments for CCS. Table 2 explains the potential impacts of the categories in Table 1. The explanations are very tentative and can be re-defined after discussion. The Safe Drinking Water Act (SDWA) authorities do not cover some of the column titles, such as human health and welfare, ecological impacts, and are very limited on atmospheric releases. Board recommendations are needed to determine which of these column entries are SDWA-specific. Once this is determined, the workgroup will concentrate on those topics, initially. Recommendations will be made on what goes into each cell.

Rachael Deming commented that the financial instruments were broadened beyond the RCRA purview. The financial instruments indicate where a third party can trigger the financial mechanism to where the responsible party is in control of providing the financial instrument. On property damages, there is a distinction between damages in a third party liability to individuals vs. remediation in the longer term. Regulations need to be made for third party liabilities separate from remediation. EFAB needs to give the Agency the rationale for the categories.

DFO Meiburg asked if the table is trying to show the types of risks against the types of financial instruments and whether the instruments are appropriate in terms of risk. *Mr. Tozzi* added that some instruments are aimed at Carbon Capture only. *DFO Meiburg* thought the table implied that different types of financial instruments may be appropriate for different phases of CCS. *Mr. Tozzi* agreed and added that the legislative bills under consideration should include financial assurance, but that the legislative drafts may not use financial assurance terminology. EFAB can alert EPA to the regulatory regime that will have to be put in if the legislation passes. The bills may not give the authority to EPA, so EPA needs to use the recommendations of EFAB to ensure they have the authority to implement the legislation. *DFO Meiburg* added that financial assurance involves many different types of activities with different risks and time horizons and the instruments may differ.

Jim Tozzi stated that the time table for the Board's ideas on strengthening the regulations is slated for completion in December 2009. The second task is developing a matrix of potential CC&S risks and financial assurance considerations. The third task includes broad considerations of basic policy issues, which are included in the draft paper: *Establishing a Liability Regime for Carbon Capture & Sequestration: Elements of a Long-Term Stewardship Program*. The paper was developed at a 2009 June meeting in Washington, DC. The Agency asked the workgroup to look at short-term impacts of SDWA fixes. The main issue is the role of EFAB in making recommendations on the more global liability issues of CCS. If the workgroup only works on Agency-specific issues, some of the expertise of the Board would not be used.

The main issue is that a sound regulatory regime needs to be in place before regulations are put in place. The first element is to comply with permits and the second one is financial assurance conditions. If liability protection is provided, then compliance is an issue. The main liability scheme for CCS is in the Price-Anderson Act, which included three categories for liability: individual site or operator, collective site or operator, and governmental.

The first liability relates to the role and responsibility of an individual operator. If they are in a pooled resource later in the game, they would not have to pay for it. The line needs to be drawn for the individual operator. The workgroup will make recommendations to address this. The other item is when the individual operator liability ends and collective or federal action begins. Some members think that the individual should be responsible as long as possible.

Another issue is Trust Fund management. Legislative bills differ on which governmental agency should ask for closure. If liabilities are set by the Agency, this would be a huge job for EPA and EFAB. Whether EPA or the Department of Energy (DOE) is in charge needs to be determined. DOE should probably not be in charge of environmental concerns. Senate Bill No. 1013 is a demonstration project on liability. The Price Anderson Act was set up 50 years ago as a demonstration program and it still remains in place.

Another issue is the preemption of state laws. One view is that common tort laws should be preempted. EFAB should deliberate on the extent common law should be preempted. Pooled funds will pay for some damages not covered by common law. The other question is whether a government fund is needed as a bail-out program. No time-line has been set for the liability issues.

Questions

Does the demonstration project get different definitions? *Jim Tozzi* responded that proponents say that there are a lot of risks and people need to get a break because of the uncertainties. The other argument is to put a resource system in place, so that the first four or five projects could have larger government back-ups. *Jim Tozzi* was concerned that a program put in place would never be changed.

What is a trust fund in the public and private sector? *Jim Tozzi* responded that the chart shows the difference is the money source. A private trust fund is all private and not managed by the federal government. If the government has a trust fund, who would manage it and what findings would get the funds released? For the most part, the federal level would collect fees and manage the trust fund.

Is there any discussion about the appropriate investment given the long-term risk? *Jim Tozzi* did not have an answer for this question, as the workgroup had not focused on this issue. One idea is a continuously accruing fund over time. *Jim Tozzi* said the Agency makes the determination of how the funds are obligated, but this may not be within EPA's purview.

Comments

If the longer look is delayed and the focus is on safe drinking water, it would seem that those ideas need to proceed simultaneously, because the recommendations on the SDWA and financial

assurance would help to inform the longer range impacts. If you conclude there are only a limited number of risks under financial assurance, then the other risks need to be dealt with in the larger scheme and a decision made on who should pay for them. *Jim Tozzi* said that the longer term look is needed, but the push is for the short-term aspects. The chart will reveal the limitations of the term “financial assurance.” EPA needs the authority to take actions on the short and long terms.

How far the liability should go needs to be discussed. If we design a liability system and a financial system that matches, this is different than a remedy-based system. The table shows a lot of this and there are tools that can be used, but EFAB or EPA needs to determine the breadth of the workgroup’s task.

Ms. Deming said the workgroup could take the draft of the long-term liability paper and add sections that would allow dual use for identifying options for financial assurance and options for long-term issues. EFAB needs to inform EPA that other options are needed for financing risks. *Jim Tozzi* added that if we say that financial assurance is the only option, it could be interpreted as “that is all that is necessary.” All of the issues should be indicated, but EFAB could indicate the key provisions and make statements on this.

DFO Meiburg said that EFAB should parse out the various elements of financial assurance needed in the CCS process within the constraints of SDWA, and added that SDWA is not sufficient to address all of the issues in the long-term risk. It is unusual for the Board to make recommendations on financial assurance when the liability scheme is uncertain. A liability has to be assumed to recommend financial assurance. *Jim Tozzi* thought EFAB should be more pro-active in terms of prevention.

Ms. Hernandez agreed that by commenting on the long-term financial assurance question before the range of the liability scheme is known; it would make it difficult to determine the appropriate financial assurance mechanisms. Does it make any sense to have a Board discussion of the liability range or should the broadest liability be assumed and then recommend the appropriate financial assurance to cover that liability?

In response to a question about the state of the discussion in Congress on this issue, *Jim Tozzi* said the most recent Senate Bill by Senators Casey and Enzi gives DOE the authority to set up a fund and set the limits for funding and enforcement. A House bill by Congressman Bingham is a demonstration program.

Ms. Patton added that the Casey Bill does not ask for consultation with EPA, but the agencies cannot operate in isolation. Another complexity is the highly-regulated, power industry and financial assurance structures cannot be developed in absence of the restrictions that the entities or communities are going to face for pass-through costs. Another concern is whether there is a way to transition into a commercial mechanism.

Other issues and concerns stated by Board members include the following:

- Several members thought that EFAB should be pro-active.
- Proscribing financial assurance mechanisms without understanding the risks would be difficult. The Workgroup’s matrix did not have a concept of the risks.
- Remediation, operational, and third-party risks are different.

- Instead of worrying about the extent of the risk, just because liability has not been defined, the matrix could be used to relate financial assurance mechanisms to the risks that can be covered to ascertain how much liability protection is needed.
- The workgroup intended the matrix to present opportunity to create mechanisms related to the liabilities. For example, the liability for CO₂ injections is different than liability for pipeline breakage. Only a few of the financial instruments apply to pipe-line fractures, such as trust funds and letters of credit.
- The matrix basically shows different types of risks and the different financial tools for each type of risk.
- The matrix shows a base liability scheme based on existing legal and common law structure, but this could be made more apparent.
- Every industry activity does not need financial assurance. For example, businesses that pollute continue to operate without any kind of pollution insurance or financial assurance.
- The liability for carbon sequestration would depend on who owns the pipes. The financial mechanisms would differ whether it was a private or public entity. Some type of pooled liability is needed.

Jim Tozzi said the Agency in charge makes the final decision, but this should be done in consultation with EPA. There is a role for EPA, because of their background on these sites. At present there is no established business model, but one will emerge from the dialogue about liability related to who gets the credit, and who is liable, etc. The requirements for financial assurance might determine who will be involved. The models might include a single utility provider who is liable or there may be many entities and a common management system, common carrier, and common injection manager.

In regards to DOE, the workgroup had not talked to them yet, but EPA has had discussions with DOE, and the group had discussions with EPA. *Jim Tozzi* wondered to what extent EPA is going to spend a lot of time on this effort. DOE will play some role, but some other agency should make the decision on certification for closure and post-closure and financial assurance.

DFO Meiburg asked if it would be valuable for the Board to articulate what the EPA should consider on the longer-term financial responsibilities. The paper is descriptive on a liability scheme, not a prescriptive one, and there is no charge from the Agency on a prescriptive set of principles. *Dr. Tozzi* said the initial charge was to look at SDWA and then to come up with long-term views.

Dr. Tozzi said the deadline for the guidelines on how to fix an Underground Injection Control (UIC) regulation is December 31, 2009. Principles for what would govern the program and the beginning of actions beyond SDWA would be available at the Spring meeting. In relation to the risks and impacts on business models and financial assurance, the matrix could be expanded. The initial focus is on SDWA-related financial assurance, but this is sub-set of broader issues. EFAB needs to review and discuss the analysis of the principles on preemption and common law torts as presented by the workgroup. Different viewpoints will need to be expressed or reconciled in the final report.

Report Out on Financial Assurance

Mary Francoeur, Workgroup Chair, said that the two sub-groups of Cost Estimation and Commercial Insurance have been productive. *Kelly Downard* will discuss Cost Estimation and

then *Lindene Patton* will discuss Commercial Insurance in place of *Justin Wilson*, the Co-Chair, who was unable to present.

Financial Assurance: Cost Estimation

Kelly Downard, Co-Chair, presented an overview of the Cost Estimation Project which resulted from the Agency's discomfort with the reliance on cost estimates, because if the cost estimate is wrong, the financial assurance is faulty. One of the major concepts was the development of a Cost Estimation Consultative Group of 8-10 cost estimators with representation from the Agency, states, and industry. Experts exist, but they do not always communicate with each other. The Consultative Group would have a formal status and they would review instances of past experiences when cost estimates did and did not work and then draw up a body of practice. The review process would include products, such as Cost Pro software and other processes that can be utilized by the cost-estimators. Expanded training is critical for continuation and to pick up new knowledge from others. Training workshops in every state would result in consistent, contemporary communication about what happens throughout the country. Workshops could provide advice about good practices and improve the reliability of the cost estimation process.

The next steps include developing and preparing the next draft of the Cost-Estimation Consultative Group Skeleton Concept paper, preparing and holding a cost-estimation teleconference with a diversified range of private sector representatives; and beginning to work on holding a Cost-Estimation Workshop. (See handout.) One more consultation with state representatives is needed after they share Workgroup information. Industry representatives may be able to contribute other ideas about the Concept paper. The Workshop with representatives from the Agency, industry, academia, and the states, will be held in conjunction with the EFAB 2010 Spring meeting, if possible. The National Remedy Review Board under the Superfund had a similar beginning and a workshop, so the workgroup will consult with them on the process.

The Workgroup topics are factors that affect cost estimates, such as technology or economic changes. A periodic review of estimates was discussed with the states, but the time frame needs to be determined. The methodology for performing cost estimates, product updates, and training are other factors. The Consultative Group process needs to be defined. A clearinghouse and a website could be used to share ideas.

DFO Meiburg added that the recognition of three separate areas under cost estimation were discussed in the workgroup and the workshop would be used to clarify these areas. Cost estimation remains a critical issue in corrective action. First, the factors that affect cost estimates include: 1) errors and omissions; 2) changes in science; 3) political changes and policy framework; 4) changes in technology; and 5) changes in commodity costs. All of these are more important to corrective action than to closure and post-closure.

Secondly, what are methods and tools that people use for doing cost-estimates? Models are used and some are good and others are wrong. After-the-fact studies can be used to see what changes affected the cost estimate. The third area was the possibility of process improvement for cost estimation to make it more effective, relying on the model used by the National Remedy Review Board in the Superfund program. This was done to conserve expenditure of funds by the U.S. government. This would be a process to provide updates to the practice community.

Ms. Deming brought up the issue of how the cost estimation process is used for innovative technology and whether it could discourage innovative technology. An example was a technology called Low-Temperature Thermal Desorption that was done by Ciba Specialty Chemicals at a DDT manufacturing site. The technology included a low-temperature incinerator that processes the soil, heats it enough to destroy the chemical, and then puts the dirt back in the ground. Ciba signed a consent decree for financial assurance of \$210 million dollars for implementing the technology. The implementation cost \$50 million, but the technology had huge benefits. *Ms. Deming* asked: If you are doing cost estimates for the innovative technologies, how do you price them for financial assurance purposes without being a disincentive?

Ms. Patton added that we were trying to find a way to assure that recommendations could incentivize new technologies that were valuable, but not put huge risks into the portfolio of EPA's exposure. Some proven technology would have to back up the new technology and be included in the cost estimation. *Mr. Kelly* said that as new ideas are proposed, people from industry could look at different ways to do things.

Mr. Kelly recapped the next steps: One more phone conference with state representatives; a discussion with industry representatives; plan and execute the workshop after discussion with the National Remedy Review Board. Ideas from EFAB members would be helpful. *Mr. Kelly* with the assistance of EFAB staff will write a draft paper to be reviewed by the workgroup, and then get feedback from EFAB.

Financial Assurance: Commercial Insurance

Lindene Patton reported that the workgroup reviewed the previous work by *Justin Wilson, Co-Chair*, and attempted to resolve difference of opinions over the last draft. The results were as follows:

- The differences between insurers, regulators, and the regulated community were clarified related to the function and form of commercial insurance in the context of financial assurance. Agreement was reached that confirming and making transparent those differences is a value the Board can provide to the Agency; however, EFAB cannot resolve the differences in all cases.
- More work needs to be done on the impacts of increased regulation on the availability of certain types of financial assurance, but there was no agreement on how that would move forward.
- The workgroup recognized that a core request from EPA was for the Board to provide an opinion on minimum financial strength ratings; so the current language will be reviewed again to ensure agreement. Some testifier comments at the last Workshop would be reviewed for the factual background, if possible.

All the comments on the paper would be provided by September 1, 2009, with the goal of revising the report and have a workgroup report out by the end of September 2009. *DFO Meiburg* said the full Board has not seen draft No. 8, but the comments today indicate that this draft has made a lot of progress. *Ms. Patton* agreed that the last few reports have clarified the concepts and recommendations from the Board. *DFO Meiburg* added that the most controversial issues could be discussed further by the Board. The goal would be to complete the report by the 2010 Spring meeting. He then asked for highlights about some of the difficult issues.

Ms. Patton responded that there was a divergence of opinion about legal conflicts when applying financial assurance. Insurance is highly regulated in most states and environmental activities are also highly regulated by the federal and state governments. Financial regulators in the form of insurance regulators do not necessarily work together with the environmental regulators; therefore, some differences were evident. The litigation history indicates that there is a controversy between these regulators as related to commercial insurance. The most controversial issue in the report states that the insured and the insurers should not enter into a contract when each party has fundamentally different expectations. It is important to resolve those issues before entering into a contract. This might require revising procedures on the part of the regulators and the regulated communities. A great deal of discussion related to defining the differences; and they decided not to resolve the differences for the Board.

Another controversial issue has to do with financial ratings for insurance providers. Several documents need to be reviewed regarding the ratings and the Board will need to determine what the best minimum rating recommendations are in light of the changing economic conditions. The Board has made recommendations on captive insurance, but the economy has changed since then. The workgroup has to recognize economic cycles, so the recommendation has to be able to incorporate those conditions.

DFO Meiburg saw a common thread among all of the workshop reports in that the Board needs to apply its analytical ability to the complexities of these reports. He reviewed some of the complexities in each workshop report. Recommendations to the Agency need to clarify the conflicts and differences.

Adjournment: The meeting was adjourned at 5:05 p.m.

Tuesday August 11, 2009 (8:30 a.m.)**Opening Remarks**

DFO Meiburg welcomed everyone to the full day session of the EFAB, which would consist of two presentations, one from *Joanne Throwe, President, Environmental Finance Center Network*, and the other from *Marcia Mulkey, Acting Deputy Associate Administrator, EPA's Office of Policy, Economics, and Innovation (OPEI)*. Next, EFAB workgroups would report on Water Loss Reduction and SRF Investment Options. Development of the Strategic Action Agenda would include Proposed New Projects. A period of Public Comment would follow the presentations and Board discussion.

Environmental Finance Center Network Update (EFCN)

Joanne Throwe, President, EFCN, said the year has been different because of the EPA competition, but this forced the EFCs to plan for the next six years in relation to EPA's goals. EFCs are the connection between the communities and EPA. EFAB's Strategic Action agenda for 2009-2010 was reviewed for the competition, and the EFCs are working on each of these goals. The workload has increased tremendously from community requests for assistance. The focus of today's report will show how the EFCs have met some of these goals and will illuminate the work done in tribal areas.

Heather Himmelberger discussed the EFC in Albuquerque, New Mexico, and the work done with Native American tribes. EPA Goal 2, Clean and Safe Water, includes tribal access to safe drinking water by improving infrastructure to increase the number of homes in tribal areas with access to safe water and basic sanitation. Goal 3, Land Preservation and Restoration, includes working with Native American tribes to ensure that the land is restored properly. Lastly, Goal 5, Healthy Communities and Ecosystems, has an objective to improve human health and environment in Indian Country. Stan Meiburg added that the Administrator of EPA recently affirmed the Nation's tribal policy and the application of government-to-government relationship.

EPA has direct responsibility in terms of safe drinking water for tribes. Tribes can attain the status of a state and can run their own program, but in smaller tribes EPA runs the program. In New Mexico, there are 19 pueblos and 2 Apache tribes; and in Oklahoma there are 5-6 tribes that are regulated by EPA. There are a few in Texas and Louisiana, for a total of 87 water systems in Region 6. The activities include assistance with compliance and monitoring to make sure the samples are taken at the right time. Monitoring reporting violations and health-based violations have been greatly reduced after EFC assistance. The EFC administers the tribal operator's certification program through the application process giving tribal operators certification tests. The EFC pre-dated the national program on operator certification, and EPA used their guidelines with a few changes for the national program.

Under training, they try to fill needs that are not being met, but the goal is for the tribes to do everything for themselves. One example was on how to change the chlorine level to reduce the bacterial count, so the tribes could fix the pumps and set the chlorine levels themselves. The other big area is to explain regulations, such as the new ground water rules, for every single tribe in Region 6 by the end of September 2009.

Sanitary surveys are also provided to EPA, and then EPA indicates the areas that need improvement. An educational component was added to explain the deficiencies and how tribes can change them. Some tribes have done the sanitary surveys themselves. Educational outreach with tribes covers asset management and performance-based training, to move the tribes beyond compliance.

Ms. Throwe said that *Laura Lee Barbaria* would report for *Sarah Diefendorf*, who is visiting with an Indian tribe in La Jolla, California.

Laura Barbaria, of the Green MBA Program at Dominican University of California, discussed what the EFC in San Rafael, California is doing with three tribal projects. One project is with the Taurus Martinez Tribe in Palm Springs on land re-use and clean-up, because their land was a dump area. Although the site was cleaned up, dumping is still happening. The tribe is interested in green technologies and green businesses to generate assets to clean up the land. A report has been completed on the project.

The second project is in Northern Nevada. The population was evaluated by Green MBA students and the findings were that there are 8200 local populations dispersed around the City of Reno and rural areas. The charter was originally for recycling, but this has become less valued because of price changes, so they are looking for other businesses as a cooperative. The first draft of the report has been completed.

The last project is for the La Jolla Tribe near San Diego and they have put together a recycling center. A business plan was lacking, so Region 9 EFC will help them develop a business plan for economic opportunities. *Sarah Diefendorf* is working with them now.

There is good synergy between Region 9 and Dominican MBA students, because courses are hands-on and there only 20 students. The focus is on sustainability. The EFC provided \$25,000 for stipends for students to work on the project.

Mary Tiger, EFC, Project Director, University of North Carolina at Chapel Hill, speaking for *Jeff Hughes, Director*, talked about their EFC projects that related to EPA's goals. Many of the projects interconnect with several goals. One project is working with the School of Government on the collaborative exploration of the legal implications of water partnerships in a specific region. The project uses leveraged funding from the Golden Leaf Foundation. The project helps a community to enter into partnerships and will also provide a road map for other communities on how to develop partnerships.

The state is interested in water partnerships. The project in Surrey County has been used to work with the state on a broader level. In the drought of 2007-08, many communities nearly depleted their water supplies, so this was the motivation for action. North Carolina is interested in getting water systems to partner and connect with each other. The EFC was requested to determine the location and size of existing connections to see where connections did not exist.

The EFC worked with both qualitative and quantitative data to develop an overview of water connection systems, which includes a guide book to help communities develop a water partnership. An interactive map shows the communities that are connected, the characteristics of the connections, such as the capacity, the nature of their use, and the wholesale rates. Data was collected from secondary sources, actual interactive agreements and interviews with local utility

managers. This is a tool that the state can use to develop water resources use planning in the near future.

Another type of connection is between the local government and its citizens. The North Carolina General Assembly has been discussing how to give local governments the authority to finance environmental improvements and collect property taxes to pay for them. These are called Voluntary Environmental Improvement Bonds (VEIBs), but some are called Property-Assessed Clean Energy and other terms. The EFC is working with communities, non-profit organizations; state legislators, and attorneys to understand this financial mechanism. The North Carolina General Assembly has two bills. The first one gives cities and counties the authority to design and use a Revolving Loan Program using federal grants. The second would allow bond financing used in the Berkeley First Model. The power companies are interested, but some resistance has come from local conservatives. However, this type of financing has the power to finance many different types of environmental programs. The EFC is a resource for localities to work through the process.

With the Georgia State Revolving Fund, the EFC has worked through a contract to provide support to the SRF teams to work through Green Project Reserve (GPR) programs and to facilitate the scoring of financing of water and energy efficiency, green infrastructure, and other environmental activities. Some of the projects funded through the GPR program include water meter replacement, stream restoration, permeable parking lots, and water fixture retrofit replacements for localities.

William Jarocki, Director, EFC, Boise State University, Boise, Idaho, introduced *Jo Ella Hoy*, who is the Project Officer for the satellite office in Kansas City. *Mr. Jarocki* discussed the Plan-to-Fund Program, reporting, the financial dashboard, and planning for Region 10's 2010 work plan. The Executive Prioritization Tool developed in 2007 was designed to help watershed groups prioritize all of the things they want to implement in their plans. The tool utilizes a series of decision rules that the groups use to design and score the projects to develop a priority list. This free, web-based tool is used for other kinds of environmental finance.

The Office of Wastewater Management requested the EFC to build a tool which is pre-loaded with the decision-rules that funding agencies could use in funding projects. A second project in Region 3 is a diesel retrofit project, where a modification of the tool will be used to rank the selection of how diesel retrofits is implemented in the Port of Baltimore. The Office of Enforcement and Compliance (OECA) may use this tool to prioritize their caseloads. Within EPA management, they may use this to do their work plans. The most surprising event was the contact from a Canadian consultant who found the presentation on the Web and asked if the tool could be used to help the Jamaican government prioritize their capital budget. The Jamaican government is going to use the tool to prioritize their capital budgeting and maybe looking at previous allocations to revise the priorities.

For reporting, *Mr. Jarocki* suggested going to the publications page of the Boise State EFC Website to see how the dashboard and other tools have been used in every state and region and by every profession and how well it works. After a presentation in June in Syracuse, there was a large increase from June to July in the use of the financial dashboard for drinking water.

The Wastewater Financial Dashboard was released at the end of July, which is in addition to the Drinking Water Financial Dashboard. The tool visualizes the kind of information everyone is

working with including the National Pollutant Discharge Elimination System (NPDES) permits. The tool is changing the way people are using financial information. Every region can use these tools.

In Region 10, the EFC will build a technical financial management dashboard for drinking water programs for each state. Baseline information will be captured on all the water systems in the state that will guide the state drinking water programs and providers. The tool can be used in the future to determine water usage.

Ms. Throwe noted that this was an indication of how the EFCs work as a network through conference calls and meetings.

Dr. Sam Merrill, Director, EFC, University of Southern Maine, Portland, Maine, mentioned two activities, related to EPA goals that help local communities with financial problems. A Brookings Institute Report for the State of Maine of 2006 talked about what Maine needed to do to get out of a financial hole by building on their assets, which are natural resources. The EFC helped to formulate an asset-based, economic development for the State vs. a needs-based economic development. The result was that there was an executive order to develop economic development districts similar to counties. This was called the Quality of Place Framework. Requests from New England governments for the Framework would eventually enable a regional approach.

The EFC had a video on consensus guidelines on how to address Smart Growth challenges to do high-density, affordability, walkable downtown development. A Guide has been developed to accompany the video. Under the EPA goal of Clean Air and Climate Change, the largest focus is another tool, called COAST or Coastal Adaptation to Sea Level Rise Tool, which is a simulation and modeling tool for coastal communities that will have to deal with adaptation costs of sea level rise. A cost-risk profile can be used for the probability of changes in the sea level. The input variables can be modified and the costs estimated for each activity to prevent destruction of property, including hurricane damage.

Kevin O'Brien, Director EFC, College of Urban Affairs, Cleveland State University, Cleveland, Ohio, said that the recession has been important for the EFCs as states and local governments look at how to become more efficient. In Region 5, the EFC is working on three projects:

1. The Northeast Ohio Regional Sewer District has a 2.5 billion dollar CSO (Combined Sewer Overflow) that requires them to implement a water retention system to reduce the number of outflows into Lake Erie. They are reviewing strategies to reduce the potential construction needs to meet the CSO order. One idea was utilizing land in the Greater Cleveland area on 22,000 vacant properties in Cleveland and on the 20,000 empty properties in the greater area to help the regional sewer district by developing leisure space. Properties could be aggregated to create retention ponds, community gardens, small and medium-sized parks, and larger central parks to improve the value of the city so it will not be developable. The parks would absorb water and reduce the flow into the sewer system. Several goals of the EPA, such as clean water, but also land preservation and restoration, clean air and climate change are involved. The goal is to reduce the amount of energy it takes to process water flowing through the storm system.

2. Two projects with Michael Curley include looking at innovative projects financing and SRFs across the country, and a Smart Way Transport Operation to reduce diesel pollution. *Mr. Curley* added that the focus is on over 20,000 loans that have been made in the SRF program where the guarantee authority has only been used once. People can use the guarantee authority to expand their capabilities. The second focus is on the dislocation in the bond market due to the collapse of the financial guarantee insurance industry, except for the Assured Guaranty Corporation represented by *Mary Francoeur*, which has helped a lot of communities to raise money for water and sewer. Recently the Chesapeake Bay, under a Presidential Order, will develop a program under a special section of the Clean Water Act, to do a lot of innovative things to amend that section and test the programs as a demonstration. The Act may be revised when it is renewed under the SRF program.
3. The EFC has been working with wind energy trade projects for Indiana and Ohio to create a schematic for the wind energy supply chain to identify the opportunities for the development of wind energy manufacturing component.

Mary Francoeur, Managing Director, Assured Guaranty Corporation, New York, N.Y., discussed some basic projects. Under the American Recovery and Reinvestment Act (ARRA), there are many projects that were not “shovel ready,” including New York’s Green Innovation Program. Other communities could not take advantage of the 20 percent, green project set-aside. Many communities need information on what green infrastructure means. She has worked with the National League of Cities in preparing one-half day seminars with the Leadership Training Institute focusing on mid-level readiness projects. In the near future, she is planning a basic level seminar on “Sustainability 101, What Every Government Official Should Know,” including what is green infrastructure, such as the use of a rain garden, to help communities take advantage of the ARRA funds.

With funding from USDA World Development, the focus is on Lake Ontario coastal communities on financial planning, water and wastewater system management, and teaching students how to put in rain gardens and bio-swells. In the City of Oswego, a large rain garden and rain barrels are being placed on the city hall property. Local voluntary labor is being used, such as Boy Scouts and garden club members. Community education is being done at the sites to explain green infrastructure.

Lauren Heberle, Director EFC, University of Louisville, reported that one of the core projects has been to produce 24 practice guides for municipalities or others who are interested in EPA goal-oriented projects. The EFC will also take requests for topics for the practice guides. Public symposiums are held related to sustainable cities in Louisville and this will be broadcast in the future. Another project includes EPA goals, 1, 3, and 4, which are very interconnected, to help communities prioritize their goals. One is providing land use and housing quality surveys and inventories to small and medium communities to help them understand land use patterns and how they are related to successful sustainable development plans, respond to climate change initiatives, and develop efficient strategies for public investment. The surveys can be used to prioritize spending on energy efficiency, land conservation, vacant property revitalization and clean-up, the location of green space and urban agriculture, restoration of urban ecosystems, and other greener economic development options. The surveys can also be used to leverage grant money.

The second effort is a community clinic action plan in partnership with the University of Louisville City Solutions Center, the Urban Design Studio, and the National League of Cities Urban Institute, to work with small to medium-sized cities to develop community action plans. These will include action plans, workshops, connections to resources, and understanding the costs and benefits of action plans. The EFC will help them use plans that are relevant to their specific community. The unique economic, social, and environmental context of each community will be the starting point of planning. Open stakeholder processes can help to build a stronger culture of environmental citizenship.

Ms. Throwe said that in the Chesapeake Bay area the U. of Maryland EFC has had one project in each state connected to the Bay. The project for the Port of Baltimore has received \$3.5 million dollars of ARRA funding to retrofit dredge trucks, cargo handling equipment, locomotives, tugs and tows. The work is in conjunction with the Maryland Department of Environmental Services. Food Trader is another program that has 600 members, including restaurants and retailers in Maryland, Delaware, Kentucky, and New York. The EFC also works with watershed organizations using Mr. Jarocki's tool to help some states with proposals under the Trust Fund.

In response to a question about the use of block grant programs to support EFC programs, *DFO Meiburg* said that there have not been block grants but EPA has funded about \$2 million dollars per year to all nine EFCs, which becomes seed money to leverage funding opportunities for other projects. In the 1990s, there were some funds to apply to environmental improvements for each of the 9 EFCs, from the Regional Geographic Initiative, which was very limited. Funding is now focused on specific projects.

Ms. Throwe discussed border funding for BECC and NAD/Bank, which is being reviewed by the GAO office to ascertain its effectiveness. Another related effort was the use of the Environmental Finance Program's Guidebook of Financial Tools at a tribal conference.

DFO Meiburg commented that EFAB is a policy advisory board, but the EFCs bring out the importance of implementation and the delivery of environmental finance to projects that make a difference in people's lives and the environment. The variety of tools that EFCs have used is outstanding. EFAB receives assistance from the EFCs on a wide variety of workgroups to help with policies. There is a great function and value for the Board as a convening space to connect the EFCs with each other. These efforts could be presented to the Environmental Council of States (ECOS) to produce more alliances between states. *Ms. Throwe* said that presentations have been made by EFCs to ECOS in the past and will do so in the future.

DFO Meiburg introduced *Marcia Mulkey, Acting Deputy Associate Administrator of the Office of Policy, Economics, and Innovation (OPEI)*, who has provided leadership and expertise for EPA for over 20 years in the Office of the Administrator, The Office of General Counsel, the Office of Enforcement and Compliance Assurance, the Office of Prevention, Pesticides, and Toxic Substance and Region III's Office of Regional Counsel.

Financial Incentives for Environmental Technology

Marcia Mulkey, Acting Deputy Associate Administrator of the Office of Policy, Economics, and Innovation (OPEI), introduced *Dr. David Widawsky*, an economist in the Innovation Office who has been working on green jobs and new governmental programs. Ms. Mulkey used a PowerPoint presentation called, "*Creative Approaches to Supporting the Development and*

Adoption of Environmental Technology, Including Financial Mechanisms.” The Office of Research and Development (ORD) and many experts in OPEI helped to develop the presentation. *Ms. Mulkey* listed all of the persons in various EPA offices who have helped to develop the ideas in the presentation. The major topics covered included Introduction to Environmental Technology, NACEPT and Environmental Technology, Environmental Technology at EPA, Case Studies of Environmental Technology, and Discussion questions.

Environmental Technology is central to environmental protection. Environmental technologies include those that reduce or prevent pollution, capture and safely sequester pollution, clean up pollution, and measure contaminants/pollutants. Green chemistry is involved in energy efficiency, which is very important, especially on reducing pollution.

Ms. Mulkey said that financial considerations are involved in all of the technologies. Pollution control includes capture and management of pollutants. Clean up of pollution is largely technology, which has used large amounts of money since the Super Fund. Technology that enhances EPA’s ability to monitor pollution is extremely important. Sustainable technologies must be cost effective and not cause unintended consequences.

The next slides showed the trend in CleanTech spending in U.S. Corporate Research and Development (R&D), Worldwide Government R&D, U.S. Venture Capital (VC), and the U.S. Market in the three years before the economic crash. Corporate R&D shows modest growth and heavy spending on energy programs. Worldwide government spending is incremental and a lot is spent on energy. U.S. Venture Capital was spent on energy efficiency, air monitoring, water purification, preventing pollution, and sustainable techniques, but has increased the most on energy in 2006, compared to the previous 10 years. A slide depicting the U.S. Market in the 70s-80s and 80s-90s, the 90s-2000, and 2000 onward, showed it was in the 70s to 80s that had the biggest increase in various Clean Tech technologies, although energy spending has increased since 2000.

The technology continuum includes research, development, demonstration, verification, and commercialization or utilization. The first four stages have areas where EPA has contributed a lot, but when it comes to the utilization stage, EPA has not been very involved.

EPA has three major advisory groups working on environmental technology and has several reports. The National Advisory Council on Environmental Policy and Technology (NACEPT) is the main advisory group for EPA on technology. Reports were received in 2006, 2007, and 2008 on technology programs. Two are focused on the marketplace and the third is related to technology financing issues related to venture capital. EPA’s responses to the reports include establishment of a Senior Environmental Technology Officer (SETO) and an increased role for the Environmental Technology Council (ETC). EPA is very active in the Environmental Technology Verification (ETV) Program, which certifies that technology work. The second report focused on the market place and what drives the market. Where and when EPA regulates has a major impact on the marketplace, even though this is a by-product of EPA regulations. In the last few years, EPA has tried to form voluntary partnerships to produce greenhouse gas-reducing technologies.

The Environmental Technology Initiative is under the ORD for the implementation of technologies, but this Office is not suited for market place oversight or financing. To try to integrate the activities related to environmental technology, EPA has ETC Action Teams, and a

stated mission for this work. The Initiative is Agency-wide and fairly well-established at this point. The teams include specific items, such as pesticide application to reduce spray drift, lead paint remediation, and detection.

DFO Meiburg interjected a question about how the Agency decides what issues will be covered by action teams. *Dr. Widawsky* said the action teams were set up by the ORD before the NACEPT reports were received. The issues covered depended on whether someone in the Agency wanted to focus on the particular problem.

The Technology Continuum shows EPA activities under the various headings described above. Commercialization does not have any EPA activities shown, so EFAB could help with the financing questions in the private sector. The question would be how to match the money with technology that has been developed and is ready for use and needs to be diffused. The venture capital community was contacted through the use of forums and roundtables in three regions. Venture capitalists are difficult to locate, especially during an economic downturn. The question is: What is the role of venture capitalists in technologies that do not have a pay-off? Under the ETC, EPA verifies that the technology works or meets regulatory standards for monitoring, calibration or performance. Regulatory standards sometimes create a barrier, but this concern may not be valid. One of the challenges is that there is a barrier to being first with an innovation, because the later entrants have lower costs. *Ms. Patton* said she was on the ETC and explained that part of the reason a barrier exists is that ETC is managed by a private contractor and the expenses have to be re-captured. The ETC has tried to get a broader group for the first-test run to spread the costs, but it is difficult to find market-drivers. The tension is whether the purchaser of the technology is interested in monitoring or applying the technology in the marketplace.

Ms. Mulkey said the ETC has some case studies on how to market the technologies. One ETC case study is on ambient ammonia monitors. There are a lot of good monitoring technologies that are not being used because the marketplace is not interested. Animal Feeding Operations (AFO) monitoring and sampling have been used to quantify ammonia emissions. EPA has Voluntary Compliance Agreements with 2,000 feeding operations. Another case study is focused on prevention of paint spray into the environment. This technology saves money and has had broad adoption. The military buyers have reduced their pollution sources. Another technology to capture natural gas, Eductor Vapor Recovery Unity, has thrived and has spread globally.

Different market traits, such as demand, growth rate, competitive dominance, and the nature of purchasing decisions affect financing approaches. The market traits include fast growing markets, large markets with medium growth, and shrinking markets. A chart showing market growth and market size indicated that energy technology was the fastest and largest. Wastewater treatment is large in size, but not as fast growing.

The ways that the government acts as a facilitator of technology financing include such programs as U.S. Army Venture Fund, CIA Venture Fund, Department of Energy Loan Guarantee Program, Small Business Innovative Research Grants, and state governments. States are in the development business, but not as much in CleanTech, and some offices have closed due to budget cuts.

Six discussion questions are listed in the PowerPoint including the topics of financing challenges, informing private financiers, leveraging of government mechanisms, more effective verification processes related to marketing, and government purchasing. *Ms. Mulkey* challenged the Board to use the questions in their further deliberations. The last slide showed a bibliography and some websites for further information. The role of EFAB needs to be investigated further, according to *Ms. Mulkey*.

Questions and Comments

Ms. Hernandez talked about a large environmental technology, capital venture in the early 90s when Vice-President Gore was the primary leader. There were problems because venture capital was going into dot.com ventures, drugs, and bio-tech, which was a big loser. The cost of selling technology to each consultant, site, regulator, and customer individually was an impossible barrier, not because of regulations or conservatism, but because making that many points of sale was too difficult. Another major concern of both regulators and the regulated was who bears the cost if something goes wrong. A big debate was about whether verification should be certified, and whether there should be a governmental form of guarantee. If it was just verification, industry felt that they would be responsible for what didn't work and the marginal profits were not worth it. She said it was difficult to sell environmental technology in the California market at that time.

Now the focus is on energy and climate and these projects have a large perceived interest, but when the price of oil went down in December, those who invested in energy technology lost money. It is easy to access venture capitalists at conferences. Climate ventures would be acceptable, but development of measuring and monitoring tools would not be of interest, because of the small market for the tools; and most companies would not want to make the changes. Contacting a few VC players would be helpful. EPA has a choice about whether to get involved in the energy field. EPA could help build a bridge between DOE and VCs, if they start on climate change first. The California Department of Toxic Substances Control (DTFC) is starting a large green chemistry, regulatory program, and they are turning to the private market. EPA could discuss ideas with that group.

Ms. Patton commented that EPA should focus its support on new environmental technology related to EPA's goals, because the VCs need regulatory certainty. Stability creates willingness to invest. EPA needs to spend more time on the economics and business issues. EPA should verify commercial-ready technology. If they do, then by definition, EPA would not support R & D. EPA needs to review its policy goals and look at the economic externalities EPA is trying to capture, and turn them into business models. Businesses must include within their models pollution control or sustainability activities related to EPA goals that would not otherwise be addressed. EPA should do economic analysis linked up with science. The group could be divided into four areas, as follows:

1. EPA interests in supporting R&D for new technology.
2. The type of group that needs help in proving R&D is different than those who have done the R&D and need proof of concept and application.
3. Groups that can actually employ the applicability for potential commercialization.
4. Projects that would be forever dependent on subsidies or those that will become independent of governmental subsidies. The challenge is to determine the long-term goal that enables the technology to be economically independent of governmental subsidies.

Most investors want economic stability and are concerned about the requirements, which have not yet been determined. In the climate area, there is no answer about the type of credit for structures or whether there will be a long-term commitment to convert base-load delivery either nationally or regionally. In dealing with power, public power policies are important to elected officials and administrators. EPA should look at how the ETV process is structured, because it is not constructed to look at R&D, it is structured for commercial deployment. EPA is science-driven and has a framework that could be expanded to include business models.

Ms. Mulkey responded that EFAB's advice could help determine what piece of this large problem EPA could focus on. The solution may be to infuse the technology verification process with other parts that relate to economic sustainability or increased certainty. *Ms. Patton* responded that EPA has programs that require new technologies and new regulations and needs to decide which ones support. Those in the RFD proposals have a level of certainty and Agency commitment and would be the most viable. *Ms. Mulkey* added that new technology could be required for some programs or could benefit established regulatory schemes.

Several suggestions were made to assist EPA into developing and moving new technologies into commercialization, as follows:

- The Interstate Technology Research Council (ITRC), which is an arm of the Environmental Council of the States (ECOS) that is made up of state employees that review and verify new technologies similar to EPA Action Teams. The Oversight Board meets at each meeting of ECOS. They could invite *Ms. Mulkey* to come to their meeting to share ideas.
- Federally-funded R&D Centers are under the DOE or DOD, such as the Rand Institute, create public goods that in turn create commercial technology, such as the Global Positioning System. EPA could contract with one of DOE's FFRD Centers to pursue new technologies and adopt their model.
- Within the framework of the SBIR program there are 22 agencies that can fund small businesses at \$500,000, which avoids the problem of the need for large payoffs. The SBR program is tailored to move products from the verification process toward the market.
- A paradigm is needed for the already existing tools and programs.
- EPA programs, such as the Energy Star and Smart Growth, where products are rated in accordance with performance criteria, help with the marketing of the products. The problem is the uncertainty of what the best standard might be and avoidance of harmful consequences of new materials. EPA's scientific work complemented by life cycle science could lead to potential products. There is a lot of potential innovation in the building sector, especially in materials and chemicals.
- The purchase of technology by EPA includes taking on some of the risk. Developing and disseminating environmental product declarations based on life cycle science would bring in new technologies for EPA, DOE, and DOD.
- Private entities such as underwriter laboratories are looking at developing life cycle-based protocols for rating equipment and products. The building industry would be accepting of standardization that would get the technologies into the marketplace more rapidly.

Ms. Patton stated that Government funds only should be involved where private firms cannot be used. There needs to be a transition to private funding or public funding will go on forever. The decision needs to be made as to whether the goal is R & D, proof of concept, commercial verification or actual market aggregation. The governmental role is very different for each of those goals, whether the idea is to support start-up or continual funding. If a company is already getting an economic benefit, then the governmental role is questionable. If you need to protect a natural resource and need to force a technology that otherwise would not exist, such as protection of an ecosystem, there is no market system today that prices that in the absence of regulation. This gets back to the idea that certainty of regulations drives private investment.

Ms. Mulkey asked whether regulatory certainty is stability of the regulatory scheme or enforcement. *Ms. Patton* responded that if there is a law on the books, then enforcement is present, and people will comply. Enforcement is one of the ways to implement a public policy choice.

Ms. Himmelberger said that in the New Mexico region they are more involved in the application of the new technologies in areas, such as arsenic, water treatment, leak detection assessment, and Sandia Labs products. Sometimes it is in the application of products where things go wrong, because the applicator does not do what they say they will do or not at the same price. If the economics of applications do not meet expectations, funding them would not make any difference. An educational piece on application might be helpful.

Mathilde McLean suggested developing the technologies that are not market-ready at universities where there are engineers. Engineers at Columbia University are working on waste technology, for example. Venture capitalists are headquartered near universities so business-oriented people can interact with the engineers. If the engineers could get the technology to a point where VCs could invest in projects that have a five-to-seven year investment, they might be successful. Policy needs to be in place before the investment is made.

Peter Meyer said that energy is important because of the rising energy costs and the chance of private return. The government may not want to subsidize the private return, but the issue is access to capital to use the innovation. Start-up funds could be helpful even with a private return.

DFO Meiburg thanked *Ms. Mulkey* for her presentation and summarized the discussion by stating that the *Financial Incentives for Environmental Technology* encompasses a vast complexity of phases of financing, types of technologies, and the place for public or private investment in relationship to the types of tools derived from the technology. Secondly, the financing brings up the issue of how to incorporate failures in the financial assurance requirements. Thirdly, EPA has wanted to promote environmental technology, but they have not wanted to be the guarantor of performance of any particular type of technology and have not been involved in the marketplace competitions. EPA wants to set standards and let the private sector work out how to use the new technology.

Report Out on Water Loss Reduction

Terry Agriss, Chair, said that since the March meeting a research assistant has been employed to assist the workgroup. The first project was to review information provided by *Scott Haskins* and the American Water Works Association (AWWA). In the initial work, water loss reduction is

limited to drinking water, but wastewater could be looked at in the future. Background information compiled by the Assistant revealed some interesting statistics including: spending on drinking water infrastructure is underfunded by \$160 to \$325 billion dollars; 53,000 public water systems in the U.S. serve at least 25 people or 15 connections; estimated expenditures are \$30-40 billion dollars a year; and 83 percent of the systems are serving only nine percent of the population. Generally, for the very small systems they are privately-owned, but most of the systems are publically-owned.

One focus of the workgroup would be on energy efficiency, because water and wastewater treatment utilize about three percent of the electricity used in the U.S.; and water treatment alone comprises about 33 percent of municipalities' energy consumption. Another focus is on the use of water audits. Generally, the workgroup identified that the AWWA's water audit techniques are very useful. One recommendation might be that governmental funding-agencies of water loss reduction projects require some type of water audit and a follow-up management plan as a pre-requisite to obtaining funding.

Another issue was asset management programs and how they relate to water loss. Several ideas were discussed, such as using the EFCs for training, cost-benefit analyses, and life cycle processes. Although not high-tech, funding the use of tools already accessible and established programs could be useful. The recommendations may differ for large and small systems. For the small systems, there has been some innovative financing already done and these could be used as examples for others. The workgroup reviewed funds that are currently available, such as SRF funds for drinking water projects, grants, the ARRA funds, and some of the DOE funds for energy efficiency. Finally, the benefits of cooperative agreements between municipalities to help reduce costs and improve management would be reviewed by the workgroup

The workgroup will review the abstracts written by the research assistant and make necessary changes. Then, a detailed outline for the paper would be developed for the Agency report. The goal is to complete the outline by mid-September and then have a draft report for the workgroup to review by mid-November. The final report would be ready for the Board in March. Ms. Agriss thanked the workgroup members and asked them to add their comments.

John Boland added that the audit is the process of finding out how much water goes to metered connections, how much unmetered water goes to customers, how much is used, but not measured, and how much is being lost. Apparent and real water losses can only be determined by estimation. In the absence of these precise numbers, there is no basis for the water companies to reduce their losses. There is no real incentive for water companies to act, on meter registration even though the meter is working slowly, because the cost of meter repair or replacement exceeds the revenue produced. Issues of analyses and issues of incentives have to be considered. Benefit-cost analysis requires knowledge of where the losses are and then determination of how to address the losses.

Mr. Marsh added that the group discussed whether water loss fixes are operating or capital costs, because that can have a significant effect on the availability of SRF and other capital funds. *Mr. Haskins* focused on the need to clarify the problems that need to be solved and proper local level, investment decisions. Some major investments are being made where water loss and conservation would be better options over the life cycle. The report would need to define the problem and the importance of guidance, policies, and financial mechanisms to solve the problem and change behaviors and practices at the local and private level.

Ms. Francoeur commented that the credit analysis community—rating agencies and bond insurers—need to know about water loss in terms of management, which is really a cost-benefit analysis of the respective utility.

Mr. Thompson added that the cost of treatment needs to be considered. Small communities that have made investment in reverse osmosis are much more interested in saving water than if people have an aquifer that only requires chlorine to treat the water.

Ms. Tobias asked if sediment and erosion control are involved in looking at cost-effectiveness. *Ms. Agriss* said the workgroup would not focus on this for drinking water, but might later under wastewater.

Mr. Hinds suggested everyone read the paper, because water loss is a neglected issue at the local level, and then decide whether EFAB should take on an issue that does not have an audience.

Ms. Agriss responded that the analysis showed that small communities could save money on capital expenditures and staffing, if awareness was increased. The report to EPA will include how to use the EFCs and develop some guidelines that communities can follow.

Ms. Himmelberger thought that the water footprint would change the equation where there is drought and keeping water supply intact is more important. People have focused on re-cycling because there are funds available and it is a public good. Water loss reduction may be expensive, but could be a good effort beyond cost savings. *DFO Meiburg* agreed that the availability of supply could be an incentive for action. *Ms. Peay* noted that this is about getting the kind of information people need in order to define the need and the resources available, especially for states.

Report Out on SRF Investment Options

Jim Gebhardt, reporting for *George Butcher, Chair*, said the SRF Investment Workgroup was formed after the SRF Leveraging Workgroup. With the various SRF models that have been used over the last few years; the investment function has a more important role in the future. Investments are either short-term, basically dollars that are idle in terms of program support, or long-term that work in relation to financial assistance liabilities, such as the subsidy payments that are scheduled to be paid out over 20-30 years. The weaker model is a direct loan program that does zero percent loans, so there is a trade-off between the loan and the monetary returns that would be received when the dollars are returned. The stronger form of the model is a robust financing program, where funds are de-coupled outside of the bond function.

When SRF dollars are pledged to actions, the return on the dollars is limited to the cost of funds. From an investment return standpoint, the weaker model is underachieving and not maximizing funding. In the stronger model, some long-term investments almost 30-40 percent can be invested at an unrestricted rate, which has added robust monetary returns. Basically, the returns are turned into environmental returns, because the leveraging factor is being boosted by the increase in the return rate.

In New York, for example, the cost of funds was about three percent in the last few transactions and the investment returns have been closer to five percent. The return on investment can be converted into additional environmental projects that can be funded in the same time frame.

Looking at efficiency of dollars utilized and the funding gap, the investment function becomes very important in lining up long-term investments. This was the reason to focus on the investment function, which is tethered to the financing side of the model. The other idea is that being able to de-couple the long-term investments actually encourages the opportunity to more fully utilize the SRF funds.

The workgroup had some conference calls and reviewed investment policies. Also, they worked with Council of Infrastructure Finance Authority and developed a questionnaire for their members, many of whom have responded to date. Many of the states are working on the weak form of the model, but some are progressing to the stronger form. Where the investment function resides is critical. In many states, the investment function resides with the state treasurer, and in some the SRF financing also resides there. The question arises if this is a more passive relationship between the treasurer and the SRF manager in terms of how the money is managed, and does it create statutory barriers to SRF investigator influence on how the funds are spent. This area needs further investigation.

The questionnaire covers the investment location; the extent of the investment authority in states based on enabling statutes; information on negative investment performance; and the effect that would have on investment in those states. Information would be obtained to support a more active investment role in the management of SRFs from the standpoint of the states and EPA.

Yesterday morning many issues were discussed such as how SRFs are organized, the resources that SRFs have in each state, and the level of awareness. The next steps are gathering more data on states, exploring the investment function from the standpoint of interface between state treasurers and SRF administrators, developing an outline for the first draft of the working group paper, and then developing a draft for the March 10, 2010 meeting.

Lastly, there was a consensus of the group that the investment function should be a more important aspect of SRF funding. The idea of the SRF as an endowment would provide a wider range of investments. The federal statute permits interest-bearing obligations and states have added investment quality requirements. The question with endowments is looking at liabilities related to equities, even though this is not a good environment now, but it would be a small piece. Currently, we are going to work on fixed income investments.

Ms. Deming added that this would represent a cultural change for SRFs. Certainly, sustainability comes into this discussion, and having some guidelines is very important.

Ms. Francoeur asked if the report was going to discuss the disruption in the market. *Mr. Gebhardt* said many states are looking for the new investment paradigm that takes them beyond reliance on commercial providers. The market problems are linked to the financing models. While the market downturn is not the driver of the report, it will probably influence some of the recommendations.

Mr. Tozzi asked if the operating doctrine is to treat SRFs as endowments. *Mr. Gebhardt* said that they are similar to endowments in that they are made in perpetuity, the funds promote the nation's good, and it is designed to work 10, 20 or 30 years from now. *Mr. Tozzi* wanted to see this as a long-term goal, so the group might want to address this as an operating doctrine to see what the operating procedures should be for SRFs.

Ms. Agriss added that the workgroup discussed the fact that by having more robust investments larger returns were generated than the SRFs historically have done. This goes beyond the problems of SRF funding reductions. *Mr. Gebhardt* responded that the Leveraging Report did discuss the endowment effect.

Mr. Swartz said the workgroup was not advocating buying equities in companies, but in the vast majority of SRFs there is very little attention paid to investments and often the funds sit in an account to cover short-term needs rather than in investments. The SRFs should be encouraged to invest the money in the trust fund into better paying investments compared to no investments.

Development of the Strategic Action Agenda: Proposed New Projects

DFO Meiburg opened the afternoon session by stating that a potential new project will be proposed by *Michael Curley* and *Landon Marsh* and a review of environmental technology. Other new ideas could be brought forward.

Ecosystem Services Markets

Langdon Marsh reported on a proposal from *David Primozich* from the Willamette Partnership, a non-profit organization, which is developing an ecosystem market-base for the Willamette River basin in Oregon. In terms of innovative finance, there are markets for ecosystem services that result from restored wetlands and riparian areas. The entities that might be able to purchase those services are governments, developers, and other public and private parties. Over the past four years, the partnership has developed a system of metrics to measure the services that can be attributable to these riparian lands. The system converts the metrics into standardized units that are acceptable to regulators and markets. The system includes accounting support for transactions. They have achieved consensus among state and federal governments, and representatives of potential participants as to the general framework and specifics of how these ecosystem outcomes can be measured, verified, and used as trading units.

This project implies a new and constructive role for government agencies in terms of leveraging their regulatory role by participating in the development of these markets, the verification of the outcomes, and oversight of the inspection of the services. The more immediate benefit is that the process can be used to avoid making poor investments in infrastructure by providing ecosystem services to the same watershed. For example, one agency tried to require a sewage treatment system in the basin to install technology to cool off discharge water to protect the salmon. A very innovative utility worked with the agency to use funds allocated for chillers and expensive equipment to pay farmers and other land owners upstream to restore riparian areas that resulted in cooling of the river at a fraction of the cost.

The challenge is how to start this market to enable entrepreneurs to compete and develop the best set of ecosystem services, and to be able to sell them to developers who would need to buy credits. A capitalization fund would help jumpstart the market. The returns from the investment would enable additional investments to be made to become a true revolving fund. The markets the Willamette Partnership are proposing would save millions of dollars by avoiding projects that don't make ecological sense.

DFO Meiburg said that in the Southeastern states, such as the Florida Everglades, nutrient loading is a big problem. The debate revolves around making stream water treatment areas use

natural systems to filter out the nutrients to achieve an adequate level of water quality as opposed to chemical treatments that are very expensive. EPA has been criticized on the time required to set up large-scale programs and the uncertainty of maintaining all of the ecosystem services. The challenge is how to deal with ecosystem services over time, including buying of rights upstream and preventing the upstream users from changing their methods.

David Primozich said that a basic agreement reached last week is that every natural resource agency in the state will use a functions-based accounting methodology. The problem is that the metrics for measuring impacts has underperformed over time. The public is skeptical of the reality of the mitigation and offset programs. The programs that are being used to offset impacts that have already occurred are performing their services. The basic system being developed is function-based, so the metrics take more time investment, but they will be able to set up indicators that can be tracked over time.

The Willamette Partnership intends for the services to continue over time. Annual third-party verification needs to be done, because a credit does not get sold unless it has third-party verification. The outcome of having measurable metrics in a function-based system is that any third-party should be able to measure the service performance over time. Also, a credit cannot be sold in the system until a third-party registry has occurred that tracks individual credits over the life of the credit from creation to retirement. The registration is essential. In each market, the credit will operate differently. Mitigation credits are permanent, so an in-perpetuity easement is necessary on the ground. Offset markets are driven by permitted, on-going activities that fluctuate over time as technology changes. The life of a credit is matched by the market, so some have to have an easement. For temperature credits it is 20 years, so the land has to be under protection.

Gregory Mason asked if their system has easements or some other agreement from users or the land lessees. *Mr. Primozich* responded that it depends on whoever owns the mitigation bank. For wetlands to get an instrument from a bank that enable the credits to be sold, two things are required. First, the ability to manage the system over time is required. Second, if the property is transferred to a land trust, there is a requirement for a non-wasting endowment that goes with the transfer and pays for in-perpetuity and maintenance costs.

Carbon & Emission Credit Trading

Mr. Curley reported that the *Innovative Financing Tools* workgroup discussed cap and trade programs and the Waxman marketing legislation. About 70 percent of energy consumption goes into buildings, so you can't have an effective climate change or carbon program without including buildings. Since a cap and trade program is a market-based program, if you inject a financial incentive here, then one of the players has been favored. Cap and trade programs are useful in limited situations. One example was the Port of Baltimore where the Mayor or Governor of Maryland did not want cap and trade because they want to get rid of or abate the pollution. Pennsylvania has been struggling with a non-point source pollutant for a long time and the problem is how to aggregate the pollution from small farms and finance them over a long period of time. The workgroup has called experts to ask under what circumstances financial incentives are valid in a market-based system, such as cap and trade.

Mr. Curley said two items were on the horizon: 1) the Cap and Trade Program for Carbon; and 2) Cap and Trade for Non-Point Pollution. In response to the President's Executive Order for a

multi-agency task force for the Chesapeake Bay to remediate the Bay, one of the ideas would be a nutrient cap and trade program. Virginia has a point-to-point program, which is easier to do because of the large entities involved. Point-to-Nonpoint is more difficult. There is a need for innovative financing if the nutrient trading programs are going to work. Innovative financing incentives are needed for cap and trade programs to combat pollution. The work group is looking for what other incentives would be valid in a cap and trade program, and how to create non-point source nutrient-trading programs for water pollution.

DFO Meiburg said that the issue is whether this is a project for the Board to undertake. The usual criteria for assessment are whether there is a specific client in the Agency, a specific outcome, and is it worthwhile for the Board to pursue the issue. This project would be an issue of great interest and controversy. *Mr. Curley* added that because of the President's Executive Order, the Chesapeake Bay has its own section of the Clean Water Act—Section 117. This means that it can be changed and used in different ways. The Clean Water SRF can be used in a national estuary program. An amendment could be added to Section 117 related to the Clean Water SRF in Title 6, to establish the Chesapeake Bay as a national estuary, so new innovative ways can be tested without affecting the entire country. This is a chance to clean up the Bay and to do some interesting experimentation, such as a laboratory or a demonstration programs that could have impacts on the country over time.

Douglas Scott seconded both of the ideas of *Mr. Curley's*. In relation to the Chesapeake nutrient bill, the Agency is also interested in nutrient pollution in the Mississippi River, because traditional methods do not work and innovative ideas will be needed. On the cap and trade side, he sees the similarity to the VEIB discussions. Small generators of solar and geothermal energy cannot get short-term dollars, so an innovative framework tied in with energy efficiency and retrofits is required. The Clinton Foundation and other groups are doing some major projects, such as for the former Sears Tower.

Ms. Peay added the State of Connecticut has created a cap and trade program for the Long Island Sound. The issues of non-point source and private financing are very important. Pennsylvania has been struggling with the same issues that would need to be reviewed by EFAB.

Mr. Jarocki added that they have an office in Seattle that is working on the same issues of how to trade, including point and non-point pollution. The Board and the EFCs could both be involved in developing innovative financing incentives. The Maryland EFC was created just to work on the Chesapeake Bay problems. One of the EFAB criteria for projects is whether the EFC network could be involved. *Ms. Throwe* agreed that the topic is currently under discussion on the Bay. The Bay Banks, the Chesapeake Fund, the Red Barn and others are involved. Any new effort should be coordinated with what is already being done and brought back to EPA. The EFCs would want to be accessed for this effort.

Ms. Patton agreed that it was an interesting idea to pursue an innovative finance mechanism to deal with the more intransigent challenges. She suggested reviewing innovative finance for new technology deployment that has been tried in other countries. A value could be placed on natural resource commodities or common goods in the same way that countries put values on technology. If you want to funnel or prioritize the type of trading, you could look at feeding tariffs that have been used in the context of deploying or incentivizing or prioritizing the selection of one power source over another as a public policy priority. Giving a legal right or

requirement to priority purchases has a history in the U.S. using tracked cash, such as in methane capture and long-term power agreements.

Ms. Patton added that a public policy mechanism is needed for funneling a prioritized choice through financial incentives for improvements on wetlands trading where the nutrient load has already been exceeded. Then, either a mandatory buy-first or invest-first in a particular offsetting, pollution control technology is needed. This would be a very regional-specific framework recognizing the differences between regions. Solutions proposed by EFAB could be transferred to other areas.

DFO Meiburg thought that the Board was supportive of adding this project to the existing Innovative Financing Tools Workgroup, and that the project would be in agreement with the EFAB criteria for new projects. *Mr. Curley* agreed that some things are not known yet, such as the Cap and Trade Bill. The project would need to be better defined in the future, so setting a time-line would be difficult. *Mr. Curley* asked for a list of current members of the Workgroup. *Vanessa Bowie* pointed out that the EFAB folder contained a list of the workgroups and the members of each group.

Financial Incentives for Environmental Technology

DFO Meiburg asked *Ms. Mulkey* to address the issues. *Ms. Mulkey* did not have a specific charge, but said the project would need a design phase to determine what makes sense for EFAB's experience. She will not be in her present position for very long, but OPEI, ORD, and other parts of EPA would be supportive of the Board. *DFO Meiburg* said that there was Board interest, but better definition is needed of financial incentives for environmental technology. It would be helpful to have an EPA contact to help clarify the project. *Ms. Mulkey* was certain that EPA would identify a responsible person to work with the Board.

In response to a member's request to narrow down the project, *Ms. Mulkey* responded that it would depend on who is contacted in EPA. She thought it would be useful for EFAB to help the Agency understand where it could productively facilitate the matching up of money sources and developing technology, not necessarily for new R&D projects or those fully-ready for commercialization. The financing could include many types of financing entities for technology that show promise. VCs may not be the best sources. The question is how the Agency can invest money or human capital in facilitating or promoting the capacity of a technology to become commercialized.

One member questioned the government's role in financing technology for the market. *Ms. Mulkey* said the answer may be that there is no role for government. The Agency is interested because technology can solve some of the current problems. If there is a form of information that is useful to financial markets, it would be important to EPA.

Mr. Tozzi said that one criterion for government intervention was if there is a market failure. This needs to be determined first. Very few of the research programs in the government would meet that performance standard. One of the largest market failures was for clean coal technology, which was very expensive. There is no explicit program statement that identifies market failures. The second issue is to what extent and how would government resources be marshaled.

Ms. Deming worked on a previous OPEI initiative where people were asking why we were trying to talk about market value for environmental management system; and whether that is a role for the Board. The project brought together people from different market sources to inform them about the systems and to share information. She would endorse the issue once it is better defined.

Ms. Pesek said that at Syracuse University's Center of Excellence (COE) was created by the Governor of New York for creating jobs and focusing on R&D in three areas: environmental quality, water resources, and clean and renewable energy. Several million dollars a year came from EPA to support research that was happening in the New York State university system. The COE granted funds to researchers to take projects from R&D to commercialization. To focus the project, EPA programs that include commercialization as an endpoint should be reviewed. For example, one program has succeeded in developing small technologies, like sensors, at a low cost.

Mr. Jarocki said when the EFC was created in Idaho; the main idea was how to get technologies into the marketplace. There is a body of knowledge from Region 9, even though some projects have failed. *Sarah Diefendorf* could provide information from her experience and could contribute to the workgroup.

Ms. Hernandez suggested talking to *John Wise*, who was involved in environmental technology in the 90s. The breadth of the topics raised was interesting. The truth is that different technologies will interact with the marketplace in different ways. If EPA can formalize entrance into building certification, their stamp of approval would go much further than certification by DOE. Unless someone from EPA says the project is approved, it is not going to work at the VC level. There is a bridge role that EPA can play with DOE, because EPA has worked well with the states. Carbon sequestration and cap and trade are starting in the absence of a framework, so this topic could be pursued in the absence of a framework.

Ms. Tobias raised the question of venture and seed capital as related to public goods. Improving the environment is something everyone wants, but no one is willing to fund. To the degree that there are promising technologies that could use seed money, it is a classic role of a governmental entity to provide that kind of capital, particularly in the current difficult economic environment. Technologies that would not attract private investment probably will fail, but there is a history of government feeding new technologies with seed money. The most promising of those technologies were picked up by the private sector.

Mr. Curley said financial incentives can bring in technology that is not readily marketable. An example of a New York area project was an investment of \$6,000 in a geothermal system that saved \$1200 dollars a year and had a five-year payback. If the county had a VEIB program where the money could be paid back over 20 years, the payments would have been \$450 a year.

Other ideas expressed by members and EPA staff include the following:

- Discipline is needed in areas of R&D, commercial-ready technology, and unproven projects.
- The Agency needs to decide what it wants that is currently not being served by the private market, and if not, why not.
- The Agency could assist for a short time or permanently.

- Advice from EFAB could be an analytical process, rather than applying it to certain circumstances. A paradigm for analysis might be a better place to start.
- Talking to VCs is not the best place to start. VC investors are interested in large global problems. Their interests need to be determined.
- A meeting with Agency stakeholders and EFAB members is needed.
- The investigation of what has already been done is a good idea, as many states have projects underway.
- Certainty of regulation is the most important in terms of promoting new technology.
- EFAB should develop a preliminary framework before meeting with the Agency.
- For EPA, the impact of environmental technology may be low on the scale of importance.
- EFAB could develop 3-4 questions related to EPA goals in the Strategic Plan, where innovative technology would help achieve the goal.
- A market failure or a regulatory opening could be identified, where the approach did not work to incentivize market involvement.
- The impact of EPA policies and regulations should be considered.

DFO Meiburg agreed that this was a good approach and that he was hearing that there was interest, but the definition was amorphous. He offered that he would meet with stakeholders in the Agency to determine what they would be doing. Members who would be interested in working on this are: *Cherie Rice, Jennifer Hernandez, Lindene Patton, Michael Curley, Leanne Tobias, Rachael Deming, Bill Jarocki, Terry Agriss, Mathilde McLean, Greg Mason, and Sharon Peay.*

Ms. Hernandez thought it would be better to ask the questions in the form of a matrix related to technology groups. For example, what are the financial incentives for measurement technology? EPA could determine five areas of technology of interest to them. Even regulatory certainty or predictability is not that difficult, because the Agency is moving in that direction in terms of performance standards. Percentage reductions off of targets could be set beyond today's baseline. Questions should be framed around the technologies that the Agency is most interested in promoting.

DFO Meiburg suggested that a three-point structure be developed by *Ms. Patton* and *Ms. Hernandez* and sent to members noted above, by email. After review, this would be used in a meeting with the Agency. *Ms. Mulkey* was satisfied that EFAB would be able to develop ideas prior to meeting with the Agency. Since there were no other projects mentioned by members, *DFO Meiburg* asked for public comments.

Public Comment: No public comments were made.

Next Steps

DFO Meiburg reviewed the status of the work group papers. The SRF Investment Options and the Water Loss Reduction position papers are nearing completion and could be acted on at the Spring EFAB Meeting. The Innovative Financing Tools workgroup has picked up a new project. Under Financial Assurance for Cost Estimation, the next step is to develop a framework for a workshop to be held some time in the late winter or early spring, as more discussion is needed on this project. On Commercial Insurance there should be an issue paper circulated to the Board based on Draft # 8. He commended the workgroup members who have served the Agency in framing some different perspectives, which demonstrates the value of EFAB to the Agency.

Finally, Under Carbon Capture and Sequestration, the workgroup would move to get recommendations on the SDWA provisions very quickly and then continue to work on the longer-term framework. In addition, EFAB members will work on the framework of questions for the Agency on environmental technology.

After a brief discussion on changing the venue for the EFAB August meeting, it was decided to keep San Francisco as the location. The next meeting will be on Tuesday, March 16 and Wednesday, March 17, 2010, in Washington, DC. The idea of a workshop will also be explored. *Mr. Barnes* commented on the extraordinary talent on the Board and was the best Board in terms of the value brought to the Agency to serve the public interest.

DFO Meiburg thanked the Board for their time and talents.

Adjournment: The meeting was adjourned at **4:09 p.m.**

Appendix

EFAB Members Present:

- A. James Barnes, Chair, Professor of Public and Environmental Affairs, Indiana State University, Bloomington, IN
- Terry Agriss, President, TAgriss Advisory Services, New York, NY
- John Boland, Professor Emeritus, The Johns Hopkins University, Department of Geography and Engineering, Baltimore, MD
- Michael Curley, Executive Director, The International Center for Environmental Finance, Towson University, Towson, MD
- Rachel E. Deming, Partner, Scarola Ellis LLP, New York, NY
- Kelly Downard, Chairman, Louisville Metro City Council, Louisville, KY
- Mary Francoeur, Managing Director, Assured Guaranty Corp. New York, NY.
- James Gebhardt, Chief Financial Officer, NY State Environmental Port Facilities Corporation, Albany, NY.
- Scott Haskins, Vice President, Global Water Business Group, Bellevue, WA
- Jennifer Hernandez, Partner/Co-Chair, National Environmental Team, Holland and Knight, LLP, San Francisco, CA
- Keith Hinds, Financial Advisory, Merrill Lynch, Albuquerque, NM
- Mathilde O. McLean, Assistant Vice-President, Citi-Municipal Securities Division, New York, NY
- Langdon Marsh, Fellow, National Policy Consensus Center, Portland State University, Portland, OR
- Gregory Mason, Chief Operating Officer, Georgia Environmental Facilities Authority, Atlanta, GA
- Karen Massey, Deputy Director, Missouri Environmental Improvement and Energy Resource Authority, Jefferson City, MO
- Lindene E. Patton, Chief Climate Product Officer, Zurich North America, Great Falls, Virginia
- Sharon Dixon Peay, Financial Administrator, Office of the State Treasurer, Hartford, CT
- Cherie Collier Rice, Treasurer and Vice President of Finance, Waste Management, Inc., Houston, TX
- Leanne Tobias, Principal, Malachite, LLC, Bethesda, MD
- Dr. Andrew Sawyers, Program Administrator, Maryland Water Quality, Financing Administration, MD Department of the Environment, Baltimore, MD
- Douglas P. Scott, Director, Illinois Environmental Protection Agency, Springfield, IL
- Greg Swartz, Vice President, Piper Jaffray & Co., Phoenix, AZ
- Steve Thompson, Executive Director, Oklahoma Department of Environmental Quality, Oklahoma City, OK
- Jim J. Tozzi, Director, Multinational Business Services, Inc., Washington , DC

EFCN Directors or Representatives:

- Laura Barbaria, Director of the Green MBA Program at Dominican University of California

- Lauren Heberle, Director, EFC, U. of Louisville, Louisville, KY
- Heather Himmelberger, Director, EFC, NM Institute for Engineering Research and Applications, Albuquerque, NM
- William Jarocki, Director, EFC, Boise State University, Boise ID
- Kevin O'Brien, Executive Director, Great Lakes EFCN, Cleveland State University, Cleveland, OH
- Sam B. Merrill, Director, EFC, U. of Southern Maine, Portland, ME
- Sara Jade Pesek, Director, EFC, Syracuse Center of Excellence in Environmental and Energy Systems, Syracuse University, NY
- Mary Tiger, EFC, Project Director, University of North Carolina at Chapel Hill,
- Joanne Throwe, Associate Director, EFC, National Center for Smart Growth, U. of Maryland, College Park

EPA/EFAB Staff

- Stanley Meiburg, EFAB Designated Federal Official (DFO), Deputy Regional Administrator, U.S. Environmental Protection Agency, Atlanta, GA
- Vanessa Bowie, Director, Center for Environmental Finance, Washington, DC
- Timothy McProuty, Program Analyst, Center for Environmental Finance, Washington, DC
- Pamela Scott, Environmental Finance Specialist, Center for Environmental Finance, Washington, DC
- Alecia Crichlow, Program Analyst, Center for Environmental Finance, Washington, DC
- Sandra Keys, Program Analyst, Center for Environmental Finance, Washington, DC

Expert Witness:

- Peter B. Meyer, Director, E.P. Systems Group, Covington, KY

USEPA Presenters: Jane Diamond, Acting Deputy Administrator, EPA, Region 9; Marcia Mulkey, Acting Deputy Associate Administrator, Office of Policy, Economics, and Innovation.

USEPA Guests: Ann Codrington, Joseph Dillon, Shana Harbour, Jo Ella Hoye, Terri Johnson, Kelly Kunert, Bob Maxey, Patricia Pfeiffer, Dale Ruhter, Tracey Sheppard, Ryan Smith, Raffael Stein, Bob Stewart, Joseph Tiago, Mary Tiger, Bruce Kulpan, Amanda Aldridge, George Faison, and David Widawsky.

Other Guests: Scott Anderson, Environmental Defense Fund, Climate and Air Program; Sue Briggum, Waste Management; Shellie McClary, Oklahoma Dept. of Environmental Quality, Oklahoma City, OK; David Primozich; and Gabrielle Wong-Parodi, Resources for the Future.

**ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL FINANCIAL ADVISORY BOARD
SAN FRANCISCO, CA - AUGUST 10-11, 2009**

AGENDA

AUGUST 10, 2009

- 8:00 AM - **REGISTRATION AND PROJECT GROUP MEETINGS**
12:30 PM
- 12:30 PM **LUNCH**
- 1:00 PM **REGISTRATION** (continued)
- 1:30 PM Opening Remarks and Introductions..... Jim Barnes, Chair
Stan Meiburg, DFO
- 1:45 PM Welcome Back to San Francisco Jane Diamond
Acting Deputy Regional Administrator
EPA, Region 9
- 2:00 PM **PROJECT REPORT OUT**
Carbon Capture & Sequestration Jim Tozzi
- 3:30 PM **BREAK**
- 3:45 PM **PROJECTS REPORT OUT**
Financial Assurance..... Mary Francoeur
Cost Estimation Kelly Downard
Commercial Insurance Lindene Patton
- 5:00 PM First Day Summary Jim Barnes/Stan Meiburg
- 5:15 PM **ADJOURN**
- 6:00 PM **GROUP DINNER**

**ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL FINANCIAL ADVISORY BOARD
SAN FRANCISCO, CA - AUGUST 10-11, 2009**

AGENDA

AUGUST 11, 2009

- 8:30 AM Opening Remarks Jim Barnes/Stan Meiburg
- 8:45 AM Environmental Finance Center Network Update Joanne Throwe
President, EFCN
- 9:45 AM **BREAK**
- 10:00 AM Financial Incentives for Environmental Technology Marcia Mulkey
Acting Deputy Associate Administrator
Office of Policy, Economics, and Innovation
- 11:00 AM **PROJECTS REPORT OUT**
Water Loss Reduction..... Terry Agriss
SRF Investment Options George Butcher
- 12:30 PM **LUNCH**
- 2:00 PM Development of the Strategic Action Agenda..... Full Board
- PROPOSED NEW PROJECTS**
Carbon & Emission Credit Trading..... Michael Curley and Lang Marsh
Financial Incentives for Environmental Technology Full Board
Other Proposed Projects..... Full Board
- 3:30 PM **BREAK**
- 3:45 PM Public Comment..... Stan Meiburg, Facilitator
- 4:00 PM Wrap-Up and Next Steps Jim Barnes/Stan Meiburg
- 4:15 PM **ADJOURN**

Jane Diamond
Acting Deputy Regional Administrator

Jane Diamond is currently the Acting Deputy Regional Administrator of EPA's Pacific Southwest Office (Region 9). She serves as the Region's Chief Operating Officer overseeing a workforce of 900, a regional budget of \$870 million and a \$2.3 billion grants program.

Jane will mark her 30 year anniversary of federal service in 2009. She has previously served as Region 9's Assistant Regional Administrator where she was responsible for strategic planning, financial management, grants and contracts, information resources and technology, human resources, regional science coordination, quality assurance and the Regional Laboratory. Jane has also been Acting Director and Deputy Director for the Superfund Hazardous Waste Cleanup Program. Since becoming a manager in 1988, Jane has held leadership positions in three of EPA's environmental divisions, including the U.S./Mexico Border Water and Wastewater Infrastructure Program, Southern California Watershed Protection Program, Federal Facilities Cleanups, and Hazardous Waste Compliance and Enforcement.

Jane received B.A. degrees in economics and social welfare from the University of California Berkeley.

ENVIRONMENTAL FINANCIAL ADVISORY BOARD CARBON CAPTURE & SEQUESTRATION WORKGROUP

Summary of Workgroup Activities August 2009

- December 2008: **Developed CC&S Project Charge**
- Identified Project Chair
 - Met with OW and OAR staff
- January 2009: **CC&S Workgroup Conference Call**
- Reviewed and refined CC&S Project Charge/Agenda
 - Reviewed and discussed available resources on financial responsibility and long-term liability for CC&S
- February 2009: **CC&S Initial Project Work**
- Established EFAB Network (secure Internet site)
 - Assigned working papers to Workgroup members
- March 2009: **Spring CC&S Workgroup and EFAB Meetings**
- Discussed and refined Workgroup activities/assignments
 - Reviewed and discussed Working paper #1: The Price Anderson Act Paradigm as a Model for CC&S
- June 2009: **Washington DC CC&S Workgroup Meeting
(Discussion Areas)**
- Financial Assurance for Class VI Wells
 - Lessons learned from RCRA
 - Non-RCRA Options
 - Long-Term Stewardship
 - Price Anderson papers
 - State Actions papers
 - Peer Review

August 2009:

Summer CC&S Workgroup and EFAB Meetings

CC&S Workgroup Discussion Topics

- Financial Instruments and Potential Carbon Capture and Sequestration Risks
- Elements of a Long-Term Stewardship Program

CC&S Project Working Papers

Financial Assurance for Class VI Wells: Lessons Learned from Prior EFAB Work

Overview of Financial Assurance Mechanisms by Federal Statute

Chiara Trabucchi Congressional Testimony on CC&S before the Senate Committee on Energy and Natural Resources -- May 14, 2009

Chiara Trabucchi Responses to CC&S Questions received from the Senate Committee on Energy and Natural Resources – June 1, 2009

The Oil Spill Liability Trust Fund

The Price Anderson Act Paradigm as a Model for Regulation of carbon Capture & Sequestration
The Price Anderson Act: A Basic Primer

Comparison of State CCS Programs in terms of the Price Anderson Analytic Metric by
Regulatory Standards and Legislation

What Type of Outreach Should the CC&S Workgroup Use to Vent its Work to Ensure Accuracy?

Draft Matrix of Potential Carbon Capture & Sequestration Risks and Financial Assurance Considerations

Carbon Capture & Sequestration Working Paper

August 10-11, 2009

Table 1. Matrix of Financial Instruments and Potential Carbon Capture and Sequestration Risks

Risk	Financial Instruments									
	Private Sector Trust Fund	Public Sector Trust Fund	Letter of Credit	Escrow Account	Certificate of Deposit	Surety Bond	Insurance	Line of Credit	Financial Test	Corporate Guarantee
Potential Human Health and Welfare Impacts										
Catastrophic weather events resulting in supply chain interruption or demand surges for energy						C	C	C	C	C
Technological failure leading to bodily injury						C, S(O)	C, S(O)		C, S(O)	C, S(O)
Changes in quality of or access to recreational activities	S(C)	S(L)	S(C)	S(C)	S(S)	S(C)	S(C)	S(S)	S(S), S(C)	S(S), S(C)
Human health effects (e.g. illness days, asthma incidents, mortality)	S(C)	S(L)	S(C)	S(C)		S(C)	S(C)		S(C)	S(C)
Potential Ecological Impacts										
Adverse impacts to ecological receptors (e.g., reduced vegetation, endangered species issues)	S(C)	S(L)	S(C)	S(C)		S(C)	S(C)		S(C)	S(C)
Potential Damages to Property										
Surface/subsurface trespass						S(S)	S(S)		S(S)	S(S)
Asset infringement or restrictions to land use or subsurface activities						S(S)	S(S)		S(S)	S(S)
Induced seismic activity						S(O)	S(O)			
Damage resulting from geologic exploration or ground heave						S(O)	S(O)			
Corrective action issues	S(C)	S(L)	S(C)	S(C)		S(C)	S(C)		S(C)	S(C)

VERY, VERY DRAFT - 7/25/2009

Table 1. Matrix of Financial Instruments and Potential Carbon Capture and Sequestration Risks

Risk	Financial Instruments									
	Private Sector Trust Fund	Public Sector Trust Fund	Letter of Credit	Escrow Account	Certificate of Deposit	Surety Bond	Insurance	Line of Credit	Financial Test	Corporate Guarantee
Potential Atmospheric Releases										
Improper Venting of CO ₂						C	C		C	C
Financial exposure if allowances are exceeded				C				C	C	C
Pipeline fractures						T	T		T	T
Business interruption						S(L)	S(L)	S(L)	S(L)	S(L)
Legal liability arising from failure to permanently sequester carbon (e.g., invalidation of carbon credits)						S(L)	S(L)	S(L)	S(L)	S(L)
Loss of tax benefits/site permits						S(L)	S(L)		S(L)	S(L)
Potential Impacts to Water Resources										
Drinking water or groundwater contamination	S(C)	S(L)	S(C)	S(C)		S(C)	S(C)		S(C)	S(C)

Key:

C = Capture

T = Transport

S(S) = Sequestration, Siting

S(O) = Sequestration, Operation

S(C) = Sequestration, Closure and Post-Closure

S(L) = Sequestration, Long-Term Stewardship

Table 2. Summary of Preliminary Rationale

Risks	Explanation
Potential Human Health and Welfare Impacts	
Catastrophic weather events resulting in supply chain interruption or demand surges for energy	<ul style="list-style-type: none"> ▪ In the event of catastrophic events, the company likely would finance activities using cash on hand or through the use of a short-term credit facility (e.g., line of credit). ▪ Depending on the nature of the catastrophic event, the company may have transferred the risk to a surety or insurer (e.g., through the use of flood insurance, etc.).
Technological failure leading to bodily injury	<ul style="list-style-type: none"> ▪ Risks are generally short-term (i.e., only through the capture or injection period). ▪ Likely are retained by the company (e.g., financial test or corporate guarantee) or managed with a risk transfer mechanism (e.g., bond or insurance policy).
Changes in quality of or access to recreational activities	<ul style="list-style-type: none"> ▪ Access changes likely would occur during the siting phase, and generally would be one-time expenses. The company likely would finance activities using cash on hand or through the use of short-term mechanisms like a line of credit or certificate of deposit. ▪ Changes to the quality of recreational activities may occur during the closure/post-closure or long-term stewardship phase. ▪ During a defined closure/post-closure period where companies may continue to operate, risk could be managed using either third-party or self-insurance mechanisms. ▪ During long-term stewardship, the company may no longer be operating. Given the long time horizon and the potential magnitude of damages, it is unlikely that a private, third-party mechanism would be sufficient to manage the risk.
Human health effects (e.g. illness days, asthma incidents, mortality)	<ul style="list-style-type: none"> ▪ These are human health effects likely occurring as a result of long-term carbon dioxide exposure, rather than catastrophic release. Could occur either during the closure/post-closure or long-term stewardship phase. ▪ During a defined closure/post-closure period where companies may continue to operate, risk could be managed using either third-party or self-insurance mechanisms. ▪ During long-term stewardship, the company may no longer be operating. Given the long time horizon and the potential magnitude of damages, it is unlikely that a private, third-party mechanism would be sufficient to manage the risk.
Potential Ecological Impacts	
Adverse impacts to ecological receptors (e.g., reduced vegetation, endangered species issues)	<ul style="list-style-type: none"> ▪ These are impacts likely occurring as a result of long-term carbon dioxide exposure, and could occur either during the closure/post-closure or long-term stewardship phase. ▪ During a defined closure/post-closure period where companies may continue to operate, risk could be managed using either third-party or self-insurance mechanisms. ▪ During long-term stewardship, the company may no longer be operating. Given the long time horizon and the potential magnitude of damages, it is unlikely that a private, third-party mechanism would be sufficient to manage the risk.
Potential Ecological Impacts	
Surface/subsurface trespass	<ul style="list-style-type: none"> ▪ Risk probably would be identified during the siting phase. ▪ Because the risk is short-term and resulting costs would probably be one-time, risk could be retained by the company (e.g., financial test or corporate guarantee) or managed with a risk transfer mechanism (e.g., bond or insurance policy).
Asset infringement or restrictions to land use or	<ul style="list-style-type: none"> ▪ Risk probably would be identified during the siting phase. ▪ Because the risk is short-term and resulting costs would probably be one-time, risk could be retained by the company (e.g., financial test or

Table 2. Summary of Preliminary Rationale

Risks	Explanation
subsurface activities	corporate guarantee) or managed with a risk transfer mechanism (e.g., bond or insurance policy).
Induced seismic activity	<ul style="list-style-type: none"> ▪ Seismic activity represents a low probability but highly damaging event. Risk greatest during the active injection period. ▪ The low probability of risk combined with the potentially large magnitude of damages makes it unlikely the company could sufficiently fund a third-party financial instrument like a trust fund or letter of credit. ▪ The company probably would not want to retain the risk itself, and would choose to manage it using a risk transfer mechanism (e.g., bond or insurance policy).
Damage resulting from geologic exploration or ground heave	<ul style="list-style-type: none"> ▪ Similar to seismic activity, this represents a low probability but highly damaging event. Risk greatest during the active injection period. ▪ The low probability of risk combined with the potentially large magnitude of damages makes it unlikely the company could sufficiently fund a third-party financial instrument like a trust fund or letter of credit. ▪ The company probably would not want to retain the risk itself, and would choose to manage it using a risk transfer mechanism (e.g., bond or insurance policy).
Corrective action issues	<ul style="list-style-type: none"> ▪ Corrective action activities would not be identified until the closure/post-closure or long-term stewardship phases. ▪ During a defined closure/post-closure period where companies may continue to operate, risk could be managed using either third-party or self-insurance mechanisms. ▪ During long-term stewardship, the company may no longer be operating. Given the long time horizon and the potential magnitude of damages, it is unlikely that a private, third-party mechanism would be sufficient to manage the risk.
Potential Atmospheric Releases	
Improper Venting of CO ₂	<ul style="list-style-type: none"> ▪ Risks are generally short-term (i.e., only during the capture period). ▪ It is likely that risks are retained by the company (e.g., financial test or corporate guarantee) or managed with a risk transfer mechanism (e.g., bond or insurance policy).
Financial exposure if allowances are exceeded	<ul style="list-style-type: none"> ▪ Risk is not to the public, but rather to the company undertaking sequestration. The company likely would cover any expenses using cash on hand or through the use of short-term financial mechanisms like a certificate of deposit or line of credit. ▪ Because the company should be able to manage risk entirely on its own (e.g. through systematic recording of carbon emissions), it seems unlikely that the company would seek to transfer the risk to a third-party.
Pipeline fractures	<ul style="list-style-type: none"> ▪ Risks are generally short-term (i.e., only during transport). ▪ It is likely that risks are retained by the company (e.g., financial test or corporate guarantee) or managed with a risk transfer mechanism (e.g., bond or insurance policy).
Business interruption	<ul style="list-style-type: none"> ▪ Risk is not to the public, but rather to the company undertaking sequestration. ▪ If the company remains operational during the long-terms stewardship phase, the company likely would finance activities during a business interruption using cash on hand or through the use of a short-term credit facility (e.g., line of credit). It also may choose to hedge against the risk using a risk transfer mechanism (e.g., surety bond, or insurance). ▪ Given the long-time horizon, it seems unlikely the company would set aside cash in advance using a third-party mechanism.
Legal liability arising from failure to permanently sequester carbon (e.g.,	<ul style="list-style-type: none"> ▪ Risk is not to the public, but rather to the company undertaking sequestration. ▪ If the company remains operational during the long-terms stewardship phase, the company likely would pay any legal penalties using cash on hand or through the use of a short-term credit facility (e.g., line of credit). It also may choose to hedge against the risk using a risk

VERY, VERY DRAFT - 7/25/2009

Table 2. Summary of Preliminary Rationale

Risks	Explanation
invalidation of carbon credits)	<p>transfer mechanism (e.g., surety bond, or insurance).</p> <ul style="list-style-type: none"> ▪ Given the level of uncertainty about potential future liability, it seems unlikely the company would set aside cash in advance using a third-party mechanism.
Loss of tax benefits/site permits	<ul style="list-style-type: none"> ▪ Risk is not to the public, but rather to the company undertaking sequestration. ▪ If the company remains operational during the long-terms stewardship phase, the company likely would retain the risk itself. It also may choose to hedge against the risk using a risk transfer mechanism (e.g., surety bond, or insurance). ▪ Given that the risk is the loss of future <i>benefits</i>, it seems unlikely the company would set aside cash in advance using a third-party mechanism.
Potential Impacts to Water Resources	
Drinking water or groundwater contamination	<ul style="list-style-type: none"> ▪ Drinking water or groundwater contamination could occur over a long time horizon, and may not be identified until the closure/post-closure or long-term stewardship phase. ▪ During a defined closure/post-closure period where companies may continue to operate, risk could be managed using either third-party or self-insurance mechanisms. This would be similar to managing risk under the current UIC framework. ▪ During long-term stewardship, the company may no longer be operating. Given the long time horizon and the potential magnitude of damages, it is unlikely that a private, third-party mechanism would be sufficient to manage the risk.

DRAFT

EFAB FINANCIAL ASSURANCE WORKGROUP COST-ESTIMATION PROJECT

Overview and Status of Cost-Estimation Work

August 2009 Update

Overview of Project Activities

1. Draft Cost-Estimation Consultative Group Skeleton Concept outline and send to the Workgroup for review - - ***Completed March 2009***
2. Flesh out the outline and develop a Workgroup-approved draft Cost-Estimation Consultative Group Skeleton Concept paper - - ***Ongoing***
3. Identify and pull together a group of State environmental representatives - - ***Completed June 2009***
4. Send Draft Cost-Estimation Consultative Group Skeleton Concept paper to the State representatives group for review - - ***Completed July 2009***
5. Hold cost-estimation discussion with Zurich's cost-estimation expert(s) - - ***To Be Done***
6. Hold a teleconference call with the group of State representatives to discuss the draft Cost-Estimation Consultative Group Skeleton Concept paper - - ***Completed July 2009***
7. Identify and pull together a group of industry representatives - - ***Underway***
8. Send draft Cost-Estimation Consultative Group Skeleton Concept paper to the group of industry representatives for review - - ***To Be Done***
9. Hold a teleconference call with the group of industry representatives to discuss the draft Cost-Estimation Consultative Group Skeleton Concept - - ***To Be Done***
10. Schedule, prepare and hold an EFAB Cost-Estimation Workshop including a wide range of participants from the States, industry, academia, and other interested parties - - ***To Be Done***

Current Activities

- Review and discuss the staff summary of the July 2009 cost-estimation teleconference call held with a group of State representatives
- Discuss the draft Cost-Estimation Consultative Group Skeleton Concept outline and obtain detailed Workgroup member comments/revisions

Next Steps

- Develop and prepare the next draft of the Cost-Estimation Consultative Group Skeleton Concept outline incorporating Workgroup feedback
- Prepare for and hold a cost-estimation teleconference call with a diversified range of private sector representatives, including Zurich's cost-estimation expert(s)
- Begin work on holding a Cost-Estimation Workshop – need to set a date, decide on and obtain a meeting venue, etc.

Marcia E. Mulkey

Marcia E. Mulkey serves as Acting Deputy Associate Administrator of the Environmental Protection Agency's Office of Policy, Economics, and Innovation (OPEI). Marcia has over 20 years of scientific and policy experience. She has provided leadership and expertise to EPA in the Office of the Administrator, the Office of the General Counsel, the Office of Enforcement and Compliance Assurance, the Office of Prevention, Pesticides, and Toxic Substances and Region III. Prior to her interim appointment as Deputy Associate Administrator, she served as Acting Associate Administrator of OPEI. Prior to this, she directed the Office of Site Remediation Enforcement. Her service to EPA includes leadership of Region III's Office of Regional Counsel from 1988 to 1998, with an interlude serving as Acting Principal Deputy Counsel. From 1998 – 2003, Ms. Mulkey directed the Office of Pesticides Programs during key phases of the effort to successfully implement the landmark Food Quality Protection Act. She has served in teaching positions at home and abroad. She was twice recognized with Presidential Rank awards as a senior EPA executive. Ms. Mulkey is a cum laude graduate of Harvard Law School and a member of the District of Columbia Bar.

Creative Approaches to Supporting the Development and Adoption of Environmental Technology, Including Financial Mechanisms



A Presentation for the
Environmental Financial Advisory Board
August 11, 2009



Presentation Overview

- Introduction to Environmental Technology
- NACEPT and Environmental Technology
- Environmental Technology at EPA
- Case Studies of Environmental Technologies
- Financing & Environmental Technology
- Discussion



Environmental Technology:

What do we mean? Why is it important?



Environmental Technologies are...

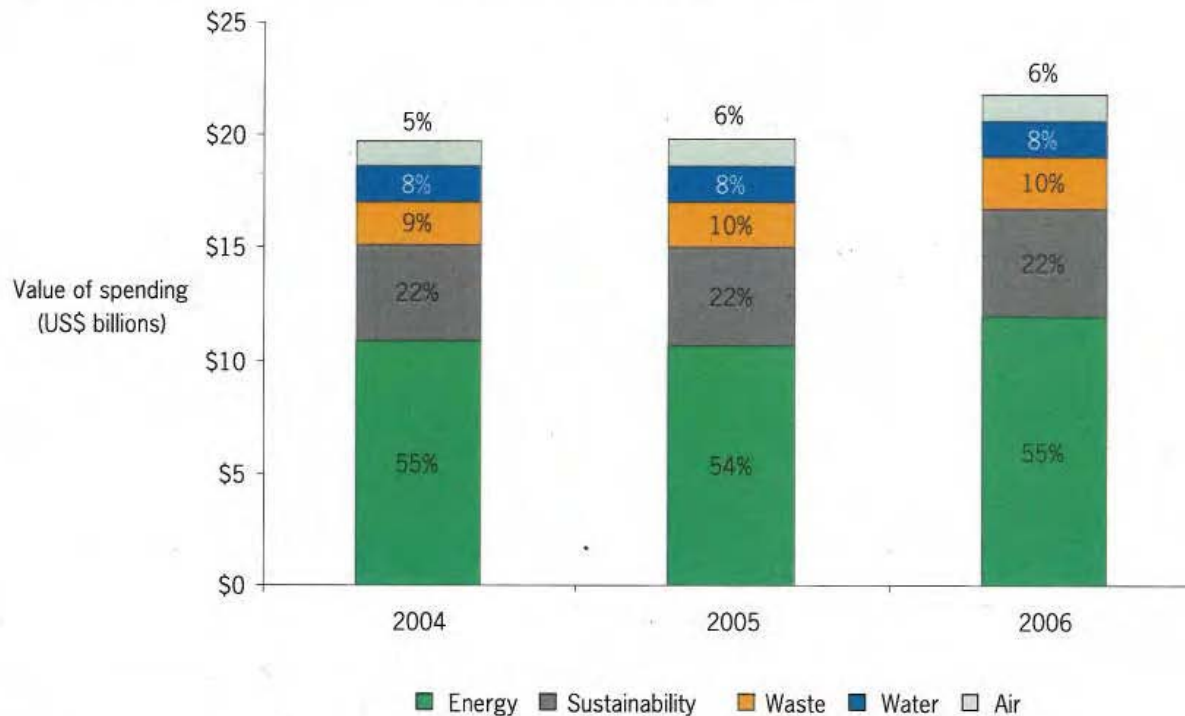


- Environmental technologies include those that...
 - Reduce or prevent pollution (includes energy efficiency)
 - Capture and safely sequester pollution
 - Clean up pollution
 - Measure contaminants/pollutants
- Sustainable technologies must...
 - Be cost effective
 - Not cause unintended impacts that outweigh their value



CleanTech Spending: US Corporate R&D

Fig. 2.3.3: Energy dominates the cleantech corporate R&D spending



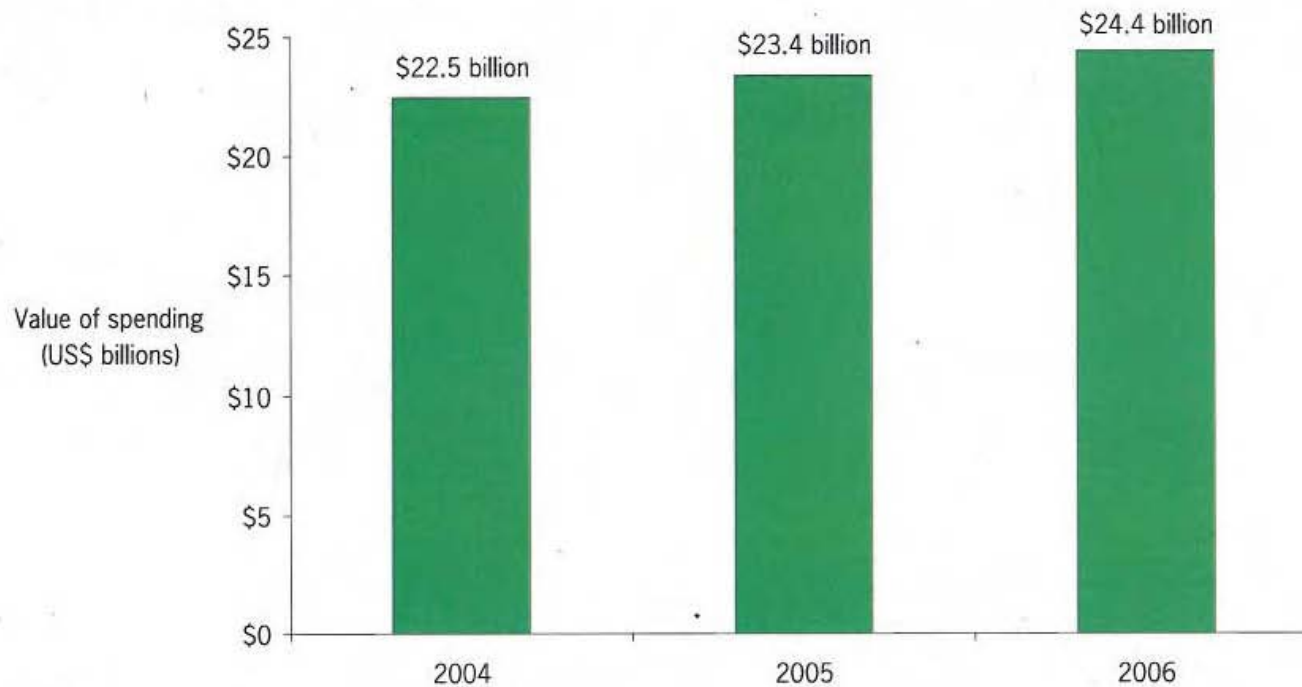
Source: Lux Research Inc.

- **Air accounts for 6% of spending but has shown consistent growth.** Clean air technologies accounted for the smallest share of corporate R&D in 2006 at \$1.2 billion worldwide – however, growth rates have held consistently at 6% per year since 2004.



CleanTech Spending: Worldwide Government R&D

Fig. 2.2.1: Increase in cleantech government funding barely beats inflation



Source: Lux Research Inc.

CleanTech Spending: US Venture Capital

Fig. 2.4.5: Cleantech VC deals span five key sectors

Sector	Description	VC investment value 1995 to 2005	VC investment value 2006
Energy	Emerging technologies that improve the efficiency of energy generation, storage, and distribution	\$2.37 billion	\$1.46 billion
Air	Emerging technologies for air monitoring, air purification, and energy-efficient air conditioning	\$45.0 million	\$6.29 million
Water	Emerging technologies for monitoring and purifying water, including novel desalination techniques	\$175 million	\$97.6 million
Waste	Emerging technologies to stop pollution from entering the environment, or convert it to useful byproducts	\$249 million	\$80.1 million
Sustainability	Catch-all category for emerging technologies that employ novel techniques for reducing environmental impact	\$1.18 billion	\$394 million

Source: Lux Research Inc.



CleanTech Spending: US Market

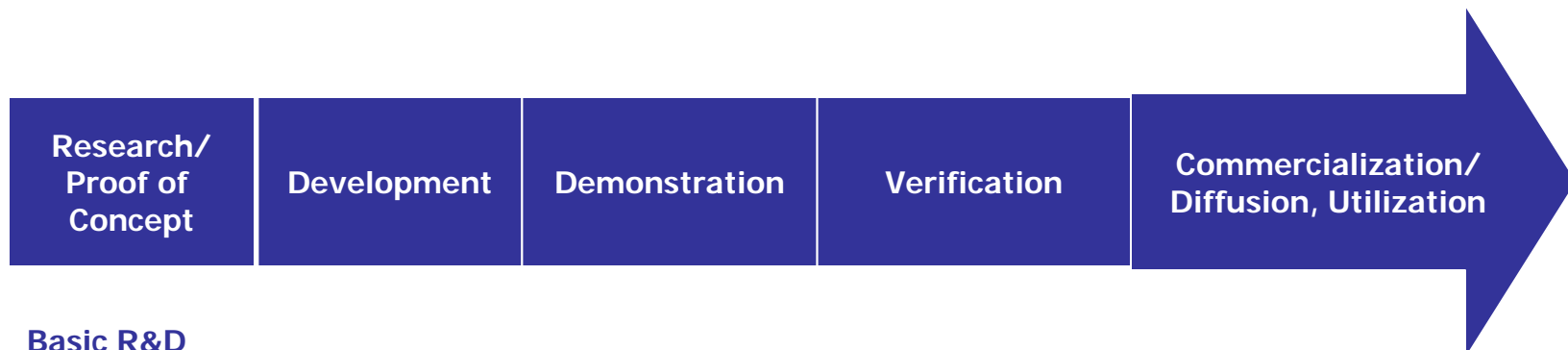
(Dollars in billions)

Environmental Industry Segment	1970	1980	70-80 Growth	1990	80-90 Growth	90-00 Growth	2000	2010	00-10 Growth
Services									
Analytical Services	0.1	0.4	300%	1.5	314%	1.6	7%	1.9	20%
Wastewater Treatment Works	4.3	9.2	116%	19.8	116%	30.0	52%	44.5	48%
Solid Waste Management	3.2	8.5	164%	26.1	208%	42.0	61%	58.8	40%
Hazardous Waste Management	0.1	0.6	550%	6.3	921%	8.0	27%	9.7	21%
Remediation/Industrial Services	0.1	0.4	550%	8.5	1813%	10.0	18%	13.7	37%
Consulting and Engineering	0.3	1.5	367%	12.5	761%	18.0	44%	28.8	60%
Equipment									
Water Equipment and Chemicals	3.2	6.9	117%	13.5	95%	20.0	48%	32.6	63%
Instruments and Information Systems	0.1	0.2	100%	2.0	820%	4.0	100%	6.0	50%
Air Pollution Control Equipment	1.0	3.0	196%	10.7	258%	18.0	68%	19.1	6%
Waste Management Equipment	2.0	4.0	105%	10.4	159%	9.6	-8%	11.5	19%
Process and Prevention Technology	0.0	0.1	259%	0.4	418%	1.2	200%	2.0	70%
Resources									
Water Utilities	5.7	11.9	109%	19.8	67%	33.0	67%	42.3	28%
Resource Recovery (Recycling)	1.2	4.4	283%	13.1	197%	18.0	37%	25.5	42%
Environmental Energy Sources	0.3	1.5	420%	1.8	15%	15.0	733%	38.2	155%
U.S. Totals:	\$21.6	\$52.6	145%	\$146.4	178%	\$228.4	56%	\$334.6	46%

Source: Environmental Business Journal



Technology Continuum



Examples:

Basic R&D
Grants

Small Business
Innovation
Research

Cooperative
Research and
Development

Verification/demonstration

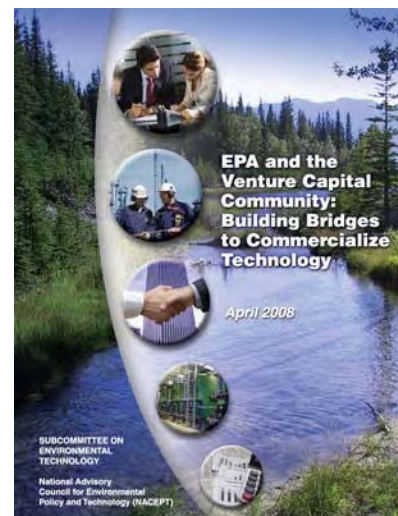
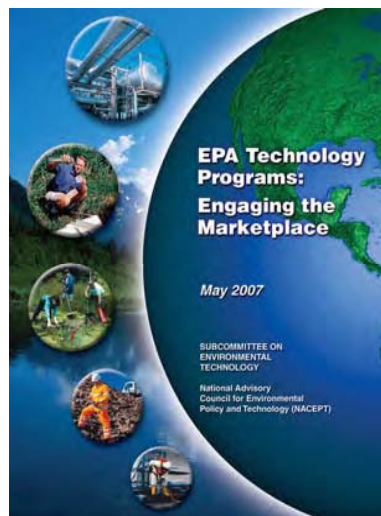
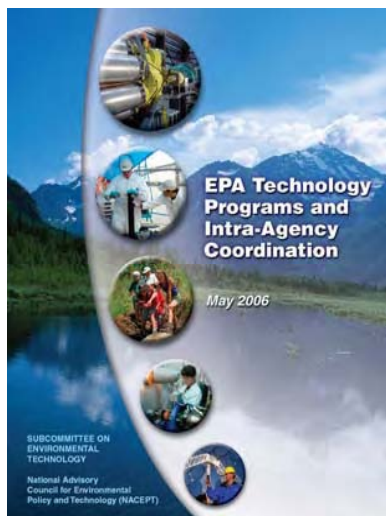
Commercial
scale
grants/loans

Export
programs,
trade
promotion,
trade financing



NACEPT Environmental Technology Subcommittee Reports

- EPA Technology Programs and Intra-Agency Coordination (May 2006)
- EPA Technology Programs: Engaging the Marketplace (May 2007)
- EPA and the Venture Capital Community: Building Bridges to Commercialize Technology (April 2008)



NACEPT Report: *EPA Technology Programs and Intra-Agency Coordination (2006)*

Recommendations:

- Create and broadly publish the Environmental Technology Development Continuum
- Enhance Internal EPA Technology Program Effectiveness
- Improve the Environmental Technology Council (ETC)
- Expand the Environmental Technology Verification program (ETV)

EPA's Response:

- Senior Environmental Technology Officer (SETO)
- Increased role of Environmental Technology Council (ETC)
- Regional Environmental Technology Advocacy Network (RETAN)
- Environmental Technology Assessment and Verification Staff



NACEPT Report: *EPA Technology Programs: Engaging the Marketplace (2007)*

Recommendations:

- Create new and diverse partnerships
- Encourage market demand
- Engage in international issues
- Address global climate change
- Expand the Environmental Technology Verification program (ETV)

EPA's Response:

- Progress continues with SETO, RETAN, ETC, and ETV
- EPA Science Adviser charged with identifying additional technology support opportunities
- EPA partnerships to promote greenhouse gas-reducing technologies



The Environmental Technology Initiative

Newly created effort in the Office of the Science Advisor, largely in response to NACEPT recommendations includes:

- **Senior Environmental Technology Officer (SETO)**

- Focal point for environmental technology in EPA
- Coordination
- Chairs EPA's Environmental Technology Council

- **Environmental Technology Council (ETC)**

- Originally established in 2004
- Cross-Agency representation
 - Network of technology contacts
- Action Teams
 - Multimedia problems with tech solutions
- Goal is to:
 - Facilitate innovative technological solutions to the Agency's priority environmental problems and to collaborate with other Federal Agencies and States to leverage funding and resources.



On Going EPA Environmental Technology Activities: ETC Action Teams

- Remote Sensing of Pollutants
- Recovering the Value of Waste for Environmental and Energy Sustainability
- Technologies Promoting the Sustainable Use of Contaminated Sediments and the Beneficial Reuse of Waste-Related Materials
- Lead Paint:
 - Remediation in Dwellings
 - Development of more accurate lead paint and dust test kits
- Continuous Fine Particulate Monitoring
- Improved Pesticide Application Equipment to Reduce Spray Drift
- Rapid Detection of Microbial Contamination of Water: Application of Molecular Technologies to Source and Potable Water Monitoring



EPA's "Technology Continuum"

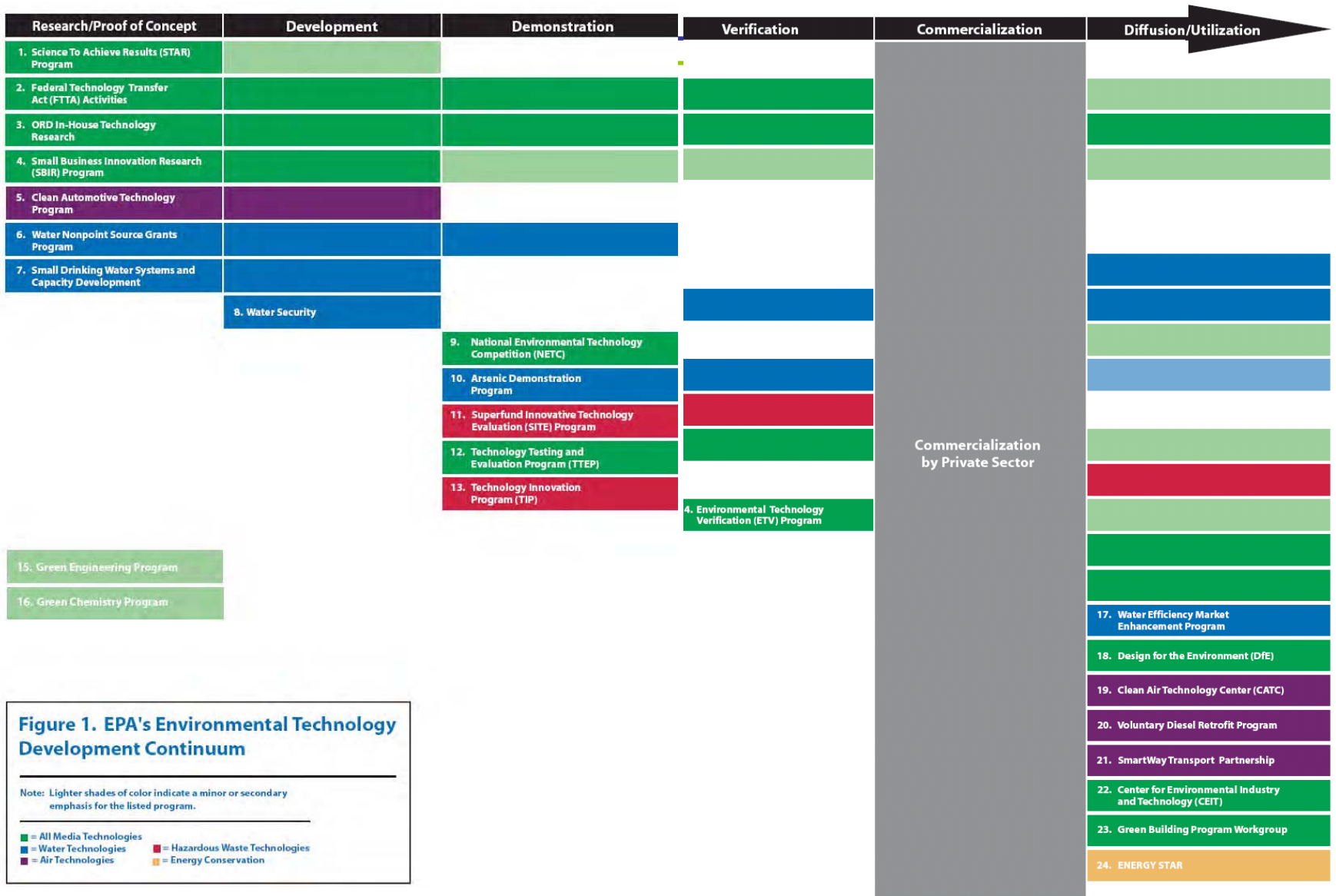


Figure 1. EPA's Environmental Technology Development Continuum

Note: Lighter shades of color indicate a minor or secondary emphasis for the listed program.

- = All Media Technologies
- = Water Technologies
- = Air Technologies
- = Hazardous Waste Technologies
- = Energy Conservation

NACEPT Report: *EPA and the Venture Capital Community: Building Bridges to Commercialize Technology (2008)*

Recommendations:

- Set long-term greenhouse gas standards
- **Create and maintain communication with investment community**
- **Strengthen financial support and reduce regulatory risk for technologies**
- Streamline permitting for new technology commercialization
- Enforce environmental regulations consistently
- Use metrics and monitor new technologies
- Expand the Environmental Technology Verification program (ETV)

EPA's Response:

- Regions 5 and 6 have hosted venture capital forums
- Region 1 will host a venture capital forum that focuses on energy efficiencies in the fall
- Region 5 is conducting a roundtable Emerging Drivers for Cleantech Investments: An EPA Investor Roundtable in September



Environmental Technology Verification



- EPA houses the Environmental Technology Verification Program (ETV)
- ETV provides a mechanism for third party verification of environmental technology performance
- Development of test protocols and verifications are generally paid by the technology developer/vendor
- Costs are generally highest for the first technologies tested – discouraging the first verifications.



ETV Case Study: Ambient Ammonia⁶⁴ Monitors

- Largest source of ammonia in US is Animal Feeding Operations (AFOs)
- Current sampling is time consuming labor intensive and not continuous
- New ammonia monitors better and more easily quantify emissions
- EPA have Voluntary Compliance Agreement (VCA) with AFOs to use technology
- 2,000 AFOs agreed to VCA in 37 states



ETV Case Study : Laser Touch Spray Technology

- Paint spray targeting device developed by the University of Iowa.
- Helps spray painters reduce paint overspray.
- Less paint is used which reduces overall paint cost, reduces VOCs and HAPs emitted and solid waste produced.
- Technology is inexpensive and has been widely adopted by auto part manufacturers, auto collision repair shops and the military.



ETV Case Study: Eductor Vapor Recovery Unity (EVRU)

- Technology designed to recover gas from storage tank vents for utilization or sale.
- Reduces emissions of HAPs, VOCs and methane.
- Low tech, non-mechanical with no moving parts to maintain.
- Up to 3,170 facilities (out of an estimated potential market of 12,670) could voluntarily install the EVRU, in part because of the technology's economic benefits.
- The estimated economic value of the recovered natural gas could equal \$41 million to \$120 million per year.
- Because of the EVRU manufacturer has become a global leader in vent gas recovery and reduction and has installed units on 4 continents.



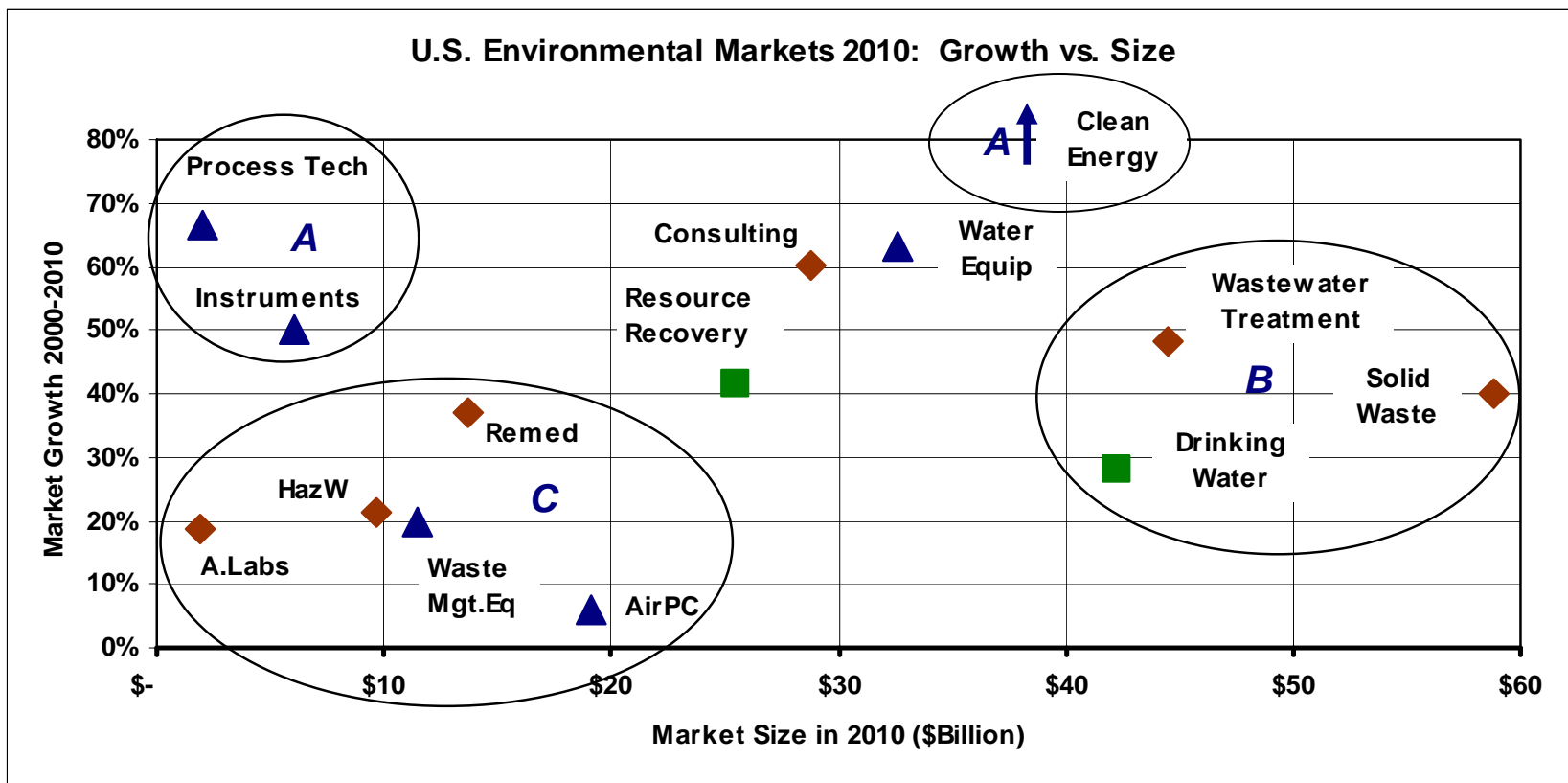
Market Traits Affect Financing Approaches

- Different market traits – demand, growth rate, competitive dominance, nature of purchasing decisions – call for different financing considerations
 - **Fast Growing Markets (Group A):** Clean energy and instruments offer much higher growth rates (>20% per year) allowing recovery of equity investments. Larger markets, like water treatment and resource recovery with steadier growth rates, that match the economy and demographic trends, allow for some debt funding and project finance, often with some public finance.
 - **Large markets growing approximately at the rate of the economy (Group B):** Municipal ownership is high in these sectors precluding venture capital. Tax exempt bonds, international lending are more typical.
 - **Shrinking markets (Group C):** Declining markets, like remediation and consulting, must rely on asset conversion, e.g. brownfield development or facility turnaround, to generate returns since losses on operations are common.
- For international markets, project debt financing is a paramount factor since markets and enforcement mechanisms are not well-developed.



U.S. Enviro Markets 2010 Forecast: Growth vs. Size

- A) Small markets growing faster: Process Technology, Instruments, Energy, Water
- B) Large markets growing basically with the economy: Infrastructure, Services
- C) Shrinking markets: Traditional backend Cleanup and Remediation



Examples of Technology Financing Supported by Government

- US Army Venture Fund (OnPoint Technologies)
 - Authorized by 2002 Defense Appropriation Act
- CIA Venture Fund (In-Q-Tel)
 - Launched in 1999
- Australian and UK Government Venture Funds
 - UK initial budget \$150M
 - Australia 2008 budget \$400+M
- Department of Energy Loan Guarantee Program
 - Authorized by Energy Policy Act of 2005
 - Up to \$30B under Obama Administration
- Small Business Innovative Research Grants
 - EPA's current mechanism for funding private technology development and other innovative commercial research
 - Budget is a fixed percentage of Federal Agency R&D appropriations
 - 2009 EPA budget ~\$4.8M
- State Government
 - Michigan is providing GE with \$74 million in tax incentives to build a \$100 million advanced-manufacturing center to develop renewable-energy technologies near Detroit
 - Many State technology development offices are closing due to budget constraints
- Export-Import Bank – Environmental Exports Program





Discussion Questions

- Are finance challenges a significant limitation in commercializing environmental technologies? If so, what actions could EPA take to overcome the limitations? How does that vary with types technologies/situations?
- What kind of EPA information about current environmental technology needs and knowledge about future needs can be conveyed to potential public (e. g. DOE) and private financiers and how?
- The venture capital community has expressed an interest in learning more about what EPA views as the upcoming environmental “grand challenges” that will likely require technology breakthroughs. How can EPA best develop and convey this type of insight to investors?





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Discussion Questions Cont.

- How could EPA leverage Government Mechanisms? Are there modest “boosters” to capital availability that EPA could consider (e.g. inducement prizes, business incubators)? Are there other financing mechanisms that EPA can better match to technology opportunities?
- Is government funded technology verification (e.g. ETV reports) important to catalyze private financing? What would make verification more effective in aiding technology commercialization?
- To what extent can government purchasing be a factor in promoting the advancement of environmental technology?



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U.S. EPA Financial Advisory Board
SRF Investment Working Group

Status Report

EFAB's August 2008 "Report on the Relative Benefits of the Direct Loan and Leveraged Loan Approaches for Structuring State Revolving Loan Funds," recommended that EPA explore the role of investment returns in promoting the long term health and success of state administered SRF programs. The Council of Infrastructure Financing Authorities ("CIFA") is currently polling its members regarding current investment practices. The purpose of the inquiry is to make an assessment of (a) the legal, institutional and operating constraints (including USEPA Operating Agreements) that directly impact the investment function; (b) the relative importance assigned by state SRF administrators to the investment function; (c) the investment approaches used by state's and the impact any investment loss experience may have had in shaping it; and (d) gauge support for EPA taking a more active role in linking investment practices to SRF specific program goals.

CIFA has agreed to share these results with the SRF Investment Options Workgroup. The Workgroup plans to assess the findings and prepare a report based on the findings. The goal of the report is to assess current investment practices and make recommendations to USEPA with respect to steps that the federal government might consider taking to promote the role of the investment function in SRF administration. Specific questions to be answered include:

- How critical is the location of the investment function within state government to the investment approach and importance assigned to SRF investment returns?
- How do current legal and operating constraints shape the investment approach?
- Is SRF staff expertise sufficient to support a more active investment function?
- Consistent with achieving desired program returns, would requiring state's to develop best investment management practices result in better overall SRF program performance?
- Should federal legislation be modified to allow an endowment approach to SRF investment management?

Questions for SRF Program Managers Regarding Investment Practices

1. Where does the investment function reside?
 - a. SRF manager
 - b. SRF financing entity
 - c. State treasurer
 - d. Other (please specify)

2. Does the entity responsible for managing SRF monies have staff that is knowledgeable or can be trained to manage investments? If not, can you retain investment services via a contract?

3. How does the state's governing statute direct the investment of SRF monies?

4. Given where the investment function resides and any statutory considerations:
 - a. Are investment decisions made with a view to the SRF's specific program goals such as building Funds capacity? _____
 - b. How do you view the purpose of the investment authority under the CW and DW SRF federal statutes? _____
 - c. Given current investment authority, in what ways is the management approach directed toward protection of principal versus growing the capital base of the program?

 - d. How would you describe the investment management approach? Is the approach driven by a philosophy that is conservative, moderately conservative, balanced, moderately aggressive, or aggressive? _____

5. Has your program or State ever experienced a negative outcome on investments? If so, please describe what impact it had, if any, on the investment decision making process

6. Does your program have written investment guidelines/policies/procedures and are they regularly reviewed and updated to allow for new investment options?

7. Now that the program has matured, do you see any value in amending governing statutes and allow the SRF to pursue broader investment options to grow the capacity of the Funds?

8. Does your USEPA Operating Agreement contain any restrictions regarding investment practices? If so, please explain _____

9. Has your Regional EPA staff ever rejected a request to modify your investment guidelines or not accepted a change regarding investment practices in your Operating Agreement?

10. Would it be beneficial if EPA required that investment practices be based on achieving SRF-specific program goals? _____

Proposed New Project:

Financial Incentives for Carbon Emission and Credit Trading

I am proposing that the Innovative Financing Tools Workgroup focus on financial incentives for carbon and other emission credit trading (except carbon sequestration) as well as nutrient trading. I think both will be major issues that the Agency will be dealing with over the coming years. The Board should have a ready audience.

I believe that the Agency's report pursuant to the recent Executive Order on the Chesapeake Bay will deal heavily with nutrient trading. Virginia already has a system which is only point-to-point. Maryland is working on coming up with one. Pennsylvania has come up with a highly innovative concept that involves the use of CWSRF money and has already been approved by the CWSRF Office in Washington, D.C. Unfortunately, they haven't gotten it off the ground yet in Pennsylvania because of the risks associated with it. As it turns out, our VEIB concept is just what they need to mitigate such risks. This, alone, would be a very innovative concept to report on. We can also find out what the other states are doing, if anything. We have an offer from the Evergreen/Red Barn group, who are trying to organize the Pennsylvania program, to give us a briefing. I recommend that we take them up on their offer.

As you also know, both the Agency and House Energy & Commerce Committee Chair, Henry Waxman, are working on carbon trading concepts as part of the overall emphasis on climate change. In addition, the CWSRF has already promulgated a rule approving use of their funds to reduce airborne mercury deposition. We should write this up; especially since a mercury trading program already exists. In addition, I think the CWSRF is also poised to approve funding of air deposition reduction programs in the Chesapeake states, because of the well-documented impact on the Bay. Finally, our 2008 report on diesel emissions discussed the sale of carbon credits that Region 9 approved for the City of San Diego. We should revisit this issue and see where this is going.

In short, financial incentives can have a major positive impact on trading programs. We should begin documenting how this can occur and make recommendations wherever appropriate.