Scaling up Clean Energy

Secretary Steven Chu
Clean Energy Ministerial
Washington, D.C.
19 July 2010
Represented here today:

- 80% of world energy use
- 4 billion people
- $50 trillion in GDP
Our goal is action

To collaborate on policies and programs that will accelerate the world’s transition to clean energy technologies
We can go further, faster by working together to:

• Aggressively pursue energy efficiency
Global electricity consumption expected to double from 2005 - 2030

LBNL, May 2010
Standards stimulate technology:
Refrigerator efficiency standards and performance

The role of technological innovation is constantly underestimated in its ability to lower costs.

Best Available Tech. 254 kWh/yr
Importance of standards: The quality of LEDs in off-grid lighting products varies widely.

Quality assurance programs protect consumers and prevent “market spoiling”

Setting common efficiency standards is critical for creating large markets for efficient products.

As Energy Ministers, we have the opportunity today to make dramatic progress on aligning standards.
Simple efficiency solutions can have a big impact

Efficient cook stoves
60 – 70% more efficient, less wood-gathering, less deforestation, fewer emissions, improved public health

White roofed buildings:
Sunlight energy is reflected back into space rather than heating up buildings and homes in the summer.

Santorini, Greece
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Learning Curves: crystalline silicon and thin-film technology

- Historical Prices

- Module Price (2006 $ / Wp)

- Cumulative Production (MWp)

- Production line size (Megawatts per Year)

- Note: Based on Module Purchase Price Not Manufactured Cost

- c-Si

- Thin Film

- Polysilicon shortage

- $1.00/W @ <20 GW

- $1.00/W @ >100 GW

- >20 per KWh equivalent PV electricity cost

Source: Adapted from National Renewable Energy Laboratory
Buildings consume 40% of energy in U.S.: A new way of designing and constructing buildings.

- Conceptual Design
- Detailed Design
- Virtual Building integration
- Construction & Installation
- Operation
- Continuous real-time commissioning

Computer-aided design tools with Embedded Energy Analysis

Computer-controlled operation with Sensors and Controls for Real-Time Optimization

- Oxygen sensor
- Air pressure sensor
- Air temperature sensor
- Engine temp. sensor
- Throttle position sensor
- Knock sensor
The US, China, Russia, Australia, and India have \( \frac{3}{4} \) of the world’s known coal reserves.

The US is investing $4 billion in CCS, matched by \(~$7\) billion of private sector money.

We are funding $8 billion in loan guarantees.

*We are working towards reducing costs to allow commercial deployment in 8 – 10 years*
A new approach to carbon capture inspired by an enzyme used by the human body

‘Masked' cell wall degrading enzymes within a plant that can be activated after harvest could transform cellulosic biofuels
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- Adopt policies that leverage private sector investment
Strong policies drive clean energy investment

**Watts of renewable electricity per $1,000 GDP**

- **Germany**
  - Carbon cap
  - Green Bank
  - Renewable electricity standard

- **Spain**
  - Carbon cap
  - National efficiency target
  - Feed-in tariffs

- **China**
  - Renewable electricity standard
  - Feed-in tariffs
  - Tax incentives

- **United States**
  - Some state policies
  - Intermittent federal tax credits

Source: REN 21; IMF, Center for American Progress
The most important policy that will stimulate innovation is a declining cap on carbon emissions.
If you ran a power company today and had an aging coal plant that needs replaced, would you...

Build a conventional coal plant

Build a clean alternative – nuclear, wind, or coal with CCS

Westinghouse AP1000 design

Wait for a clear policy on carbon and build nothing
How do we expand a clean energy revolution at a time of long-term fiscal constraints?
Clean energy growth stalled with the economic recession

IEA: $750 billion/year investment required by 2030

Sources: Pew Charitable Trusts (historical)
IEA (target required)
Stimulus spending worldwide boosted clean energy spending significantly.

Public sector RD&D spending in IEA countries
We in this room can change how the world uses energy