



U.S. DEPARTMENT OF
ENERGY

Post-Paris Collaborations on Clean Energy

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U.S. Department of Energy

Overview

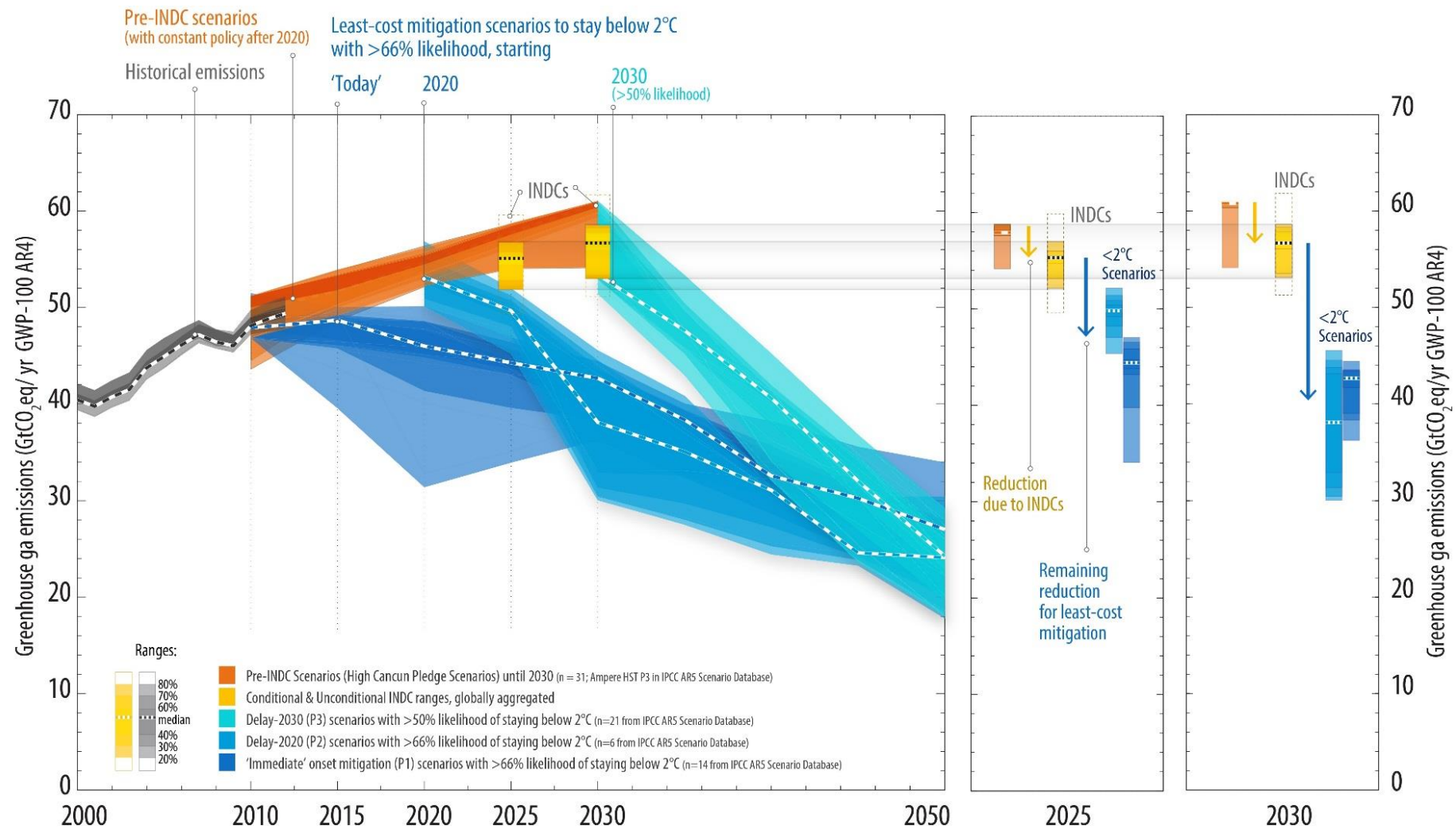
- I. Paris Agreement (COP21)
- II. Selected International Partners
- III. Key Collaborations – Clean Energy Ministerial and Mission Innovation

I. Paris Agreement (COP21)

I. Paris Agreement – Key Elements

- Countries submitted Intended Nationally Determined Contributions (INDCs) submitted before December 2015 Paris meeting.
- Most countries targeted 2025 or 2030 in their contributions.
- Agreement will open for signature this week on Earth Day (22 April 2016).
- Agreement will enter into force after 55 countries that account for at least 55 percent of global emissions have ratified.
- Countries agreed to a five-yearly global stock-taking, the first in 2023.
- Countries agreed to additional transparency and reporting requirements.

I. Paris -- INDCs are significant, but not sufficient

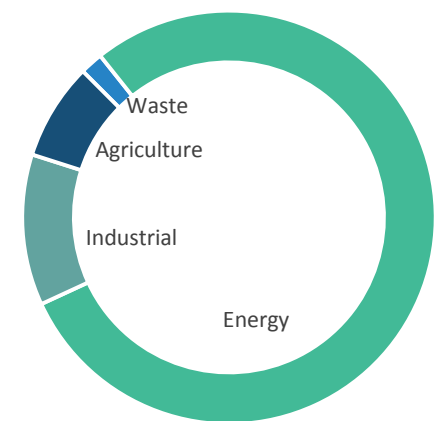
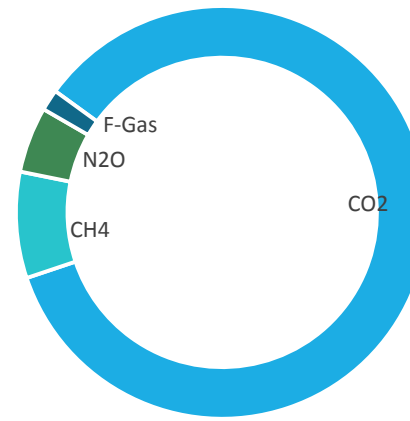


Source: UNFCCC Secretariat *Synthesis Report on the Aggregate Effect of the INDCs*, includes INDCs representing 147 countries and approximately 85% of 2010 global emissions.

II. Selected International Partners

II. Key Partners: China

Total Emissions: 11 GtCO₂e



Major Provisions of China's INDC:

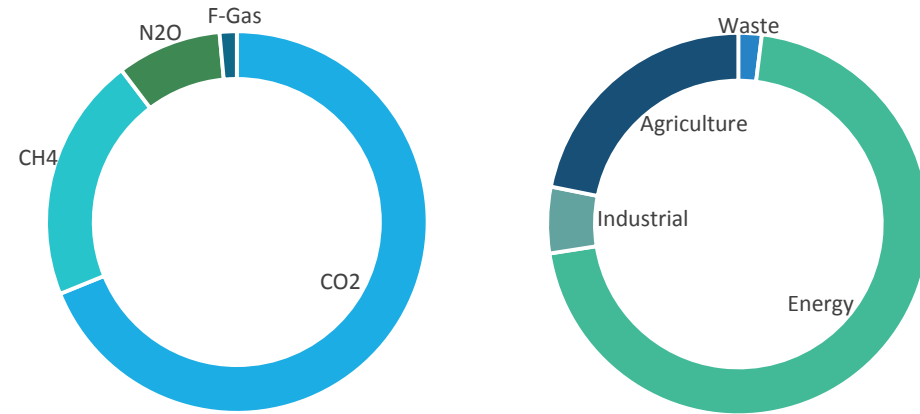
- Peak carbon dioxide emissions around 2030 and make best efforts to peak early;
- Reduce carbon dioxide emissions per unit of GDP by 60% to 65% from 2005;
- Increase the share of non-fossil fuels in primary energy consumption to around 20%; and
- Increase forest stock volume by around 4.5 billion cubic meters on the 2005 level.

Selected DOE Engagements:

- U.S.-China Clean Energy Research Center
- Climate Change Working Group, including CCUS workshops
- U.S.-China Energy Efficiency Action Plan
- U.S.-China Renewable Energy Partnership
- Clean Energy Ministerial

II. Key Partners: India

Total Emissions: 3 GtCO₂e



Major Provisions of India's INDC:

- Reduce the emissions intensity of GDP by 33-35% by 2030 from 2005 level;
- Around 40% cumulative electric power installed capacity from non-fossil fuel resources by 2030, with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).
 - India has a separate goal of 60 GW of wind and 100 GW of solar by 2022.
- Create an additional carbon sink of 2.5-3 Gt CO₂e through additional forest and tree cover by 2030.

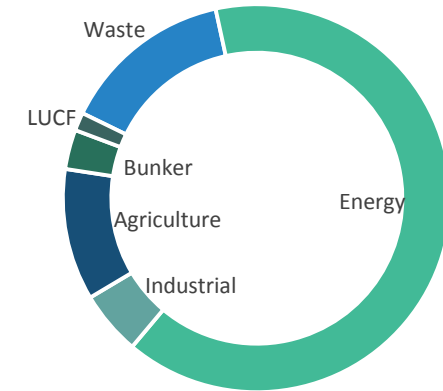
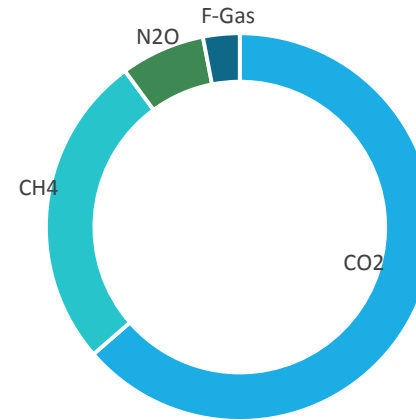
Selected DOE Engagements:

- Solar resource maps
- Modeling and regulatory support for energy conservation building codes
- High-Ambient Temperature HFC-free Cooling Systems R&D
- Clean Energy Ministerial

Emissions data from WRI CAIT database.

II. Key Partners: Mexico

Total Emissions: 0.7 GtCO₂e



Major Provisions of Mexico's INDC:

- Committed to reduce its GHGs by 22 percent and black carbon (soot) by 51 percent by 2030 (not conditional on int'l support), relative to BAU levels.
- Peak GHGs in 2026 to achieve 22 percent reduction target, with a long-term goal of halving emissions by 2050 relative to 2000 levels.
- With international support, Mexico says it could further reduce its GHG emissions by 36 percent and black carbon by 70 percent by 2030.
- First country to include a comprehensive adaptation component to its INDC

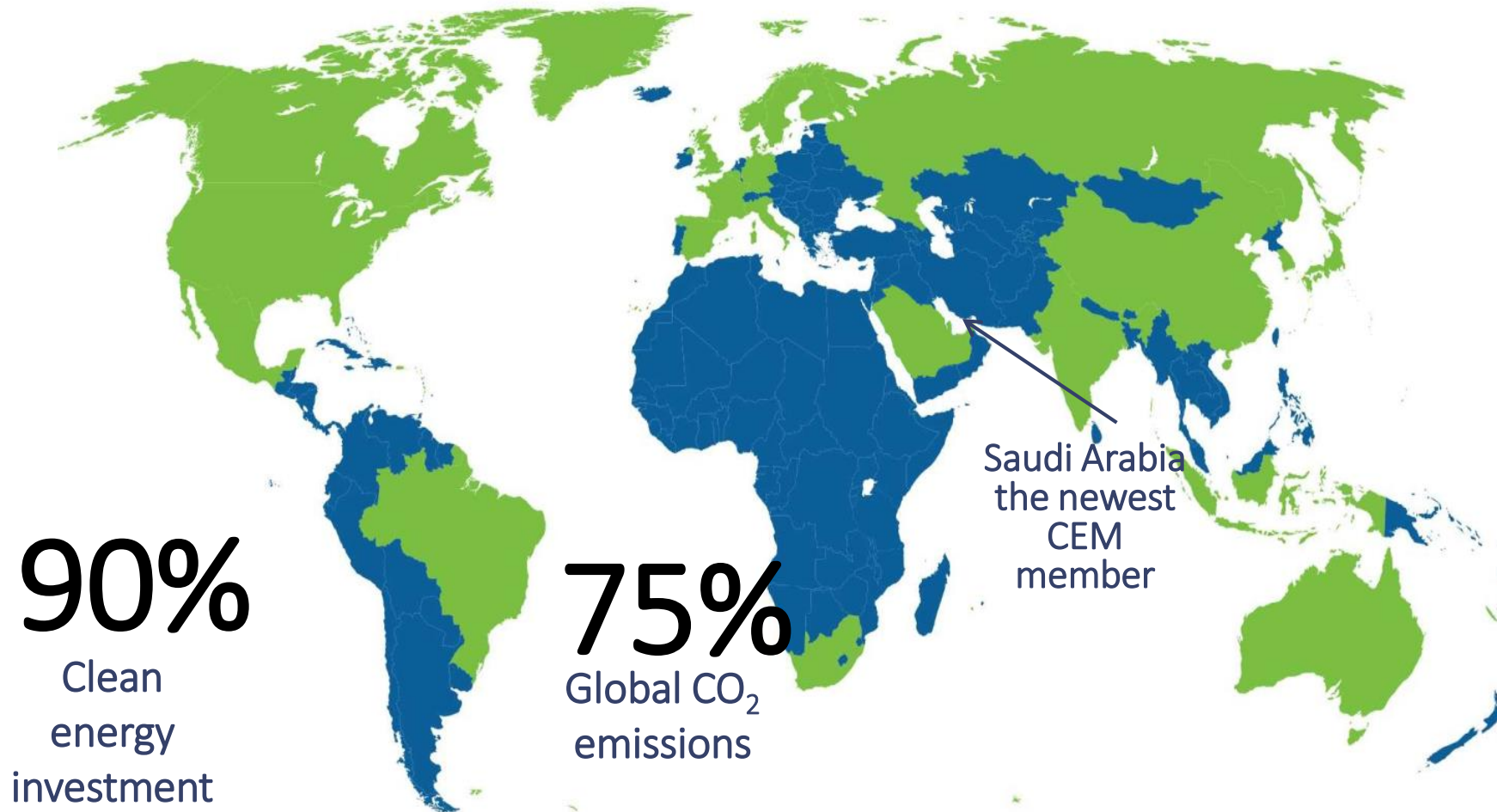
Selected DOE Engagements:

- U.S.-Mexico Clean Energy Task Force
- North American Energy Ministers Meeting
- Second Quadrennial Energy Review (QER 1.2)
- Clean Energy Ministerial

Emissions data from WRI CAIT database.

III. Key Collaborations – Clean Energy Ministerial and Mission Innovation

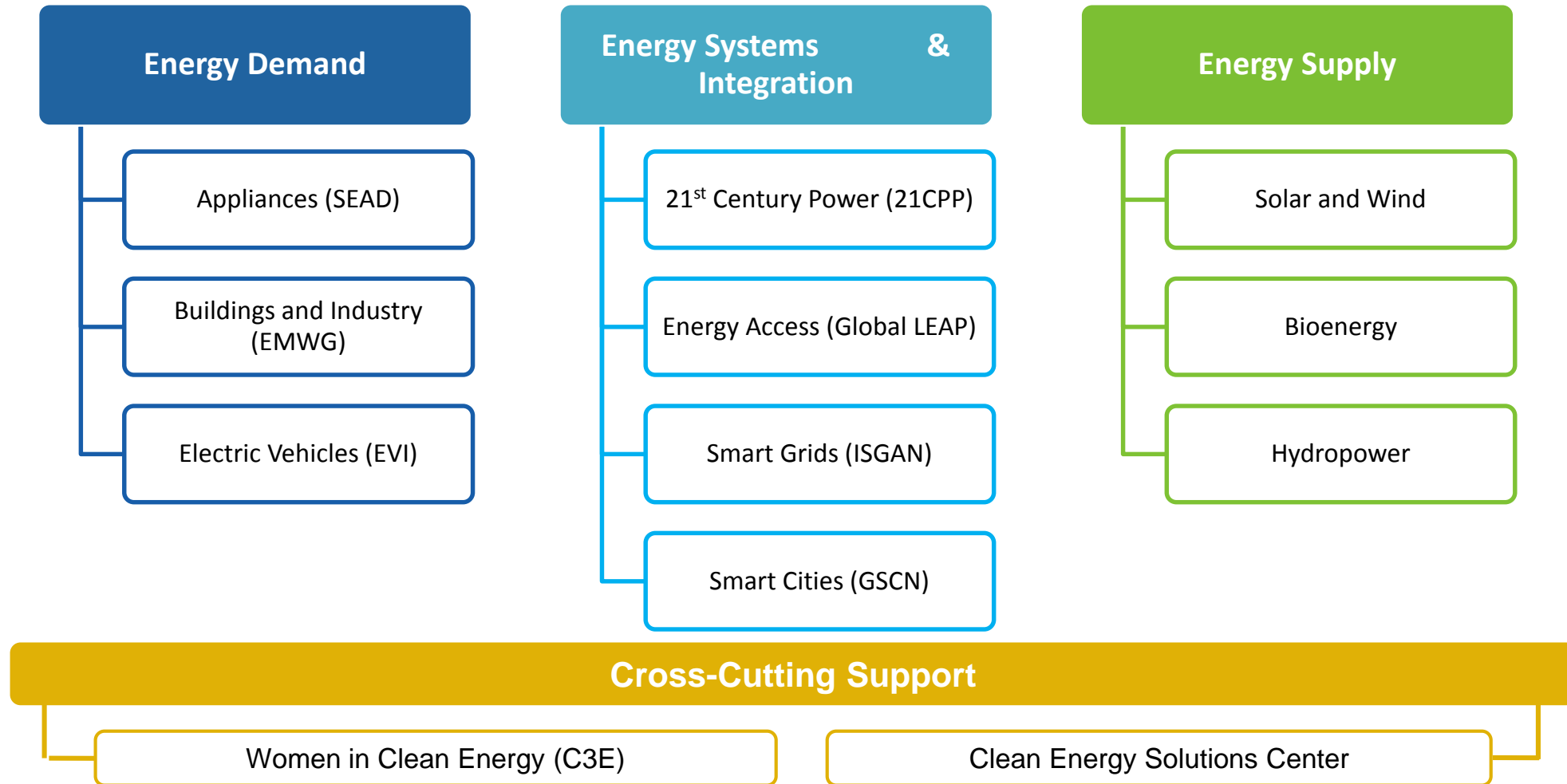
III. Key Collaborations – CEM: Deploying Clean Energy



CEM
Members:
23
Countries
and the
European
Union

CEM Initiatives

Year-round technical and policy collaboration delivering tangible results



CEM Initiatives: Delivering Results

Equipment and Appliance Efficiency

- India became the first country in the world to comprehensively set **quality and performance standards for LEDs**. The standards, informed through peer exchanges facilitated by SEAD, could save as much as **277 terawatt hours of electricity (TWh) and avoid 254 million metric tons of CO₂ emissions** cumulatively between 2015 –2030, the equivalent of avoiding 90 coal fired power plants.

Clean Energy Solutions Center

- Clean Energy Solutions Center has responded to more than **180 requests** for policy assistance from nearly 90 countries through its **Ask-An Expert service**. For example, assistance included helping the Caribbean member states (CARICOM) draft aggressive regional and national sustainable energy targets of 20 percent in 2017, 28 percent in 2022, and 47 percent in 2027.

CEM Initiatives: Delivering Results

Electric Vehicles Initiative

- The **Electric Vehicle Initiative (EVI)** provides authoritative information on global EV sales and EV deployment policy. It also provides technical assistance to support the formation of EV policies. For example, EVI research has informed India's National Mission on Electric Mobility, which targets deployment of 5 to 7 million EVs by 2020. By analyzing the real-world costs, benefits, and environmental impacts of vehicle electrification in Indian cities, EVI researchers helped establish **India's incentive programs that could save 4.8 billion barrels of oil and 270 million tons of CO2 emissions by 2030.**



CEM6: Key Outcomes

- Launched enhanced, second phase – “CEM 2.0”
- Created Steering Committee – sustained, multilateral leadership
- Launched three campaigns:
 - Global Lighting Challenge
 - Power System Challenge
 - Scaled-Up Clean Energy Solutions Center
- Announced hosts for CEM7 and CEM8



CEM7 and CEM8

World's two largest economies and carbon emitters demonstrate commitment to the CEM and to clean energy



President Barack Obama announced in a video message that the **United States** will host **CEM7** in **2016**



China's Minister Wan Gang announced that **China** intends to host **CEM8** in **2017**

CEM7: Key Features

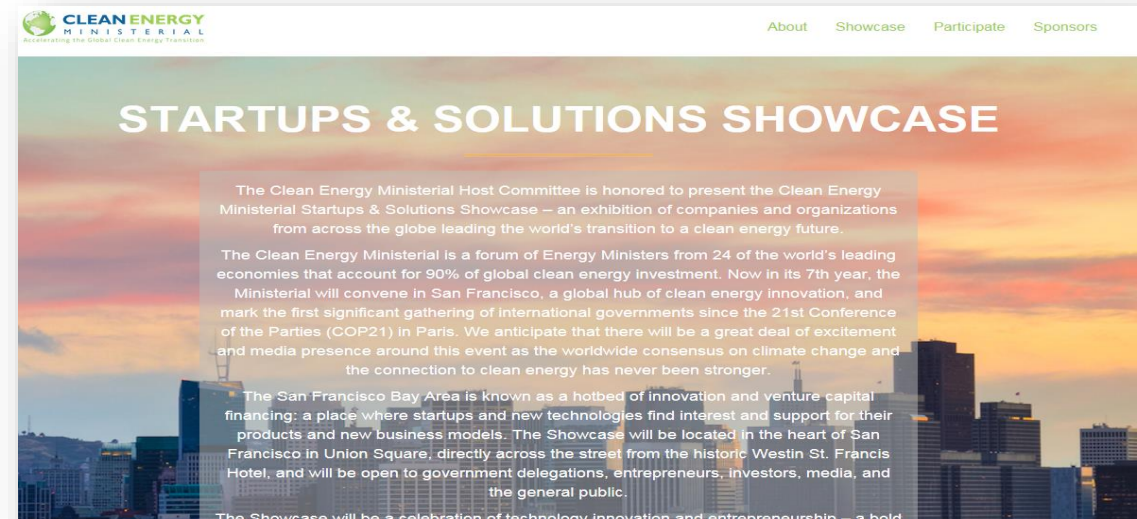
- **Engaging Bay Area Clean Energy Community**
 - May 31 tour of Tesla factory followed by reception and tech tour at Google
- **Public-Private Roundtables**
 - Four concurrent roundtable discussions with Ministers, c-suite level executives, and other clean energy leaders
- **Public-Private Action Summit**
 - Keynote speakers, fireside chats, and panel discussions with clean energy luminaries
 - Opportunities for high-profile announcements of ambitious clean energy efforts and endorsements of CEM campaigns
- **Technology Showcase**
 - Showcase featuring 100 global clean energy innovations



CEM7: Startups and Solutions Showcase

Celebrating technology, innovation, and entrepreneurship

- Showcase of ~100 innovations that are driving clean energy deployment
- Open to technology and solution providers, startups, project developers, utilities, system operators, research institutions, government and regulatory agencies
- **7 Exhibitor Categories:**
 - Low carbon supply
 - Efficiency
 - Access
 - Systems Integration
 - Digital Energy
 - Financing
 - Transportation



Visit CEM7.org for more information

CEM7: Public-Private Roundtables

TOPIC	SYNOPSIS
Innovative Mechanisms and Strategies for Investment in Energy Efficiency	Focus on effective and innovative mechanisms to finance energy efficiency and ways to scale-up capital flows and investments. Identify existing mechanisms and best practices, and develop recommendations to feed back to CEM ministers as well as the G20.
Facilitating Private Sector Clean Energy Sourcing and Deployment	Efforts by the private sector to source renewable energy for their operations, data centers, manufacturing, etc.; and how those efforts can contribute to larger scale RE deployment in countries around the globe; identify barriers and potential supportive governmental policies.
Government Procurement and Demonstration of Clean Technology	How governments can act as “test-beds” for emerging clean-energy and energy efficient technologies and policies. How governments can partner with industry and leverage public procurement to accelerate the up-take and demonstration of innovative energy technologies and policies.
Renewable Energy in the 21st Century - Securing the Value of Wind and Solar Power	Demonstrate the opportunity of reduced cost of wind and solar power for achieving power sector policy objectives. Highlight importance of system integration strategies to achieve high shares of renewable energy. Agree on the need for policies to balance the exposure of VRE generators to short-term price signals while providing sufficient investment security.

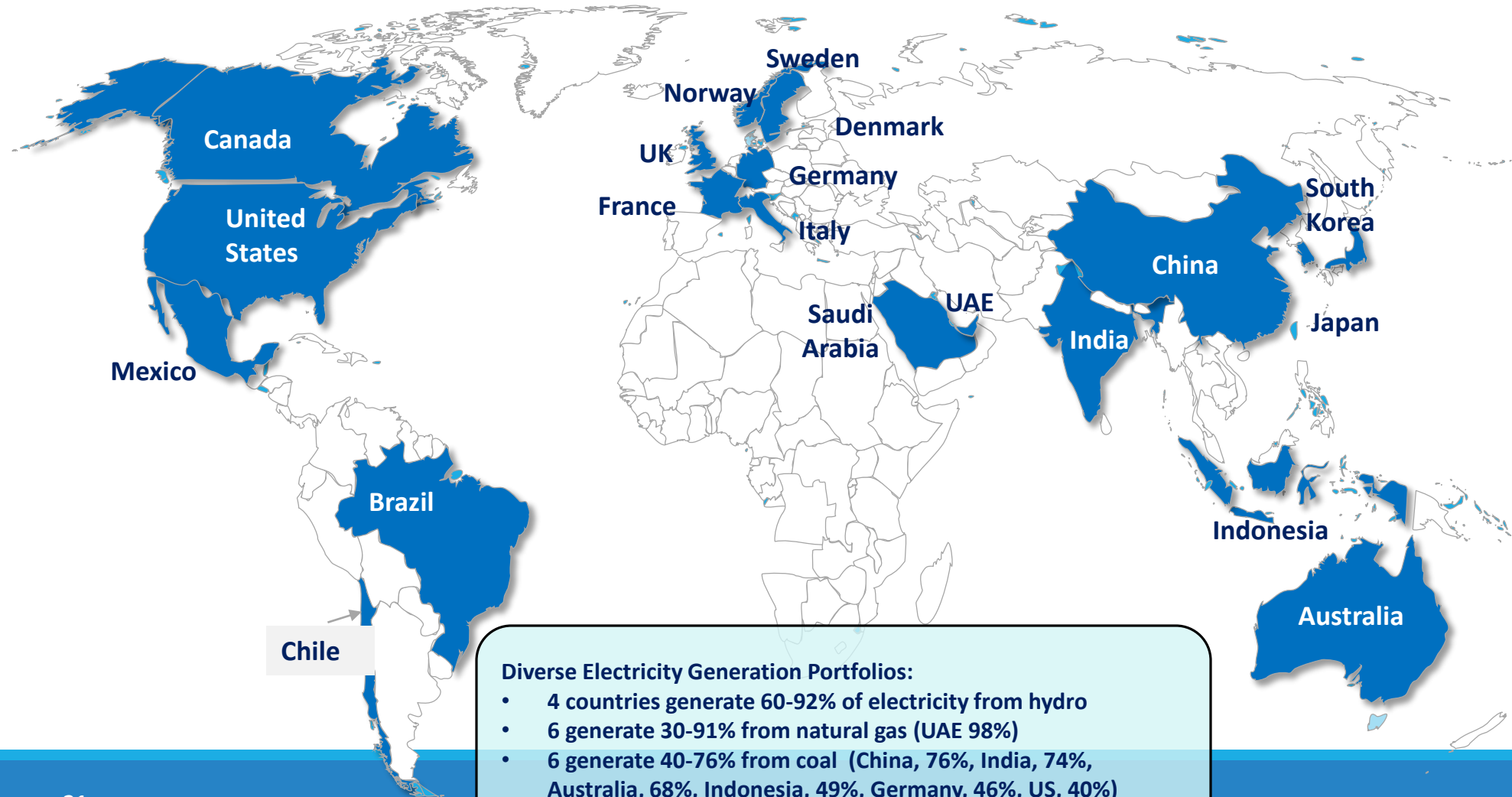
III. Key Collaborations – Mission Innovation: Tomorrow's CE Technologies



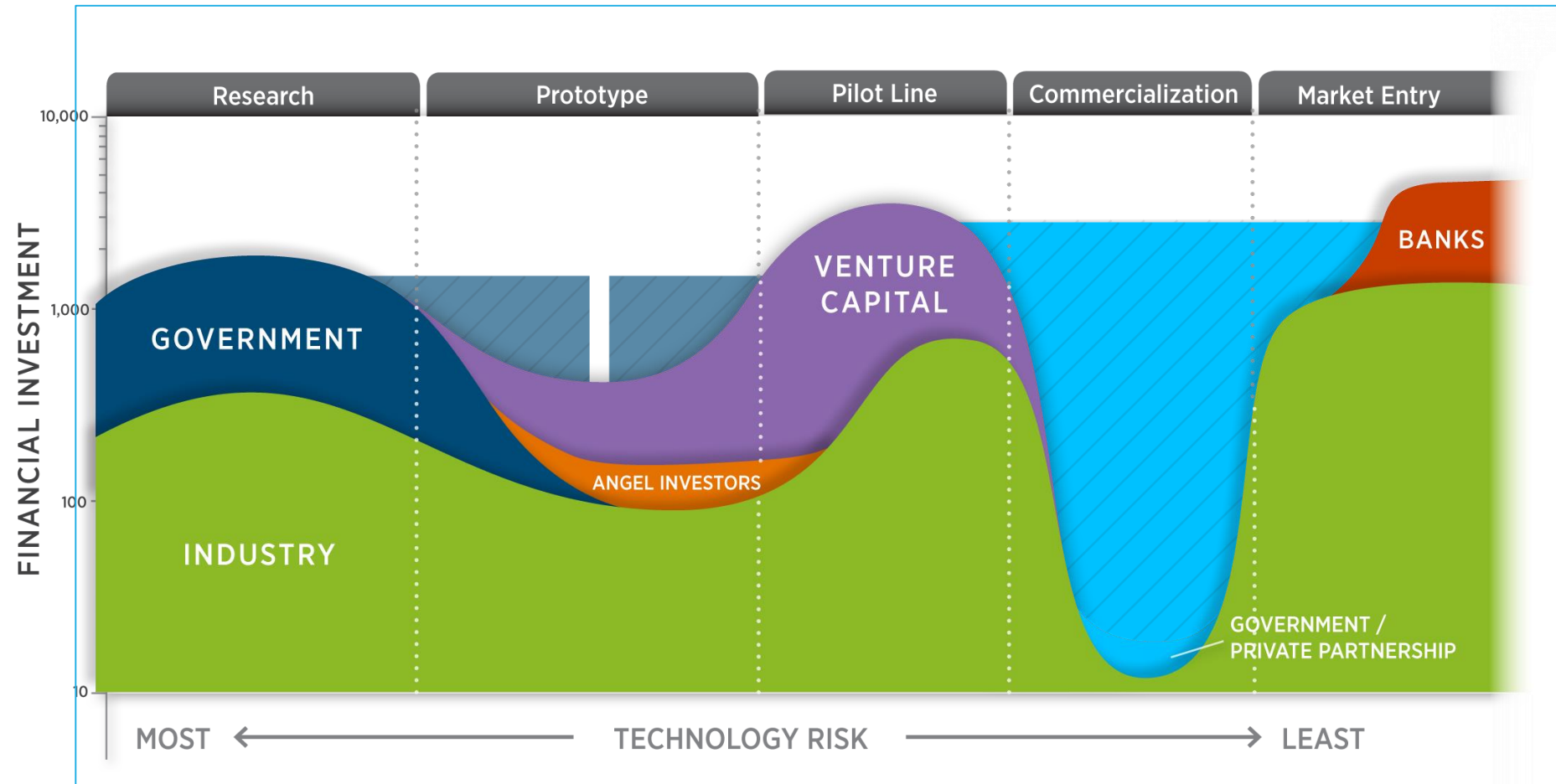
- 20 Countries
- Representing 85-90% global clean energy research and development investment
- Supporting a **doubling** of research and development investment over 5 years
- Complemented by a parallel private sector initiative: Breakthrough Energy Coalition

Mission Innovation: Global Scope

- 60% of the world's population (and the top 5 most populous countries)
- 67% of the total greenhouse gas emissions and nearly 75% of the CO2 emissions from electricity
- 70% of global GDP
- Over 80% of all government investment in clean energy R&D



Mission Innovation – Public funding to accelerate the innovation cycle



The Breakthrough Energy Coalition

27 investors and the University of California, representing 10 countries, with collective net worth of \$300+ billion



Mukesh
Ambani



John
Arnold



Mark
Benioff



Jeff
Bezos



Alwaleed
bin Ttalal



Richard
Branson



Ray Delio



Aliko
Dangote



John Doerr



Bill Gates



Reid
Hoffman



Chris
Hohn



Vinod
Khosla



Jack Ma



Patrice
Motsepe



Xavier
Niel



Hasso
Plattner



Julian
Robertson



Neil
Shen



Simmons &
Baxter-Simmons



Masayoshi
Son



George
Soros



Tom
Steyer



Ratan
Tata



Meg
Whitman



Zhang Xin
Pan Shiyi



Mark
Zuckerberg,
Priscilla Chan

Breakthrough Energy Coalition

- **Different kind of investor** – long-term commitment to new technologies; put truly patient, flexible risk capital to work
- **Different approach to investing** – identify investable ideas early on; speed up the innovation cycle; adopt different types of deal structures
- **5 Investment Principles:**
 1. Invest **Early** - - emphasize early stage research
 2. Invest **Broadly** - - all technologies and sectors; all stages of the innovation cycle,
 3. Invest **Boldly** - - consider “outliers” if a credible pathway to rapid scaling
 4. Invest **Wisely** - - utilize expert advice to guide investors (“science diligence”)
 5. Invest **Together** - - target investments in Mission Innovation participating countries

Clean Energy Solutions – For Today and Tomorrow

Mission Innovation

Clean Energy Ministerial

Future Innovations

Science
Research
Development
Analysis

Tech
Demos

Deployment Now

Policies
Best Practices
Capacity Building
Prizes, Recognition

Create
New Ideas

Improve Performance

Reduce
Cost

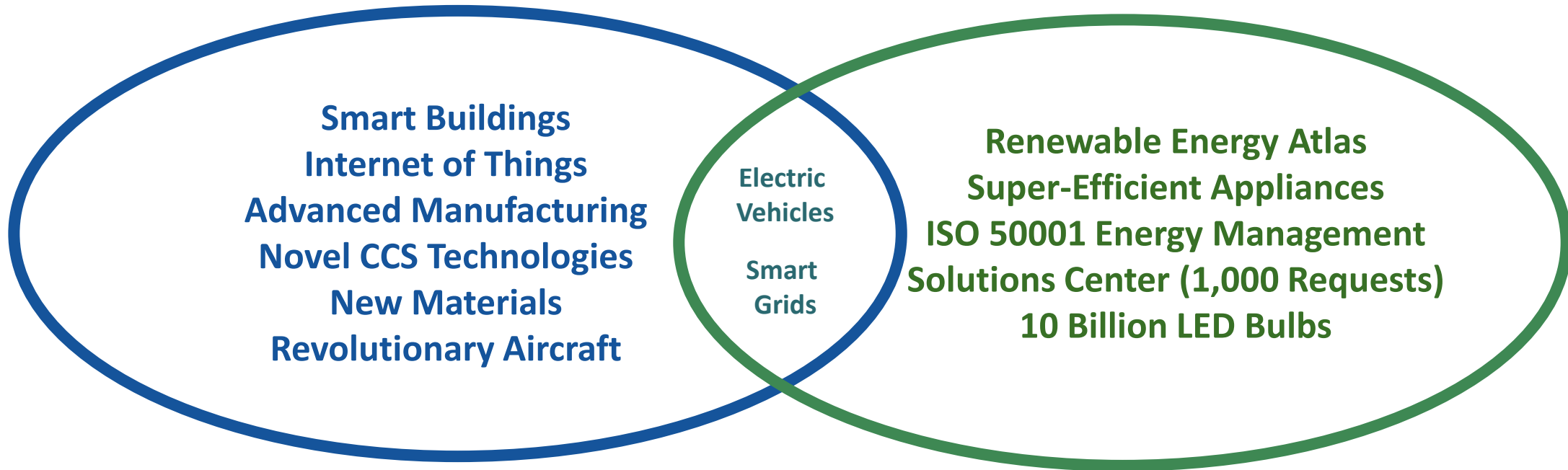
Raise Awareness

Facilitate
Market Uptake

Clean Energy Solutions – Examples

Mission Innovation

Clean Energy Ministerial



Create
New Ideas

Improve Performance

Reduce
Cost

Raise Awareness

Facilitate
Market Uptake

Back-up slides

CEM Initiatives

Participation in Clean Energy Ministerial Initiatives

October 2015

	AUSTRALIA	BRAZIL	CANADA	CHINA	DENMARK	EUROPEAN COMMISSION	FINLAND	FRANCE	GERMANY	INDIA	INDONESIA	ITALY	JAPAN	KOREA	MEXICO	NORWAY	RUSSIA	SAUDI ARABIA	SOUTH AFRICA	SPAIN	SWEDEN	UNITED ARAB EMIRATES	UNITED KINGDOM	UNITED STATES
APPLIANCES (SEAD)	●	●	●		●			●	■	●		●	●	●	●	●		●	●	●	●	●	●	■
ELECTRIC VEHICLES (EVI)			●	■	●		●	●	●		●	●	●	●	●	●			●	●	●		●	■
ENERGY MANAGEMENT (EMWG)	●		●		●				●	●		●	●	●	●				●		●			■
21 ST CENTURY POWER (21CPP)					●		●			■					●				●	●				■
ENERGY ACCESS (GLOBAL LEAP)												●	●						●				●	■
SUSTAINABLE CITIES (GSCN)				●			●	●													●	■		
SMART GRIDS (ISGAN)	●		●	●	●	●	●	●	●	●	●	■	●	■	●	●	●		●	●	■			■
BIOENERGY		■									●	●												
HYDROPOWER		■									●				●	●								
SOLAR AND WIND					■		●	■	●	●	●		●	●	●	●			●	■		●		●
CLEAN ENERGY POLICY (SOLUTIONS CENTER)	■				●				●	●	●	●	●		●				●			●		■
WOMEN IN ENERGY (C3E)													●		●				●			●	●	■

Non-CEM countries, nongovernmental organizations, and private businesses also participate in selected initiatives.

■ Lead ● Participant