



CEATI
INTERNATIONAL

Centre for Energy Advancement
through Technological Innovation

*Approach to Collaborative
Research and Energy Storage*

Utility Participation Map **CEATI** INTERNATIONAL



AltaLink LP
 ATCO Group
 BC Hydro
 Brookfield Renewable Power
 Capital Power Corporation
 Columbia Power Corporation
 Enbridge Gas Distribution
 ENMAX Power Corporation
 EPCOR
 FortisAlberta
 FortisBC
 FortisOntario
 Great Lakes Power
 Greater Sudbury Hydro
 Horizon Utilities
 Hydro One Networks
 Hydro Ottawa Limited
 Hydro-Quebec
 Manitoba Hydro
 Nalcor Energy
 Nalcor Energy Churchill Falls
 Natural Resources Canada
 New Brunswick Power Distribution
 Newfoundland and Labrador Hydro
 Newfoundland Power
 Nova Scotia Power
 Ontario Power Authority
 Ontario Power Generation
 PowerStream
 Rio Tinto Alcan
 Saskatoon Light & Power
 SaskPower
 Toronto Atmospheric Fund
 Toronto Hydro-Electric System
 TransAlta Energy Corporation
 TransCanada Pipelines
 Yukon Energy



Alcoa Power Generating
 Allegheny Energy Supply
 Ameren UE
 American Electric Power
 American Transmission Company
 Arizona Public Service
 Avista Corporation
 Bonneville Power Administration
 California Department of Water Resources
 Chelan County Public Utility District
 Con Edison
 Douglas County PUD
 Duke Energy Corporation
 Entergy Services
 Eugene Water and Electric Board
 Exelon
 FirstEnergy Corporation
 FirstLight Power Resources Services
 Florida Power & Light
 Grant County Public Utility District
 Hetch Hetchy Water & Power
 National Grid
 National Rural Electric Cooperative Association
 New York Power Authority
 New York State Electric & Gas
 North American Hydro
 Northeast Utilities Service Company
 Pacific Gas and Electric Company
 Portland General Electric
 Public Service Electric and Gas Company
 Puget Sound Energy
 Sacramento Municipal Utility District
 San Diego Gas and Electric Company
 Seattle City Light
 South Carolina Electric and Gas Company
 Southern California Edison
 Southern Company
 Tacoma Power
 Tennessee Valley Authority
 U.S. Army Corps of Engineers
 U.S. Bureau of Reclamation
 Wisconsin Public Service



ESB Ireland



Environment Agency
 Scottish and Southern Energy
 Electricité de France
 RTE France
 SHEM



Ghana Grid Company



Elforsk AB
 Vattenfall AB



Fortum Generation AB



Deltares



E.ON Wasserkraft GmbH



Israel Electric Company



Tohoku Electric Power Company
 Tokyo Electric Power Company



Korea Hydro & Nuclear Power
 Korea Water Resources



Ausgrid
 ENERGEX
 Essential Energy
 Hydro Tasmania
 Powerlink Queensland
 Snowy Hydro



Meridian Energy
 Mighty River Power
 Transpower New Zealand

17 Independent Interest Groups and Task Forces

Generation & Utilization

- **Strategic Options for Sustainable Power Generation**
- Hydraulic Plant Life
- Water Management
- Dam Safety
- Thermal Generation
- **Customer Energy Solutions**

Distribution

- Distribution Assets Life Cycle Management
- Power Quality

Transmission

- Life Cycle Management of Substation Equipment and Apparatus
- Power System Planning and Operations
- Overhead Line Design Issues & Wind and Ice Storm Mitigation
- Transmission Line Asset Management
- Transmission Underground Cables

Multi-Business Unit

- Infrastructure Protection and Security
- Grounding and Lightning Task Force
- **Smart Grid Task Force**
- Protection & Control Task Force

2013 Strategic Options for Sustainable Power Generation (SOIG) Program

Two Face-to-face Meetings and Workshops per Year:

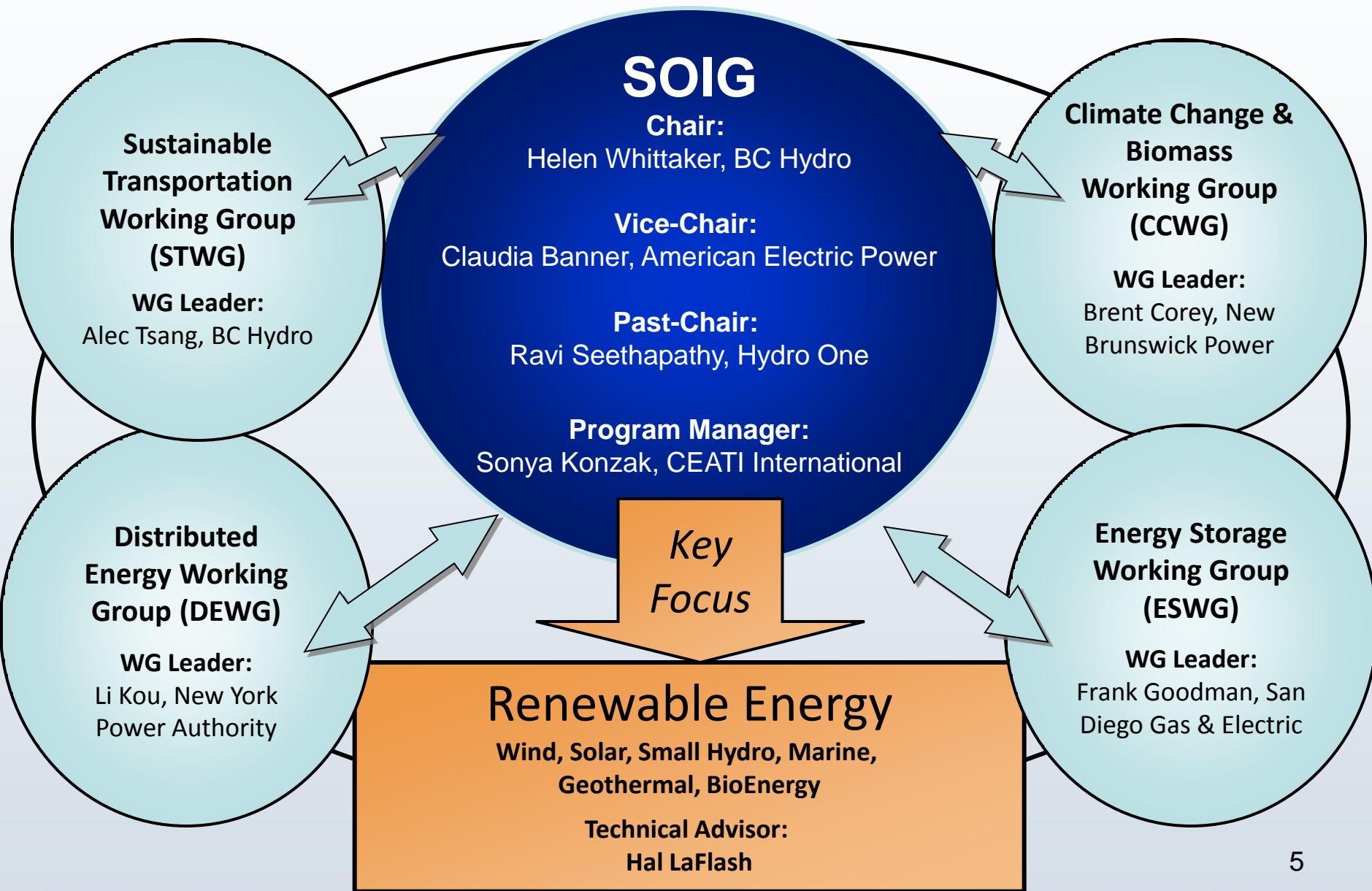
May 15-17, 2013 – San Diego, CA: SOIG General Meeting

September 11-13, 2013 – Halifax, NS: SOIG General Meeting

Projects

- Energy Storage Scoping Study
- Emerging Energy Technologies: Technical and Economic Assessment
- Assessment of the Potential for Hydrokinetic Technologies
- Agricultural Biomass Torrefaction Research Program
- Canadian PEV Charging Infrastructure Deployment Guidelines
- PEV Deployment: Policy Paper from Utility Perspective
- Woody Biomass Torrefaction Evaluation Program
- Conversion of Waste Heat to Electricity

SOIG Structure and Working Groups



Energy Storage Program Activities

- » Spring 2013 Workshop
- » 2012 Fall Meeting
- » 2011 Energy Storage Workshop

Managing System Impacts of
Variable Energy Resources

Energy Storage Session:
BC Hydro, Manitoba Hydro,
Hydro One

Projects

- » Long Island Demonstration and Evaluation of NAS Battery
- » Feasibility of Above-Ground Compressed Air Energy Storage (CAES)
- » Ontario Energy Storage Feasibility Study



Energy Storage Scoping Study

Goal: Identify technical specifications for storage systems in terms of cost and performance for specific functions.

- Storage Systems
- Function
- Technical Specifications

- Output Smoothing
- Volt/Var Support
- Frequency Regulation
- Spinning Reserve
- Bulk Energy Storage
- Time Shifting
- Load Following

- Flywheel
- Batteries
- Flow Batteries
- Pumped Storage
- Liquid Air
- SMES
- CAES



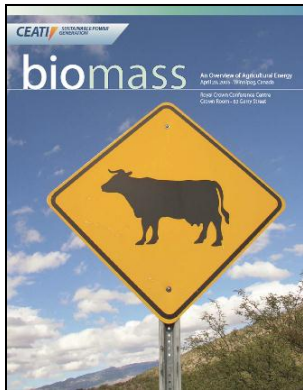
- Ramp Rate
- Duty Cycles
- O&M
- Life Cycle Cost
- Communication and Control

Outcome and Next Steps

- » Assess effectiveness of current pilot projects and R&D Activities.
- » Explore locations and new applications for potential demonstration or deployment projects.



Highlight Projects



Biomass Torrefaction Evaluation Program

- Identify and prioritize the most promising torrefaction technologies
 - Comprehensive lab analyses, pilot test burns and milling tests



Formulation of Polymer Cutout Specifications

- Review of utility standards and manufacturer designs and test requirements
 - Collaboration with the CSA to develop standard CAN/CSA-C310-09.



Contact Information

Sonya Konzak

Program Manager

Sonya.konzak@ceati.com

514-866-5377 X226

Hal LaFlash

SOIG Technical Advisor

Hal.laflash@ceati.com

925-222-0124

CEATI International Inc.

www.ceati.com