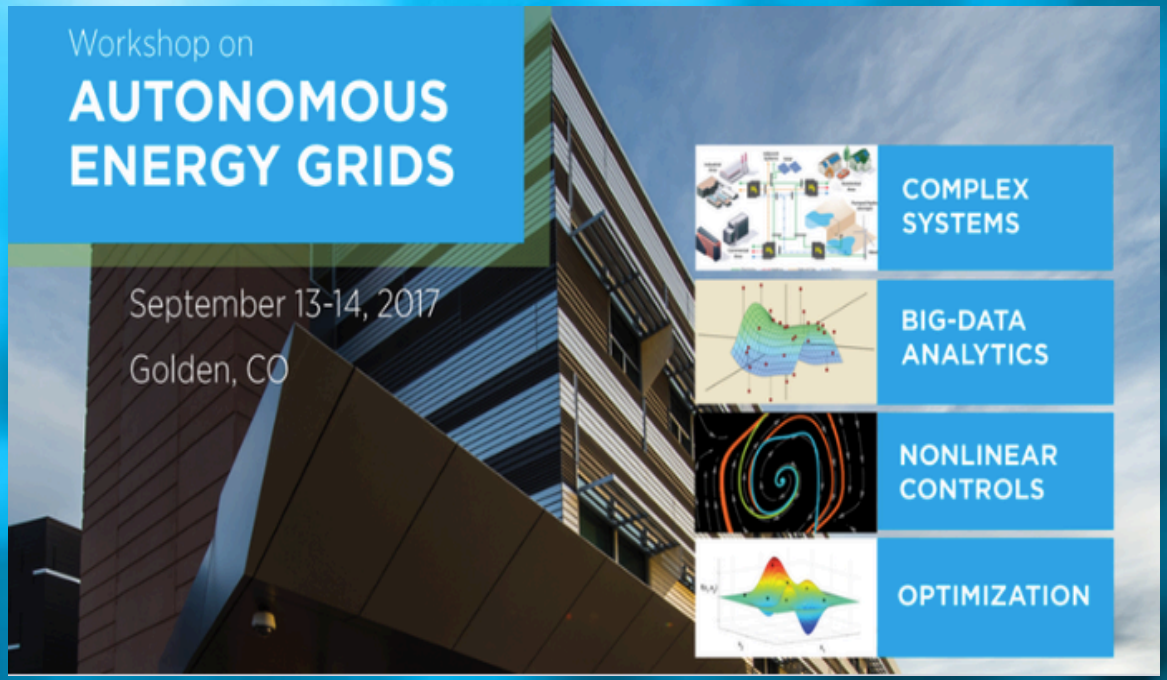
NREL
NATIONAL RENEWABLE ENERGY LABORATORY

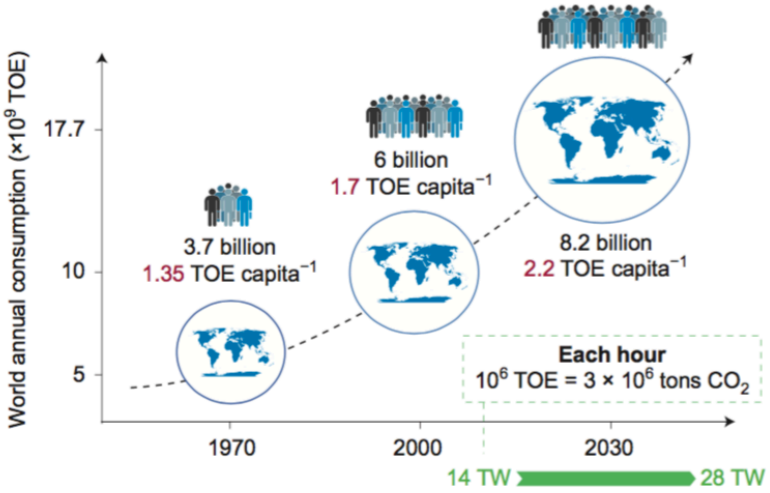


Peter F. Green

Deputy Laboratory Director, Science and Technology

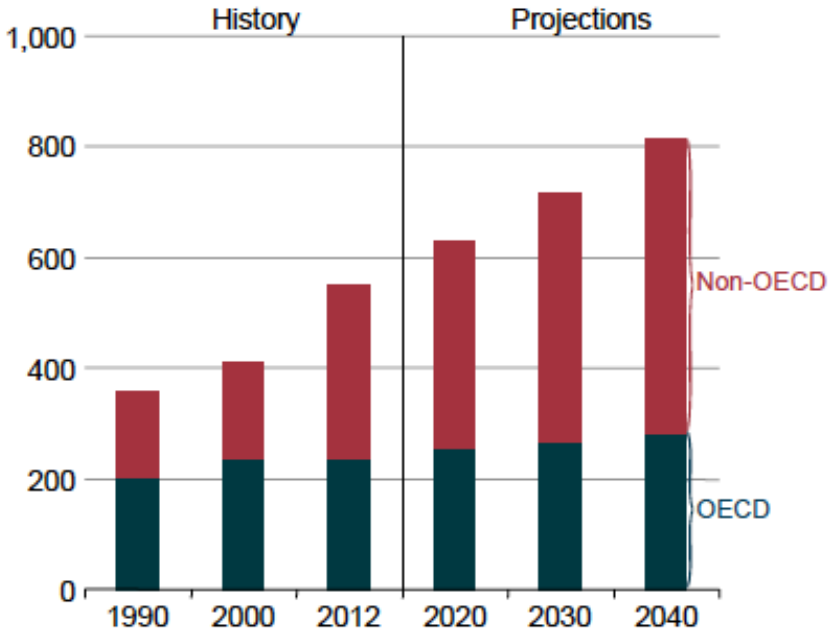
Cheap energy must be available for an increasing global population

Global Population Growth and Needs



Nature Chemistry,
Larcher and Tarascon, 2015

Figure 1-1. World energy consumption, 1990–2040 (quadrillion Btu)



The *International Energy Outlook 2016* (IEO2016)

NREL's Science Drives Innovation and boosts economic growth

Renewable Power

- Solar
- Wind
- Water
- Geothermal

Sustainable Transportation

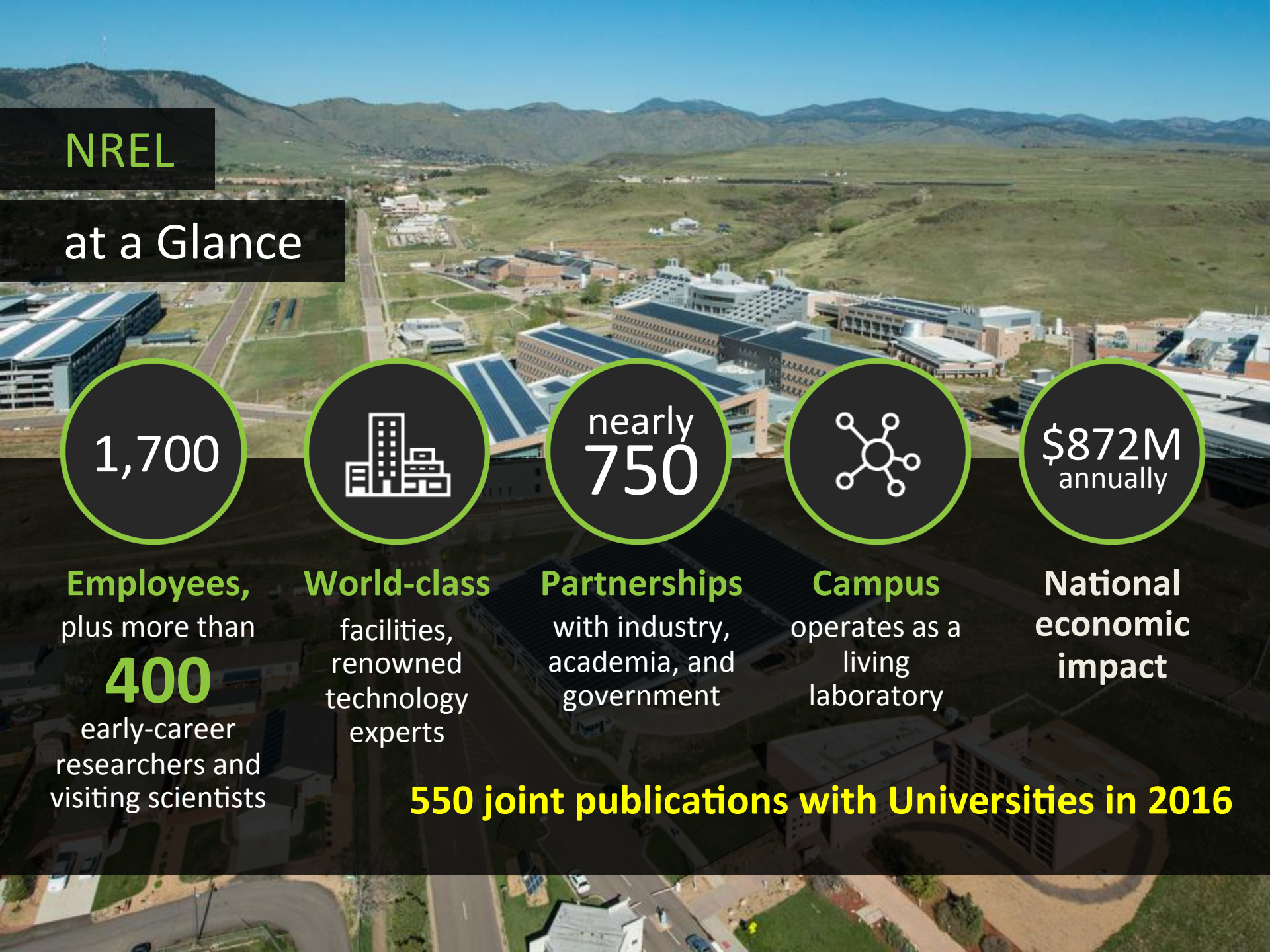
- Bioenergy
- Vehicle Technologies
- Hydrogen

Energy Efficiency

- Buildings
- Advanced Manufacturing
- Government Energy Management

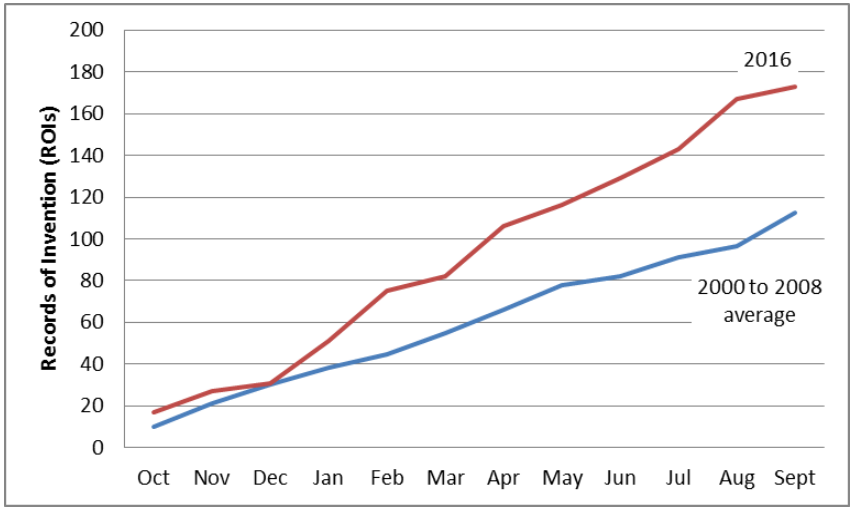
Energy Systems Integration

- High-Performance Computing
- Data and Visualizations


NREL
at a Glance
1,700
Employees,
plus more than
400
early-career researchers and visiting scientists
World-class
facilities, renowned technology experts
nearly
750
Partnerships
with industry, academia, and government
Campus
operates as a living laboratory
$872M
annually
National economic impact
550 joint publications with Universities in 2016

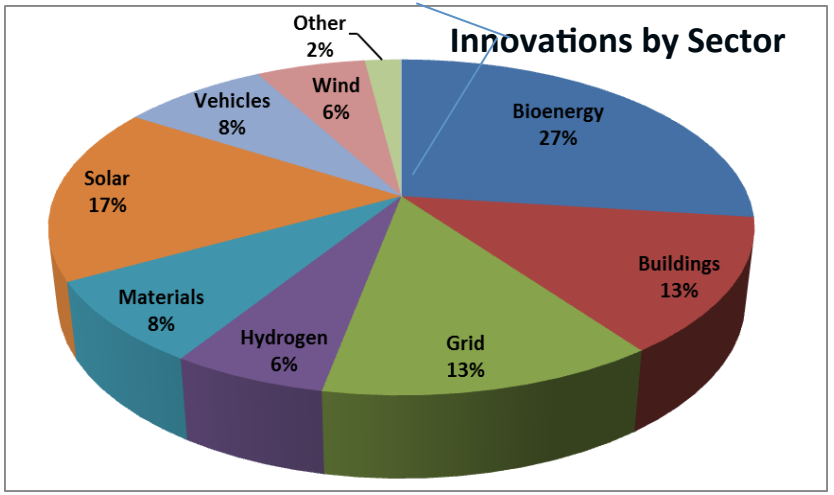
FY 2016 Baseline: Connecting Science, Innovation and Impact

Increasing Innovation



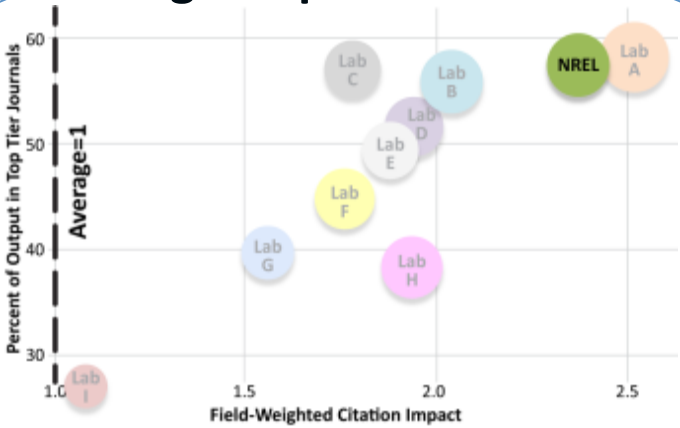
- 15.6 innovations/100 Research FTEs vs. national laboratory average of 5.6

Translating Innovations to Impact



- 147 Issued U.S Patents
- 244 Active Licenses/Option Agreements
- Most CRADAs within Lab System

High-Impact Science



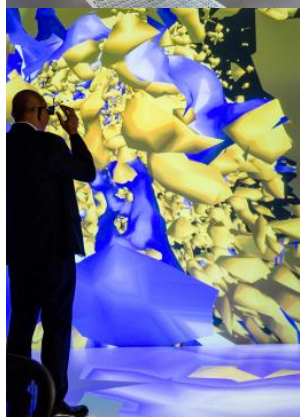
Percent of Output in Top-Tier Journals vs. Field-Weighted Citation Impact (2013-2016)

Future Prospects for Clean energy research are very compelling

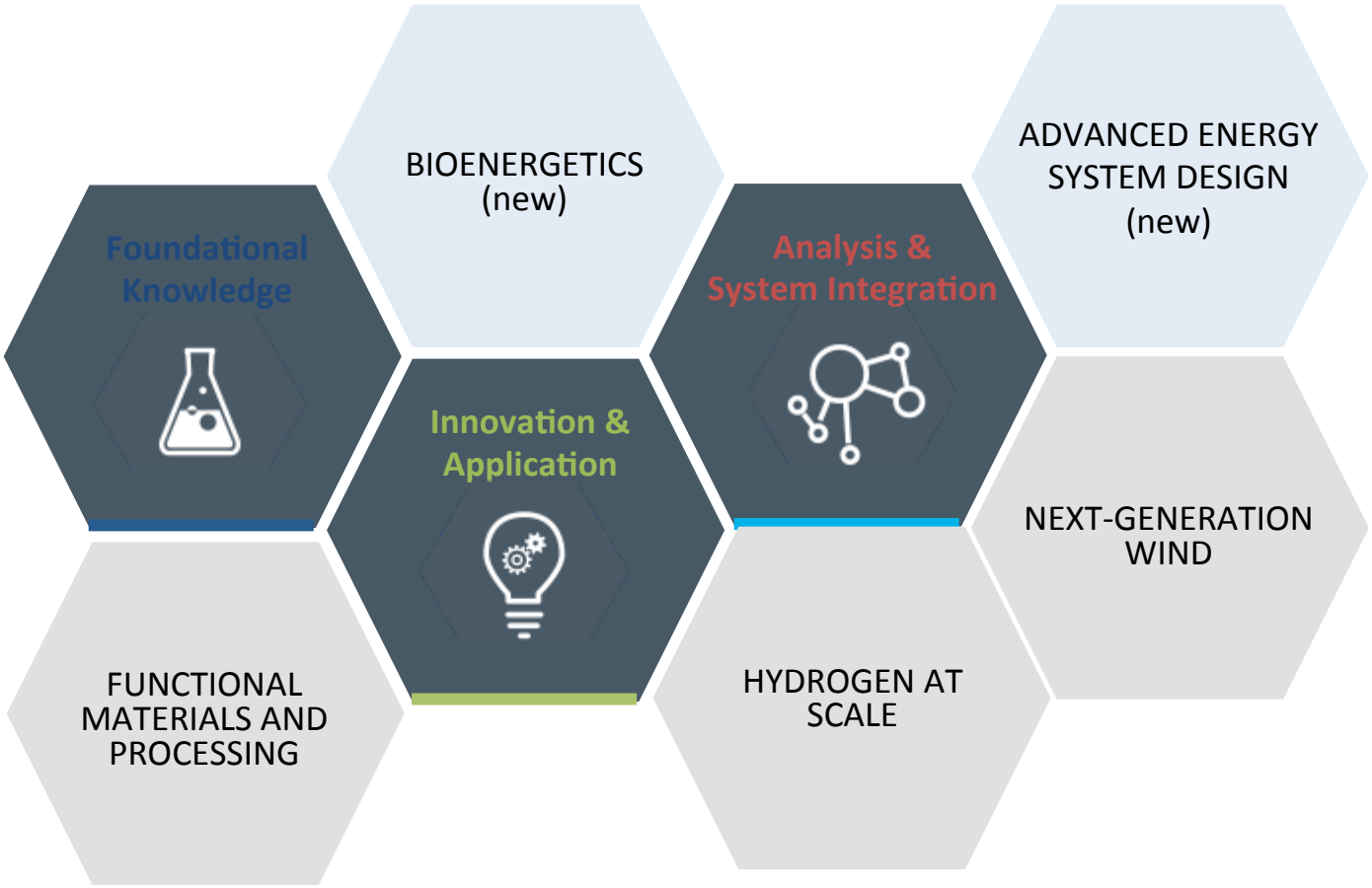
- Advances in clean energy technologies are continually driven by
  - foundational scientific discoveries
  - enabling advances in other fields.

- Intellectual Property will be will be significant
  - challenge is that discoveries originate from anywhere around the world –*significant US competition*
  - need to have a scientifically engaged workforce

- Our success will be determined by our ability to make prudent investment decisions and exploit of advances/ discoveries from anywhere around the globe



Five Initiatives will Catalyze Innovation and Impact



Creating the technical foundation and innovations to advance domestic energy options that are secure and resilient – and cost-effective without subsidies

Workshops to inform investment directions

1. Electrons to Molecules
2. Energy Storage
3. H2@Scale
4. **Autonomous Energy Grids**
5. Power Electronics with Grid Integration Focus
6. Wind Manufacturing
7. Multi-scale Energy Systems Model


Thank You!