



NYSERDA

Clean Energy Fund

Informational Webinar 2: Innovation and Research

July 15, 2015

Today's Objectives

Objectives:

- Provide stakeholders with a summary of the approach NYSERDA has proposed to employ under the Clean Energy Fund (CEF)
- Provide an opportunity for stakeholders to ask questions and receive answers

Key Dates:

- Week of July 20, 2015: NYSERDA posts a summary of frequently asked questions to its website and files with the Public Service Commission (PSC)
- August 14, 2015: Initial comments due
- August 28, 2015: Reply comments due
- Order anticipated late-2015

Agenda

- Overall Budget and Benefits
 - Funding Authorization, Budget and Collections
 - Bill-As-You-Go Approach
 - Administration and Evaluation Costs
 - Benefits
 - Investment Plans
 - Fuel Neutrality
- Questions
- Innovation and Research Initiatives and Initial Budgets
 - Energy-Related Environmental Research
 - Technology and Business Innovation
- Questions

Pillars of Reforming the Energy Vision

Reforming the Energy Vision (REV)—New York’s strategy to enable self-sustaining, clean-energy markets supporting a cleaner, more resilient, and affordable energy system

- 1 Groundbreaking Regulatory Reform**
REV Regulatory Proceeding
- 2 Evolution of State Programs**
Clean Energy Fund: NY-Sun, NY Green Bank
NY Prize
- 3 Leading by Example**
Using the State’s Energy Assets

Overall Budget and Benefits

Budget Overview

- Proposed 10-year budget to provide stability and a consistent signal to the marketplace
- Will facilitate the realization of the State's desired long-term outcomes of market transformation, private capital leverage, and greenhouse gas (GHG) emissions reductions
- Provides an immediate reduction in ratepayer collections, declining annually and resulting in \$1.5B in reduced collections from 2016-2025
- Substantially reduces cash balances in three years
- Requests authorization to obtain an external borrowing facility for NY Green Bank
 - Provides liquidity and certainty of projected steady state of \$200M/yr capital commitment schedule
 - Removes constraints on total CEF collections schedule

CEF Funding Authorization

(\$ millions)

Funding Authorization (2016-2025)	
Market Development	\$2,713.4
Innovation and Research	716.6
2016 Main Tier Solicitation	<u>150.0</u>
Subtotal	<u>3,580.0</u>
NY-Sun	960.6
NYGB	<u>781.5</u>
Total	\$5,322.1

Funding Breakdown	
Incremental collections	\$3,909.3
RGGI	250.0
Repurposed funds and interest	
SBC	85.8
EEPS	125.7
RPS	<u>844.4</u>
	<u>1,162.5</u>
Total	\$5,322.1

CEF Budget Allocation

	2016	2017	2018
Market Development			
Commercial	\$66.0M	\$49.3M	\$32.0M
Industrial	\$59.8M	\$26.0M	\$18.1M
Agriculture	\$6.2M	\$6.8M	\$4.2M
Multifamily	\$8.3M	\$8.0M	\$5.8M
Residential	\$17.4M	\$17.8M	\$16.7M
Low-Moderate Income	\$75.5M	\$78.5M	\$80.5M
New Construction	\$35.3M	\$29.7M	\$24.8M
Codes	\$4.0M	\$4.0M	\$5.0M
Energy Storage	\$6.0M	\$8.0M	\$8.0M
On-Site Power	\$41.5M	\$27.0M	\$23.0M
Renewable Thermal	\$5.0M	\$10.0M	\$14.0M
Products	\$5.0M	\$6.0M	\$7.0M
Communities	\$7.0M	\$8.0M	\$8.0M
Workforce Development	\$4.0M	\$4.0M	\$4.0M
Large-Scale Renewables	\$3.0M	\$4.0M	\$4.0M
Market Development Evaluation	\$12.6M	\$11.2M	\$10.2M
Total Market Development	\$356.6M	\$298.2M	\$ 265.2M

Note: Totals may not sum exactly due to rounding.

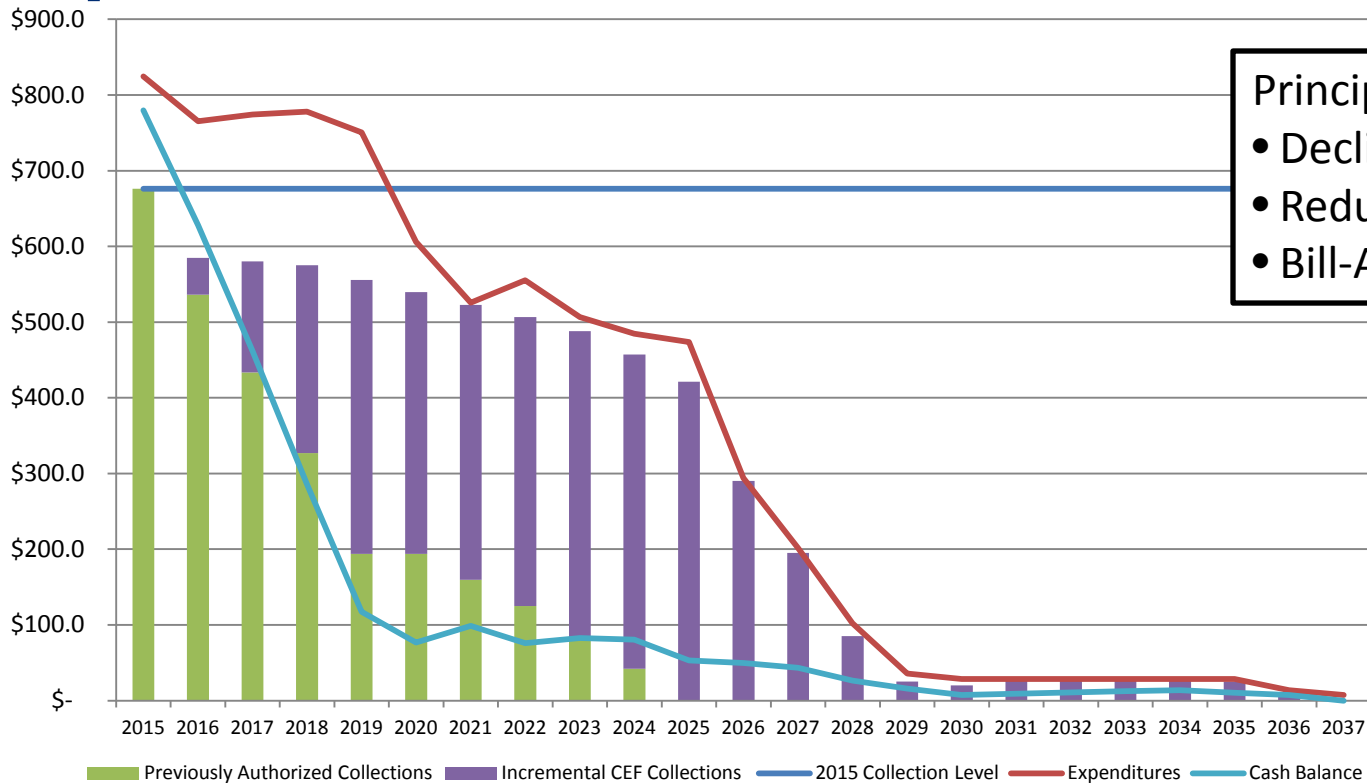


CEF Budget Allocation

	2016	2017	2018
Innovation and Research			
Energy-Related Environmental Research	\$4.0M	\$4.0M	\$4.0M
Smart Grid	\$12.0M	\$13.1M	\$15.1M
Renewables and DERs Integration	\$18.9M	\$14.5M	\$14.6M
Building Innovations	\$9.7M	\$13.6M	\$12.7M
Clean Transportation	\$8.7M	\$8.5M	\$7.5M
Innovation Capacity and Business Development	\$10.7M	\$17.2M	\$17.0M
Innovation and Research Evaluation	\$2.4M	\$2.8M	\$2.8M
Total Innovation and Research	\$66.4M	\$73.8M	\$73.8M
Main Tier 2016 Solicitation	\$150.0M	-	-
Grand Total	\$573.0M	\$372.0M	\$339.0M

Note: Totals may not sum exactly due to rounding.

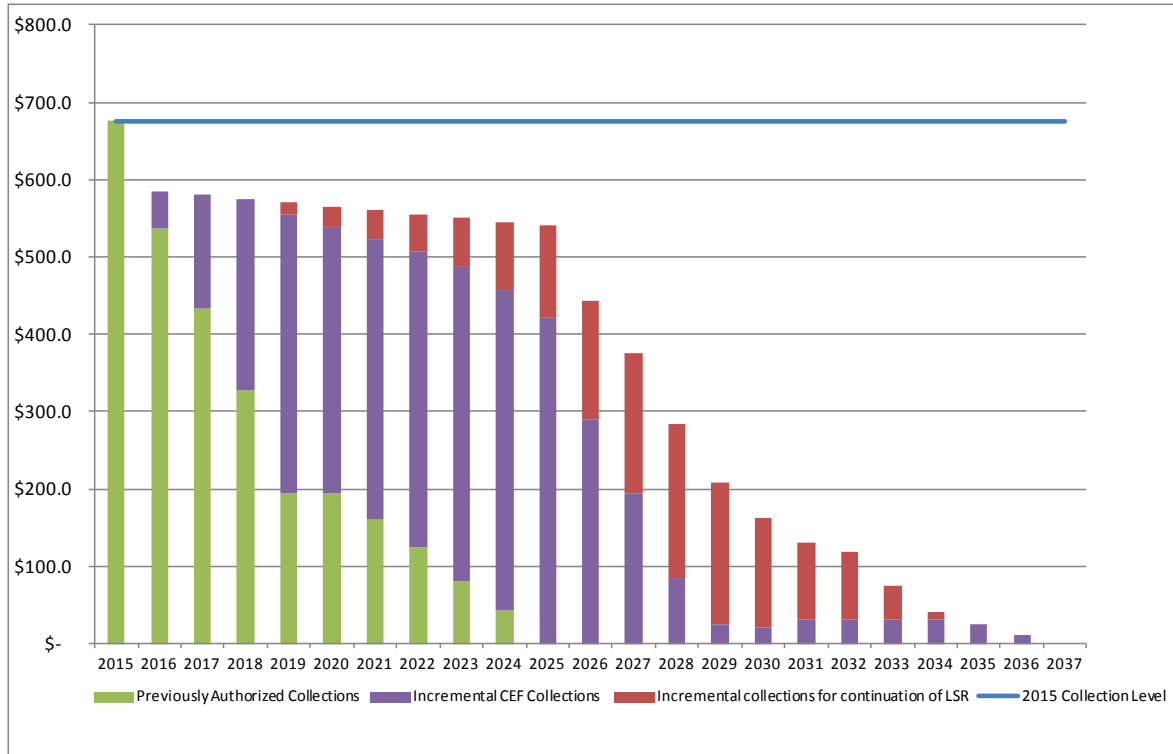
Proposed CEF Collections



Principles:

- Declining collections
- Reduce cash balances
- Bill-As-You-Go

Proposed CEF Collections + LSR Funding



Proposed CEF collections plus estimated funding to support a Large-Scale Renewables (LSR) mechanism, if authorized, would still support an annual decrease in total collections

Bill-As-You-Go Approach

- Would minimize accumulation of unexpended balances while maintaining sufficient funding to meet its projected near-term expenditures
- Mechanics:
 - NYSERDA would receive an initial payment from utilities of 25% of the first year's authorized collections
 - At the end of each quarter, NYSERDA would submit reimbursement requests to each utility, based on actual expenditures realized

Administration and Evaluation Costs

- Maintain current administrative cost cap of 8% of total authorized funds
- Set budget for evaluation activities which is less than the current budget of 5% of total authorized funds
- Maintain coverage of a proportionate share of the annual New York State Cost Recovery Fee

Benefits

- Manage the portfolios to advance four primary outcomes:
 - GHG emissions reductions
 - Customer bill savings
 - Energy efficiency and clean energy generation
 - Mobilization of private sector capital
- Longer-range estimates will be done on a lifetime basis to capture the full benefit of the investment
- Incremental annual benefits provided in three-year projections in Investment Plans

Benefits

Portfolio	Estimated 10-Year CEF Lifetime Benefits in Millions					Leverage Ratio
	MWh	MMBTU	CO2 (tons)	Bill Savings	Private Investment	
Market Development	137	491	76	\$ 20,412	\$ 8,875	4.23
Innovation and Research	*	*	*	*	\$ 3,265	5.00
NY-Sun	88	NA	28	\$ 12,810	\$ 9,216	9.60
NY Green Bank	*	*	*	*	\$ 8,000	8.00

** Energy and other benefits for the Innovation and Research and NYGB portfolios will be measured and tracked over the 10 years of the CEF. The NYGB performance accounting will be separately identified and quantified through the NYGB procedures and business plans.*

- Compared to EEPS, the market-rate sectors, including Commercial, Industrial, Multifamily, and Residential provide:
 - 79% more energy savings
 - 57% more GHG emissions reductions

Investment Plans

- Annual Investment Plan for the Market Development and Innovation and Research portfolios, identifying:
 - Rolling three-year budget projections and estimate of benefits
 - Initiative details and timeline
 - Performance indicators and results
 - Market intelligence
- Requested flexibility to allocate funds within and across the two portfolios to optimize anticipated benefits and increase market responsiveness
- Continuous initiative improvement of initiatives via Test-Measure-Adjust

Fuel Neutrality

- Would allow clean energy investments to be made based on overall public benefits without regard for specific fuel type
- Provides:
 - Customer-centric clean energy initiatives
 - Better optimized GHG emissions reductions
 - Benefits on a larger system basis, including:
 - Reduced impacts of systems interruptions
 - Improved resiliency of fuel availability when interruptions become necessary

Overall Budget and Benefits

Questions?

Innovation and Research Initiatives and Initial Budgets

Innovation and Research Portfolio

Environmental Research

- To provide objective information on the environmental impacts of energy technologies to help inform policy making and identify strategies to mitigate environmental impacts

Technology and Business Innovation

- To accelerate and catalyze the most valuable innovations that will create low-GHG solutions, system and customer benefits, and a vibrant clean energy industry in NY
- Will be strategic, focused, and capital efficient in addressing NY's pressing needs and opportunities
- Will focus on high impact strategic priorities while maintaining an ability to pivot to emerging opportunities
- Embraces a stronger technology-to-market focus
- Employs rigorous portfolio management

Environmental Research

A robust, comprehensive approach to:

- Guide cost-effective GHG mitigation and climate adaptation strategies
- Inform state and federal energy and environmental policies
- Examine the health and ecological co-benefits of alternative energy and technology solutions
- Guide emerging energy technologies and systems

Environmental Research

The research agenda will work to:

- Enhance the understanding of the environmental impacts of current and emerging energy technologies, systems, and pollution control technologies
- Identify barriers and opportunities related to the implementation of alternative energy technologies
- Evaluate the effectiveness of energy-related environmental protection strategies
- Provide accountability through analysis of long-term monitoring records and modeling
- Enhance the understanding of the source types, source regions, and specific pollution components contributing to major energy-related environmental problems in NY
- Provide insight on the relative contribution of fuel combustion in various sectors to the state's environmental challenges
- Prioritize opportunities for mitigation and identify pollution control strategies
- Help identify more environmentally friendly options for cleantech companies

Technology and Business Innovation

Initial strategic priority areas:

- Smart Grid Systems
- Renewables and Distributed Energy Resource (DER) Integration
- Buildings Innovations
- Clean Transportation
- Innovation Capacity & Business Development

Will also remain opportunistic to support other promising technologies and solutions that offer unique but similarly impactful opportunities to NY

Smart Grid Systems

- **Vision:** Accelerate the evolution to a smarter more *integrated* grid that “enables” new value-added services in pursuit of efficiency, sustainability, reliability, resiliency, and affordability - REV transformation

Smart Grid Systems Focus

1) Transmission & Distribution (T&D) Systems

Opportunity/Challenge: T&D system losses can approach 10%, with significant losses occurring in the distribution system. System resiliency is being increasingly challenged by storm events

Approach: Development & validation of advanced devices, controls, condition monitors, system diagnostics, communications, and advanced distribution management. Robust utility partnership. REV aligned

Smart Grid Systems Focus

2) Community Grids

Opportunity/Challenge: Communities continue to remain vulnerable to storms and have historically not been engaged with energy grid optimization and DER

Approach: Leverage technology developments and the NY Prize Competition, which will conduct a multi-stage microgrid design and build competition in communities and utilities across the state. Document microgrid performance, test/validate REV principles, address barriers

Renewables and DER Integration

- **Vision:** Accelerate market adoption and increase recognition of the benefits of distributed and renewable resources

Renewables and DER Focus

1) DER Performance Improvement

Opportunity/Challenge: Energy production value of renewable generation and DER can be significantly improved

Approach: Invest in solutions to optimize renewable energy (e.g., improved wind siting & design, maintenance diagnostics; solar electric coatings)

Renewables and DER Focus

2) DER Integration

Opportunity/Challenge: Lack of interoperability between the grid, DER, storage, and customers impedes capturing full value of DER/renewables

Approach: Focus initially on battery integration with solar electric & other DER

Renewables and DER Focus

3) Enabling Technologies – Energy Storage

Opportunity/Challenge: Better understood storage performance requirements for specific applications will have greater value and market penetration

Approach: Invest in application analytics and validate energy storage product specification-application match. Work with consortia (NY-BEST), developers and end-users

Renewables and DER Focus

4) Water Resource Recovery Facilities

Opportunity/Challenge: Wastewater treatment facilities currently consumer 1.5% of NY's power and energy use is likely to increase

Approach: Develop and demonstrate advanced concepts (controls, energy efficiency, advanced nutrient removal, self-generation) that promote zero net energy wastewater facilities

Buildings Innovations

- **Vision:** Create technologies and systems that can enable zero net energy buildings, deep energy efficiency retrofits, and smart buildings - providing value and comfort to occupants and owners

Buildings Innovations Focus

1) NextGen Heating, Ventilation, and Air Conditioning (HVAC)

Opportunity/Challenge: HVAC systems account for the largest proportion of building energy use

Approach: Invest in techniques for separate humidity & temperature control, cold climate heat pumps, integrated HVAC Systems (renewables, storage, with conventional systems), intelligent HVAC systems

Buildings Innovations Focus

2) Smart Buildings

Opportunity/Challenge: Smart buildings have the potential to minimize energy costs, support a robust grid, increase system resiliency, and facilitate integration of on-site generation and storage

Approach: Direct investment in companies, establishment of a buildings consortium, use cases and pilot demonstrations, participation in standards development

Clean Transportation

- **Vision:** Accelerate the movement toward an efficient, low-GHG emissions transportation system - enhancing the quality of life in communities across New York State

Clean Transportation Focus

1) Public Transit and Electric Rail

Opportunity/Challenge: NYC subway system is the largest consumer of electricity on the metro area load pocket (1.8 billion kWhs annually), a significant portion of which is wasted due to aging equipment and infrastructure

Approach: Enhanced collaboration with Metropolitan Transportation Authority (MTA) and New York Power Authority (NYPA) to develop new products, test/validate existing products, and document technology benefits and value proposition

Clean Transportation Focus

2) Electric Vehicles (EVs)

Opportunity/Challenge: EVs offer attractive opportunities for GHG reductions, operational savings for drivers, benefits to ratepayers through vehicle-to-grid power and leveling electric grid loads

Approach: Demonstrations of new technologies, business models, policies, and processes that can bring down the cost of ownership and expand the market

Clean Transportation Focus

3) Smart Mobility

Opportunity/Challenge: Optimizing how vehicles and transportation infrastructure communicate can significantly reduce fuel consumption and emissions

Approach: Large-scale demonstration projects, support the development and growth of new products and services, provide tech transfer and information dissemination, collaborate with emerging stakeholders and consortium partners, partnerships with Department of Transportation (DOT), part of clean communities initiatives

Clean Transportation Focus

4) Transportation Demand Management (TDM)

Opportunity/Challenge: Communities that implement TDM strategies enable the development of more compact, efficient buildings and transportation systems while generating significant economic benefits

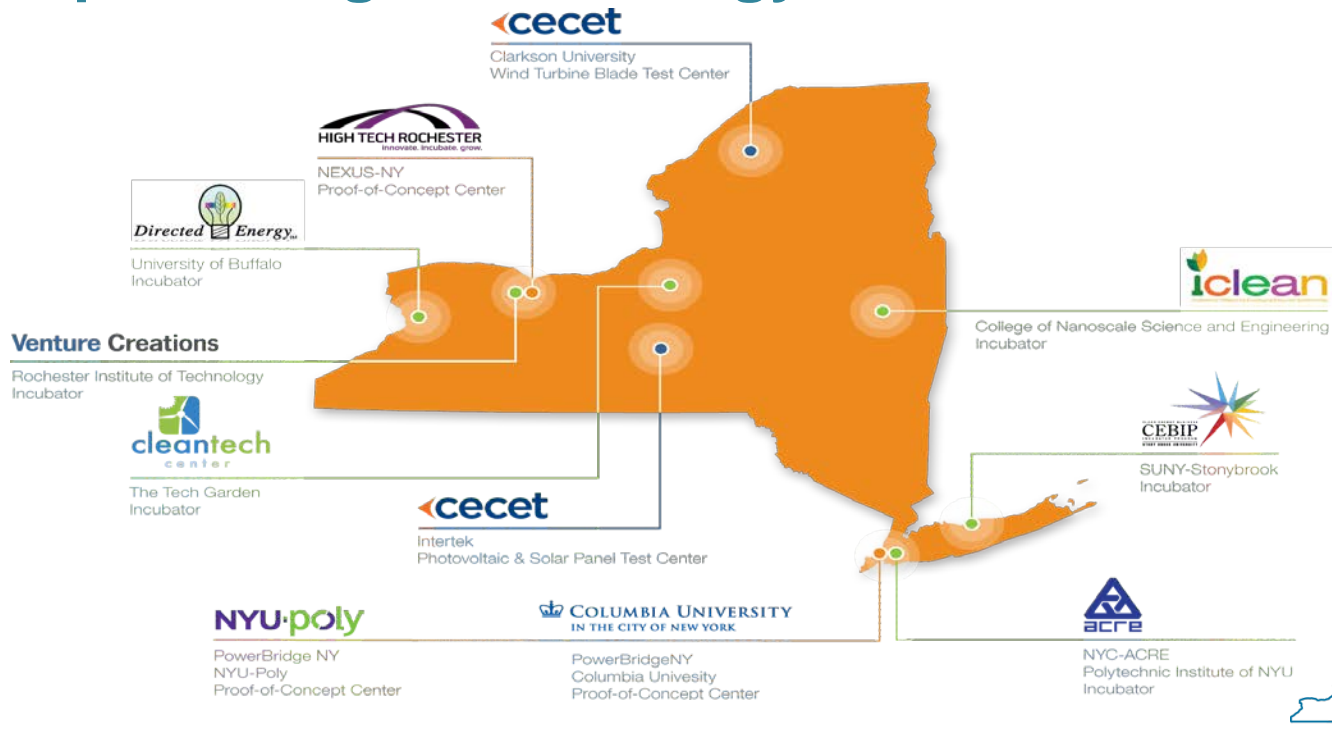
Approach: Support the growth of shared mobility providers while collaborating with behavior analysis professionals to work with municipalities and large employers

Innovation Capacity & Business Dev.

- **Vision:** A vibrant, self-sustaining cleantech innovation ecosystem that will accelerate the pace and scale of clean energy innovation in NYS and make it the place for innovation

Innovation Capacity & Business Dev. Focus

1) Develop Existing Clean Energy Innovation Assets



Innovation Capacity & Business Dev. Focus

2) Strategic Partnerships

Opportunity/Challenge: Customers are slow to accept an unproven product from an unknown startup. Start-ups struggle to access channels to the market

Approach: Matchmaker for corporate or public-sector partners. De-risk initial engagement

Innovation Capacity & Business Dev. Focus

3) Design & Manufacturing Optimization

Opportunity: It is a challenge for hardware entrepreneurs to get from first prototype to understanding application requirements and manufacturing at the right price point

Approach: Complement and leverage existing capability statewide to address cleantech application and manufacturability needs

Initial Budgets

	2016	2017	2018
Innovation and Research			
Energy-Related Environmental Research	\$4.0M	\$4.0M	\$4.0M
Smart Grid	\$12.0M	\$13.1M	\$15.1M
Renewables and DERs Integration	\$18.9M	\$14.5M	\$14.6M
Building Innovations	\$9.7M	\$13.6M	\$12.7M
Clean Transportation	\$8.7M	\$8.5M	\$7.5M
Innovation Capacity and Business Development	\$10.7M	\$17.2M	\$17.0M
Innovation and Research Evaluation	\$2.4M	\$2.8M	\$2.8M
<i>Total Innovation and Research</i>	<i>\$66.4M</i>	<i>\$73.8M</i>	<i>\$73.8M</i>

Note: Totals may not sum exactly due to rounding.

Innovation and Research

Questions?