



The Carbon Sequestration Leadership Forum

– An Overview –

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What is the CSLF?



CSLF Charter signing ceremony, Washington, D.C., USA, 25 June 2003

...an international climate change initiative that is focused on development of improved cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term safe storage.

CSLF Members



CSLF Member Countries represent

58% of world population

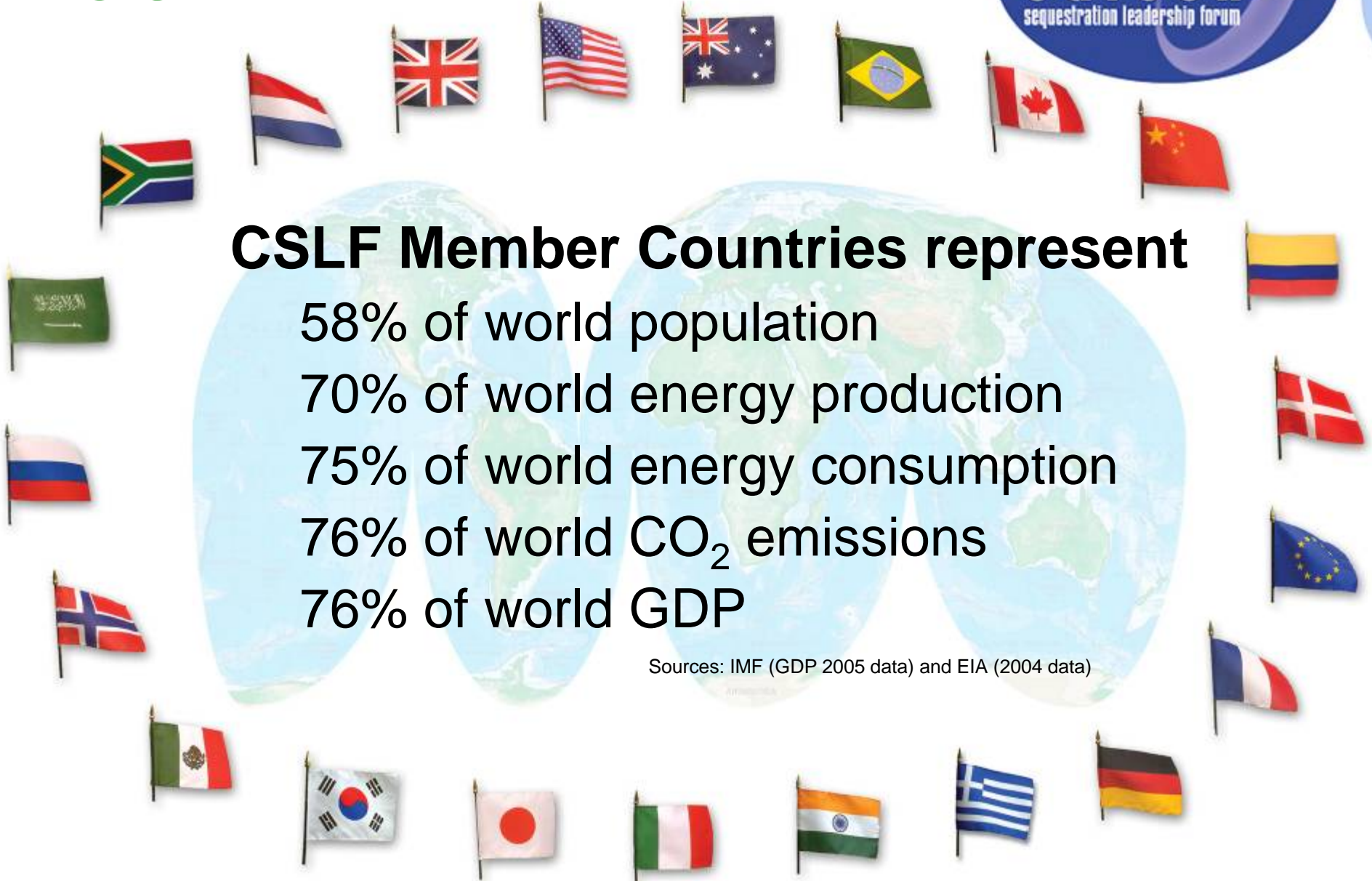
70% of world energy production

75% of world energy consumption

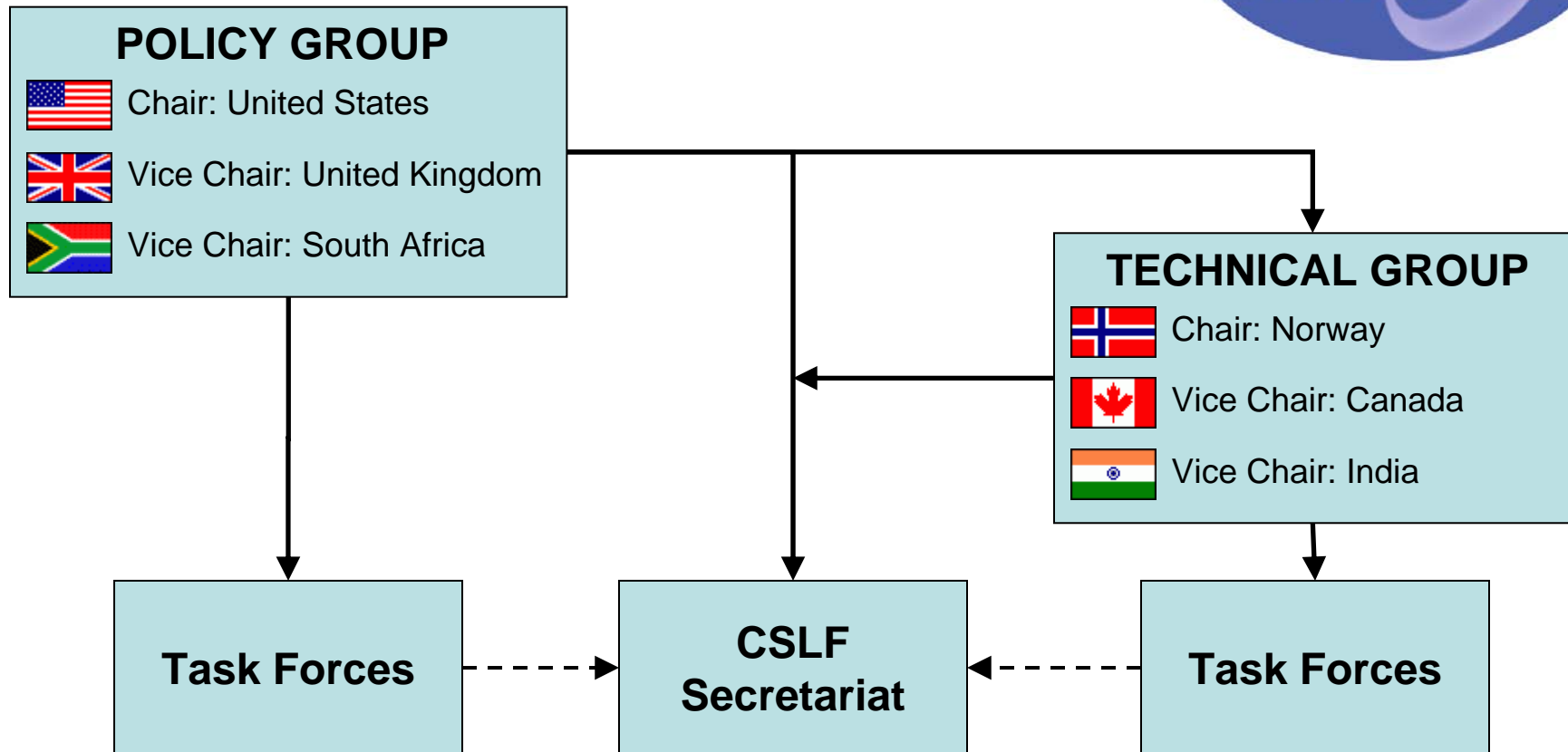
76% of world CO₂ emissions

76% of world GDP

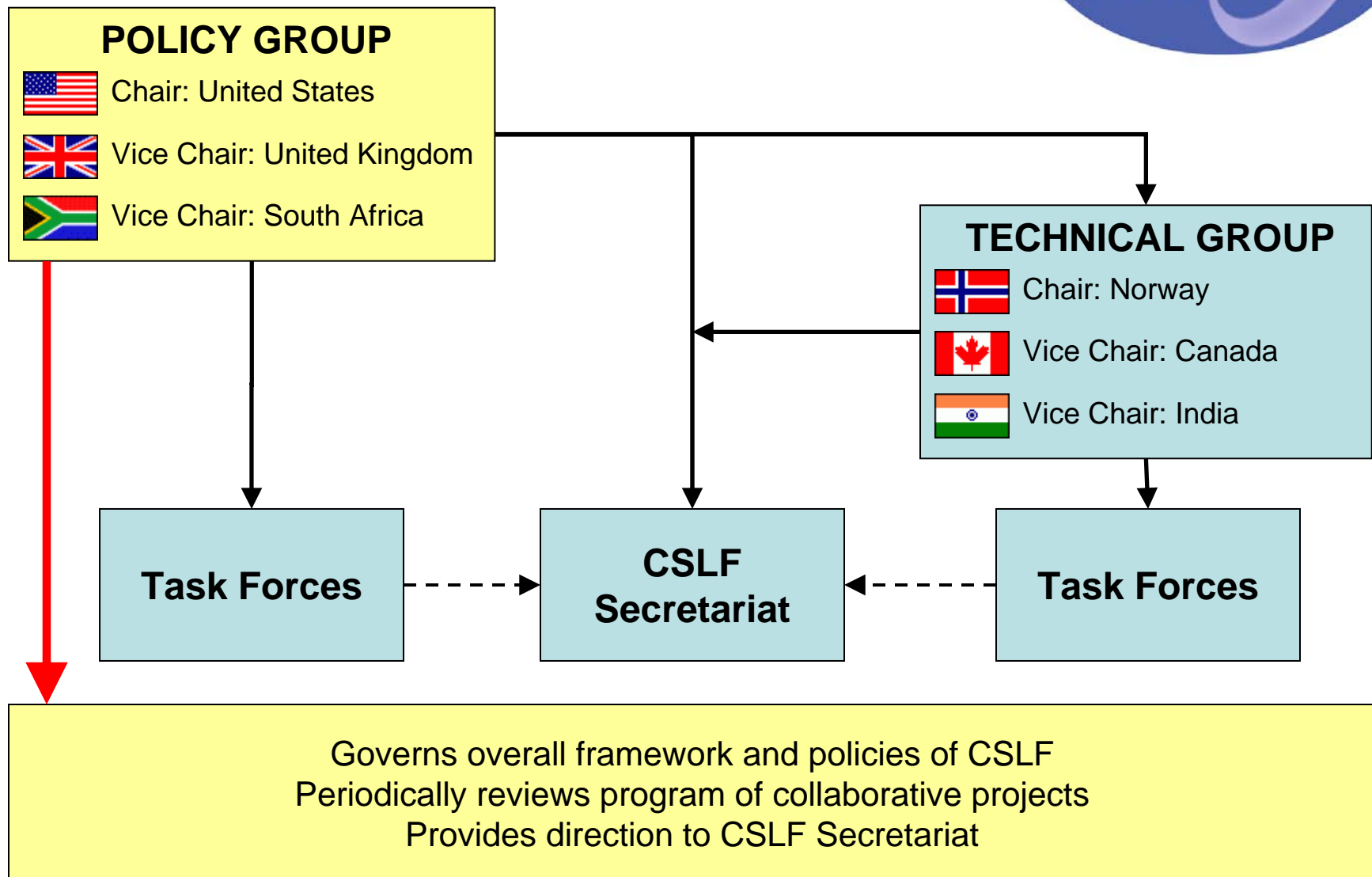
Sources: IMF (GDP 2005 data) and EIA (2004 data)



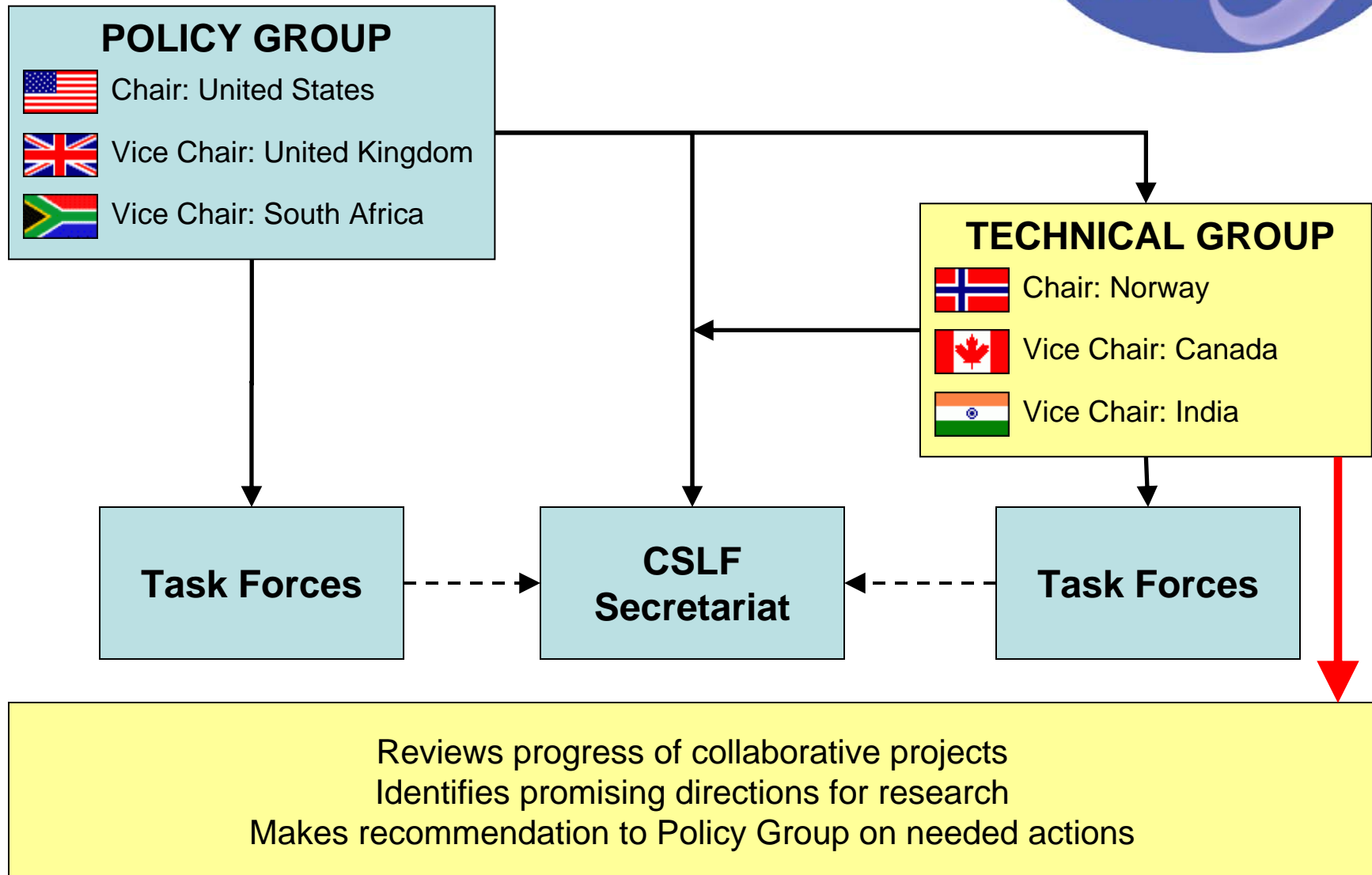
CSLF Structure



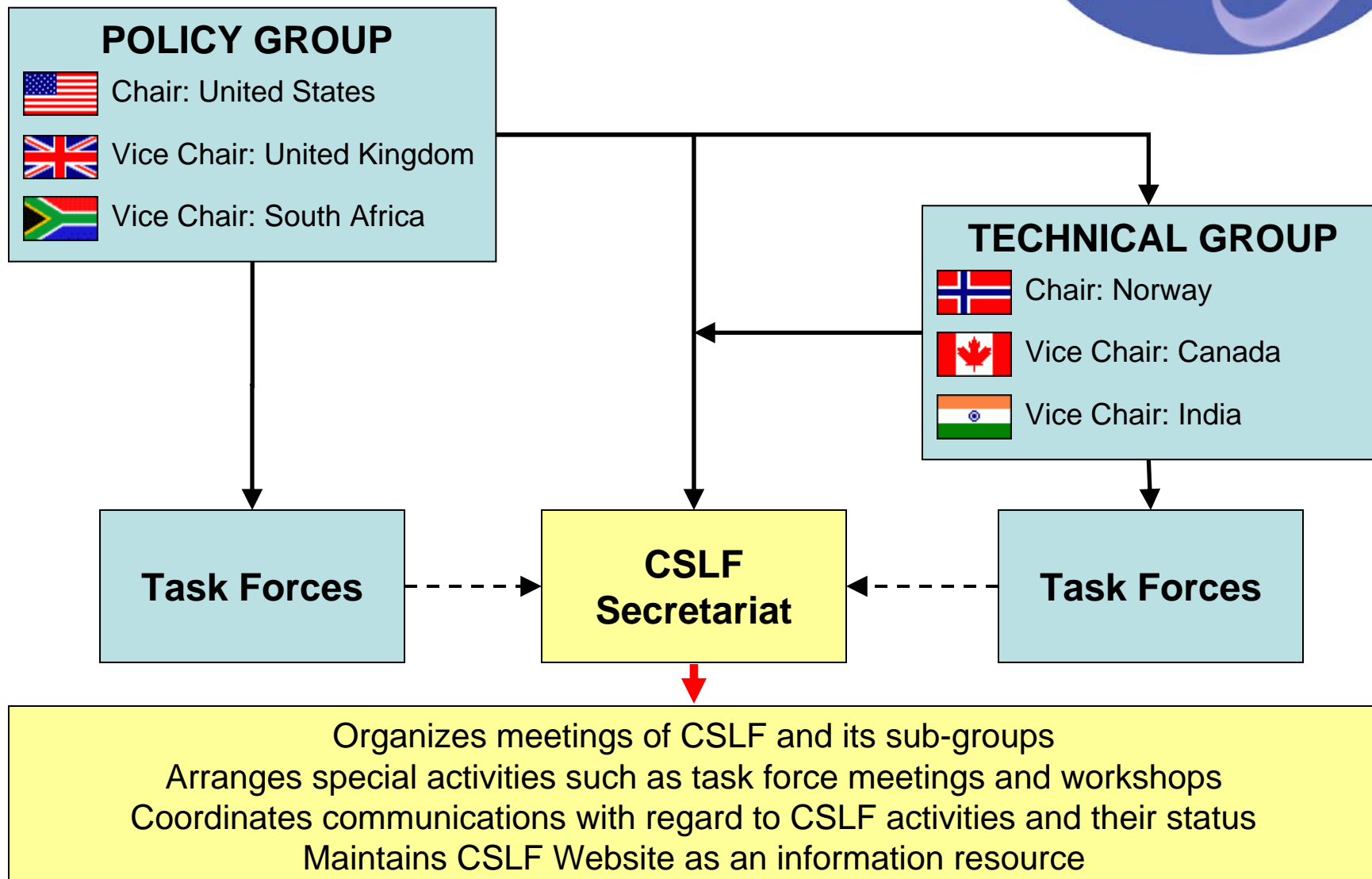
CSLF Structure



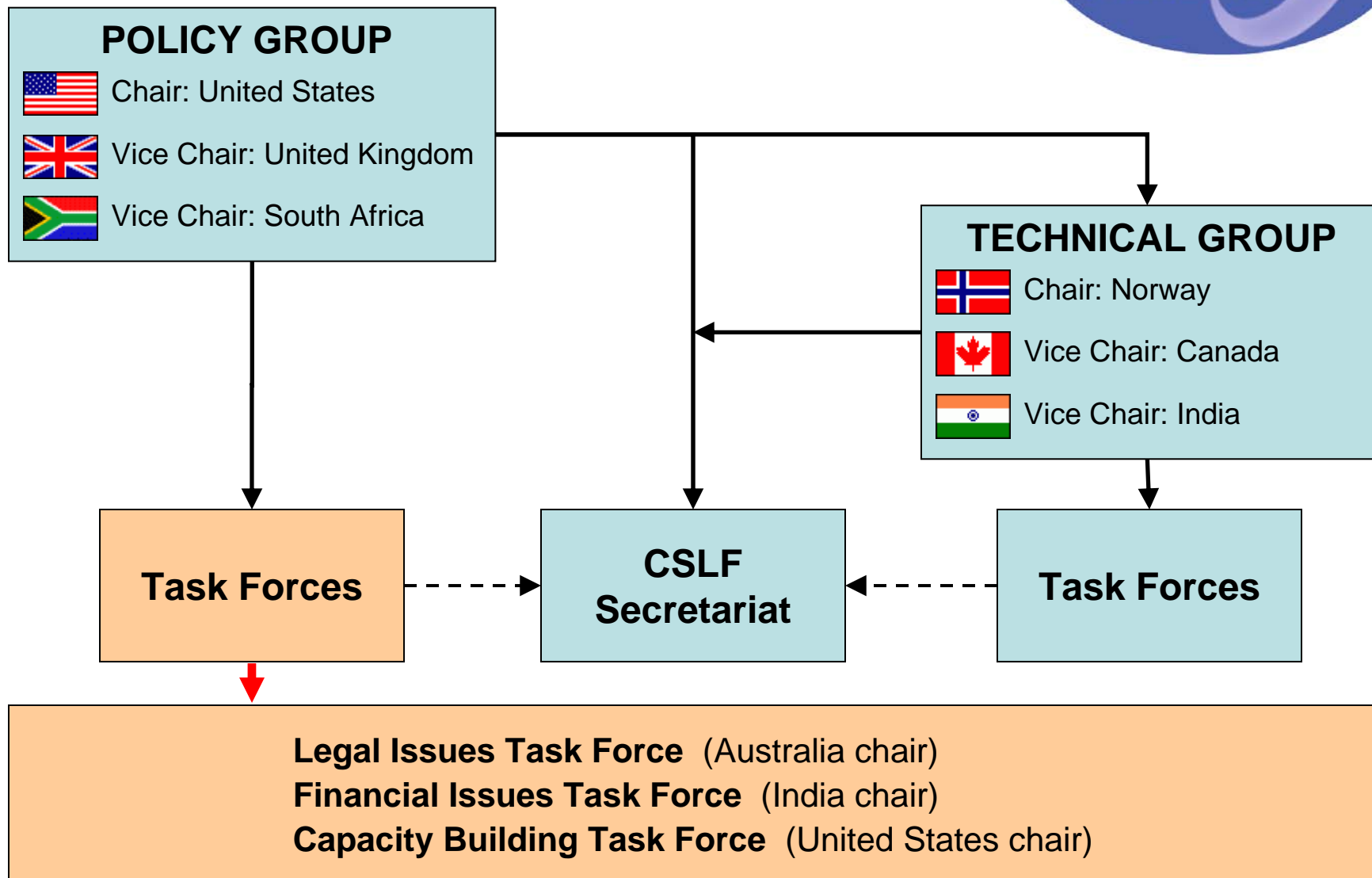
CSLF Structure



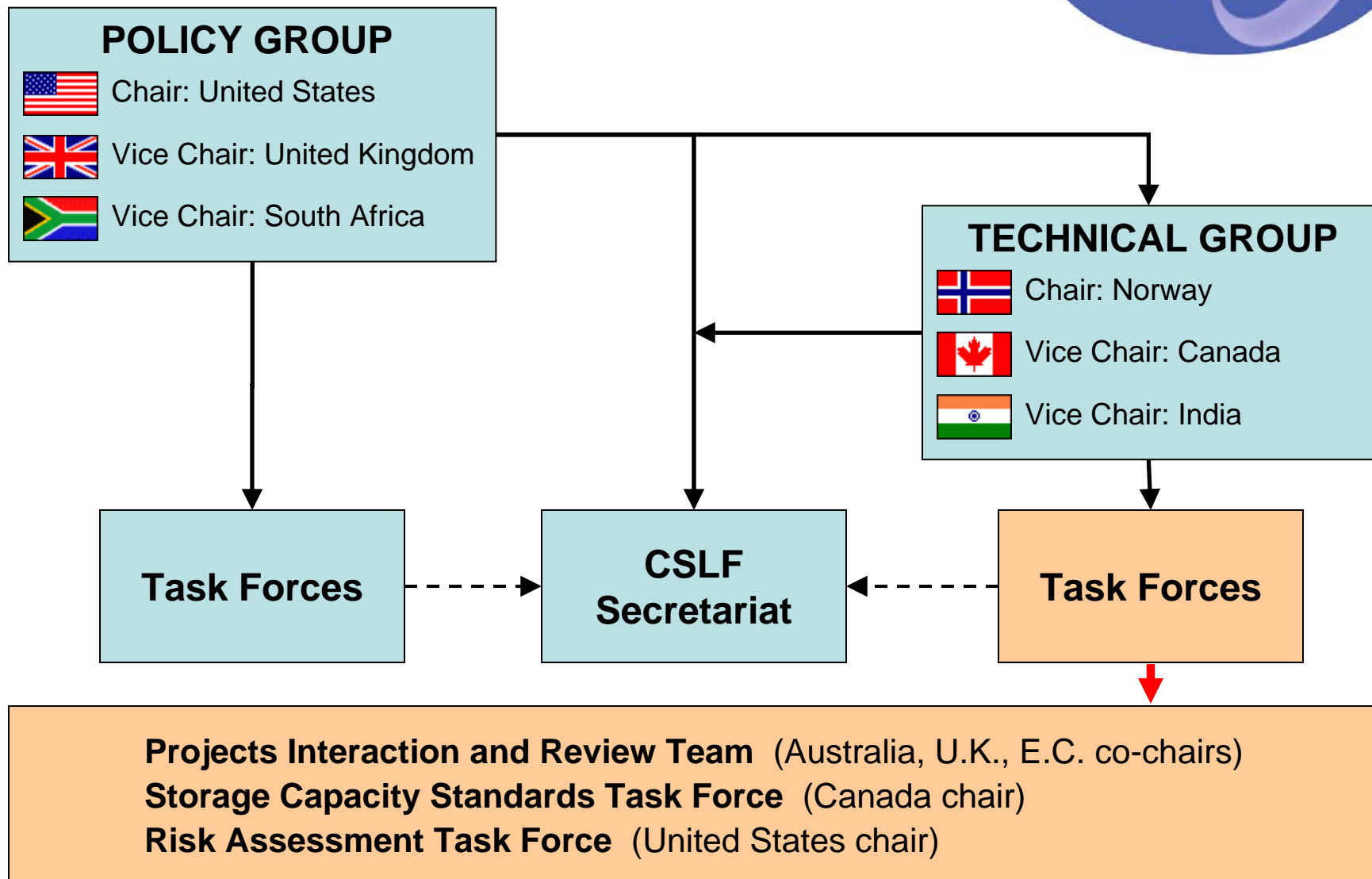
CSLF Structure



CSLF Structure



CSLF Structure



CSLF Task Forces



Legal Issues Task Force

- Members: Australia (chair), European Commission, France, Netherlands, Norway, United Kingdom, United States
- Purpose: Raise awareness, create discussion, and assist in developing solutions for five priority issues:
 - Intellectual property
 - National legal and regulatory frameworks
 - International environmental protection instruments
 - Creating a level playing field for CCS
 - Public awareness
- Milestones
 - 2nd IEA/CSLF Workshop on Legal Aspects of Storing CO₂ held October 2006 (Paris)
 - 2nd Report on Legal Aspects of Storing CO₂ has been finalized and will be published by IEA



CSLF Task Forces



Financial Issues Task Force

- Members: India (chair), Australia, European Commission, Korea, Netherlands, South Africa, United Kingdom, United States
- Purpose: Develop a detailed plan for financing carbon capture and storage (CCS) projects in emerging economy countries
- Milestones
 - Initial task force meeting held October 2007 (New Delhi)



CSLF Task Forces



Capacity Building Task Force

- Members: United States (chair), Canada, Colombia, European Commission, India, Italy, Mexico, Saudi Arabia, South Africa, United Kingdom, United States
- Purpose:
 - Assist emerging economy CSLF Members to develop the knowledge, skills, expertise and institutions needed to deploy CCS
 - Develop training and educational resources that all CSLF Members can utilize
 - Build on lessons learned from CSLF-recognized projects
 - Collaborate with other international CCS initiatives
- Milestones
 - 1st CSLF Workshop on CSLF Workshop on Capacity Building for CCS in Emerging Economy Countries held May 2007 (Pittsburgh)
 - Additional Capacity Building Workshops under development

Capacity Building Task Force (United States chair)

CSLF Task Forces



Projects Interaction and Review Team (PIRT)

- Members: Australia (chair), Canada, Denmark, European Commission, Germany, India, Netherlands, Norway, Saudi Arabia, United Kingdom, United States
- Purpose
 - Assess projects proposed for recognition by the CSLF
 - Review the CSLF project portfolio; identify synergies, complementarities and gaps for revision of the CSLF Technology Roadmap
 - Identify technology gaps where further RD&D would be required
 - Foster enhanced international collaboration for CSLF projects
 - Promote awareness within the CSLF of new developments in CCS
- Milestones
 - Overcoming Barriers to CCS Deployment Workshop held March 2007 (Paris)
 - Developed set of metrics to enable PIRT to assess potential CSLF projects
 - Completed a comprehensive CCS Technology Gap Assessment
 - Developed prioritization for implementation of CSLF Action Plan items

CSLF Task Forces



Storage Capacity Estimation Task Force

- Members: Canada (chair), Australia, Brazil, European Commission, France, Norway, United Kingdom, United States
- Purpose: Develop and disseminate a clear set of definitions and methodologies that will allow:
 - Consistent assessments of CO₂ storage capacity in geological media for use by decision makers in government and industry
 - Comparison of CO₂ storage capacity at various levels (country, basin, regional) and among sites
- Milestones
 - Paper based on Phase 1 results (Scope Definition) published in the *International Journal of Greenhouse Gas Control*
 - Phase 2 Report (Examination of Methodologies) completed and accepted by CSLF
 - Paper based on Phase 2 results accepted for publication in the *International Journal of Greenhouse Gas Control*
 - Task Force moving ahead to Phase 3 (Individual Case Studies)

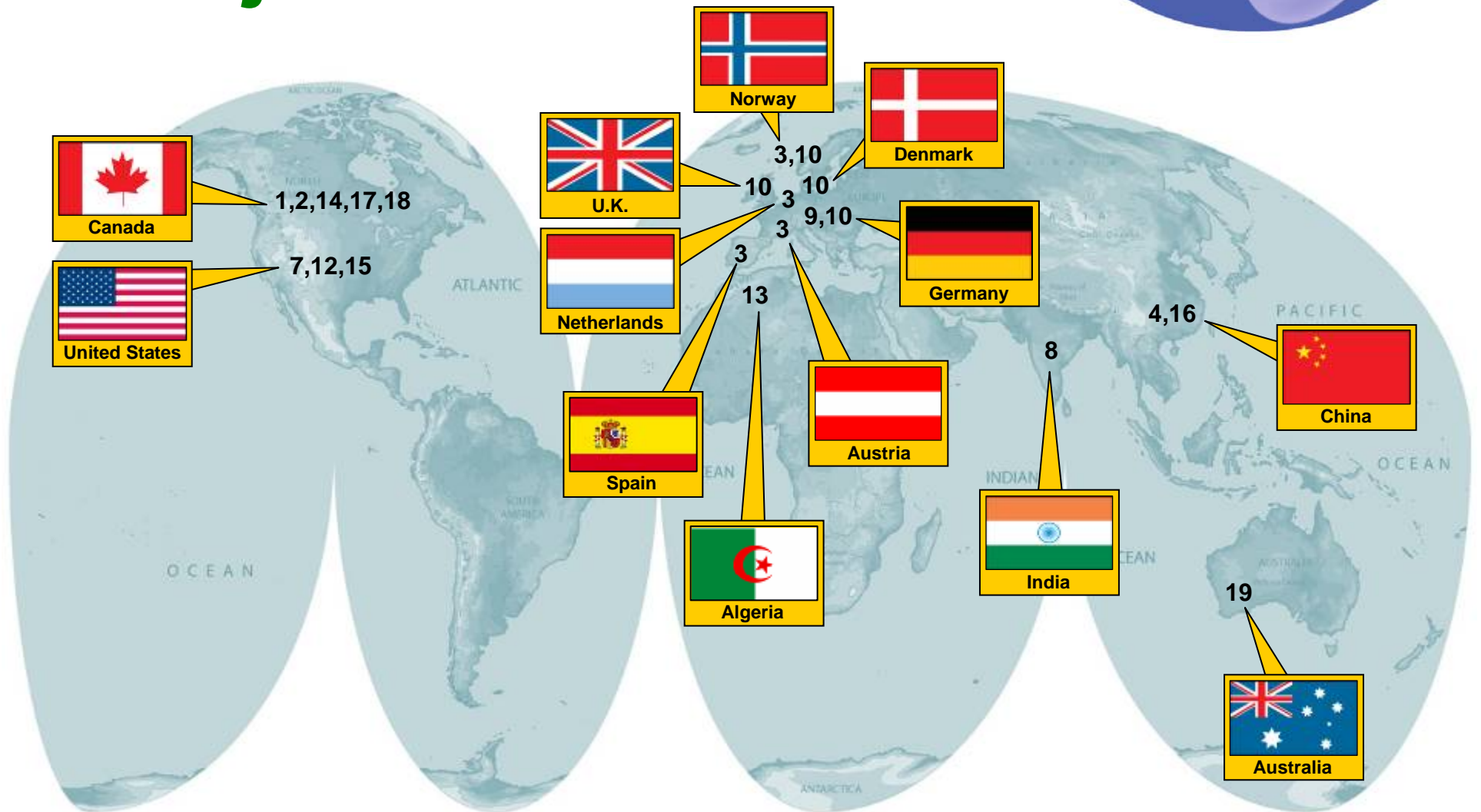
CSLF Task Forces



Risk Assessment Task Force

- Members: United States (chair), Australia, Canada, France, India, Japan, Netherlands, Norway, United Kingdom, United States
- Purpose:
 - Identify potential risks from CCS activities
 - Examine the risk assessment standards and procedures that could be used to place these risks in context based on their likelihood to occur and their possible consequences
 - Focus on risks that are unique to CCS:
 - risks associated with CO₂ injection
 - risks associated with any CO₂ migration from the storage reservoir
- Milestones
 - Finalized mission statement and agreed on planned Phase I activities
 - Currently developing task force action plan

Locations of CSLF Projects



Active CSLF Projects



<i>Project</i>	<i>Location</i>
ARC Enhanced CBM Recovery	Alberta, Canada
CANMET R&D Oxyfuel Combustion for CO ₂ Capture	Ottawa, Canada
CASTOR	Austria, Norway, Spain, and the Netherlands
CO ₂ Capture Project (CCP) – Phase 2	Various locations in Europe and North America
CO ₂ GeoNet	Various locations in Europe
CO ₂ Separation from Pressurized Gas Stream	Pittsburgh, United States
CO ₂ Sequestration in Basalt Formations of India	India
CO ₂ SINK	Berlin, Germany

Active CSLF Projects



<i>Project</i>	<i>Location</i>
ENCAP	Various locations in Europe
Frio Project	Houston, United States
Geologic CO ₂ Storage, In Salah, Algeria	In Salah, Algeria
ITC CO ₂ Capture with Chemical Solvents	Regina, Canada
Regional Carbon Sequestration Partnerships	United States
Regional Opportunities for CO ₂ Capture and Storage in China	China
Weyburn II CO ₂ Storage Project	Southern Saskatchewan, Canada
Zama Acid Gas EOR, CO ₂ Sequestration, and Monitoring Project	Northwestern Alberta, Canada
CO2CRC Otway Project	Southeast Australia

Completed CSLF Projects



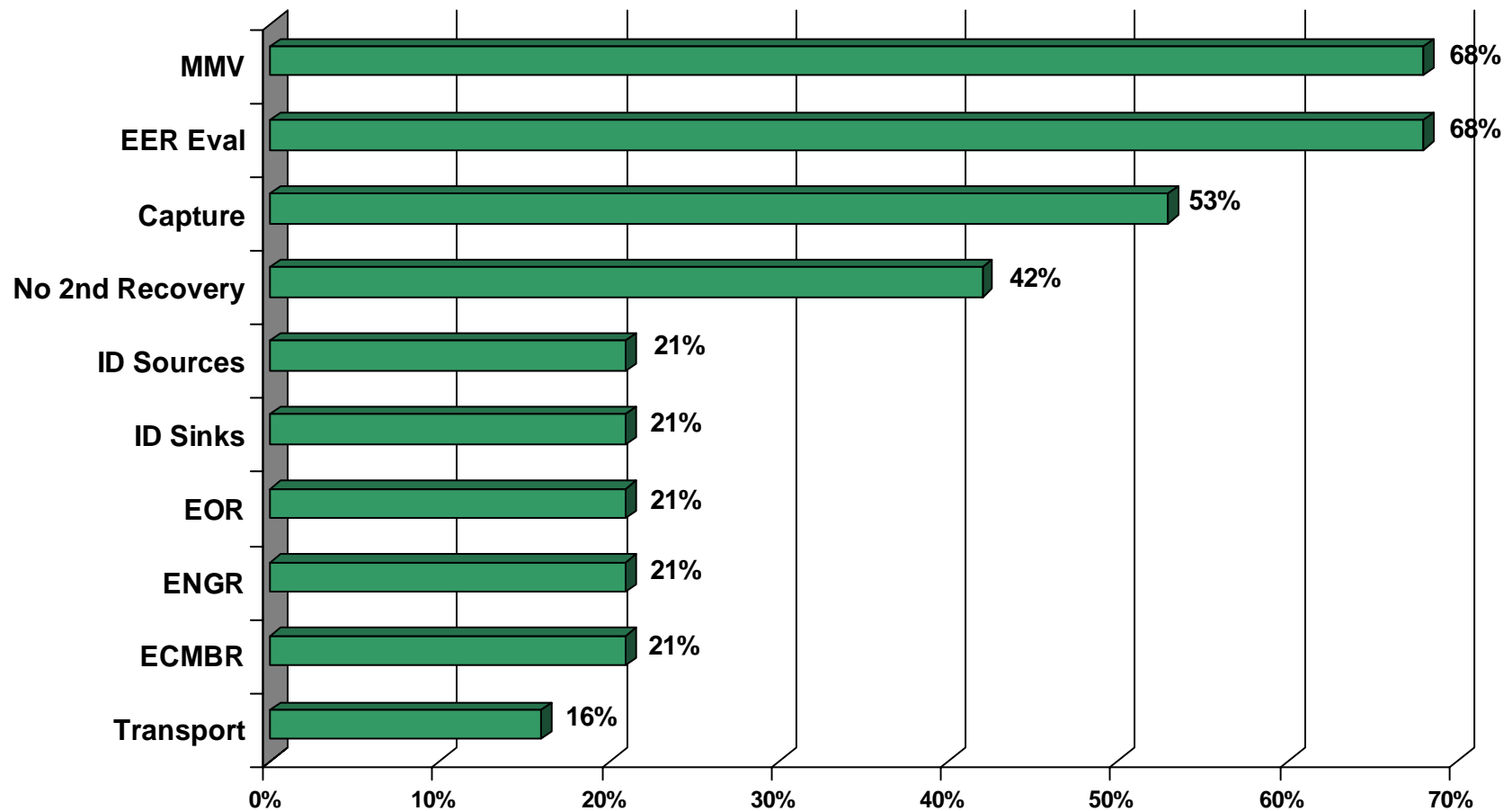
Project	Location
<p>China's CBM Technology/CO₂ Sequestration Project</p> <p>Conclusion: enhancement of coalbed methane recovery and storage of CO₂ is feasible in the anthracitic coals of Shanxi Province</p> <p>Current bi-lateral country funding phase (Canada and China) completed</p> <p>Recommendation 1: proceed to multi-well pilot at test site</p> <p>Recommendation 2: evaluate deeper coal seams at alternative sites</p> <p>Project paper in the <i>International Journal of Greenhouse Gas Control</i> Volume 1(2007) p. 215-222, available at http://www.sciencedirect.com</p>	<p>China</p>
<p>CO₂STORE</p> <p>Report: "Best Practice Manual" summing up results from the previous SACS project and CO₂STORE (http://www.co2store.org, look in "Archive")</p>	<p>Denmark, Germany, Norway, and United Kingdom</p>

Project Technologies



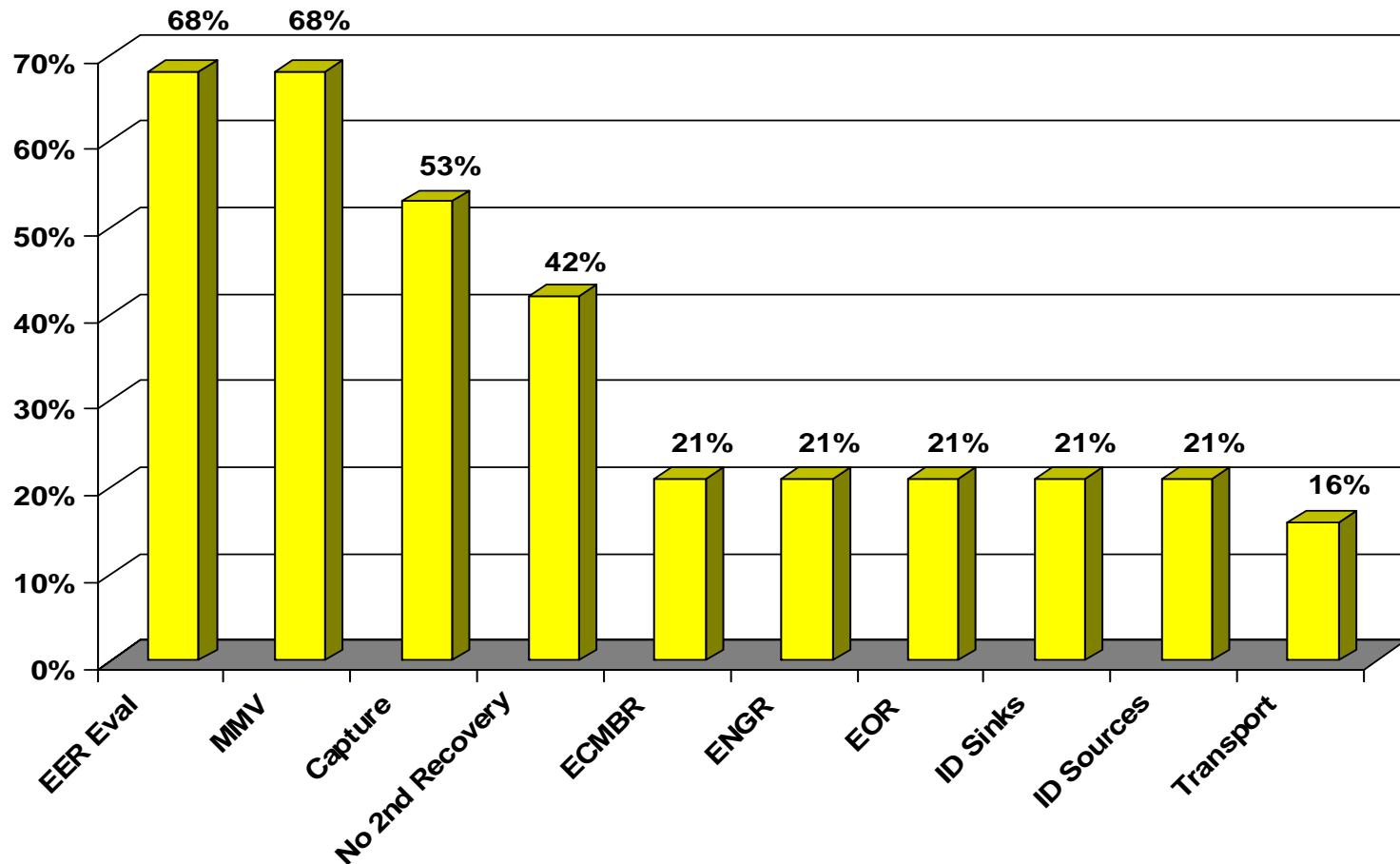
- 19 CSLF Recognized Projects (17 Active Projects; 2 Completed Projects)
- Project Technologies:
 - CO2 Capture – 10 projects
 - CO2 Transport – 3 projects
 - CO2 Storage with Enhanced Oil Recovery – 4 projects
 - CO2 Storage with Enhanced Coal Bed Methane Recovery – 4 projects
 - CO2 Storage with Enhanced Natural Gas Recovery – 4 projects
 - CO2 Storage with No Secondary Recovery – 8 projects
 - CO2 Measurement, Monitoring, and Verification (MMV) of Storage – 13 projects
 - Identification of potential CO2 storage sites – 4 projects
 - Identification of target CO2 sources – 4 projects
 - Economic and/or Environmental Evaluation and/or Risk Assessment – 13 projects

Project Technologies



Percentage of CSLF-Recognized projects showcasing a given technology

Project Technologies



Percentage of CSLF-Recognized projects showcasing a given technology

CO₂ Capture Projects



<i>Project</i>	<i>Location</i>
CANMET Energy Technology Centre (CETC) R&D Oxyfuel Combustion for CO ₂ Capture	Ottawa, Canada
CASTOR	Austria, Norway, Spain, and the Netherlands
CO ₂ Capture Project, Phase 2 (CCP2)	Various locations in Europe and North America
CO ₂ GeoNet	Various locations in Europe
CO ₂ Separation from Pressurized Gas Stream	Pittsburgh, United States
ENCAP	Various locations in Europe
ITC CO ₂ Capture with Chemical Solvents	Regina, Canada
Regional Carbon Sequestration Partnerships	United States and Canada
CO ₂ CRC Otway Project	Southeast Australia
Zama Acid Gas EOR, CO ₂ Sequestration, and Monitoring Project	Northwestern Alberta, Canada

CO₂ Transport Projects



<i>Project</i>	<i>Location</i>
Regional Carbon Sequestration Partnerships	United States and Canada
CO ₂ CRC Otway Project	Southeast Australia
Zama Acid Gas EOR, CO ₂ Sequestration, and Monitoring Project	Northwestern Alberta, Canada

CO₂ Storage with Enhanced Oil Recovery Projects



<i>Project</i>	<i>Location</i>
CO ₂ GeoNet	Various locations in Europe
IEA GHG Weyburn-Midale CO ₂ Monitoring & Storage Project	Southern Saskatchewan, Canada
Regional Carbon Sequestration Partnerships	United States and Canada
Zama Acid Gas EOR, CO ₂ Sequestration, and Monitoring Project	Northwestern Alberta, Canada

CO₂ Storage with Enhanced Coal Bed Methane Recovery Projects



<i>Project</i>	<i>Location</i>
Alberta Enhanced Coalbed Methane Recovery Project	Alberta, Canada
China Coalbed Methane Technology / CO ₂ Sequestration Project	China
CO ₂ GeoNet	Various locations in Europe
Regional Carbon Sequestration Partnerships	United States and Canada

CO₂ Storage with Enhanced Natural Gas Recovery Projects



<i>Project</i>	<i>Location</i>
CASTOR	Austria, Norway, Spain, and the Netherlands
CO ₂ GeoNet	Various locations in Europe
Regional Carbon Sequestration Partnerships	United States and Canada
CO ₂ CRC Otway Project	Southeast Australia

CO₂ Storage with No Secondary Recovery Projects



<i>Project</i>	<i>Location</i>
CO ₂ Capture Project, Phase 2 (CCP2)	Various locations in Europe and North America
CO ₂ SINK	Berlin, Germany
CO ₂ STORE	Denmark, Germany, Norway, and United Kingdom
Feasibility Study of Geologic Sequestration of CO ₂ in Basalt Formations of (Deccan Trap) in India	India
Frio Brine Pilot Project	Houston, United States
Geologic CO ₂ Storage Assurance at In Salah, Algeria	In Salah, Algeria
Regional Carbon Sequestration Partnerships	United States and Canada
CO ₂ CRC Otway Project	Southeast Australia

CO₂ Measurement, Monitoring, and Verification (MMV) of Storage Projects



<i>Project</i>	<i>Location</i>
Alberta Enhanced Coalbed Methane Recovery Project	Alberta, Canada
CASTOR	Austria, Norway, Spain, and the Netherlands
China Coalbed Methane Technology / CO ₂ Sequestration Project	China
CO ₂ Capture Project, Phase 2 (CCP2)	Various locations in Europe and North America
CO ₂ GeoNet	Various locations in Europe
CO ₂ SINK	Berlin, Germany

CO₂ Measurement, Monitoring, and Verification (MMV) of Storage Projects (Cont.)



<i>Project</i>	<i>Location</i>
CO ₂ STORE	Denmark, Germany, Norway, and United Kingdom
Frio Brine Pilot Project	Houston, United States
Geologic CO ₂ Storage Assurance at In Salah, Algeria	In Salah, Algeria
IEA GHG Weyburn-Midale CO ₂ Monitoring & Storage Project	Southern Saskatchewan, Canada
Regional Carbon Sequestration Partnerships	United States and Canada
CO ₂ CRC Otway Project	Southeast Australia
Zama Acid Gas EOR, CO ₂ Sequestration, and Monitoring Project	Northwestern Alberta, Canada

Identification of Potential CO₂ Storage Sites Projects



<i>Project</i>	<i>Location</i>
Regional Carbon Sequestration Partnerships	United States and Canada
Regional Opportunities for CO ₂ Capture and Storage in China	China
CO ₂ CRC Otway Project	Southeast Australia
Zama Acid Gas EOR, CO ₂ Sequestration, and Monitoring Project	Northwestern Alberta, Canada

Identification of Target CO₂ Sources Projects



<i>Project</i>	<i>Location</i>
CASTOR	Austria, Norway, Spain, and the Netherlands
CO ₂ STORE	Denmark, Germany, Norway, and United Kingdom
Regional Carbon Sequestration Partnerships	United States and Canada
Regional Opportunities for CO ₂ Capture and Storage in China	China

Economic and/or Environmental Evaluation and/or Risk Assessment Projects



<i>Project</i>	<i>Location</i>
Alberta Enhanced Coalbed Methane Recovery Project	Alberta, Canada
CASTOR	Austria, Norway, Spain, and the Netherlands
China Coalbed Methane Technology/CO ₂ Sequestration Project	China
CO ₂ Capture Project, Phase 2 (CCP2)	Various locations in Europe and North America
CO ₂ GeoNet	Various locations in Europe
CO ₂ SINK	Berlin, Germany
CO ₂ STORE	Denmark, Germany, Norway, and United Kingdom

Economic and/or Environmental Evaluation and/or Risk Assessment Projects (Cont.)



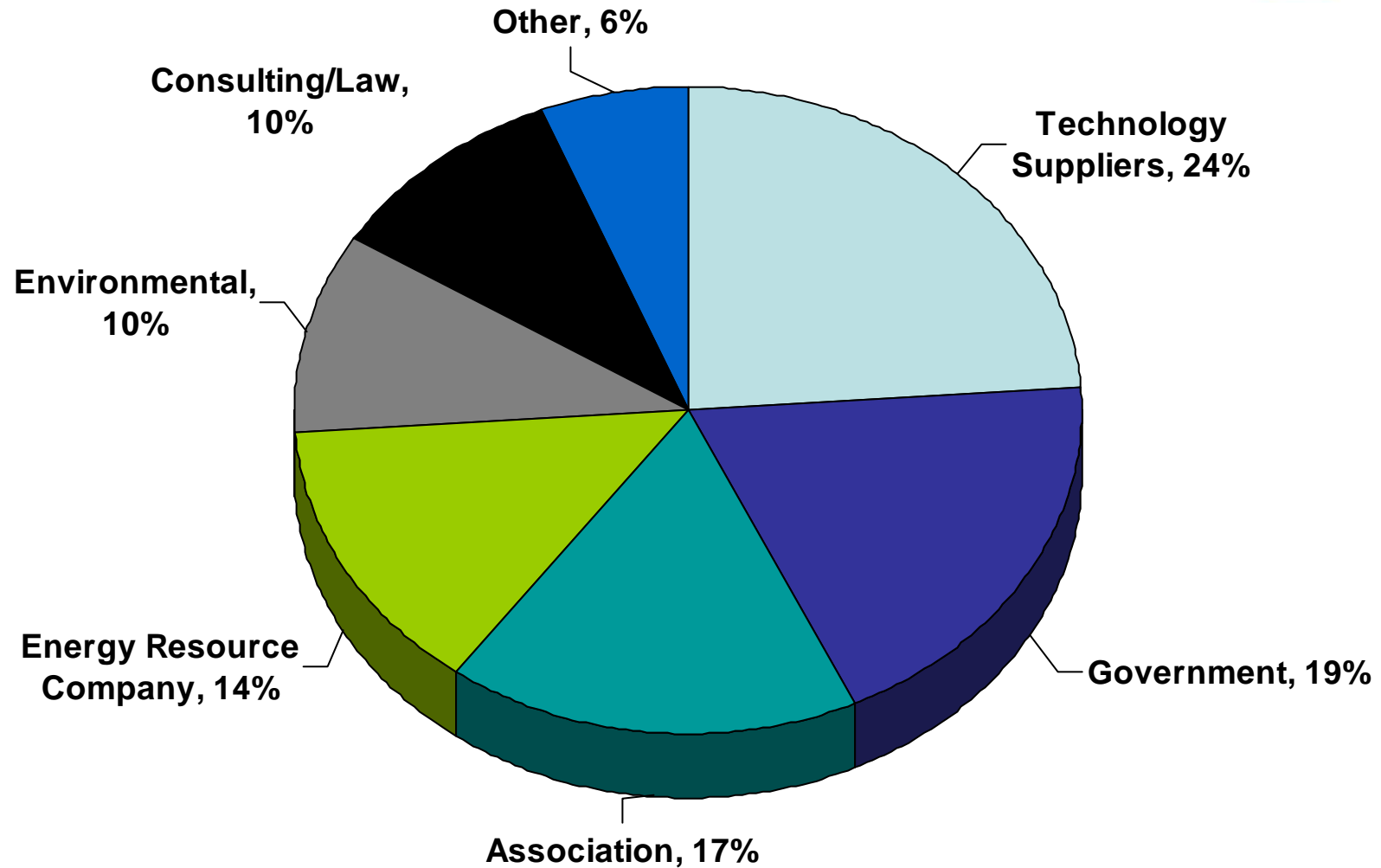
<i>Project</i>	<i>Location</i>
Feasibility Study of Geologic Sequestration of CO ₂ in Basalt Formations of (Deccan Trap) in India	India
Frio Brine Pilot Project	Houston, United States
Geologic CO ₂ Storage Assurance at In Salah, Algeria	In Salah, Algeria
IEA GHG Weyburn-Midale CO ₂ Monitoring & Storage Project	Southern Saskatchewan, Canada
Regional Carbon Sequestration Partnerships	United States and Canada
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Stakeholder Registry

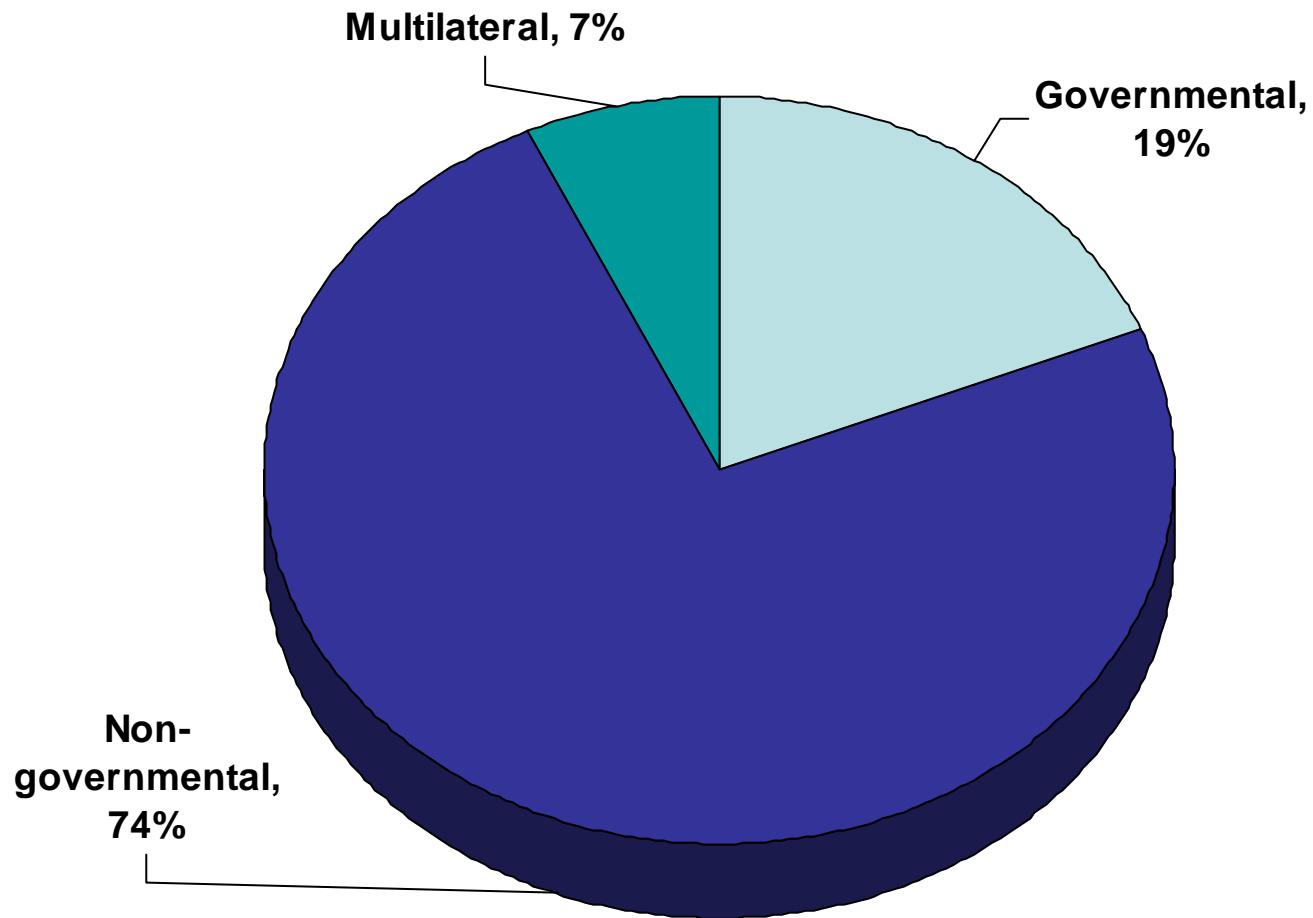


- 100 registered stakeholders, as of September 27, 2007 (includes four stakeholders which have requested not to be shown in the CSLF Website listing.)
- Stakeholders by Industry:
 - Technology suppliers – 24%
 - Government – 19%
 - Association – 17%
 - Energy resource company – 14%
 - Environmental – 10%
 - Consulting/law – 10%
 - Other – 6%
- Areas of Interest:
 - CO₂ capture – 82%
 - CO₂ transport – 64%
 - CO₂ storage – 86%
 - Environmental policy – 78%
 - Energy policy – 85%
 - Economics – 74%
 - Legal/regulatory issues – 79%
 - Capacity building – 60%
 - Financing – 53%
 - Other – 16%
- Type of organization:
 - Governmental – 19%
 - Non-governmental – 75%
 - Multilateral – 6%

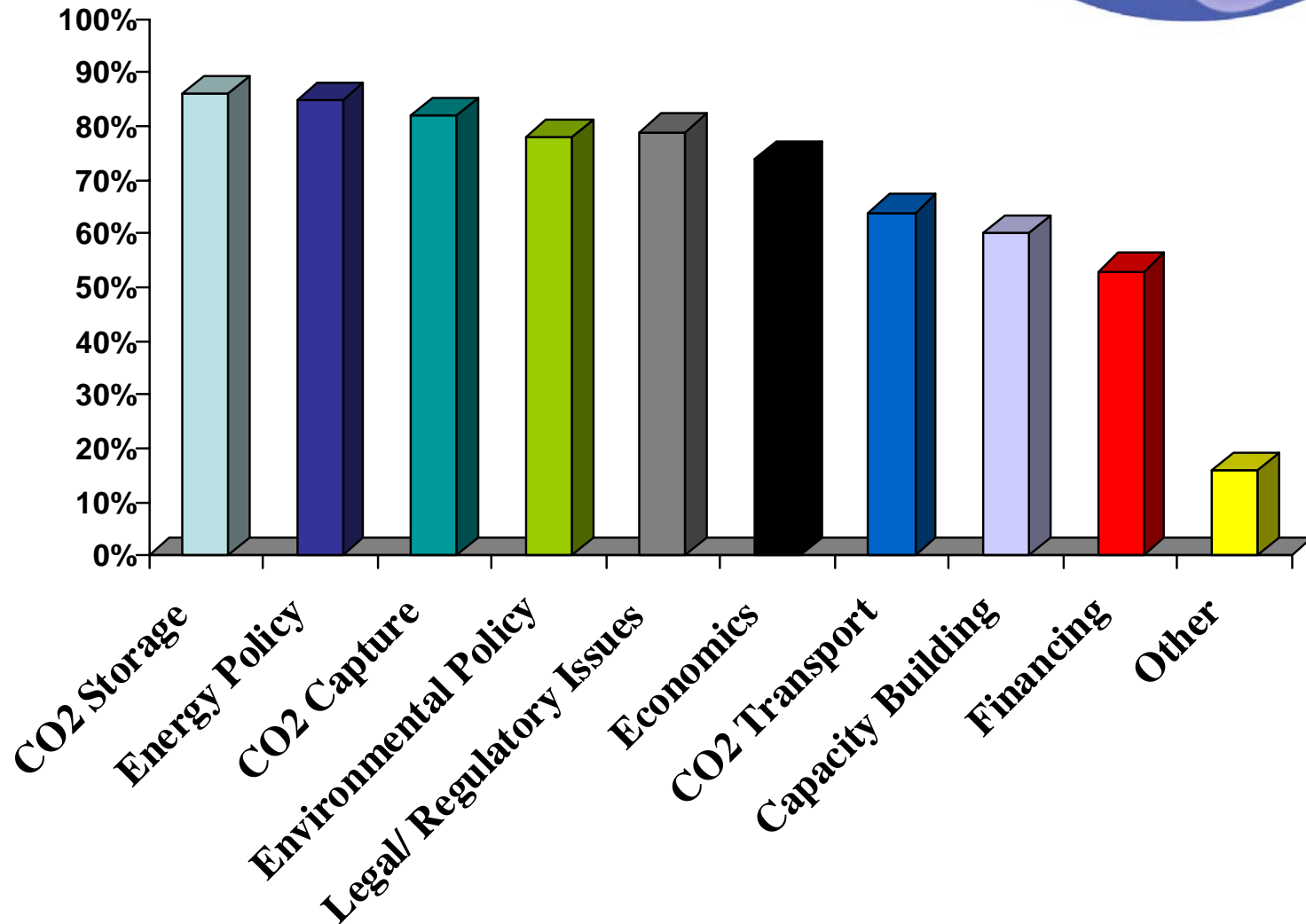
Stakeholders by Industry



Type of Organization



Areas of Interest



CSLF Public Meeting Place (PuMP)



- Policy Group directed Secretariat to create online CSLF Discussion Forum.
- Came online November 2006.
www.csforum.org/forum
- Purpose – to foster greater communication among stakeholders and between stakeholders and CSLF.
- Allows users to start discussion topics, post and read messages, and reply to the comments of others.

CSLF Web Site



- For more information, visit www.cslforum.org

A screenshot of the CSLF website homepage. The page has a green and blue color scheme. On the left is a vertical navigation menu with links such as Home, About the CSLF, Organization, Events, Meeting Information, Documents, Presentations, Task Forces, Workshops, Publications, Projects, Roadmaps, Press, Links, and Contact Us. Below the menu are sections for "CSLF Stakeholders Registry", "Education Center", and "How to Apply for CSLF Membership". The main content area features a search bar at the top right, a large banner with the CSLF logo and a text box, and a "What's New" section with several news items. At the bottom, there is a footer with a list of navigation links: Home | About the CSLF | Organization | Member Info | Events | Meeting Info | Documents | Workshops | Publications | Projects | Press | Presentations | Links | Education Center | Contact Us.

Brazilian Delegates



Policy Delegates

- Paulo Chiarelli
Secretary, Division for Environmental Policy and Sustainable Development, Ministry of Foreign Relations
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- Jose Miguez
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