

COAL UTILIZATION RESEARCH COUNCIL

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Comments related to the Department of Energy draft announcement # DE-PS26-08NT00496 related to “RESTRUCTURED FUTUREGEN”

Comments submitted by:

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INTRODUCTION:

These comments are submitted on behalf of the membership of the Coal Utilization Research Council (CURC)¹ in response to the Department of Energy’s draft announcement related to funding opportunity number DE-PS26-08NT00496, RESTRUCTURED FUTUREGEN. This draft financial assistance funding opportunity announcement relates to the Department’s intent to restructure the FutureGen project. These comments address the proposed structure and content of the Department’s draft announcement to restructure the current FutureGen program but should not be interpreted, by this submission, as supporting the intention to terminate the government’s participation in the FutureGen project.

The CURC generally opposes the proposed action to terminate DOE support of the current FutureGen project. A copy of our letter to various Members of Congress in which we urge reconsideration of the proposed action is attached for your information.² In this same communication CURC also noted its support of the Department’s initiative to undertake a solicitation in which the DOE would provide funding for the incremental costs associated with installing and operating carbon capture and storage systems (CCS) on commercial-scale electric power generation facilities. These comments reflect our recommendations to modify or clarify certain provisions set forth in the draft announcement.³

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¹A membership list of the CURC is attached as Attachment A.

²Attachment B

³Reference to the DOE “draft announcement” refers specifically to the draft “Financial Assistance Funding Opportunity Announcement” issued by the U.S. Department of Energy National Technology Laboratory on May 7, 2008, numbered DE-PS26-08NT00496 and entitled “RESTRUCTURED FUTUREGEN”

While we applaud the Department's initiative to undertake a program to support the installation and operation of CCS systems on commercial scale facilities many of our members are concerned about the Department's ability to execute the program given the stated goals and objectives as well as the available funding.

Specifically, the FOA describes an initiative to support *commercial scale projects* by adopting the principal goals and objectives of a publicly co-funded demonstration-scale project (FutureGen). We urge the DOE to modify several of these FOA requirements. Included among our suggested modifications are changes to FOA requirements related to emission controls of criteria pollutants, beyond that which is required for permitting plants today, a level of CO₂ capture percentage that has not been previously achieved in power plants at commercial scale, dates for operation that may be difficult to achieve and other criteria that also may not be realistic or prudent when measured against the business requirements of a facility, or facilities, planned and constructed to operate successfully in commerce. In this same vein, the proposed level of funding will not launch the "multiple" projects that the Department asserts is the goal of the program. Even if initial funding is restricted to discreet portions of several projects (e.g. financing the FEED for several commercial endeavors) with a "promise" that subsequent funding will be made available there are not clear reasons why an owner or operator can have confidence that the bulk of the funding for a selected project will be forthcoming at a later date. One need only review the uncertainty of the annual appropriations process or the current change in direction of the FutureGen project to be highly skeptical of a guaranteed stream of future funds. Unless the FOA modifies requirements to reflect commercial realities and proposes and adopts a funding plan that has credibility, it is difficult to envision a successful program.

These comments are designed to suggest ways in which the program might be structured for success – a goal that CURC heartily endorses. Furthermore, we commend the premise of this initiative to support installation of CCS on commercial-scale facilities and reiterate our continued appreciation for the partnership that exists between the DOE and the members of our organization.

SUMMARY OF CURC'S CONCERNS ABOUT THE PROPOSED CCS PROGRAM AS SPECIFICALLY DESCRIBED IN THE "DRAFT ANNOUNCEMENT":

- (1) The amount of funding, \$1.3 billion (in as-spent dollars), is not adequate to support "multiple" CCS projects
- (2) While the draft announcement, unlike the initial Request for Information issued by the DOE in March, seeks to clarify the eligibility of projects utilizing power generation systems other than gasification, the "tone" of the current document is decidedly oriented towards gasification based systems. The intention of the DOE through this solicitation to invite demonstration projects for IGCC as well as combustion based power generation platforms (including pulverized coal and fluidized bed systems) must be clearly and unambiguously stated. This is so especially in light of the fact that the Department has reserved to itself the ability to make selections that "are in the best interest of DOE" (page 38 of the draft announcement); an ability to make an award on "only a portion of the application" submitted (page 38); and, despite the adoption of a point evaluation system, the retention of discretionary authority to ignore the results of the comprehensive evaluation and make selections based upon non-quantifiable factors that will "best achieve the

objectives of the Restructured FutureGen program (page 37). These selection criteria, in our judgment, leave the Department with near total discretion regarding project selection and thus specifically stated objectives of the program, including the inclusion of eligible gasification and combustion based projects, must be clearly set forth in the final Funding Opportunity Announcement (FOA).

- (3) In defining eligible projects the DOE is encouraged to specifically cite the intent to include post-combustion CCS systems that utilize flue gas cleanup technologies as well as more advanced concepts like oxycombustion. In this way, with the success of the program the electric utility sector will have a number of options available for the generation of electricity and the capture and storage of CO₂. With reference to combustion-based units it is also important that the unit size and percent capture criteria clearly permit the demonstration of CCS on a portion of the flue gas stream, in the case of a pulverized coal or CFB system and on an integrated system in the case of an oxycombustion power plant. The criteria of eligibility for combustion-based systems could include CCS demonstrations at a size that can be scaled up to full commercial application based upon commercially accepted standards of scale up (e.g. single modules to multiple modules) and that achieve operational experience related to the integration of CCS with power generation and not simply the demonstration of a CCS system. Given the fact that the FOA now contemplates the inclusion of other coal fuel power generation systems, we again recommend that specific criteria be set forth in the FOA that are appropriate to combustion based systems. To this end, a parallel solicitation may be warranted.
- (4) The definition of a 300 gross megawatt per unit plant power train (with reference to an IGCC train) should be clearly defined as “gross” and not “net” capacity.
- (5) The requirement to capture 81% of the carbon content of the gas stream (with a goal to achieve 90% capture) appears to reflect a technology bias and if not, then the percentage needs to be explained. Why 81%? Again, the Department’s objective should be to provide support for commercial scale projects that will apply CCS systems to capture and permanently store CO₂ into deep geologic storage structures. The FOA should be amended to invite project applications to propose a level of capture and storage that a commercial scale project owner is willing to undertake, thereby accounting for the novelty and risk of installing and integrating such systems. The DOE might state that the goal the Department is seeking to achieve is 90% CO₂ capture and that the proposed project must demonstrate, for example, by major process components and integration of the power platform with the CCS system that a specified capture goal can eventually be achieved. A percent capture of 81% is not a reasonable approach at this stage of technology develop and/or technology integration. Industry needs to obtain baseline data, demonstrated reliability and widespread confidence in CCS systems and these goals can be achieved more cost-effectively by requiring less aggressive percentages of capture.⁴

⁴ The 90% capture requirement of total CO₂ emissions is more appropriately applied to the FutureGen project where technology demonstration is a principal goal rather than the type of commercial-scale projects contemplated by this proposed program. Furthermore, even after detailed characterization of a sequestration site, there is no certainty that it will be suitable for long term sequestration. Certainty only comes after injection of significant amounts of CO₂ and thus confirmation of predictions about the storage site. Projects need design flexibility to recover non-CCS operation if initial sequestration fails; thus, it is strongly encouraged that the program specifically recognize the possibility that long term sequestration may not be possible and specific allowance should be made for this contingency by insuring that a selected project sponsor will not be penalized and forfeit the DOE’s financial support if long term storage proves unsuccessful. Given the immature state of experience in using capture technology integrated with an IGCC, for example, CURC believes it is much more prudent to simply encourage the installation of CCS technology on a unit that will be commercially-operated rather than dictate the level of capture. Industry should be free to determine what level of capture of CO₂ makes the greatest sense from both a cost and acceptable risk exposure perspective. Ultimately, as experience is gained and cost and

- (6) The FOA suggests the Department's desire to achieve what appear to be two contradictory goals. On the one hand, the selection criteria would award a project for technology innovation (e.g. improvements in technology, see page 35 of the FOA) and yet the evaluation criteria would consider a technology's readiness ("... that would have a significant technical advancement and therefore would raise the issue of readiness." See page 19). With the focus of the FOA upon commercial-scale projects, applicants should be governed by commercially-acceptable levels of risk.
- (6) The draft announcement specifically identifies saline formations as the storage repository for at least one million tons per year of CO₂ in order to be eligible for the program. It should be made clear in the draft announcement that storage could include any permanent underground storage including for example porous saline aquifer rock structures, depleted oil or gas porous rock structures or unmineable coal, and that it is not limited to saline reservoirs.
- (7) The lack of a regulatory structure to address the transport and storage (during the life of the project as well as longer term) of captured CO₂ along with a resolution to long term liability issues for selected power generation projects must be addressed. The absence of such a regulatory structure creates an unacceptable degree of risk and uncertainty which means that action to undertake CCS projects may not take place. However, for this program to be successful, CCS projects implemented on commercial-scale power generation projects cannot await the years necessary to consider, debate and structure a permanent set of regulations and practices to address the storage of CO₂. Answers to questions about transporting CO₂, ownership of the storage reservoirs, injection of the CO₂ and liability issues attendant to the near term and then long term storage of the CO₂ must be addressed at the outset of the process when a CCS project is planned. The DOE, and various agencies of the federal government, have major roles to play in this process. More importantly, with respect to those projects that may participate in this program, the DOE, and the federal government in general, must recognize that these early projects will require separate attention and unique consideration and assistance in overcoming these obstacles.⁵
- (8) In the event the Department elects to support, in its discretion, only portions of an application, and that focus is upon the compression, transport and storage of captured CO₂, then it may be appropriate to consider proposals that apply only for that portion (compression, transport and storage) of a CCS related project. CURC advocates the need to demonstrate the integration of the power generation platform with CCS and thus any project under this program that focuses

reliability are demonstrated, it is assumed that the marketplace will demand and technology providers will supply the most cost effective and efficient systems. This demand likely will result in technology offerings capable of providing greater and greater percentages of CO₂ capture over time.

⁵ The Department makes no mention in describing the proposed program of the current lack of a regulatory structure that is required to transport, inject and permanently store the captured CO₂. This is a vitally important element of any forthcoming CCS project. The experience of the FutureGen project as well as the on-going projects within the regional sequestration partnerships is ample evidence of the complexity surrounding particularly the matters of injection, pore space ownership and short term and long term liability associated with CO₂ storage. These matters are being addressed through federal, state and local government's affirmative intervention. First-of-a-kind commercial-scale CCS projects, like those anticipated by the proposed program, will require similar assistance.

only upon compression, transport and storage, must be able to demonstrate that such project will be readily transferable to the power generation sector.

DISCUSSION OF SPECIFIC CONCERNS AND RECOMMENDATIONS:

1. COST-SHARING

a. DESCRIPTION OF PROBLEM

On an annualized basis the level of funding proposed by the Department for this initiative is both inadequate and uncertain. CURC has previously stated (in our submission commenting upon the RFI) that assuming an incremental capture and storage cost of \$50/ton CO₂⁶, the \$156 million in funding requested for FY 2009 is sufficient to support no more than one to three projects for one year⁷ and the \$290 million said to be available for the program would support those projects for less than two years.

Even if subsequent year appropriations were assured (a highly unlikely event given that appropriation requests are determined annually by Congress and also given the uncertainty beyond 2008 when a new President is in office and support of the program may be terminated) the amount of funding to be acquired annually, in our judgment, is totally inadequate.⁸

This shortfall in funds will be further exacerbated because of escalation in construction costs which have been well above the rate of general inflation in recent years.

b. RECOMMENDATION TO MODIFY THE PROPOSED PROGRAM

Assurances that the contemplated multi-year program will be funded at even the suggested \$1.3 billion level are absolutely essential. Unless the Department can provide an assurance that the total \$1.3 billion will be available, it is difficult to support a program to make multiple awards. Seeking and obtaining “advance appropriations” for the entire amount contemplated for the program is preferred. Obviously, that is not possible given the current budget cycle but the final FOA could indicate that the FY 2010 budget request will include a request for the full amount of funding. That would evidence to potential project applicants the intentions of the Department.

⁶ DOE (see: Jared Ciferno, National Energy Technology Laboratory, “Existing Coal Power Plants and Climate Change: CO₂ Retrofit Possibilities and Implications” January 24, 2008), and other studies have projected the incremental cost of CCS to be between \$40 and \$90 per ton.

⁷ As an example, a large-scale commercial power project with CCS will need to proceed through a sequence of stages. Those and estimated costs (associated only with CCS) for a 300MW demonstration at ~2MM tons CO₂/yr (90% capture) are:

Phase 1: Initial plant, pipeline feasibility study and preliminary sequestration site screening: \$2-3MM

Phase 2: Plant Front End Engineering Design (FEED), pipeline design and sequestration site detailed characterization: \$40-\$50MM

Phase 3: Detailed engineering and construction – plant, pipeline, sequestration site facility and wells: \$250-\$350MM

Phase 4: CCS Commissioning, operation, monitoring for three (3) years: \$300MM

Total Cost/project: \$600MM-\$700MM

Thus the program funding of \$1.3B is adequate to support only 2 projects.

⁸ The CURC has recommended a near term CO₂ program, one element of which is to support the installation and operation of carbon capture and storage on up to 9,000 megawatts of electric generation. The CURC program would provide a 30% investment tax credit for CCS equipment and a limited duration – up to ten years per project – production tax credit for CO₂ actually stored or otherwise used for beneficial purposes. The total estimated cost of the CURC program is \$8.9 billion. This funding would support five to ten commercial scale projects which we judge to be the minimum number required to provide industry a degree of confidence that CCS is both feasible, reliable and can be made cost acceptable.

If a decision is made to award multiple projects then selected project budget cycles should be structured such that projects (within the initial available funding) will be assured funds for discrete project activities, e.g. funding through the FEED stage of several projects or site characterization and preparation of CO₂ injection sites. Also, given the uncertainty of available government funding in the future, it is recommended that DOE consider applying a cost sharing ratio of 80-20 (government to industry) for the initial phase of a project (e.g. preliminary design through project FEED and/or site characteristics for CO₂ storage).

Several additional concerns related to the cost-sharing provisions of the draft FOA must also be resolved if the program is to be effective. They are:

- (1) With 320 gigawatts of existing coal-fired capacity in the United States, supporting projects to retrofit CCS systems on existing units should be included specifically in this FOA. However, a project sponsor, to qualify, must provide 50% cost share of the project which by current accounts will be significantly more expensive on a per ton of CO₂ captured basis than installing CCS technology on a new power generation unit. And, the DOE will not share any costs associated with parasitic power losses. It is strongly recommended that the DOE construct the FOA so that the industry cost-share is recognized through the loss of electrical output to the grid and that the cost to install and operate a CCS system therefore is entirely borne through the government's contribution. Alternatively, and more simply, DOE should offer to pay all incremental costs for the installation and operation of a CCS system onto an existing plant, in the same manner that it offers to pay the incremental costs for CCS for a new plant.
- (2) It is not clear what constitutes the base case for determining incremental costs (page 11 of the FOA). For example, do incremental costs include boiler modifications where combustion based systems are involved. Or, more generally, are incremental costs determined by comparing a non-CCS plant with the same gross or net output as a plant with CCS? If the new plant has the same net output that comparison would capture the incremental capital and fuel costs when determining the cost difference between the two. The FOA needs to provide clarification as to what specifically comprises CCS costs; the comparison of a unit with and without CCS generating the same net output seems to be a logical way to approach the cost issue. Also, given the multi-year duration of these contemplated projects (i.e., with operation not likely for several years hence) DOE should explicitly make provision for cost escalation in specifying its funding plan.
- (3) Today, coal fueled facilities can be permitted at levels less stringent than what is proposed in the FOA. While these levels of control may be appropriate for a publicly supported demonstration project they should not be made a qualifying criterion for a project(s) designed and constructed to operate at commercial-scale. The NO_x requirement in the FOA will add additional costs to the project even though such requirement is not necessary for a project to be permitted. Also, there is a concern that the PM requirement cannot be met with currently-available and widely used technology. In all of these instances, the FOA should not make these requirements a

condition of eligibility especially where the primary goal of the FOA is to demonstrate CCS at large commercial scale.

2. ELEMENTS OF THE MERIT REVIEW PROCESS

a. DESCRIPTION OF PROBLEM

The DOE previously has utilized in other competitively bid demonstration programs a numerical scoring process to evaluate both technical and financial merit of an application. Numerical scoring provides a process that insures an element of transparency. Also, assigned percentages demonstrate the Department's assessment of the importance of a particular element of the project.

Within the description of materials that will be included in the evaluation there is no explanation as to why the DOE will not utilize the "environmental questionnaire" as an essential part of the evaluation that will be conducted under Criterion 4: EHSS ASPECTS. It would appear that the contents of the questionnaire will provide information by which the DOE might conduct its evaluation under criterion 4. In this same regard, the "budget information and financial management system" evaluation criteria should be a part of the financial evaluation criteria.

b. RECOMMENDATION TO MODIFY THE PROPOSED PROGRAM

Items 3 (Budget Information and Financial Management System Evaluation Criteria) and 4 (Evaluation of Environmental Questionnaire) should be explicitly referenced as one means by which the Department will conduct its technical and financial merit evaluation. In this way, the documentation (i.e. questionnaire and budget system) will be included in the scoring evaluation rather than explicitly excluded.

3. OTHER SELECTION FACTORS

a. DESCRIPTION OF PROBLEM

As previously noted, the FOA indicates that the Department shall have the authority through the Source Selection Authority (SSA) to make selections based, not upon the numerical scoring process, but, by inference, upon other "program policy selection factors." This decision apparently will be entirely within the discretion of the SSA. By including this degree of flexibility, there is a high probability, in our judgment, that political and other related considerations become major drivers that could seriously compromise the integrity of a process that should be based upon selection of meritorious projects chosen solely upon clearly enunciated technical and financial criteria. A project that does not score at the highest level but, nonetheless is selected, will consume limited funding, personnel resources and valuable time, all at the expense of quickly and effectively achieving important technology development goals.

b. RECOMMENDATION TO MODIFY THE PROPOSED PROGRAM

The goal in administering this program should be to achieve transparency within the selection process. Obviously, there needs to be a degree of administrative flexibility so that "program policy factors" can be achieved as well. This should not mean, however, that an inferior project (one that has scored low in the merit evaluation) should be selected in order to achieve certain program policy factors. Rather than choose

such a project, the program should be structured so that no project is selected. Rather, another solicitation could be conducted by the Department that specifically seeks projects to “fulfill” the missing program policy goals. To insure complete transparency to the process the SSA should be required to specifically identify those policy factors that were applied in the selection of a given project.

CONCLUSIONS:

CURC recommends that the FutureGen project be continued as it represents an important, and necessary, step forward in the development of advanced IGCC with CCS. The program to be solicited pursuant to the pending draft FOA is also an important and necessary initiative. DOE is to be commended for initiating this program. However, to be successful, adequate funding is essential and realistic criteria tied to the requirements of a commercial-scale project are all important. The Department is strongly encouraged to adopt the recommendations set forth in these comments. We appreciate the opportunity to provide these comments and recommendations and will be pleased to provide the DOE with further clarifications as necessary.