Distributed Energy Resources and Grid Modernization

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SERDP • ESTCP SYMPOSIUM 2019 | Enhancing DoD's Mission Effectiveness

Key indicators of the energy transition

-88%
Solar PV LCOE reduction (2009 – 2018)

- 69%
Onshore wind LCOE reduction (2009 – 2018)

- 33%
Projected utility scale energy storage cost reduction (2016 – 2024)

100%
Powered by renewable energy

2%
Of total global electricity generation consumed by data centers in 2017

3.5x
Increase in the number of air conditioners by 2050

70%
New power capacity additions globally from renewable sources in 2017

2013
Annual global renewables capacity surpassed conventional capacity additions

135 million
People gained access to electricity each year between 2014 - 16

20 Million
Branded pico-solar products sold by mid-2015

5.3%
Increase in employment in renewable energy sector, at 10.3 million in 2017

11.2 bpd
US crude oil production in August 2018, surpassing Russia and Saudi Arabia as world's largest producer

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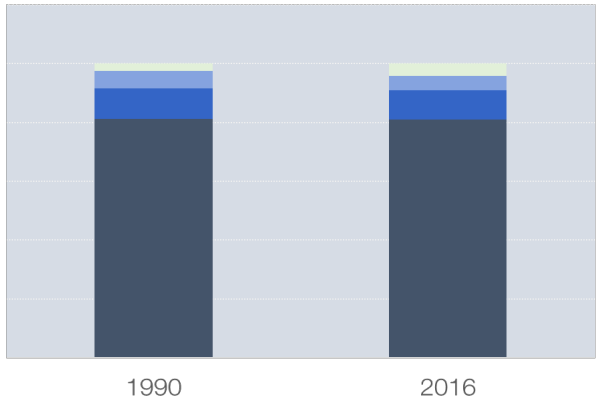
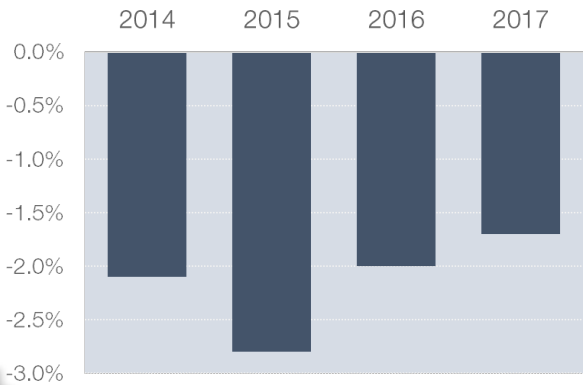
Current trajectory incompatible with global goals

Share of fossil fuels in global energy mix constant since 1990



Fossil fuel reserves are 3 – 5x remaining carbon budget. To reach climate change targets, large amounts of fossil fuels must remain in the ground.

The rate of energy intensity improvements has reduced



theguardian

We have 12 years to limit climate change catastrophe, warns UN

Urgent changes needed to cut risk of extreme heat, drought, floods and poverty, says IPCC

8 Oct. 2018

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Increasing disasters require hardening

Attributes of a transitioned grid

Supply and Demand Sides Should be Fungible

Grid Operators Should Have Visibility

Consumers Should Have Choice and Control

Facilities Should Be Resilient and Secure

Grid Should Have Low/Zero Carbon Emissions

System integration is crucial

(Credit: Encavis)

(Credit: Red Electrica de Espana)

(Credit: Siemens)

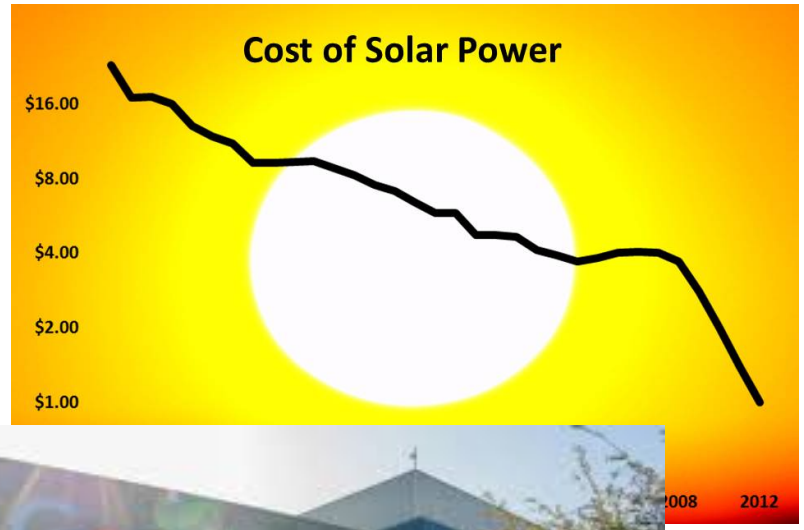
We must pay attention to communities

(Credit: Lori Wolfe/Herald-Dispatch)

(Credit: Conservation Alliance)

(Credit: Jfacew/Wikimedeia)

Distributed technologies show positive pathway



How the Federal Government can show leadership

Federal Government should serve as an example:

- **Deployment at Facilities**
- **Testing Innovation**
- **Negotiating Creative Financing**
- **Educating Others**

Federal Government can serve as a resource:

- **Sharing Best Practices**
- **Reducing Perceived Risk**
- **Serving as Community Hub**

We are at an inflection point

We have everything we need technologically to fully transition our energy system.

We simply need the will and leadership to do so.

World Economic Forum
Advanced Energy Technology
Council

Questions?

Thank you!