How to Work with CCSI²

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Carbon Management Research Project Review Meeting

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CCSI2 Tools Accelerate Capture Technology Development

- The CCSI Toolset
  - A comprehensive set of process modeling and optimization tools specifically designed, tested and proven to accelerate Capture Technology development
  - Provides the best possible use of all existing process performance data and models
    - Enables optimal design of next-step pilot and demonstration facilities and test programs
    - Directs further pilot and demonstration work to the highest value
  - Usable with all major existing modeling platforms
    - Make the best of what you already have
  - Provides highly verified model packages of multiple capture technologies

- By using the best data, modeling and optimization tools, technology development can be directed to the areas of greatest value.

CCSI2 Has a Long Successful Partnership History with Capture Technology Developers

- **Technology developers** have been **partners in developing CCSI and CCSI2 tools** from the beginning (2010)
- **Targeted partnerships** in specific technology development programs have **proven the value** of incorporating the best modeling capabilities at all levels of development
- **Major demonstration programs at NCCC and TCM** have shown the value of using advanced modeling to optimize test programs
- CCSI2 Technology **Team members have deep experience** with interfacing with technology developers to implement the advanced tools
- A focused **IP management system** has demonstrated effectiveness in protecting sensitive data and models and enabling new IP development
- A highly capable **support team** maintains and improves the toolset and enables users to gain access to the full set of CCSI2 capabilities

Accelerate Your Technology Development

- Connect with CCSI2 Team at this event
  - Multiple presentations and posters
    - The toolset and how to access and use it
    - Multiple examples of partnerships with technology development programs
    - Many members of CCSI2 Leadership and team present here

- Connect beyond this event
  - Contact leadership (Michael.Matuszewski@netl.doe.gov)
  - Software Development (KSBeattie@lbl.gov)
  - Join our Stakeholder program (JohnHShinn@Gmail.com)
  - Create your own partnership with our Technology Team leaders

# Upcoming Advanced Modeling Summit

Advanced Process Systems Engineering Stakeholder Summit

October 11-12, Tysons Corner, VA

- First Face-to-face comprehensive CCSI2 Stakeholder event since 2019
- **Comprehensive review** - 10+ years creating **most advanced tools**
  - Entire **integrated process modeling and optimization**
  - Usable on existing Process Simulation platforms (Eg Aspen) and most advanced platforms (IDAES)
  - Multiple technology applications (multiple capture technologies, integrated energy systems, water, minerals)
- Demonstrations, tutorials, partnership dialogue opportunities and more.

More information, registration, hotel bookings…
IDAES.org , News and Events tab
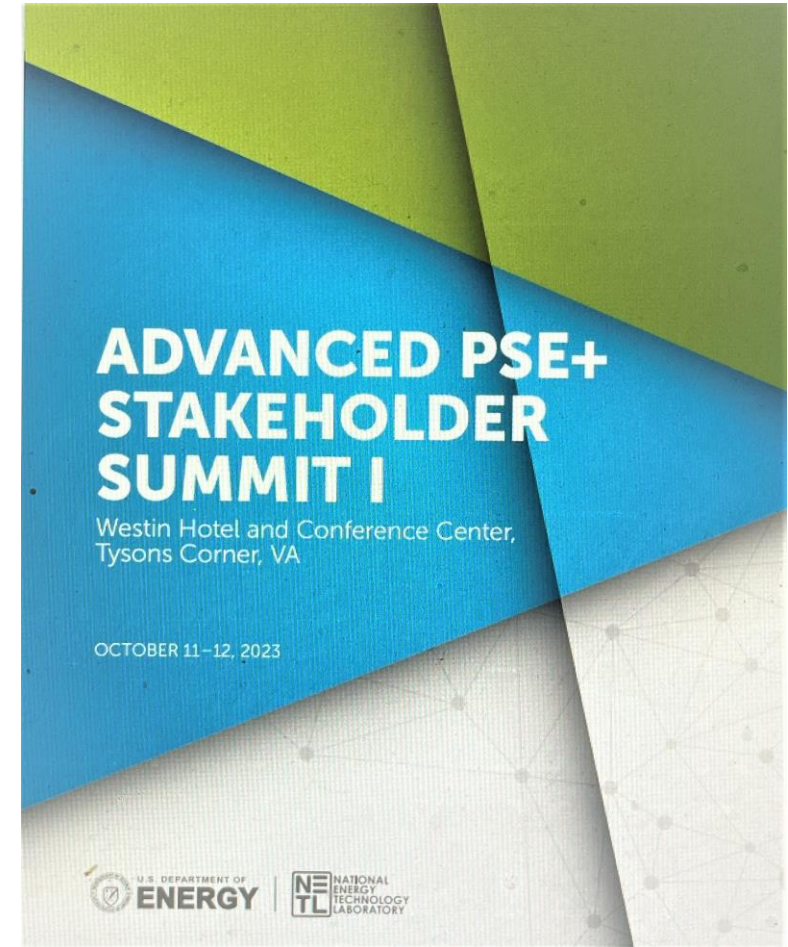
CCSI2 Toolset Access and Support

- We have a system that maintains and supports applications of the toolset

- Some Important Tools in the CCSI2 Toolset
  - Data-to-models tools
  - Model building tools
  - Model combination tools
  - Comprehensive CFD and process models for multiple capture technologies
  - Support for multiple simulations of complex models
  - Model simplification tools
  - Uncertainty quantification tools
  - Optimization tools
  - Sequential Design of Experiments capabilities

- All wrapped into readily-accessible form

Complete Toolset Available at
https://github.com/CCSI-Toolset

FOQUS - *Framework for Optimization and Quantification of Uncertainty and Surrogates*

- Synthesize, design, and optimize a complete carbon capture system while considering uncertainty
- **Updated Quarterly**

30+ tools grouped into 3 Bundles:

- **CFD Models**: High fidelity device scale Computational Fluid Dynamics (CFD) models

- **Oxy-Combustion Models**: Boiler model and a suite of equation-based models

- **Process Models**: A suite of process models implemented in gPROMS, Aspen Custom Modeler, Aspen Plus and Aspen Plus Dynamics
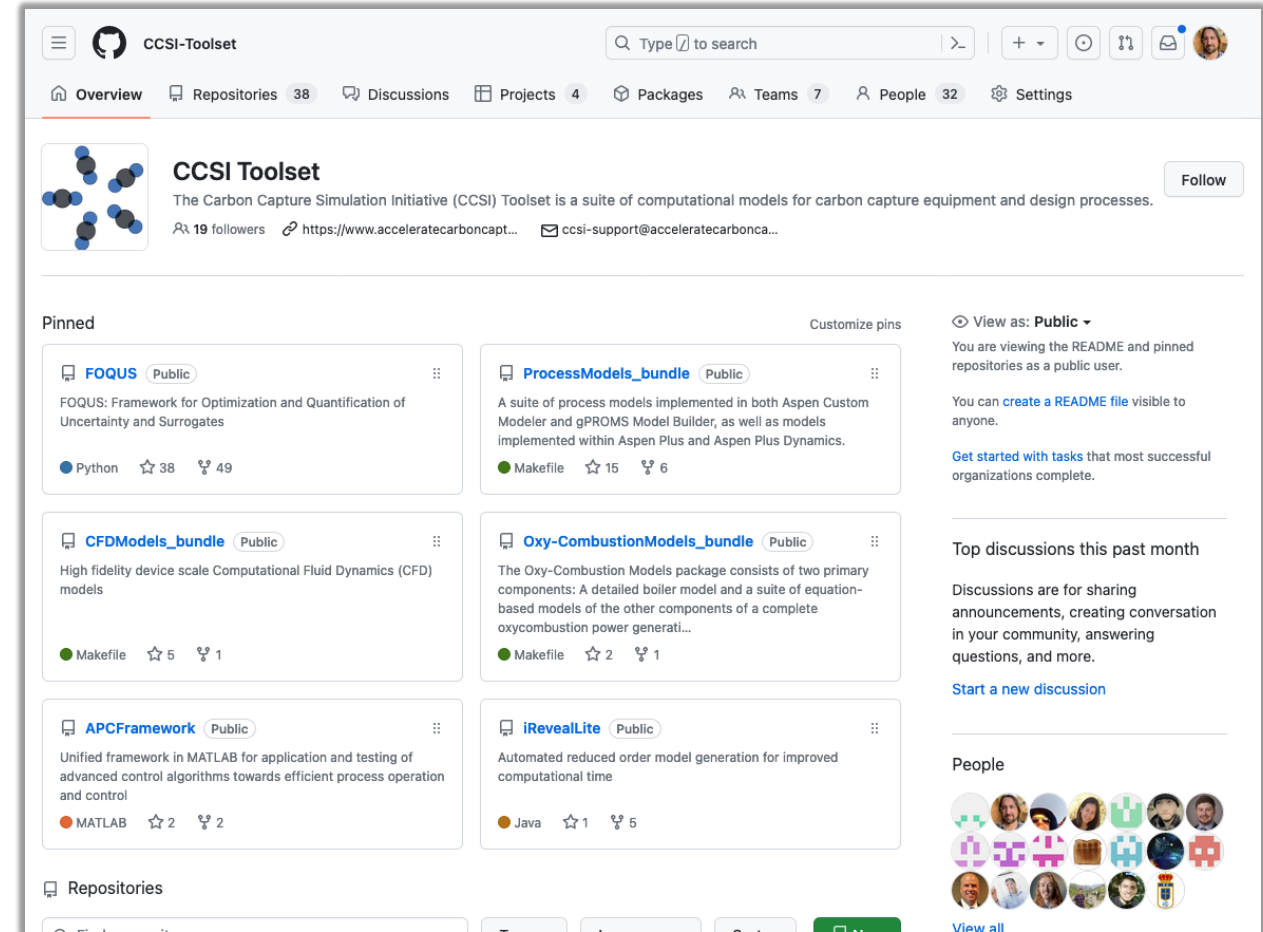
Open-Source

- Code publicly available since 2017
- Permissive 3-clause BSD license
- All may use, modify or distribute (with attrib.)
- Examination and contributions welcomed

All Changes Tested and Reviewed

- Currently being used by dev team
- Contributions are tested (manual & auto)
- Peer reviewed by core team members
- Feedback, conversation, changes…
- Change is accepted or rejected
- NDA-Protected IP uses identical process

Two-Stage Code Review Process
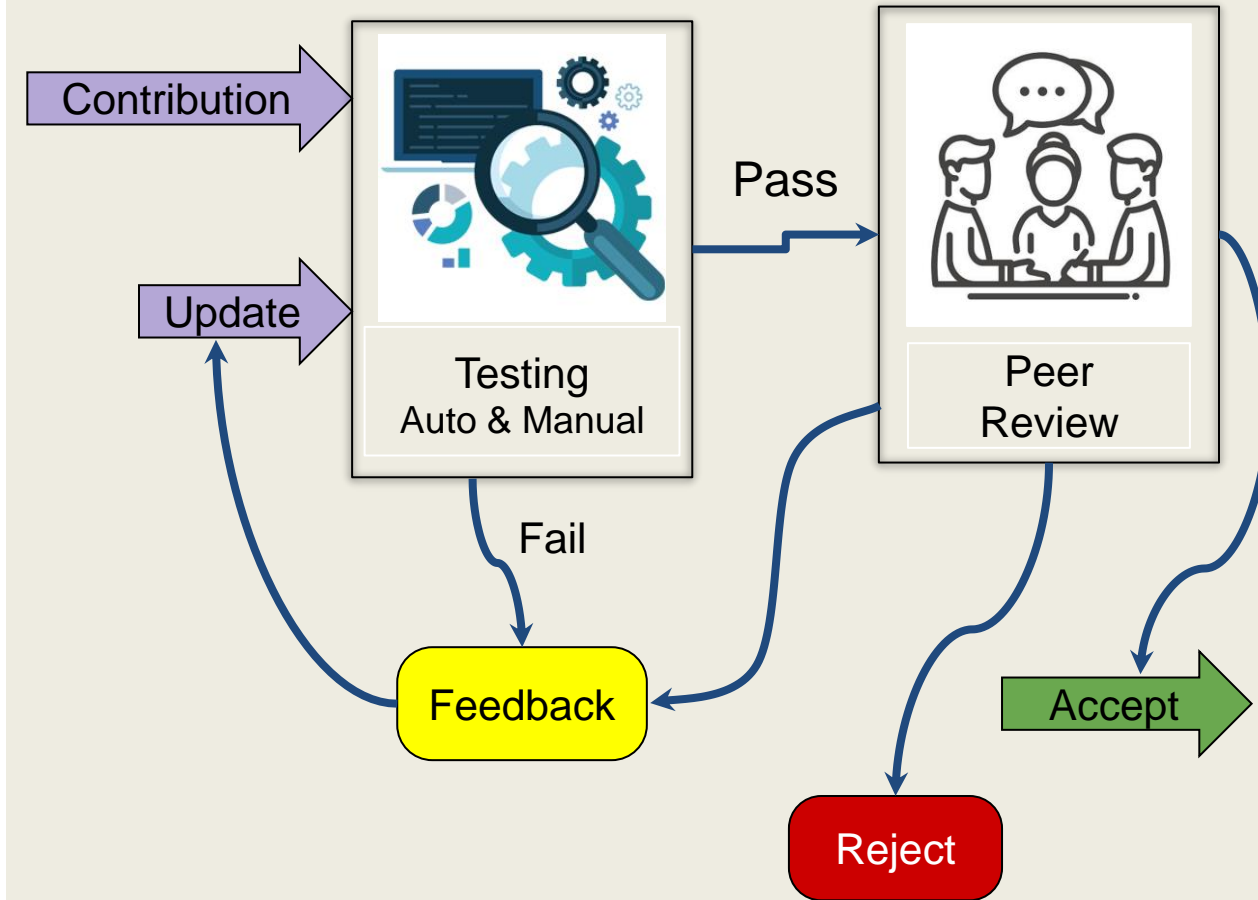
How to Connect

- Support email: ccsi-support@acceleratecarboncapture.org
  - Schedule time during virtual "office hours"
- Join the Industry Advisory Board: ccsi-iab@acceleratecarboncapture.org
- Join user group: ccsi-users@acceleratecarboncapture.org
- Download tools from GitHub: https://github.com/CCSI-Toolset
  - Discussion forums
  - Open & track issues (bugs, feature request)
  - Open & track PRs (pull requests / code contributions)
- CCSI2 YouTube channel: https://www.youtube.com/@ccsi2team452
  - Installation instructions
  - Tutorials (SDOE, UQ, ACM, Aspen Plus, Surrogates, OUU, etc.)
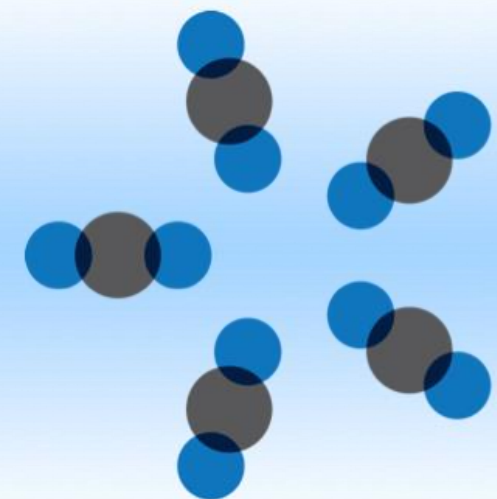
CCSI²

Carbon Capture Simulation for Industry Impact

- The CCSI² toolset is available now
- Works with your existing toolset and models
- Download, use and let us know
- Become involved and influence development

For more information:

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