



POLICY GROUP

CCS in the Academic Community: Key Recommendations on Academic Engagement

Background

At the June 2015 CSLF Mid-Year Meeting in Regina, the CCS in the Academic Community Task force was re-started with a near-term goal of identifying and engaging academic programs on CCS throughout the world.

In June 2016, the Task Force convened the first in-person meeting of the Academic Council on the margins of the CSLF Mid-Year Meeting in London. The meeting focused on four themes identified by the Task Force: Student Training and Practical Learning; Curriculum Development and Gap Analysis; Communications and Outreach; and Capacity Building. Presentations were delivered by representatives from the Academic Council in each of the four thematic areas, and broad discussions on these topics ensued. At the CSLF Policy Group Meeting in London, the group reported on the discussions of the Academic Council meeting and agreed to provide formal recommendations to the CSLF Policy Group at the Annual Meeting in Tokyo in October 2016. This document provides key recommendations for each of the four themes.

Action Requested

The Policy Group is requested to review the Key Recommendations document from the CCS in the Academic Community Task Force.



Key Recommendations on CSLF Academic Engagement **Report by the CSLF Academic Task Force** **October 2016**

I. Background

The academic community plays a vital role to advance carbon capture and storage (CCS) technologies¹ through research, development, and demonstration (RD&D), as well as through policy guidance and a wide range of educational programs that support development of the next generation of scientists, engineers and policymakers. Governments can strongly influence the extent to which the academic community is engaged in CCS. The Carbon Sequestration Leadership Forum (CSLF) is in a unique position to catalyze, grow and strengthen the academic community's contribution to achieving CSLF goals.

The mission of the *CCS in the Academic Community Task Force* (Academic Task Force), originally established in 2008, is to identify and engage academic programs on CCS throughout the world to help support the mission and path forward for the CSLF. Early accomplishments of the Task Force included a mapping and gap analysis of CCS post-graduate academic courses worldwide and links to the CSLF Capacity Building Task Force. Although in recent years this Task Force has been dormant, at the CSLF Mid-Year Policy Committee Meeting in Regina, Saskatchewan, Canada in June 2015, it was re-established with a new organizational structure and focus– to foster and support the CSLF mission and objectives via academic CCS research programs, international collaborations, research exchanges, networks, and summer schools. With more proactive engagement among the CCS academic community, the CSLF can facilitate international research collaborations in priority areas and leverage funding opportunities that advance the CSLF mission.

At the 2015 CSLF Ministerial, the Academic Task Force presented a *Baseline Survey and Plan of Action: Mechanisms for International Collaborations, Key Research Groups, Summer Schools and Networks* (Appendix 1) and secured endorsement from CSLF Ministers on the importance of the CCS academic community to help meet CSLF goals.

Following the Ministerial, the Academic Task Force established an Academic Council, comprised of representatives from institutes and universities in CSLF Member Countries, to serve in an advisory capacity to the Task Force, providing

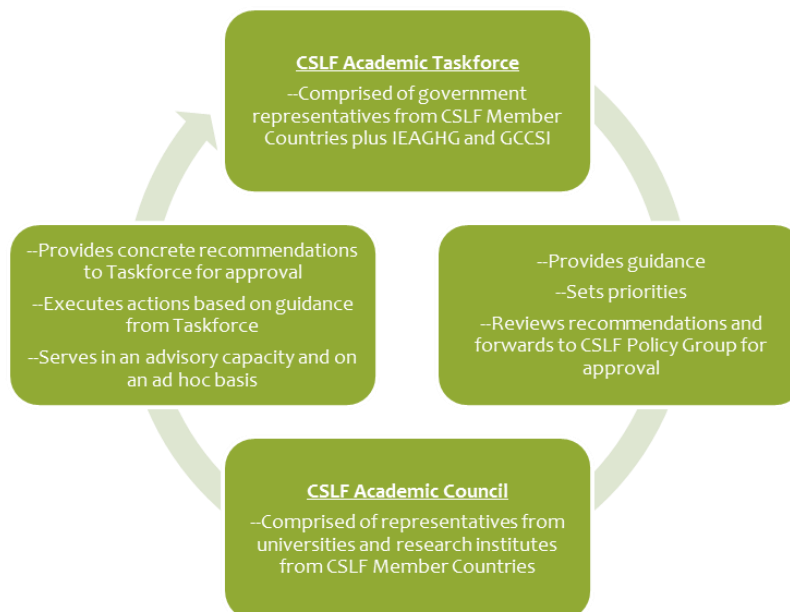
¹ CCS by definition includes carbon capture, utilization, and storage.



recommendations and acting on guidance received. The Task Force identified an initial set of priority areas for discussion with the Academic Council.

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Structure



II. Key Actions and Recommendations

In Task Force discussions following the Academic Council meeting, the group agreed to combine two themes and concentrate recommendations on: Student Training, Practical Learning, and Curriculum Development; Communications and Outreach; and Academic Community and Capacity Building.



Theme 1: Student Training, Practical Learning and Curriculum Development

Description: With the trending of Massive Open Online Courses and open access materials, accessibility to education has advanced and become enriched. While these types of technical platforms exist, there is not a clear grasp of what is available amongst the academics and industrial sectors of the CSLF Member Countries on materials for CCS training and curricula. This is an area academics can contribute in educating researchers, academics, industry and the public through sharing resources. Furthermore, well-organized, accessible resources can be leveraged towards capacity building in disseminating concepts, theory, and case studies in building the knowledge foundation in the CCS area. For example, the Province of British Columbia (B.C.) in Canada implemented the *B.C. Open Textbook Project* to increase access to higher education for students by providing openly licensed textbooks. This project focused on textbooks used in the top 40 highest-enrolled subject areas, with additions that followed. Projects such as these could offer CCS academics and programs to share resources more effectively, allowing students to access a wider selection of educational materials.

Thematic Goals

- *Organize course and curriculum on CCS for better exposure.*
- *Build a community of CCS educators.*
- *Create a network of CCS academics on the CSLF platform.*
- *Cultivate a community of educators in CCS through material sharing and regular meetings.*
- *More broadly publicize internship opportunities.*
- *Broaden opportunities for students in an international setting.*
- *Create a repository of material aimed at post-secondary education and professional training.*

In addition, CSLF nations can help to promote a forward thinking environment for CCS to grow by developing a framework for graduates in CCS related studies to spend time with appropriate government policy departments. Organizing and publicizing these can help to grow this sector internationally. Some internship programs may have citizenship, education, or age guidelines. There are several examples of existing internship programs that might be expanded or replicated in other countries. For example, the European Commission offers graduate traineeships across its whole remit (including energy and environment), and the International Energy Agency offers some internships to post-graduate students, which are managed through the Organisation for Economic Cooperation and Development. Additionally, the National School of Public Administration of Poland offers six-week internships for its students, including internships in other government agencies; the U.S. Department of Energy has hosted three Polish interns over the past three years, providing exposure to U.S. policy and



technical perspectives on CCS. Masdar Institute in the United Arab Emirates hosts the Young Future Energy Leaders Program, which seeks to educate, inspire, and position students and young professionals to become future leaders in the fields of alternative energy, by connecting them with today's leaders, offering internships and research opportunities, and facilitating energy-related site visits. The United Kingdom Parliamentary Office of Science and Technology and the Scottish Parliament Information Centre offer 3-month placements for Research Council UK (RCUK)-funded Ph.D. students and shorter internships for MSc students. Finally, many non-governmental organizations active in the energy-climate space host internships; two of the most high profile opportunities with some track record on CCS include Chatham House (United Kingdom), which has a large energy and climate program, and the World Resources Institute (United States and internationally). These programs could be models for other countries to consider and/or provide opportunities for international collaboration.

Additionally, providing students with opportunities for hands-on learning at CCS projects can enrich student learning and help build expertise in CCS. For example, the Mitacs Globalink Research Internship funds student research exchanges with an industrial focus (inwards and outwards) and accepts students on a rolling call. In addition, University of Regina has agreements with University of Edinburgh, University of Texas, Imperial College London, and University of Melbourne, which enable competitive internships for graduates from these universities at SaskPower. These programs, too, could be expanded or replicated to provide opportunities for students from around the world that are interested in pursuing careers in the CCS industry.

Recommendations:

- ❖ Update *Baseline Survey and Plan of Action* to include input from ALL CSLF Member Countries prior to the 2017 CSLF Mid-Year Meeting.
- ❖ Conduct a gap analysis on CCS post-graduate course mapping and summer school programs, leveraging ongoing work under the Trilateral CCS Initiative (Canada, Mexico, and the United States).²
- ❖ Identify existing modularized content for CCS knowledge sharing and education for broad dissemination and develop new modularized content, as needed.³

² The University of Regina has offered to fund \$7-10K for a graduate student to conduct the gap analysis.

³ The University of Calgary is working on a CCS course, and the University of Regina has a non-credit course on CCS that may be applicable. Carbon Management Canada (CMC) may also have training modules. The Academic Council will need to address licensing issues and the extent to which these entities are willing to share the training course materials. This may require setting up a system to allow content developers to collaborate through licensing (e.g., creative commons).



- ❖ Request CSLF Member Countries identify existing internships with applicability to CCS and provide information to the Secretariat prior to the 2017 CSLF Mid-Year Meeting.
- ❖ Request CSLF Member Countries' government organizations consider hosting interns to expose them to CCS policy and technical perspectives of the respective countries.
- ❖ Request CSLF stakeholder community to identify internship opportunities, with an emphasis on exposure to and/or hands-on experience at operational CCS sites.

Theme 2: Communications and Outreach

Thematic Goals

- *Broadly disseminate CCS activities and opportunities for the academic community.*
- *Create and maintain momentum through virtual meetings.*
- *Host public scholarship forum and activities.*
- *Broad publication of international student research*

Description: Postgraduate opportunities are currently piecemeal, and are often not well communicated outside of national or regional boundaries. While efforts to collaborate internationally are underway (e.g., Scottish CCS (SCCS) with Canada, University of California at Berkeley with the National Autonomous University of Mexico (UNAM)), there is not a 'one-stop' resource for storing and advertising postgraduate academic opportunities around the world.

Developing such a collaborative resource should see an increase in the level of collaboration, as contributors are kept up to date with active research in foreign institutes. In addition, ideally this would also lead to a greater degree of securing international collaborative funding for postgraduate studentships.

Additionally, several countries and regions have specific funding for industry, universities and research institutes to collaborate internationally. At times though, these programs would have greater impact if there was a way to synchronize and leverage available funding. By gathering and hosting these on the CSLF website, this would increase visibility for this type of funding, and encourage funding bodies to better synchronize suitable funding calls. Some examples of current student-focused funding announcements are included in Appendix 3.

Recommendations:

- ❖ Build website page under CSLF website on academic resources that includes links to:
 - outreach programs;
 - internship opportunity announcements;
 - summer schools and training programs on CCS;



- webinar announcements; and
- CCS modularized training.⁴
- ❖ Task and fund, where necessary, the Academic Council to identify and create content for website.
- ❖ Post videos from CSLF meetings and CCS workshops, in addition to relevant course materials for the meetings and workshops.
- ❖ Request CSLF Member Countries to provide information on their international funding opportunities for publication and broad dissemination via CSLF website on a routine basis.
- ❖ Request CSLF Member Countries' identify a point of contact for country-specific updates to the website.
- ❖ Post student research on CCS on the CSLF website.
- ❖ Enable academics to register as an academic (instead of a stakeholder) on the CSLF website.
- ❖ Fund an annual academics event based on *International CCS Academic Summit*.⁵

⁴ The CSLF Secretariat will need to consider how best to maintain the academic resources webpage as content may require routine updates.

⁵ The Academic Council should also seek to leverage Scottish CCS's extensive network, where possible.



Theme 3: Academic Community and Capacity Building

Description: CSLF Member Countries are leaders in CCS, and many are home to a variety of academic institutions, research and development, and industry. Several countries are also host to demonstrations, projects, and fully operational plants that showcase CCS technologies. For members of the public, these sites are examples of CCS in action. For researchers, academics, and industry, these sites offer the chance to observe and learn. Study tours of project sites and plants are a valuable resource where visitors can learn directly from plant operator and take this knowledge with them.

These tours would be especially beneficial for delegations or visitors from developing countries who may not have first-hand experience with CCS experts or projects. For those countries that are new to CCS or looking for ways to incorporate it into their energy and environmental portfolios, study tours can offer first-hand and practical knowledge and complement other capacity building efforts.

This is an area where the academic community can assist through organization and engagement efforts, as many host country academics will have ties with projects and plants. They may also be able to leverage academic networks, institutions, and resources that can facilitate these study tours for visitors. Study tours can be a helpful learning opportunity for those unfamiliar with CCS, especially those who may not have much exposure or access to the technology. Developing countries can benefit from these tours, as they offer tangible examples of the technology at work. With input and engagement from academics, industry professionals, and plant operators, study tours can act as a tool for outreach, awareness, and capacity building.

There are multiple countries that currently offer study tours on CCS. Australia has hosted various tours at power plants where CCS technologies are tested or used commercially, at projects such as Otway, and at research laboratories. Norway is home to established projects, such as the Sleipner CO₂ project, in operation since 1996, and ongoing research facilities such as the Technology Center Mongstad. The U.S. Research Experience in Carbon Sequestration (RECS) is a 10-day program offered to graduate and

Thematic Goals

- *Create learning opportunities for those unfamiliar with CCS.*
- *Improve outreach, awareness, and capacity building on CCS.*
- *Serve as a resource for capacity building activities and support the CSLF Capacity Building Programme, where relevant.*
- *Broad publication of international student research.*
- *Begin stakeholder engagement early and make public engagement a priority.*
- *Integrate stakeholder engagement into project management and regulatory processes.*
- *Build long-term stakeholder relationships.*
- *Make sufficient investment in time and resources.*
- *Understand and consult community.*
- *Maintain flexibility and diligence.*



doctoral students and early career professionals that includes classroom instruction and site visits. Site visits have included the National Carbon Capture Center, Plant Barry, and Kemper County Energy Facility. Located in Canada, the Boundary Dam Integrated CCS Project is the world's first commercial CCS project at a coal-fired power plant. Its operator, SaskPower, has created The Knowledge Center, through BHP Billiton's support of \$20 million over five years. This center aims to accelerate global CCS deployment by allowing the learnings acquired at Boundary Dam to be shared broadly, bringing down the costs of CCS, and managing development risk. Details on Canadian study tours are included in Appendix 4.

Stakeholder engagement is also widely recognized as a critical piece of the CCS value chain. Stakeholder engagement can be defined as a multi-directional process that brings together interested and impacted parties to discuss and implement activities that will potentially impact or influence the lives of a particular group of stakeholders. Indeed, a lack of stakeholder engagement, public awareness, and public support are often cited as major barriers to the development and implementation CCS projects and policy. At present, many CCS demonstration projects are conducted through partnerships between government, industry, non-governmental organizations, and academia. Demonstration projects and commercial projects coming online have several stakeholder groups, including general public, educators, government, regulators, industry, landowners, farmers, and others depending on specific circumstances. Each stakeholder may have varying interests, information needs, or concerns that need to be acknowledged and addressed. Additional detail is provided in Appendix 5.

Recommendations:

- ❖ Work with Capacity Building Governing Council on recommendations for capacity building moving forward.
- ❖ Request CSLF Member Countries to consider hosting study tours for developing countries (potentially outside of CSLF membership) with engagement and organization by the academic community.
- ❖ Evaluate CSLF Academic Council hosted webinars via CSLF for capacity building.
- ❖ Develop stakeholders' guidelines and engagement objectives document for use by CSLF Member Countries' Stakeholders.
- ❖ Create, evaluate, and refine stakeholder engagement strategy and communications plan.