Review of State Regulations, Standards, and Practices, Related to the Use of Coal Combustion Products: Texas Review Case Study

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ABSTRACT

A frequent barrier that hinders the use of coal combustion products (CCPs) is the broad range of state laws, regulations, policies, and guidelines regarding the management of CCPs. In addition, use practices and existing barriers vary significantly from state to state. Some states developed progressive and effective guidance for CCP utilization, while other states still lack the resources and information to feel comfortable with a more progressive approach.

To address these issues, the Energy & Environmental Research Center worked with the U.S. Environmental Protection Agency (EPA) and Headwaters Resources to perform a review of state regulations, standards, and practices related to the use of CCPs and developed a road map that may help other states increase the use of CCPs in an environmentally sound manner. Texas was selected as the pilot state because of its progressive approach to CCP utilization and its support network to implement such activities.

This paper is a case study of the first state review of Texas. It describes the logistical framework under which the review was conducted and provides a summary of findings.

PRE-SITE VISIT REVIEW PROCESS

The following logistical tasks were completed prior to the site visit. The project team feels it is important to document the process so that other reviews may be conducted using the existing framework.

Task 1: Establish an Administrative Team – A project administrative team was established to perform the majority of the administrative work, including organizing the review, compiling findings, and writing reports.

Task 2: Select a Pilot State – The project's administrative team conducted an extensive evaluation to select the pilot state. The team looked for a pilot state that:

1. Exhibited improved CCB utilization rates.

2. Demonstrated successful cooperation between industry and government agencies.

3. Would serve as a realistic prototype.

4. Has an established support network.

States that were recommended or volunteered to participate as the pilot state included the following:

- Colorado
- Illinois
- Indiana
- North Dakota
- Ohio
- Pennsylvania
- Texas

Next, input was sought from various groups and based on the criteria outlined above, Texas was selected as the pilot state.

Task 3: Form an Advisory Board – A second team, the project advisory board, was formed to provide input to interviewee selection, assist in the development of a standard questionnaire, and review findings.

Task 4: Assemble a Review Team – A select group of individuals comprised the review team whose role was to administer the meetings at the review.

Task 5: Create a Review Guide – A review guide was developed that included background information for interviewees and targeted questionnaires for each of the following discussion groups:

- Government agencies – directors and other key personnel of state or regional transportation and environmental agencies

- Marketers/end users – CCP marketers and ready-mix suppliers

- CCP generators – utilities/producers of CCPs

- Special interest – environmental and citizen groups, research institutions

Task 6: Develop a List of Interviewees – A list of interviewees for each of the discussion groups was created.

Task 7: Prepare an Agenda –The review took place on September 13–15, 2004, to coincide with a C^2P^2 Workshop in Austin, Texas. In addition, a conference call was held for interviewees who had scheduling conflicts. Written comments were also accepted.

STATUS OF CCP PRODUCTION AND UTILIZATION IN TEXAS

According to ACAA[1], 121.7 million tons of CCPs were produced in the United States in 2003, and 38% of those materials were used. Texas is the largest consumer of coal in the United States — 105,376 short tons in 2003[2]. Consequently, it is the largest producer of coal ash at about 15 million tons of coal ash per year, or about 12% of the national total[3]. Currently, 60%–70% of coal ash produced in Texas is beneficially used, up from 15% in 1992. In some instances, Texas utilities are using 100% of the ash they produce and are reclaiming material from their landfills to recycle. Fly ash produced in Texas is exported to Florida, New Mexico, and Georgia. Small amounts are imported from Arizona and Oklahoma.

KEYS TO SUCCESSFUL CCP UTILIZATION IN TEXAS

The dramatic increase (~55%) in CCP utilization in Texas over the past 10 years can be directly attributed to the following key factors. The authors believe the keys are listed in order of importance.

Key 1: Formation and Perseverance of Texas Coal Ash Utilization Group

In 1990, the Texas utilities, ash marketers, environmental consultants, and university professors formed TCAUG to promote the use of CCPs and remove barriers prohibiting utilization. TCAUG was instrumental in getting state legislation passed in 1991 (Senate Bill [SB] 1340) that encouraged recycling and required state and local governments to amend their specifications for road and bridge construction to include CCPs. In 1993, TCAUG was again influential in getting language added to SB 1051 which established the Recycling Market Development Board (RMDB) and charged this body with developing a study to identify economic and regulatory incentives and disincentives for recycling and identifying existing and potential markets for, among other materials, CCPs. As part of SB 1051, the Texas General Land Office (GLO) prepared two market studies which laid the groundwork for strategies to develop and expand recycling industries[4] .

The GLO report issued in 1994 identified regulatory barriers at the Texas Natural Resources Conservation Commission (TNRCC) (predecessor agency to Texas Commission on Environmental Quality [TCEQ]) as one of the major impediments to increased CCP utilization. As a result, the TNRCC, GLO, TCAUG, and TxDOT formed a task force to study the issue. TCAUG presented technical information to the task force, which resulted in the issuance of a coproduct regulatory guidance letter in 1995 by the

TNRCC that recognized that CCPs would best be utilized if the materials were not considered a solid waste. With this letter, recycling of CCPs in Texas began to increase substantially[4].

Finally in 2001, TCEQ formed a working group to meet with TCAUG to draft an agency rule that would convert the 1995 letter into an agency rule. This effort produced what is commonly referred to as the "eight-waste criteria rule" (30 Texas Administrative Code [TAC] Chapter 335)[4].

The collaborative effort between TCAUG, TCEQ, TxDOT, and the GLO resulted in proactive regulations that cleared the way for coal ash recycling in Texas. TCAUG used a push–pull strategy in its approach, by consulting many levels at each of the state agencies. In addition, TCAUG presented one universal voice from industry to state agencies. TCAUG attributes its success to these strategies and its tenacity over a 10-year period.

Key 2: Proactive Regulatory Developments in Texas

To develop a single beneficial use rule for solid wastes, TCAUG and a similar association from the steel industry approached TCEQ to revise its solid waste rules. It was decided that taking a statewide approach would be the most effective way to get a solid waste rule approved that applied to a number of industries. As a result, the following proactive regulation was adopted by TCEQ.

Amendment to 30 TAC Chapter 335 – Industrial Solid Waste and Municipal Wastes

Adopted on April 20, 2001, the amendment to TAC Title 30 Chapter 335, commonly referred to in Texas as the "eight-waste criteria rule" but through rulemaking became the seven-waste criteria rule, was perhaps the most influential rule that opened the doors for coal ash use in Texas by omitting utilized CCPs from the state's definition of solid waste so long as the material continues to meet all of the following criteria:

1. A legitimate market exists for the recycling material as well as its products.

2. The recycling material is managed and protected from loss, as would be raw materials or ingredients or products.

3. The quality of the product is not degraded by substitution of raw material or product with the recycling material.

4. The use of the recycling material is an ordinary use, and it meets or exceeds the specifications of the product it is replacing without treatment or reclamation. Or if the recycling material is not replacing a product, the recycling material is a legitimate ingredient in a production process and meets or exceeds raw material specifications without treatment or reclamation (Note: treatment may impact future flue gas desulfurization [FGD] utilization).

5. The recycling material is not burned for energy recovery, used to produce a fuel, or contained in a fuel.

6. The recycling material is a legitimate ingredient in a production process and meets or exceeds raw material specifications without treatment or reclamation.

7. The recycling material must not present an increased risk to human health, the environment, or waters of the state when applied to the land or used in products which are applied to the land[5].

The rule (30 TAC 335.1 Subchapter R) classifies industrial solid wastes into the following three categories:

- Class I – Any hazardous industrial waste. Besides nominal exceptions, CCPs produced in Texas are not categorized as Class I wastes.

- Class II – Any industrial waste which cannot be described as hazardous under Class I or does not meet the criteria for Class III. The majority of CCPs produced in Texas are categorized as Class II wastes.

- Class III – Inert and essentially insoluble industrial waste. Some bottom ashes produced in Texas are categorized as Class III and, therefore, are not subject to the TCEQ's eight-waste criteria rule.

TCEQ's classification is a self-classification system, meaning utilities classify their own materials. The vast majority of CCPs produced in Texas are exempt from solid waste classification. As a result, CCPs are able to compete in the marketplace like any other raw or manufactured material. No permits or prior approvals are required as long as the CCPs meet the eight-waste criteria rule.

If CCPs are stored or disposed as wastes, the General Prohibitions in 30 TAC 335.4 apply along with other solid waste regulations in Chapter 335.

Key 3: Legislative Provisions

The Texas legislature adopted the following three provisions that drastically impacted coal ash utilization in Texas.

Texas Water Code 26.12 – Unauthorized Discharges Prohibited

Texas has a prohibition in its Texas Water Code (TWC) 26.121 that allows TCEQ to take corrective action if any action (e.g., the use of CCPs) harms the waters of the state. The law states that no person may discharge waste that causes pollution of any water in the state. Corrective action is taken in the enforcement of the prohibition.

SB 1340 – CCP Use in Road and Bridge Construction

Texas SB 1340 was adopted in 1991 and encourages recycling and the use of recycled products, with the objective to minimize the landfilling or incineration of solid wastes. The bill required that state, county, and municipal entities amend their specifications to allow CCP use in road and bridge construction if technically appropriate and economically justified[3].

SB 1051 – Establishment of the Recycling Market Development Board

Texas SB 1051 was passed in 1993 and established the RMDB, which consists of heads of the TCEQ, Texas Building and Procurement Commission (TBPC), and Texas Department of Transportation (TxDOT). The board was charged with coordinating the recycling activities of all state agencies and pursuing an economic development strategy that focuses on the state's waste management priorities and development of recycling industries and markets[6]. RMDB efforts regarding CCPs are primarily focused on fly ash use in concrete.

Key 4: Newly Adopted TxDOT Specifications

TxDOT was one of the last state transportation agencies to adopt coal ash specifications, adopting its rules in August 2004. Until that time, TxDOT granted special specifications and provisions on a district and statewide basis. From 1982 to 1996, TxDOT only incorporated CCPs into 41 roadway applications[7]. However, a dramatic increase in fly ash utilization was observed once TxDOT made the materials use a priority. In the first 8 months of 2004, it used fly ash in about 80 projects.

The Texas coal ash industry generally agrees that once TxDOT decided to write specifications, it adopted specifications that helped incorporate CCPs into more TxDOT projects. However, there was some concern from industry regarding TxDOT's specification of a minimum of 20% fly ash and maximum of 35% fly ash use in concrete. The coal ash industry would like TxDOT to move toward adopting more performance-based specifications. There were also some reservations from industry about TxDOT allowing its specifications to be used at the discretion of its 25 district engineers. TxDOT believes this approach is effective because each district has its own issues that need to be addressed on a case-by-case basis.

DMS-4610 – Fly Ash

This product qualification specification was revised in August 2004 (formally DMS-8900) and establishes the requirements, test methods, and the Fly Ash Quality Monitoring Program (FAQMP) for Class C, Class F, and ultrafine fly ash used in concrete products.

TxDOT has a prequalified list of suppliers of 35 Class C and Class F fly ashes. TxDOT accepts the product suppliers' certifications of fly ash quality; however, it reserves the

right to conduct random sampling of prequalified materials and to perform random audits of test reports.

DMS-4615 – Fly Ash for Soil Treatment

This product qualification specification was adopted in August 2004 and establishes the requirements and test methods for Class C and Class F fly ash used in subgrade or base treatment. It also describes the FAQMP.

DMS-11000 – Evaluating and Using Nonhazardous Recyclable Materials

This specification was adopted in August 2004 and covers the process for evaluating the environmental factors associated with nonhazardous recyclable materials (NRM) not addressed in other department specifications. Fly and bottom ash are considered NRMs because they have established histories of use by the TxDOT.

Product Application Specifications and Special Provisions

TxDOT adopted several product application specifications in June 2004 allowing CCP use. Some of those applications include the following:

- Item 247 – Flexible Base
- Item 265 – Fly Ash or Lime–Fly Ash Treatment (Road-Mixed)
- Item 334 – Hot-Mix Coal-Laid Asphalt Concrete Pavement
- Item 341 – Dense-Graded Hot-Mix Asphalt (QC/QA)
- Item 344 – Performance-Designed Mixtures
- Item 346 – Stone-Matrix Asphalt
- Item 401 – Flowable Backfill
- Item 421 – Hydraulic Cement Concrete

In addition, TxDOT issued special specifications and provisions for CCP use including the following Special Specification 3157 – Cold Processed – Recycled Paving Material for Use as Aggregate Base Course; and Special Provision to Item 421 Portland Cement Concrete.

Key 5: Strong Building Industry Coupled with Green Building Initiatives

Overall construction activity in Texas was low in the 1990s, but as the recession lifted, the construction industry flourished. The cement shortage and building boom in the 1990s helped make fly ash concrete widely accepted throughout the state. In addition, the state has a long construction cycle because of its warm climate, which in turn abates long-term fly ash storage issues.

Coupled with the strong building industry, the state is progressive with regard to green building. Austin is leading the green building movement in Texas with its Austin Energy Green Building program. Austin offers incentives such as rebates for energy

conservation in buildings and technical support to those wanting to build green. In addition, the U.S. Green Building Council's LEED (Leadership in Energy & Environmental Design) program is gaining popularity in the state. Texas has 55 registered LEED projects and ranks ninth in the country for the number of LEED-accredited projects[8]. The LEED program encourages CCP recycling by offering points for products containing recycled materials. For example, 18 of LEED's 69 possible points are related to concrete[8].

Key 6: Texas Utilities Generally Produce Good-Quality Fly Ash

Texas utilities primarily burn Powder River Basin (PRB) subbituminous and Texas lignite coals, which generally produce high-quality Class C and Class F fly ashes appropriate for use in concrete. By producing a high-quality product, Texas has been able to develop a mature fly ash concrete market in most areas of the state. However, as the state implements the federal government's pollution control requirements, the quality of the fly ash, particularly those produced from burning Texas lignite, may be negatively impacted and may no longer be suitable for use in certain applications.

Key 7: Development of Statewide Online Recycling Resources

TxDOT and TCEQ developed the following programs online recycling resources that promote the use of recycled materials, including CCPs. These resources demonstrate the agencies' willingness to promote CCPs as a recycled material.

- TxDOT's Road to Recycling Initiative –TxDOT highlighted CCPs in its "Year of the Road to Recycling" campaign. (www.dot.state.tx.us/gsd/recycle/mat.htm).

- TCEQ's Resource Exchange Network for Eliminating Wastes (RENEW) – This network assists industries and business to market their surplus materials and by-products to other areas (www.renewtx.org).

- TCEQ's Recycle Texas Online – This database allows companies who handle recycled materials to post product information (www.tnrcc.state.tx.us/exec/sbea /rtol/).

REPORTED BARRIERS TO INCREASING CCP UTILIZATION IN TEXAS

The following barriers were identified during the Texas state review process. The authors believe the barriers are listed in order of significance.

Barrier 1: Education and Attitude

Virtually all interviewees cited ignorance or unwarranted negative feelings toward CCPs among district and local highway personnel, architects, engineers, and contactors. The lack of education can be attributed to the fact that engineers coming out of college receive, on average, less than 18 hours of concrete training in their materials class. In

those 18 hours, CCPs are briefly mentioned, and professors often reference old data. It was suggested that negative feelings could often be attributed to one bad experience using the material. In most instances, if CCPs were used in a project that failed, the CCPs were typically blamed for the failure even if CCPs were not the cause. This reaction typically occurs when users are not educated about the material.

During the review, TxDOT noted it was interested in increasing education efforts among district offices because large variations of use were noted between offices. TxDOT and the Federal Highway Administration (FHWA) influence local offices by setting specifications and offering technical assistance as requested.

Individual conflicts among architects, engineers, and contractors are where ash marketers and ready-mix producers are making the most progress in overcoming attitude and education barriers. Ready-mix producers, in particular, feel this group is easier to approach than municipalities and state agencies.

Barrier 2: Consistency of Supply

Plants burning lignite coals are beginning to blend lignite with western coals. Plants burning predominantly lignite coals generally produce Class F ash, and those burning predominantly western coals produce Class C ash. Both generally produce high-quality ashes appropriate for use in concrete, but consistency varies from plant to plant. TxDOT and ready-mix producers indicated that quality on a truck-by-truck basis is inconsistent.

A blended ash (Class C and Class F) may alleviate these issues. Marketers and ready-mix producers said they were pursuing the possibility of producing a blended ash and expect one to enter the marketplace in the next year.

Barrier 3: Liability

Liability was a prevailing word mentioned in all of the review sessions. Liability lies primarily with generators and users because generators assume the responsibility of classifying the material and users take on the liability of using the material properly.

TCEQ tends to be more risk tolerant than other state environmental agencies because it has a rule in place that allows it to take corrective action if waters of the state are harmed. This law moves the liability from TCEQ to the persons responsible for using the material.

In certain applications (i.e., remediation activities), liability concerns are more prevalent than others. CCP generators will not allow their by-products to be sold for applications they do not approve of because of liability. If someone misuses their product, they fear they will be liable for cleanup costs and damages. These fears are warranted because there have been cases in Texas where builders were awarded “future damages” in cases where the material may have been misused.

Barrier 4: Limited Markets for FGD Material and Bottom Ash

The fly ash concrete market in Texas is mature; however, FGD material and bottom ash are not fully utilized. Bottom ash competes with the state's abundant natural resources (i.e., sand, gravel, aggregates), and because of transportation costs, bottom ash is often more expensive than natural resources. The presence of pyrite in bottom ash also limits the potential for use. Marketing bottom ash for some applications requires process changes to prevent pyrites from being intermingled with bottom ash. It is estimated that 25% of CCPs produced in Texas are FGD materials. There is an effort under way by utilities to make wallboard-ready FGD gypsum (lower moisture and chloride contents). However, TCEQ's eight-waste criteria rule prohibits any treatment of recycled materials. This stipulation could dramatically impact the use of FGD material if, for instance, the chlorides in the material have to be removed to make the material suitable for wallboard.

Barrier 5: Transportation and Infrastructure Issues

Transportation costs are often the deciding factor to use CCPs in a potential project. Power plants are located in areas that are not heavily populated, so transportation is necessary to get CCPs to major markets. Some utilities also have poor infrastructure, making it difficult to transport their material by anything other than trucks.

Barrier 6: Local and Abundant Asphalt Supply

According to the National Asphalt Association (NAA)[9], Texas leads the United States in on-shore oil and natural gas production and, therefore, has a plentiful supply of asphalt. The state's big oil industry promotes the use of asphalt paving in Texas, a competing material for concrete.

POTENTIAL THREATS THAT COULD IMPACT FUTURE CCP UTILIZATION IN TEXAS

Texas currently has a thriving coal ash industry, but several potential threats were identified during the review that could hinder the future of CCP utilization in Texas. Based on review discussions, the authors believe the following threats are listed in order of importance.

Threat 1: New Pollution Control Requirements

The U.S. electric utility industry has been addressing air emission issues for many years, and the coal-fired power plants in Texas are no exception. When federal regulation requires reduction of various air emissions, power plants have necessarily responded. The responses frequently have had a subsequent impact to the type, quantity, and quality of the solid materials produced. Several Texas power plants that previously produced a high-quality ash currently produce a fly ash with a noticeable decline in quality, namely, the presence of unburned carbon at varying levels, as a

result of reducing nitrogen oxide (NO_x) emissions. Typical of the broader U.S. experience, the fly ash exhibiting increased levels of unburned carbon impacts air entrainment in concrete. Plants burning subbituminous coal have not exhibited an increase in unburned carbon even where NO_x reduction strategies have been implemented, but plants burning Texas lignite have had varied results.

In addition, the utility industry indicated concerns about how new mercury emission controls will impact the Texas CCP markets, especially the fly ash market for concrete. Typical demonstration-scale mercury emission controls incorporate the addition of an activated carbon sorbent to collect mercury present in flue gases. If this activated carbon is combined with the fly ash at a power plant, it is expected to result in an even greater impact to the quality of the fly ash as it relates to concrete use. It should be noted, however, that there are mercury capture technologies that do not use activated carbon. In many mercury control technology scenarios, various CCP streams will have increased concentrations of mercury. Questions regarding whether this material will continue to meet the TCEQ's exemption criteria and the ultimate fate and transport of entrained contaminants will need to be addressed.

Threat 2: Ability to Retain Institutional Knowledge at TCEQ and TxDOT

It may be difficult for TCEQ and TxDOT to retain institutional knowledge of CCPs as staff is turned over. TCEQ's rules, in particular, are subjective in their interpretation, and TCAUG worries that regulations may be interpreted differently by new staff who are not as educated on CCP issues as the current staff.

Threat 3: Class C vs. Class F Issues Related to ASR

Classifications (Class C vs. Class F) play a large role in the ability to use fly ash for concrete applications. Sulfate attack has significantly reduced the use of Class C fly ash as a portland cement replacement in Texas concrete and Class C fly ash is no longer being used in areas of Texas that have sulfate-rich soils. However, it is important to note that, in some cases, more Class C ash may mitigate alkali silica reactivity (ASR). For example, a 10%–15% use of Class C can pass American Society for Testing and Materials (ASTM) C618 requirements for sulfate resistance. A 1997 study also indicated that the use of Class C fly ash, rather than contributing to ASR, actually reduces ASR to acceptable levels when using high-alkali cements[10].

Threat 4: EPA Could Reconsider Its RCRA Determination

Additional pressure from special interest groups and studies evaluating the health effects of coal ash utilization could prompt EPA to reconsider its Resource Conservation and Recovery Act (RCRA) determination of CCP classification as nonhazardous wastes. EPA's former Deputy Administrator, Michael McCabe, stated, "If the states and industry do not take steps to address these wastes adequately in a reasonable amount of time or if EPA identifies additional risks to public health, EPA will revisit this decision to determine whether a hazardous waste approach is needed"[11].

ROAD MAP TO INCREASED CCP UTILIZATION IN TEXAS

The following activities were suggested as actions that would help increase CCP utilization in Texas. The proposed actions are to be implemented by a variety of CCP players, including governments at the federal, state, and local level; utilities; ash marketers; ready-mix producers; academia; and industry groups. The suggested actions were generated by interviewees and are listed in order of significance.

Action 1: Adopt Performance-Based Concrete Specifications

Texas ready-mix producers indicated a strong need to develop performance-based concrete specifications, rather than having material-based specifications that do not consider performance.

Initiatives on the federal, state, and local level will be required to adopt performance-based concrete specifications. Federal entities such as American Association of State Highway and Transportation Officials (AASHTO) and American Society for Testing and Materials (ASTM), as well as private and government entities, must first demonstrate the long-term substantiality of concrete developed according to performance specifications. Following the demonstrations, an education process from industry to government will need to be initiated.

Action 2: Develop Profitable Markets for FGD Material and Bottom Ash That Consider Transportation Costs

Texas marketers find it difficult to locate profitable markets for FGD material and bottom ash considering the transportation costs involved with getting the material to the end user. One way to resolve transportation issues is for manufacturing facilities (i.e., bricks, aggregate, wallboard) that use CCPs as a primary raw material to locate manufacturing facilities in close proximity to the power plant. This practice is conducted in Texas on a limited basis. It was also suggested that C^2P^2 could help identify markets where bottom ash and FGD material could be used as raw materials to manufacture products.

Action 3: Exempt Beneficial Reuse from Federal Toxic Release Inventory (TRI) Reporting

During the review, the question was raised, “Why do you have to report beneficial uses of CCPs as ‘releases to land’ under federal TRI?” It was suggested that TRI should exempt beneficially reused material and only require reporting of material that is sent to a disposal site. EPA offers site-specific exemptions but said that in order to get an exemption for all utilities, there would have to be a large test case from a large utility with support from industry groups such as ACAA. Some industry representatives interviewed believe this change is necessary because some definitions of release contradict the goals of C^2P^2. In addition, TRI reporting takes considerable effort, and this change would be an incentive for the power plant manager to reuse more material.

Action 4: Change How the Material Is Perceived

TCEQ was able to develop a rule that puts CCPs in the same category as other recycled materials such as plastic, aluminum, and paper by defining any reused CCP as a product. However, there are situations in Texas where the material, whether it is reused or disposed of, is still perceived of as a waste. If the industry as a whole could change how legislative bodies perceive coal ash, it could put coal ash on the same platform as other recycled materials.

Action 5: Build Off of LEED's Success

The LEED program has been successful in the United States by simply defining what it means to "build green" and by offering recognition to those who do so. It was suggested that the coal ash industry should develop a similar program led by FHWA which defines what is means to build green roads and offer recognition to those who do it successfully.

It was further suggested that the current LEED system does not favor the use of fly ash in concrete from a percent content standpoint. The ready-mix producers noted several projects that were LEED certified that did not use fly ash as portland cement replacements in the concrete. To address this issues, it was suggested that there should be a coal ash voice in the LEED program, perhaps the American Concrete Institute or ACAA.

Action 6: Promote Industry Successes Outside of the CCP Industry

Promoting successes should go beyond successful utilization projects. The overall benefits associated with CCP use should also be promoted, including decrease in the demand for landfill space, conservation of natural resources, reduced carbon dioxide emissions, economic savings for end users, reduced overall cost of generating electricity, and production of better products.

The green building movement in Texas has helped to promote successes outside of the immediate coal ash industry; however, more can be done to reach other audiences. Federal programs are also doing more to promote the industry's successes. For example, EPA's C^2P^2 program plans to highlight successful case studies online and reward the industry for its achievements in promoting, using, and researching CCPs.

Action 7: Produce a Hybrid Blended Fly Ash

Texas has experienced issues with Class C fly ash causing ASR; thus the product cannot be marketed to the concrete industry. Interviewees said that, within the next 18 months, it is anticipated that a hybrid ash will be introduced into the marketplace that will not meet ASTM C618 but will be sold as a performance-based concrete admixture. There may be acceptance issues, particularly by TxDOT, with regard to using a hybrid blended ash.

Action 8: Develop Markets for Low-Quality Fly Ash

As the quality of fly ash produced declines as a result of new emission control technologies, new markets need to be developed that use lower-quality CCPs. It was suggested that high-volume, low-quality markets such as flowable fill should be pursued.

Action 9: Provide Economic Incentives for Using Recycled Materials

The environmental benefits of utilizing CCPs are well known, but perhaps more could be done to promote using recycled materials. It was suggested that end users could receive emission credits for using fly ash as a partial replacement for portland cement because by using fly ash, the user is preventing CO_2 emission from cement production. During the review, the consensus was that economic incentives would need to be subsidized by the federal government. However, one might argue that state governments can and should provide such economic incentives on their own. Montana already provides such tax incentives. If California can restrict CO_2 emissions in the absence of federal mandates, then it follows that states can also provide tax incentives in the absence of federal action[12].

TRANSFERRING THE INFORMATION FROM THE TEXAS EXPERIENCE TO OTHER STATES

With the information gained from the review of CCP stakeholders in Texas, it is reasonable to initiate a description of how the successes in Texas may be translated to other states. Preliminary recommendations can be made, understanding that the following caveats hold true in Texas and may not be true in other states:

- Texas experienced a building boom in the 1990s, helping to make fly ash concrete widely accepted throughout the state. In addition, the state has a long construction cycle because of its warm climate, which, in turn, abates long-term fly ash storage issues.

- CCPs can be recycled as long as the application does not present an increased risk to human health, the environment, or waters of the state when applied to land or used in products applied to the land. Texas has regulations in place that require remediation of activities, including CCP utilization, where damage to waters of the state has occurred.

- A relatively large number of coal-fired power plants in Texas produce good-quality CCPs.

Actions that were noted as key to successful CCP utilization in Texas that may translate to other states are summarized as follows:

- The formation of a CCP industry group provides a forum for industry to work together to educate government agencies, potential users, and other CCP stakeholders. The CCP industry group can seek and coordinate with other state industry groups working on recycled material issues.

- The CCP industry group can develop a comprehensive guide to beneficial uses for CCPs within the state and use the guide to educate both the environmental and transportation departments to initiate the development of environmental regulations and transportation specifications that promote the beneficial use of CCPs.

- The CCP industry can support demonstration projects to develop the type of technical information that government agencies identify as necessary for CCP use to move from the demonstration to the commercial phase.

The actions noted require commitment and leadership by the CCP industry. It is less likely that a state environmental department will take the initiative to develop approvals, policies, or regulations to facilitate CCP utilization without the impetus of an industry-sponsored effort to bring the opportunity of CCP utilization to the attention of the agency. DOTs may be more assertive in evaluating applications that incorporate CCPs because of the potential for improved performance and cost savings, but industry participation and support in these potential DOT efforts are likely to guarantee successful projects and experience from which DOT representatives can draw upon to develop specifications.

The project's final report can be accessed at www.undeerc.org/carrc/Assets/TXStateReviewFinalReport.pdf.

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