Building Technologies Office

Energy Efficiency Starts Here.

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Roland Risser
Director, Building Technologies Office

Building Technologies Office

Integrated Approach: Improving Building Performance

Research & Development

Developing High Impact Technologies

Standards & Codes

Locking in the Savings

Market Stimulation

Accelerating Tech-to-Market

Goal: Reduce building energy use by 50% (compared to a 2010 baseline)

Challenges and Opportunities

Technology Costs

- Develop new building technologies and techniques
- Reduce U.S. manufacturing costs
- Whole building solutions

TECHNOLOGY DEVELOPMENT

Information Access

- Develop building performance tools, techniques, and success stories, such as case studies
- Form market partnerships and programs to share best practices
- Solution Centers
- Certify the workforce to ensure quality work

Energy Performance Data

- Develop uniform data formats and data exchange technologies
- Facilitate exchange of building performance data
- Utilize energy performance data to inform decision making
- Improve measurement and track and analyze results

TECHNOLOGY TO MARKET

Building Technologies Office

Our Programs

Emerging Technologies

Accelerates the research, development, and commercialization of emerging, high-impact building technologies that are generally five years or less to market-ready.

Residential Building Integration

Accelerates energy performance improvements in existing and new residential buildings by developing, demonstrating, and deploying a suite of cost-effective technologies, tools, and solutions to achieve:

- *Peak performance in new and existing homes to minimize energy use while ensuring affordability, safety, durability, and renewable energy readiness.*

Commercial Building Integration

Accelerates energy performance improvements in existing and new commercial buildings by developing, demonstrating, and deploying a suite of cost-effective technologies, tools, and solutions.

Standards and Codes

Provides cost-effective energy savings through national appliance and equipment standards and develops cost-effective building energy code language with evolving adoption and compliance strategies.

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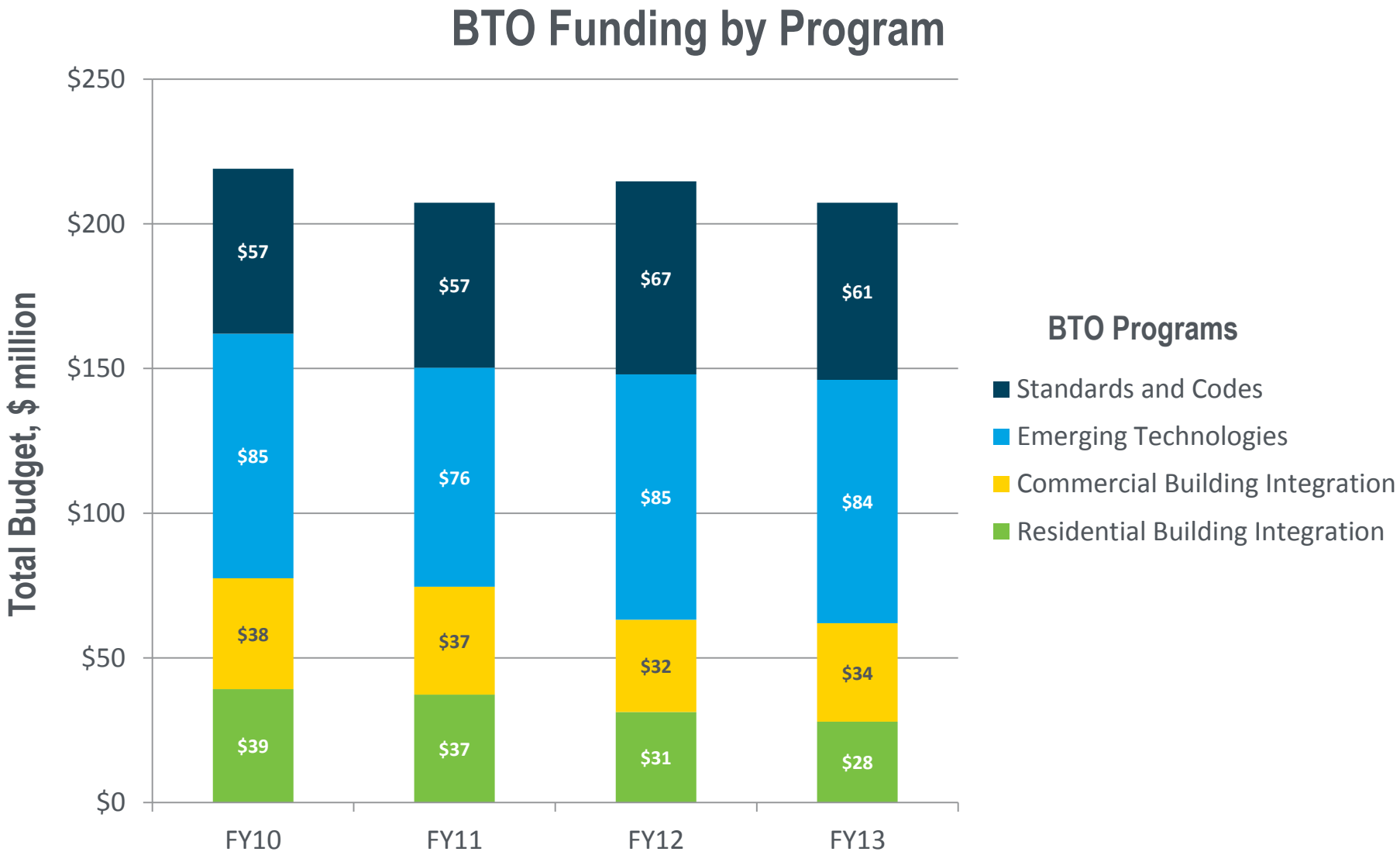
Budget Trends



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Emerging Technologies

Selecting High Impact Technologies (HITs)

Opportunity

High impact, energy efficient technologies can achieve up to 70% energy savings.

Strategy

- Identify with the Prioritization Tool.
- Establish partnerships.
- Reduce manufacturing costs
- Demonstrate new technologies.

Recent Accomplishments & Impacts

Philips 60 W replacement LED light bulb

- L Prize winner produces 93.4 lm/W
- In 2010, similar bulbs produced only 55 lm/W.

G.E. GeoSpring Heat Pump Water Heater

- 60% energy and cost savings.
- Saves a family ~$325/year on energy bills.

Sandia Cooler

- Could reduce overall U.S. electrical consumption by >7%.
- Improvement in heat transfer by 30x
- Smaller in size by 10x

ClimateMaster Integrated Heat Pump

- 50-60% more efficient than a typical water heater
- Over 100,000 ENERGY STAR heat pump water heaters sold since 2000.

Emerging Technologies

Advancing Whole Building Efficiency

Advanced windows

Advanced refrigerator technology

Low global warming potential refrigerants (working fluids)

Heating, ventilating, air conditioning, water heating

Solid state lighting

Window air conditioning

Advanced heat pump technology:

- Air source heat pumps
- Cold Climate Heat Pumps
- Ground source heat pumps
- Heat exchangers

Building envelope: Next generation attic and roof systems

Residential Building Integration

Building Market Momentum

Opportunity

Residential buildings account for almost 22% of U.S. energy consumption.

Strategy

- Build partnerships with builders and retrofitters.
- Develop tools to measure energy savings opportunity.
- Use market-focused programs to address technical and financial barriers.

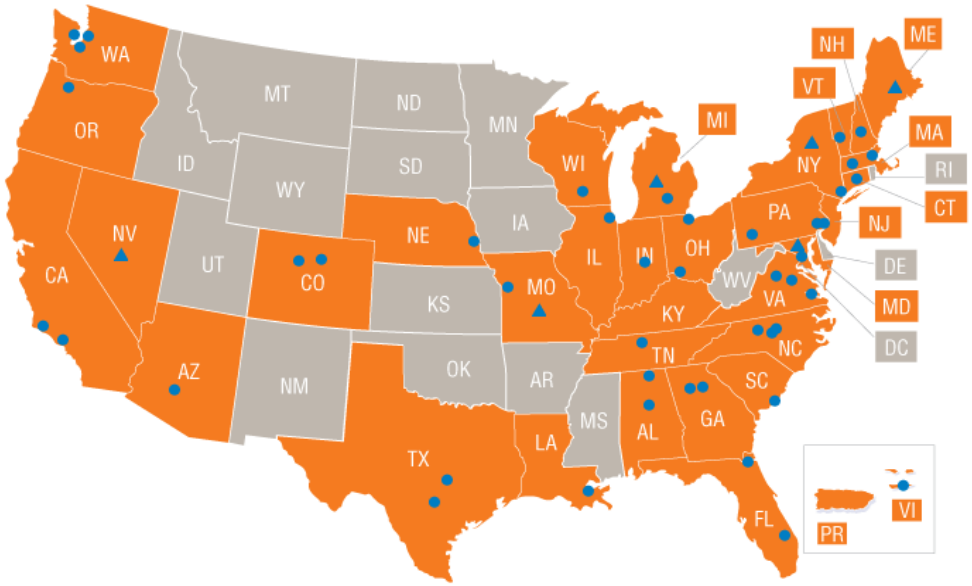
Recent Accomplishments & Impacts

- **Better Buildings Neighborhood Program**
  - Retrofit 50,000 buildings, 150,000 audits to date
  - Achieve 15-30% energy savings
- **Home Performance with Energy Star**
  - Over 250,000 retrofitted homes to date
  - 1,800 participating contractors
- **National workforce guidelines**
- **Home Energy Score**
  - 29 partner locations
  - Over 2,000 energy audits completed to date

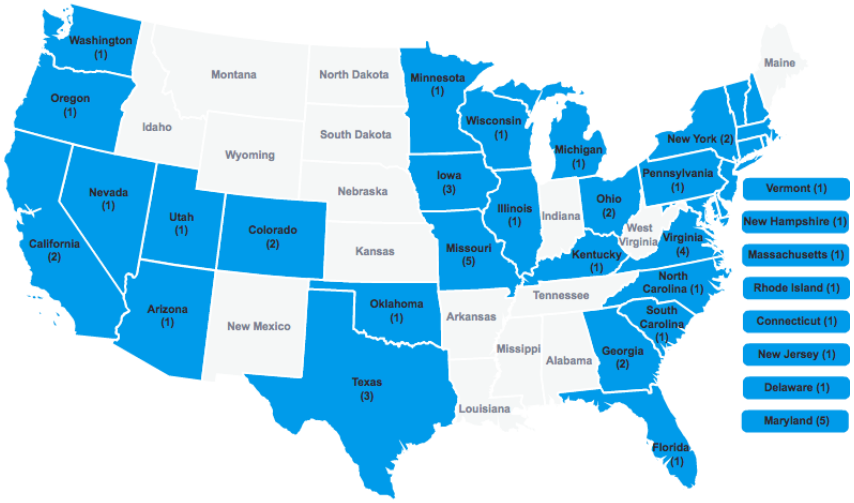
Residential Building Integration

Partnerships Span the Nation

Better Buildings Neighborhood Program



Home Performance with ENERGY STAR



Home Energy Score

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Commercial Building Integration

Building Market Momentum

Opportunity

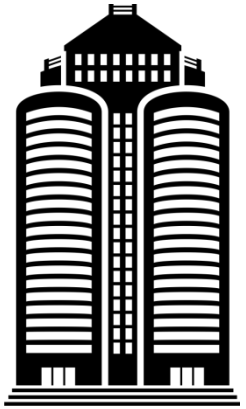
Commercial buildings account for almost 20% of U.S. energy consumption.

Strategy

- Build partnerships with building owners and operators.
- Develop tools to measure energy savings opportunity.
- Use market-focused programs to address technical and financial barriers.

Recent Accomplishments & Impacts

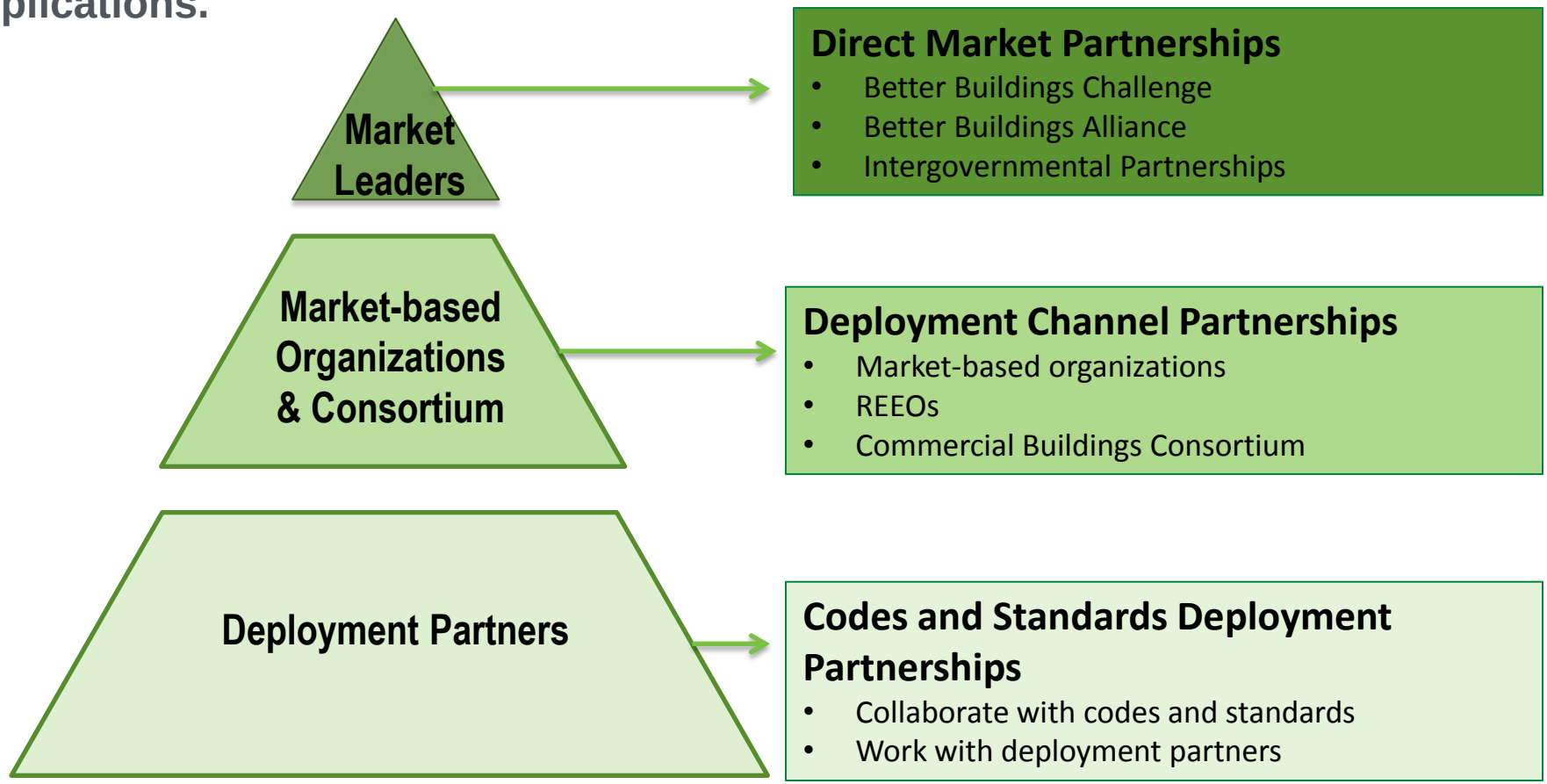
- Better Buildings Alliance Members represent ~9 billion sq. feet
- Released new technology specifications in 2012
  - Roof-Top-Unit Specification: Improving energy performance 50%
  - Lighting Specification for parking lots: 800 sites, saving 60 million kilowatt hours



Commercial Building Integration

Better Buildings Alliance Members Share Best Practices

Alliance members are working with DOE to demonstrate and share technologies, business and organizational models that work. Members also exchange transparent, objective information for easy, cost-effective replications.



Models, Tools, and Information Resources

Data-driven Decision Making

Opportunity

Communicate the value of energy efficiency to encourage adoption of technologies (lower the risk).

Strategy

- Inform users about their energy use and ways to reduce it.
- Enable comparison of energy efficiency opportunities.
- Educate building science professionals.

Recent Accomplishments & Impacts

BUILDING AMERICA SOLUTION CENTER

- **THOUSANDS** of building datasets
- **OVER 1,250,000** building energy model and software users
- **10+** tools
- **HUNDREDS** of innovations proven by experts
- **OVER 500** case studies and reports

Appliance and Equipment Standards

Locking in Energy Savings

Opportunity

Issue 23 final rules that, by the end of FY2015, deliver savings of 1,000 TBTUs/year by 2030.

Strategy

- Increase covered products.
- Enhance test procedures.
- Employ consensus process whenever practical
- Leverage R&D, voluntary and international programs.
- Accelerate schedule.
- Enforce compliance.

Recent Accomplishments & Impacts

REFRIGERATOR

- New refrigerator standards will save over $200 in electricity bills over the product's lifetime.

FRONT LOADING CLOTHESWASHER

- Will save $190 over each machine's lifetime.

TOP LOADING CLOTHESWASHER

- Will save $67 billion nationwide over next 30 years.

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Building Energy Codes

Technical Assistance and Analysis

Opportunity

Increase code adoption and compliance, while also assisting in developing technical options for the IECC.

Strategy

- Develop software to support compliance evaluation.
- Provide objective information resources and technical guidance to states.

Recent Accomplishments & Impacts

Savings by 2030:

- 1.4 quads/year
- $14.5 billion/year
- 3% reduction in CO_2 Emissions

Since 2010, over:

- 350,000 REScheck and COMcheck downloads
- 30% improvement in existing code

Standards & Codes Cumulative Impacts

Saving Energy, Money, and our Environment

$1.6 trillion by 2030

30%

more consumer energy savings

Appliance and Equipment Standards

Building Energy Codes

Emissions

By 2030, standards will result in cumulative CO_2 savings of 6.7 billion tons.

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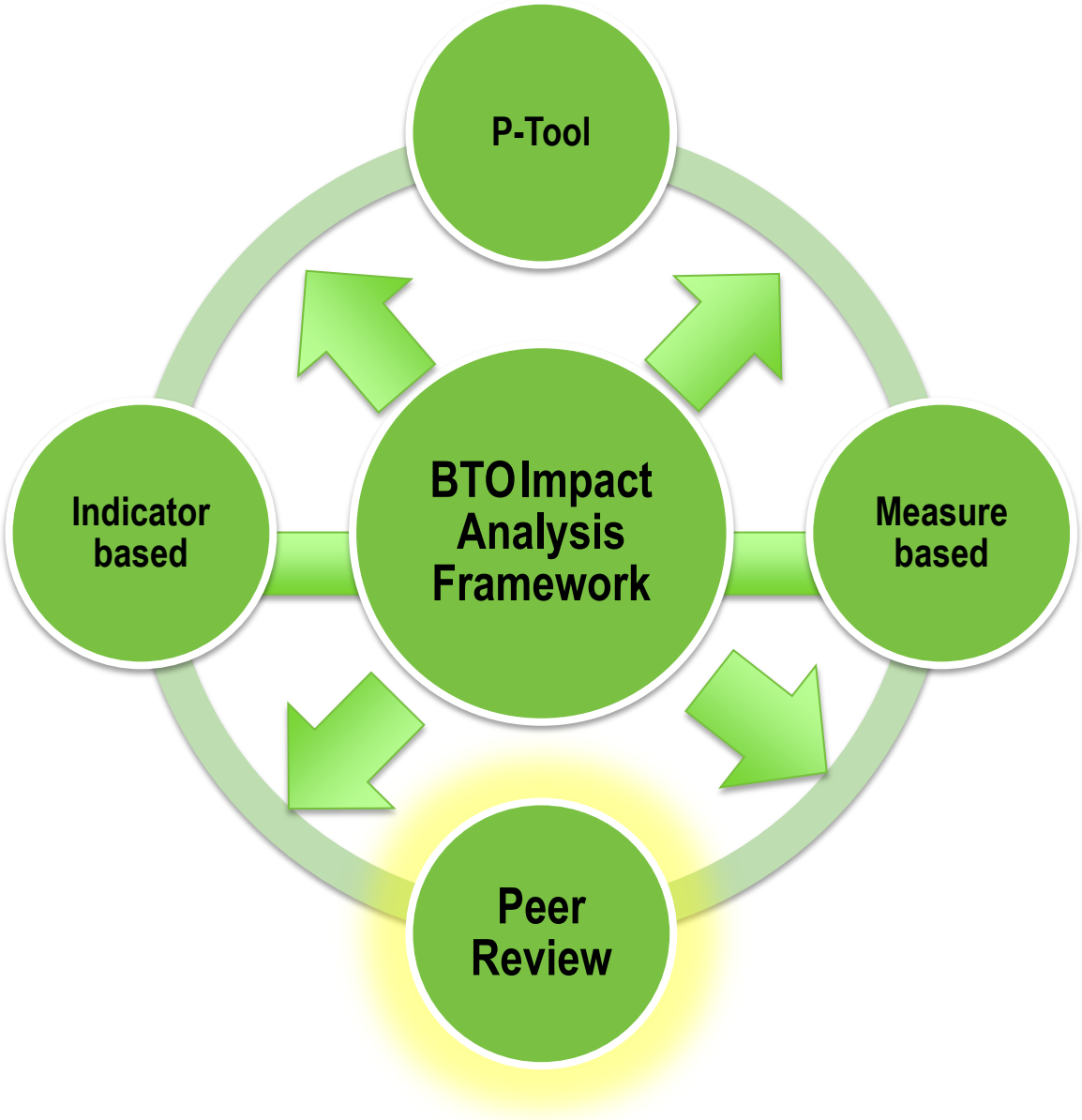
Measuring R&D Impacts



Analyzing our project and program successes, we can make more informed decisions about our investments and improve how we communicate our impacts.

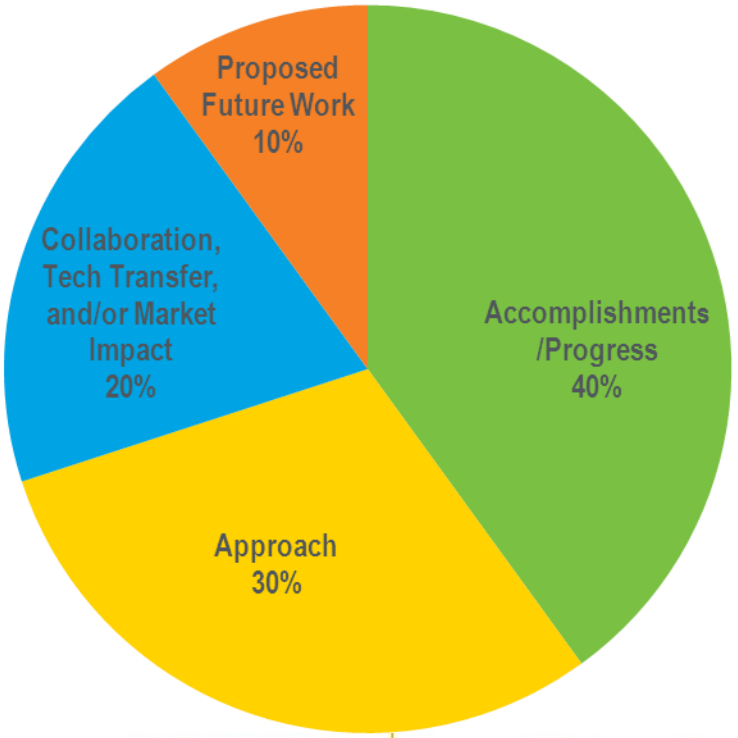
BTO Peer Review Objectives & Evaluation Criteria

The Peer Review is critical to objective assessment of BTO investments in energy efficient technology and building research, development, deployment, and demonstration activities.

Objectives

1. Independent evaluation of BTO projects.
2. Communicate BTO program activities and their connections, highlighting:
   - What we do and why
   - Progress being made with taxpayer $
3. Provide a forum that promotes the creation of collaborations and partnerships.

Evaluation Criteria Weighting



Special thanks to our reviewers!

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