Engineering Research Centers

End-of-Year Report

2020

i. 15 ERCs Referenced in Slides 1–5

NSF Nanosystems Engineering Research Center for Nanomanufacturing Systems for Mobile Computing and Mobile Energy Technologies at University of Texas (NASCENT) (Class: 2012; AY: 2012 – 2020; RY: 2012 – 2020)*	ERC for Ultra-wide-area Resilient Electric Energy Transmission Networks at University of Tennessee (CURENT) (Class: 2011; AY: 2011 – 2020; RY: 2011 – 2020)*
NSF Nanosystems Engineering Research Center for Advanced Self-Powered Systems of Integrated Sensors and Technologies (ASSIST) (Class: 2012; AY: 2012 – 2020; RY: 2012 – 2020)*	Nanosystems Engineering Research Center for Nanotechnology Enabled Water Treatment Systems at Rice University (NEWT) (Class: 2015; AY: 2015 – 2020; RY: 2015 – 2020)*
Engineering Research Center for Bio-mediated and Bio-inspired Geotechnics at Arizona State University (CBBG) (Class: 2015; AY: 2015 – 2020; RY: 2015 – 2020)*	ERC for Precise Advanced Technologies and Health Systems for Underserved Populations at Texas A&M University (PATHS-UP) (Class: 2017; AY: 2017 – 2020; RY: 2017 – 2020)*
ERC for Directed Multiscale Assembly of Cellular Metamaterials with Nanoscale Precision at Boston University (CELL-MET) (Class: 2017; AY: 2017 – 2020; RY: 2017 – 2020)*	ERC for Power Optimization for ElectroThermal Systems at University of Illinois (POETS) (Class: 2015; AY: 2015 – 2020; RY: 2015 – 2020)*
ERC for Innovative and Strategic Transformation of Alkane Resources at Purdue University (CISTAR) (Class: 2017; AY: 2017 – 2020; RY: 2017 – 2020)*	ERC for Quantum Energy and Sustainable Solar Technologies at Arizona State University (QESST) (Class: 2011; AY: 2011 – 2020; RY: 2011 – 2020)*
ERC for Cell Manufacturing Technologies at Georgia Institute of Technology (CMaT) (Class: 2017; AY: 2017 – 2020; RY: 2017 – 2020)*	ERC for Re-inventing the Nation's Urban Water Infrastructure at Stanford University (ReNUWIt) (Class: 2011; AY: 2011 – 2020; RY: 2011 – 2020)*
ERC for Revolutionizing Metallic Biomaterials at North Carolina A&T State University (NCAT) (Class: 2008; AY: 2008 – 2020; RY: 2008 – 2020)*	Nanosystems Engineering Research Center for Translational Applications of Nanoscale Multiferroic Systems at University of California Los Angeles (TANMS) (Class: 2012; AY: 2012 – 2020; RY: 2012 – 2020)*
Center for Neurotechnology at University of Washington (CNT) (Class: 2011; AY: 2011 – 2020; RY: 2011 – 2020)*	

**AY and RY denotes the Award Year and Reporting Year Range*

ii. "Annualized ERCs" on slides 1–5 include the 15 ERCs from the previous slide and the following additional 9 ERCs

Quality of Life Technology Engineering Research Center at Carnegie Mellon University (CMU) (Class: 2006; AY: 2006 – 2015; RY: 2006 – 2014)*	Engineering Research for Structured Organic Particulate Systems at Rutgers University (C-SOPS) (Class: 2006; AY: 2006 – 2016; RY: 2006 – 2015)*
Engineering Research Center for Compact and Efficient Fluid Power at the University of Minnesota – Twin Cities (Class: 2006; AY: 2006 – 2016; RY: 2006 – 2017)*	Synthetic Biology ERC at the University of California, Berkeley (SynBERC) (Class: 2006; AY: 2006 – 2016; RY: 2006 – 2015)*
ERC for Integrated Access Networks at the University of Arizona (CIAN) (Class: 2008; AY: 2008 – 2019; RY: 2008 – 2019)*	Future Renewable Electric Energy and Management Systems Center at North Carolina State University (FREEDM) (Class: 2008; AY: 2008 – 2019; RY: 2008 – 2019)*
Center for Biorenewable Chemicals at Iowa State University (IOWA) (Class: 2008; AY: 2008 – 2019; RY: 2008 – 2019)*	ERC for Lighting Enabled Systems & Applications at Rensselaer Polytechnic Institute (LESA) (Class: 2008; AY: 2008 – 2019; RY: 2008 – 2019)*
ERC on Mid-Infrared Technologies for Health and the Environment at Princeton University (MIRTHE) (Class: 2006; AY: 2006 – 2016; RY: 2006 – 2016)*	

**AY and RY denotes the Award Year and Reporting Year Range*

1 | ERC Products of Innovation, FY 1985–2020*

	FY 2020 (15 ERCs)		FY 2015–2019 Annualized		FY 1985–2020 (65 ERCs)
Intellectual Property Transaction	***Total***	***Per Center***	***Total***	***Per Center***	***Total***
Inventions Disclosed	57	4	80	5	2,564
Patent Applications Filed (Provisional and Full)	69	5	96	5	2,242
Patents Awarded	22	1	31	2	883
Licenses Issued	11	1	8	< 1	1,379
Economic Development	***Total***	***Per Center***	***Total***	***Per Center***	***Total***
Spinoff Companies	12	1	10	1	240
Spinoff Employees	139	9	76	4	1,604

** Does not include centers from the Earthquake Technology Sector*

2 ERC Influence on Curriculum, FY 1985–2020*

	FY 2020 (15 ERCs)		FY 2015–2019 Annualized		FY 1985–2020 (65 ERCs)
Degrees	***Total***	***Per Center***	***Total***	***Per Center***	***Total***
New Full-Degree Programs Based on ERC Research	2	< 1	2	< 1	57
New Degree Minors Based on ERC Research	2	< 1	0	< 1	34
New Certificate Programs Based on ERC Research	2	< 1	2	< 1	43
Courses	***Total***	***Per Center***	***Total***	***Per Center***	***Total***
New Courses Based on ERC Research	32	2	28	2	1,085
Ongoing Courses With ERC Content	246	16	291	16	3,483
Course Modules Based on ERC Research	44	3	28	2	746
Textbooks	***Total***	***Per Center***	***Total***	***Per Center***	***Total***
New Textbooks Based on ERC Research	5	< 1	4	< 1	187
New Textbook Chapters Based on ERC Research	5	< 1	6	< 1	109

** Does not include centers from the Earthquake Technology Sector*

3 ERC Information Dissemination, FY 1985–2020*

	FY 2020 (15 ERCs)		FY 2015–2019 Annualized		FY 1985–2020 (65 ERCs)
Peer-Reviewed Publications (Total)	***Total***	***Per Center***	***Total***	***Per Center***	***Total***
Journals**	668	45	918	51	24,685
Conference Proceedings**	316	21	519	29	18,435
Trade Journals	4	< 1	10	1	644
Coauthored With ERC Students	411	27	582	33	12,993
Education and Outreach	***Total***	***Per Center***	***Total***	***Per Center***	***Total***
Education and Colloquia	644	43	922	52	17,612
Workshops, Short Courses, and Webinars	467	31	370	21	6,017

** Does not include centers from the Earthquake Technology Sector*

*** Includes publications that result from center support, associated projects, and sponsored projects*

Curricular Impact of ERCs, FY 2007–2020*

	FY 2020 (15 ERCs)		FY 2015–2019 Annualized		FY 2007–2020 (39 ERCs)
New and Ongoing Courses, Workshops, Short Courses, Webinars, and Textbooks Based on ERC Research	***Total***	***Per Center***	***Total***	***Per Center***	***Total***
With Engineered-System Focus	234	16	368	20	3,982
With Multidisciplinary Content	194	13	293	16	3,439
Offered at Undergraduate Level	253	17	215	12	2,496
Offered at Graduate Level	238	16	274	15	3,276
Used at More Than One ERC Institution	89	6	96	5	939
Team Taught by Faculty in More Than One Department	76	5	83	5	912

** Does not include centers from the Earthquake Technology Sector*

*** Data collection of curricular impacts started in 2007.*

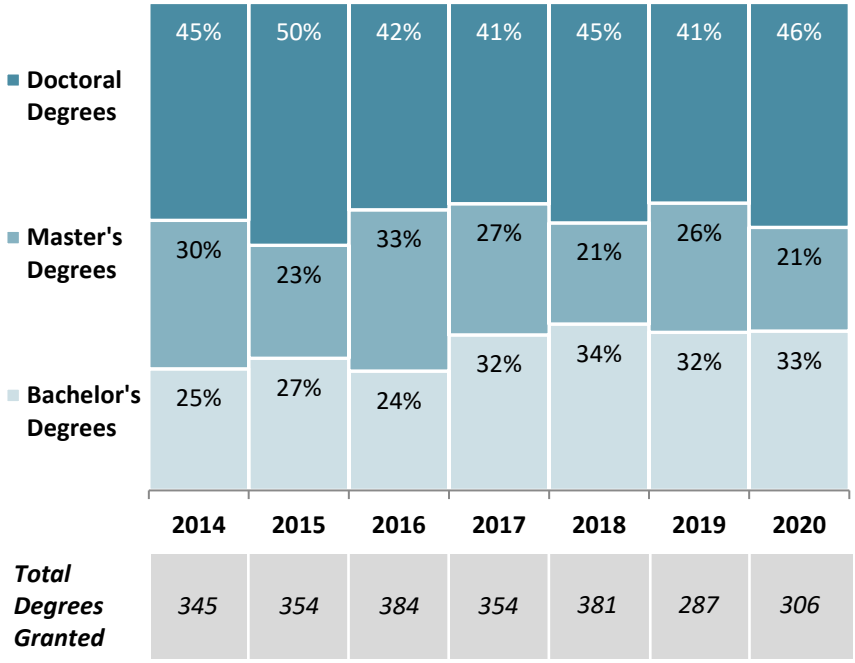
ERC Student Degrees, FY 1985–2020*

	FY 2020 (15 ERCs)		FY 2015–2019 Annualized		FY 1985–2020 (65 ERCs)
Degree Type	***Total***	***Per Center***	***Total***	***Per Center***	***Total***
Bachelor's	100	7	105	6	4,607
Master's	65	4	92	5	4,379
Doctoral	141	9	155	9	5,221
Total	***306***	***20***	***352***	***20***	***14,207***

** Does not include centers from the Earthquake Technology Sector*

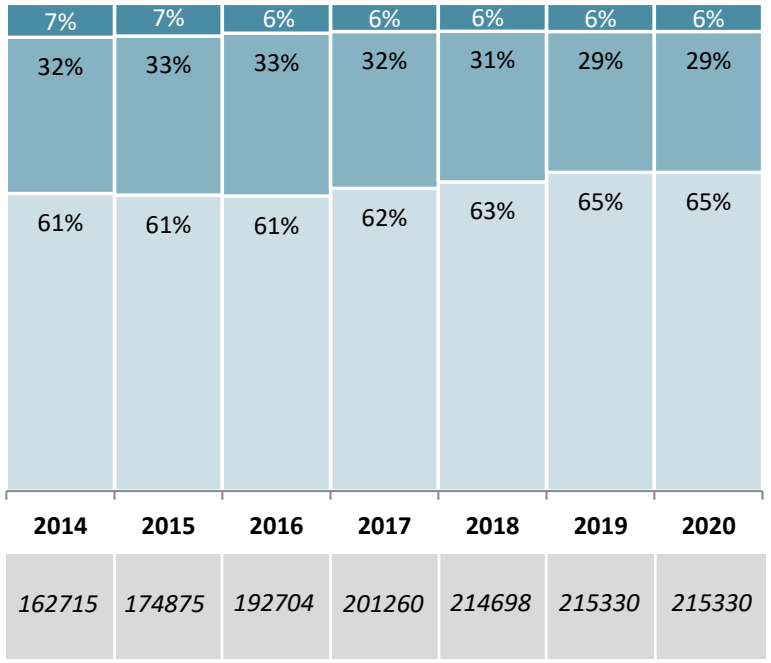
6 Degrees Granted to ERC Students vs. All U.S. Engineering Graduates, FY 2014–2020

Degrees Granted to ERC Students*
(Domestic and Foreign Students)



	2014	2015	2016	2017	2018	2019	2020
Total Degrees Granted	*345*	*354*	*384*	*354*	*381*	*287*	*306*

Degrees Granted From All U.S. Engineering Schools
(Domestic and Foreign Students)



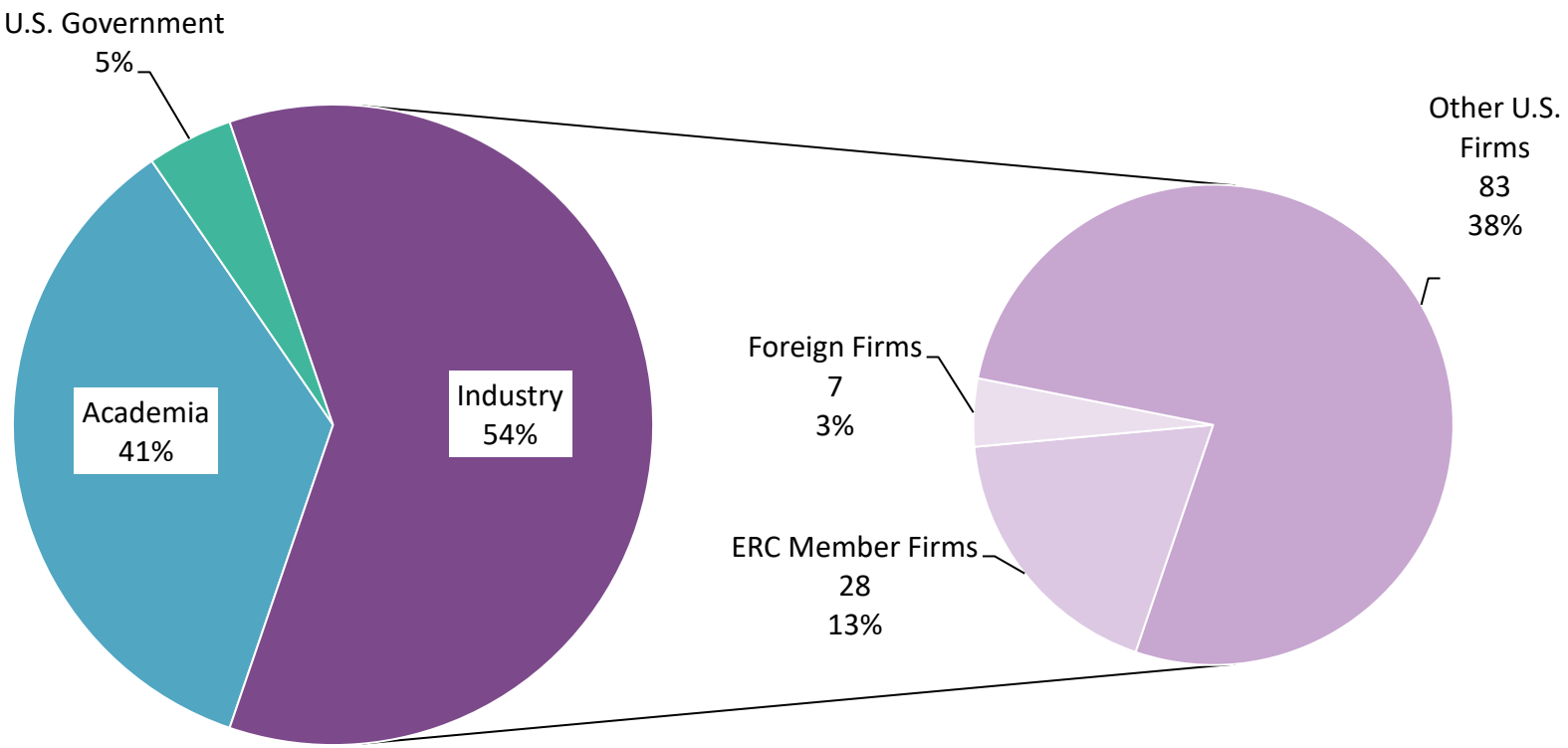
	2014	2015	2016	2017	2018	2019	2020
Total Degrees Granted	*162715*	*174875*	*192704*	*201260*	*214698*	*215330*	*215330*

** Does not include centers from the Earthquake Technology Sector*

Data Source: American Society for Engineering Education (ASEE) (http://edms.asee.org)

ERC Graduate Employment (15 Centers), FY 2020

WHERE ARE ERC GRADUATES EMPLOYED?



Total: 218

8 ERC Research and Education Personnel, by Underrepresented Group and Citizenship Status, FY 2020

Personnel Category	Total	Total U.S. Citizens and Permanent Residents	Women*		Underrepresented Racial Minorities*		Hispanic*		Foreign	
			Number	%	Number	%	Number	%	Number	%
Faculty										
Total	571	470	122	26%	26	6%	50	11%	60	11%
Graduate Students										
Postdocs	177	52	24	46%	2	4%	3	6%	104	59%
Graduate Students	1,131	543	206	38%	47	9%	72	13%	480	42%
Doctoral	938	438	169	39%	40	9%	49	11%	423	45%
Master's	196	106	37	35%	7	7%	23	22%	58	30%
Total**	1,306	595	230	39%	49	8%	75	13%	583	45%
Undergraduate Students										
ERC Undergraduate Students (Research Assistants, Non-REU Students)	684	468	239	51%	63	13%	105	22%	31	5%
NSF REU Site Award Students	57	56	36	64%	14	25%	12	21%	0	0%
ERC's Own REU Students	116	107	63	59%	33	31%	30	28%	0	0%
Total**	817	594	316	53%	99	17%	140	24%	31	4%
Community College										
Participants in RET Program	4	3	3	100%	0	0%	1	33%	0	0%
K–12 Teachers										
K–12 RET	108	89	48	54%	17	19%	15	17%	0	0%
K–12 Non-RET	50	45	30	67%	8	18%	5	11%	0	0%
Total	158	134	78	58%	25	19%	20	15%	0	0%
Young Scholars										
Total	131	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grand Total***	***3,018***	***1,827***	***772***	***42%***	***205***	***11%***	***293***	***16%***	***674***	***23%***

** U.S. citizens and permanent residents only*

*** The sum of the number of personnel for each row may exceed the total because personnel may belong to multiple categories.*

**** Leadership/Administration Directors, Thrust Leaders, and Education Program Leaders are included in the Grand Total. For the Grand Total row, all columns exclude Young Scholars, except the Total column.*

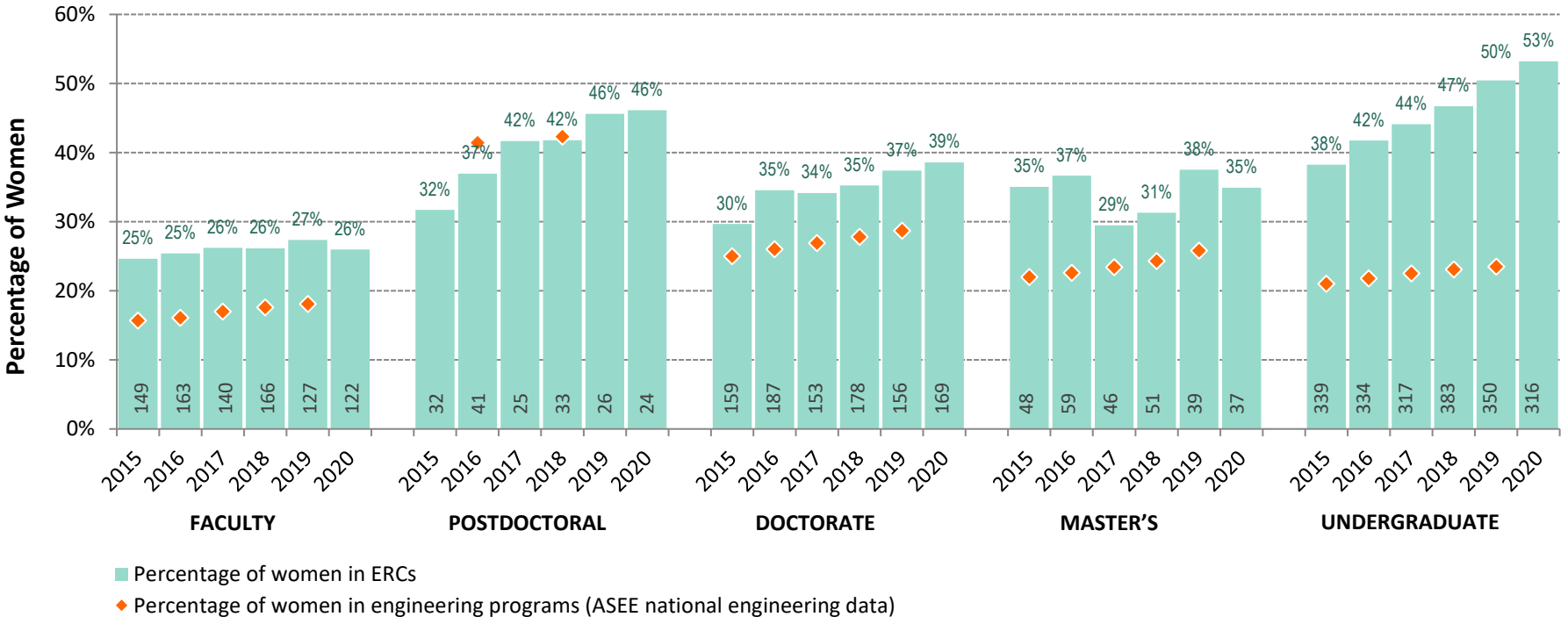
NOTE: *For years in which the center entered demographic data by institution rather than per person, data are not included.*

Participants Impacted by ERC Engineering Education Activities, FY 2020

Outreach Participants	Total
Community College Events	
Faculty Who Attended ERC-Sponsored Educational Outreach Events	41
Students Who Attended ERC-Sponsored Educational Outreach Events	850
Total	891
K–12 Events	
Pre-college K–12 Teachers	4,054
K–12 Students	54,175
Total	58,229
Grand Total	***59,120***

Women in ERCs, FY 2015–2020

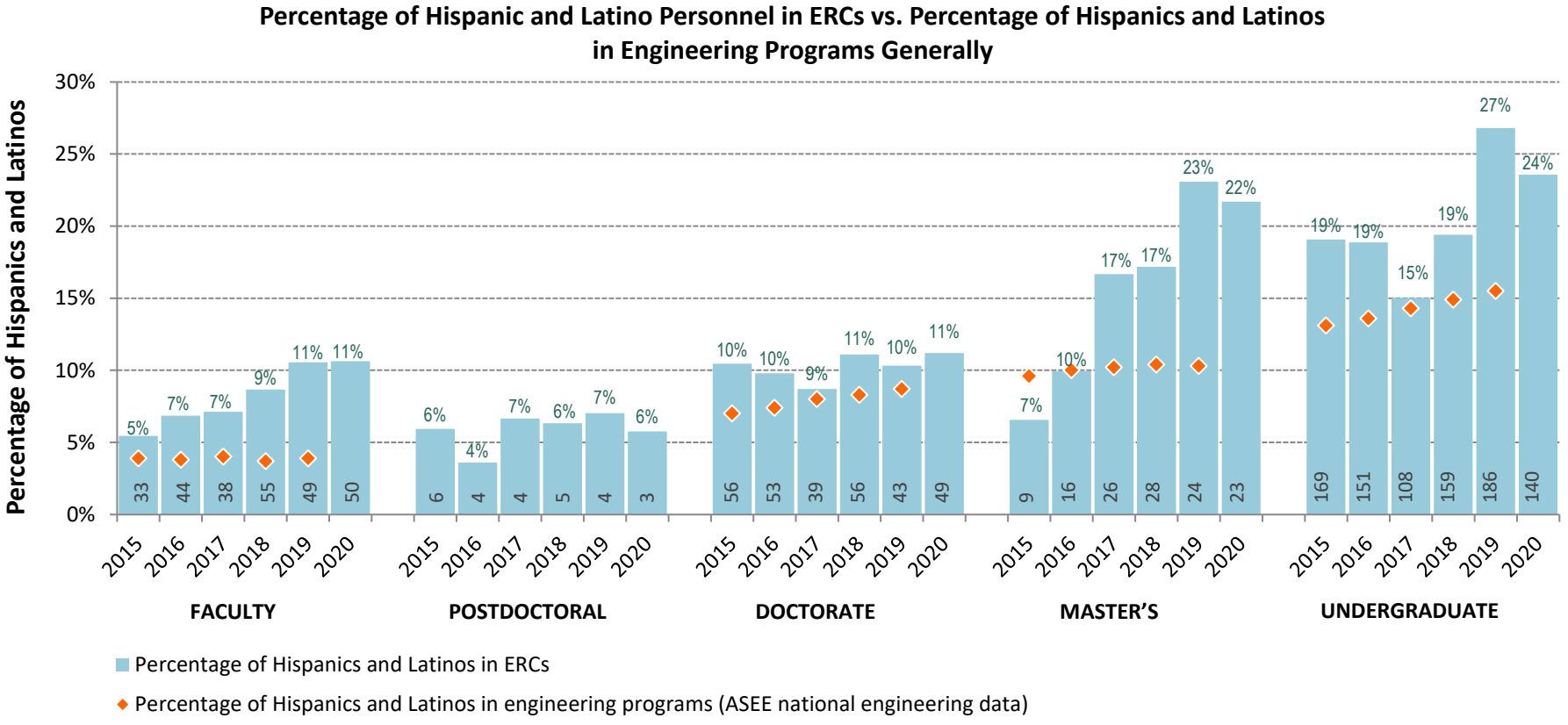
Percentage of Women Personnel in ERCs vs. Percentage of Women in Engineering Programs Generally



NOTES:

- *Data from centers are not included for years in which the center entered demographic data by institution rather than per person*
- *Both ERC data and National statistics are for U.S. citizens and permanent residents only*
- *Undergraduates include REU students*
- *The percentages of women are calculated out of the total number of U.S. citizens and permanent residents, including personnel who did not report gender*
- *ASEE data were not collected for 2020 and for postdoctoral for 2015, 2017, and 2019*
- *The percentages of personnel who did not report gender are as follows: 2015: 8.12%, 2016: 9.77%, 2017: 12.06%, 2018: 10.67%, 2019: 10.95%, 2020: 9.94%*

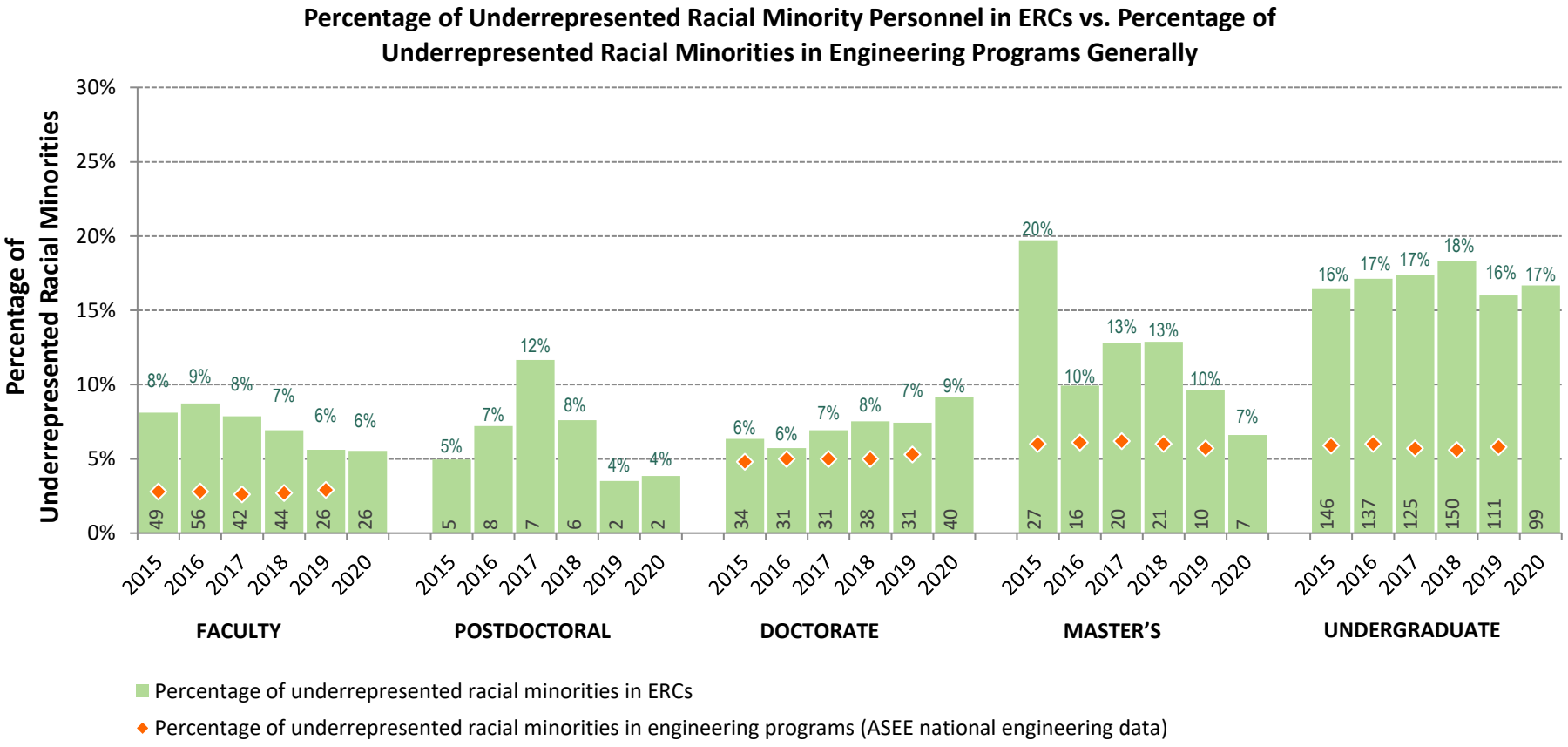
Hispanics and Latinos in ERCs, FY 2015–2020



NOTES:

- *Data from centers are not included for years in which the center entered demographic data by institution rather than per person*
- *Both ERC data and National statistics are for U.S. citizens and permanent residents only*
- *Undergraduates include REU students*
- *The percentages of Hispanics and Latinos are calculated out of the total number of U.S. citizens and permanent residents, including personnel who did not report ethnicity*
- *ASEE data were not collected for 2020 and for postdoctoral for 2015–2020*
- *The percentages of personnel who did not report ethnicity are as follows: 2015: 17.59%, 2016: 20.85%, 2017: 17.43%, 2018: 15.81%, 2019: 15.57%, 2020: 15.11%*

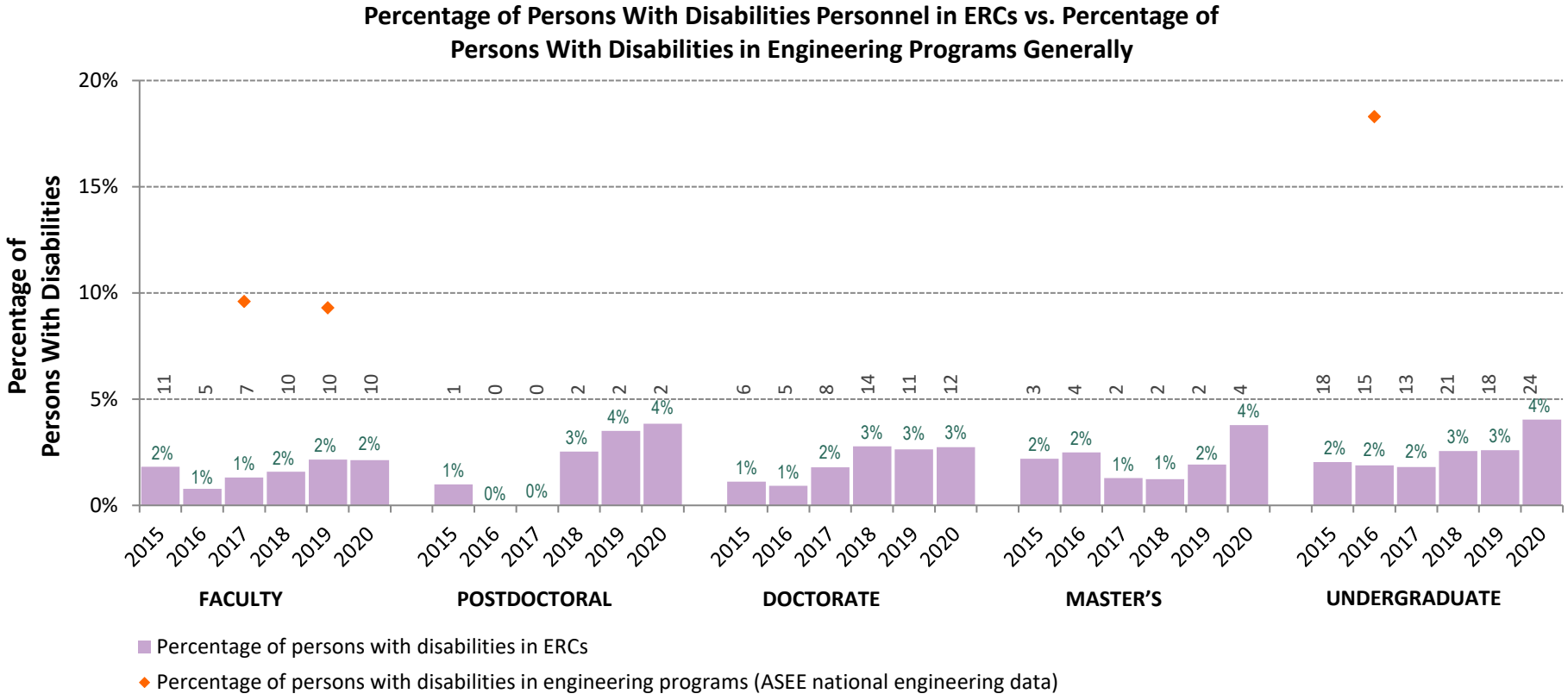
12 Underrepresented Racial Minorities in ERCs, FY 2015–2020



NOTES:

- *Data from centers are not included for years in which the center entered demographic data by institution rather than per person*
- *Both ERC data and National statistics are for U.S. citizens and permanent residents only*
- *Undergraduates include REU students*
- *The percentages of underrepresented racial minorities are calculated out of the total number of U.S. citizens and permanent residents, including personnel who did not report race*
- *ASEE data were not collected for 2020 and for postdoctoral for 2015–2020*
- *The percentages of personnel who did not report race are as follows: 2015: 19.24%, 2016: 22.06%, 2017: 17.88%, 2018: 16.91%, 2019: 17.68%, 2020: 16.37%*

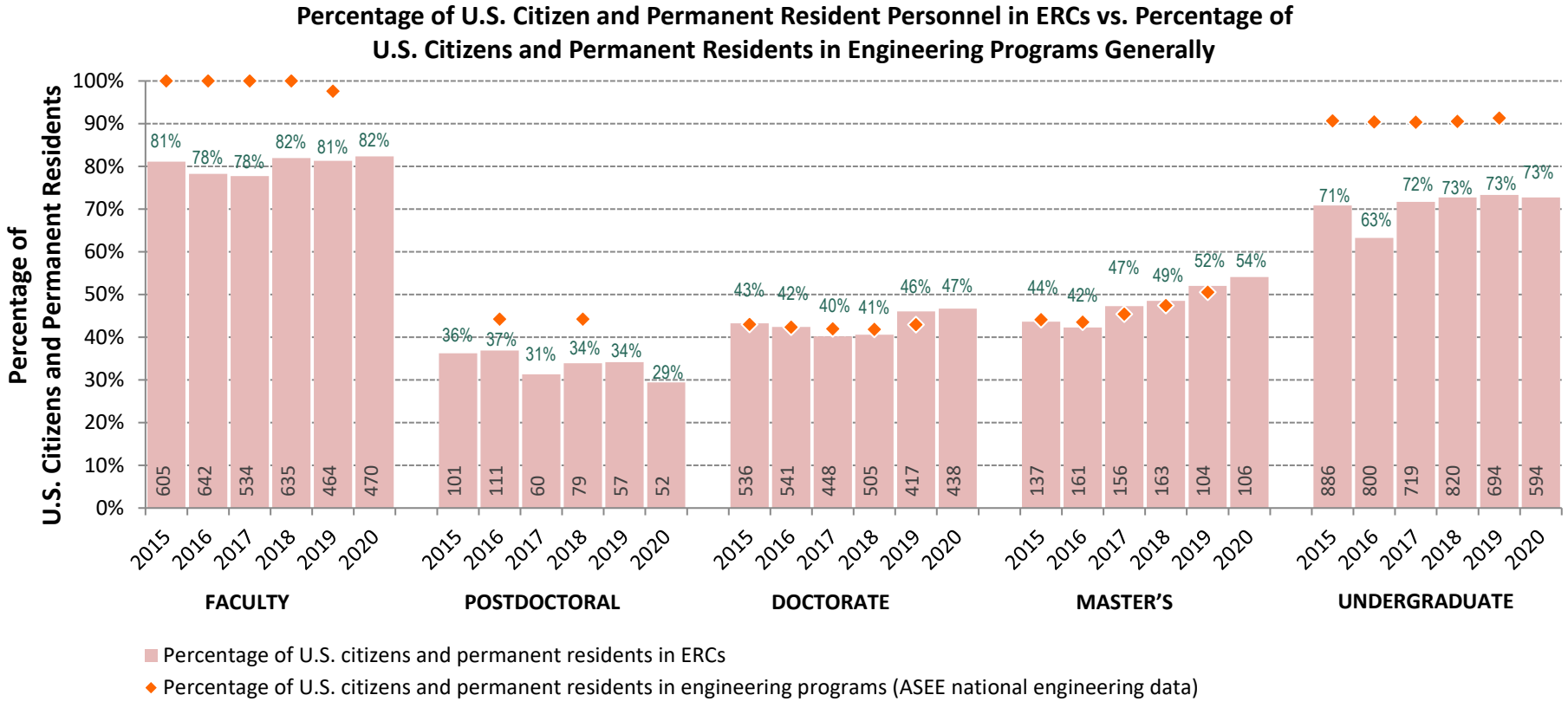
13 Persons With Disabilities in ERCs, FY 2015–2020



NOTES:

- *Data from centers are not included for years in which the center entered demographic data by institution rather than per person*
- *Undergraduates include REU students*
- *The percentages of persons with disabilities are calculated out of the total number of U.S. citizens and permanent residents, including personnel who did not report disability status*
- *The national percentages for persons with disabilities are for all persons, regardless of citizenship. The national percentages for doctoral students with disabilities and master's students with disabilities are from the national percentages for graduate students (master's and doctoral students combined)*
- *ASEE data are only available for faculty for 2017 and 2019 and for undergraduate for 2016*
- *The percentages of personnel who did not report disability status are as follows: 2015: 21.86%, 2016: 23.79%, 2017: 27.63%, 2018: 20.44%, 2019: 21.66%, 2020: 18.34%*

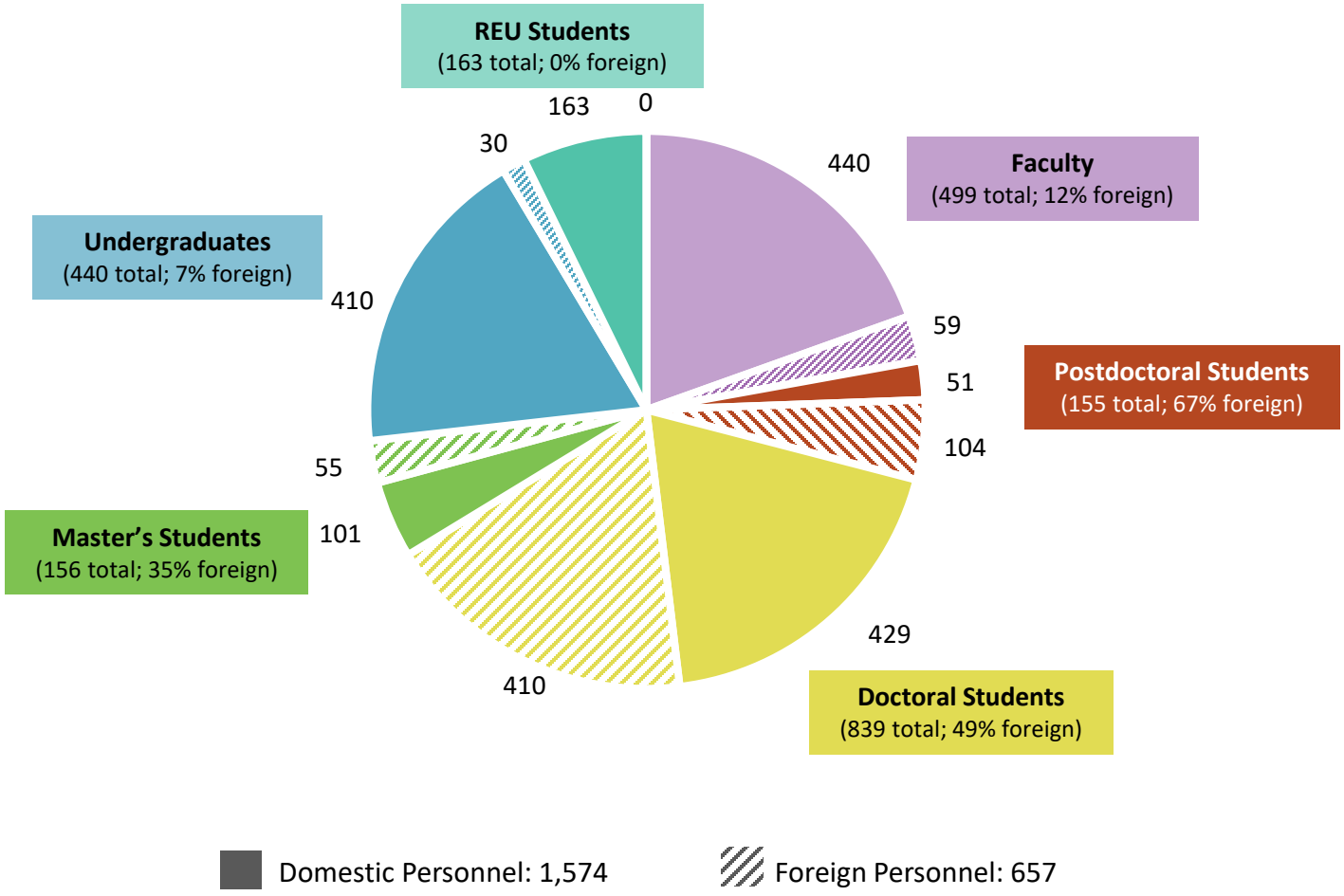
U.S. Citizens and Permanent Residents in ERCs, FY 2015–2020



NOTES:

- *Data from centers are not included for years in which the center entered demographic data by institution rather than per person*
- *Undergraduates include REU students*
- *The percentages of U.S. citizens and permanent residents are calculated out of the total number of personnel, including personnel who did not report citizenship*
- *ASEE data are not yet available for 2020 and were not collected for postdoctoral for 2015, 2017, and 2019*
- *The percentages of personnel who did not report citizenship are as follows: 2015: 13.49%, 2016: 18.42%, 2017: 14.07%, 2018: 13.09%, 2019: 12.73%, 2020: 12.64%*

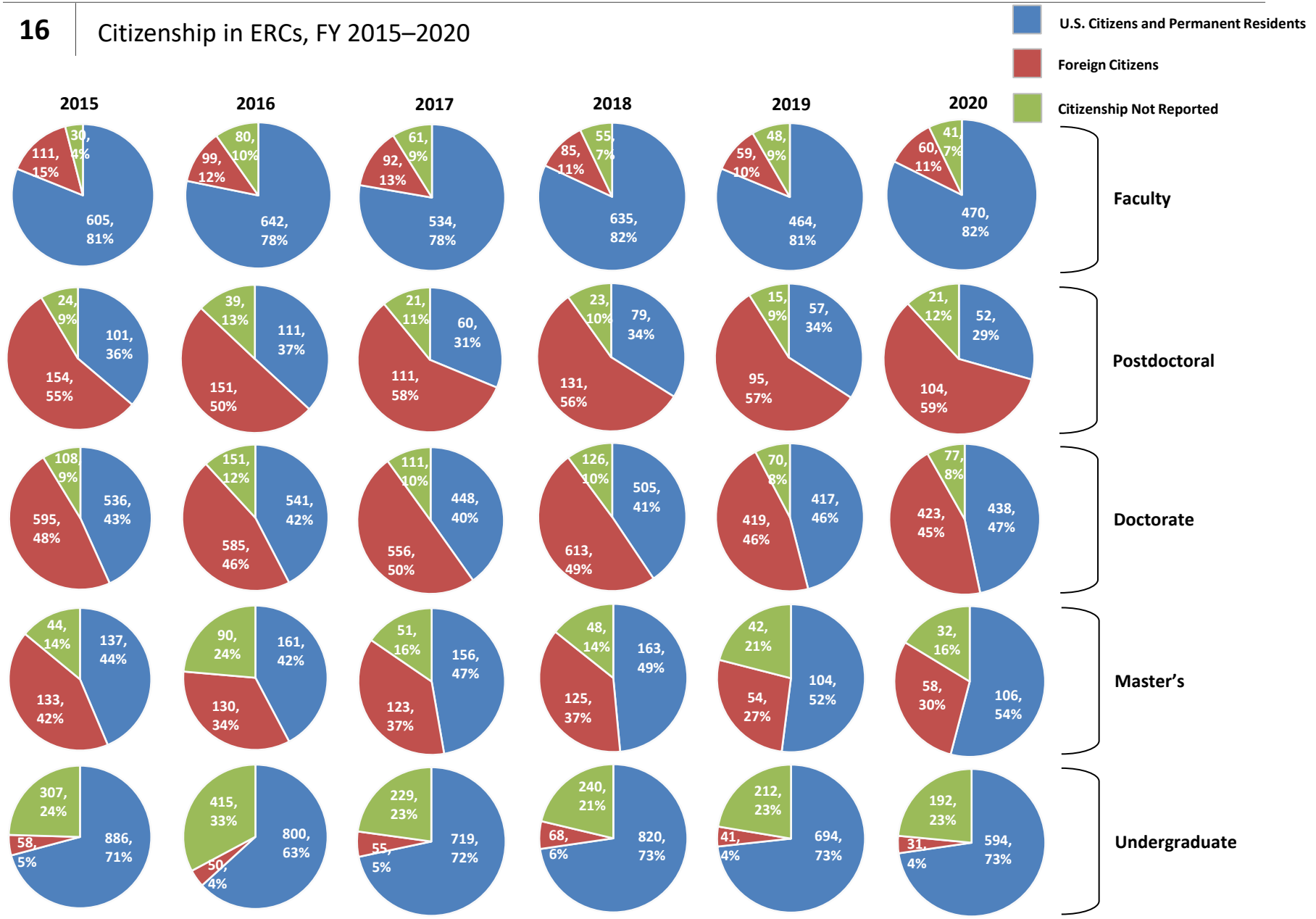
Personnel Conducting ERC Research, FY 2020



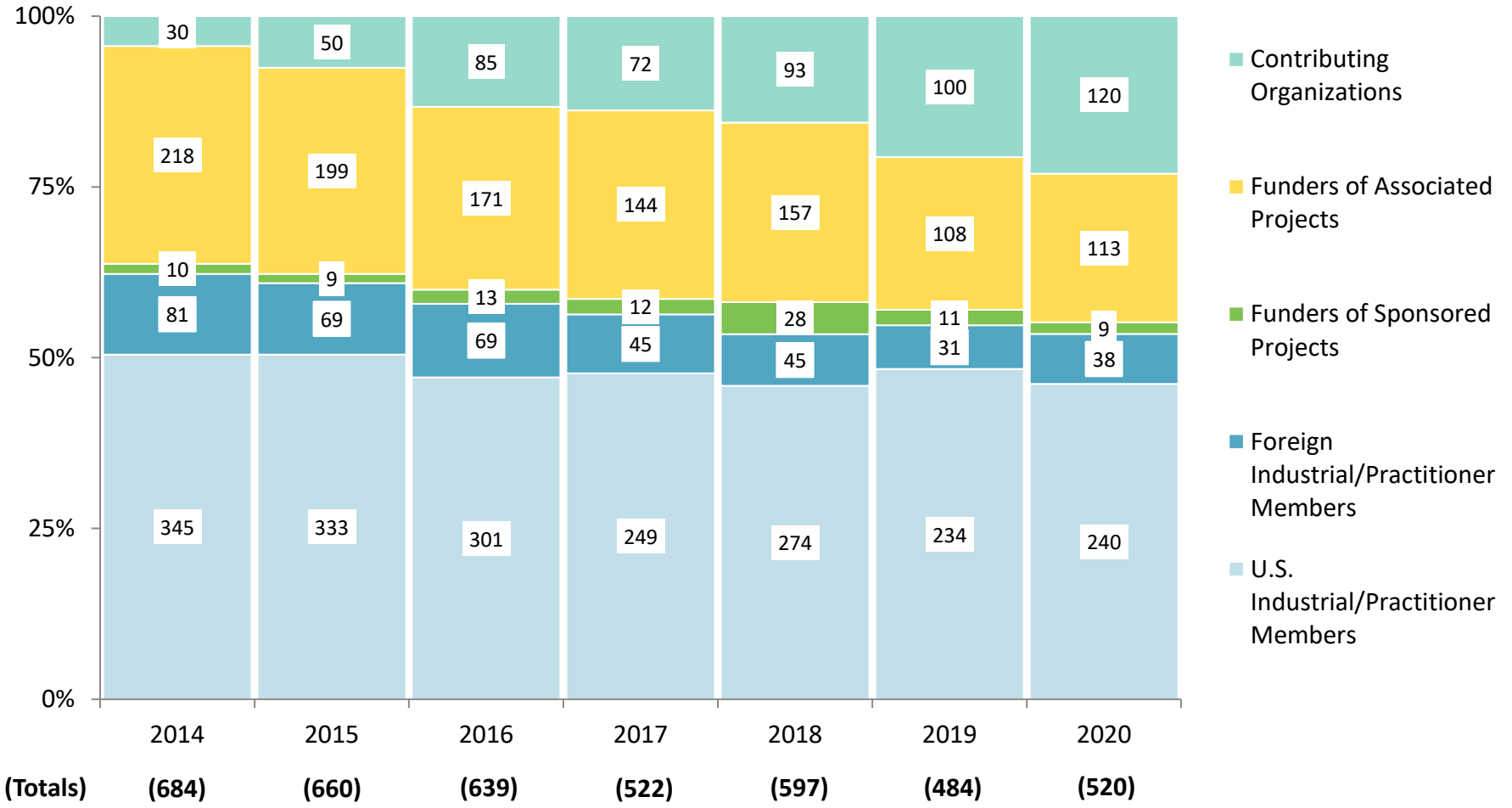
NOTES:

- *The sum of the number of personnel for each category may exceed the total number of personnel because personnel may belong to multiple categories*
- *Percentage of foreign personnel is calculated out of domestic and foreign personnel, excluding personnel who did not report citizenship*

Citizenship in ERCs, FY 2015–2020



ERC Industrial/Practitioner Members and Supporting Organizations, FY 2014–2020*



** Does not include centers from the Earthquake Technology Sector*

18 ERC Industrial/Practitioner Members and Supporting Organizations, FY 2014–2020*

	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Organization Type							
Contributing Organizations	30	50	85	72	93	100	120
Funders of Associated Projects	218	199	171	144	157	108	113
Funders of Sponsored Projects	10	9	13	12	28	11	9
Foreign Industrial/Practitioner Members	81	69	69	45	45	31	38
U.S. Industrial/Practitioner Members	345	333	301	249	274	234	240
Total Number of Organizations	***684***	***660***	***639***	***522***	***597***	***484***	***520***
Total Number of Centers	***20***	***17***	***19***	***16***	***19***	***19***	***15***
Average Number of Organizations per Center	***34***	***39***	***34***	***33***	***31***	***25***	***35***

** Does not include centers from the Earthquake Technology Sector*

Industrial/Practitioner Member Support by Year, FY 2014–2020*

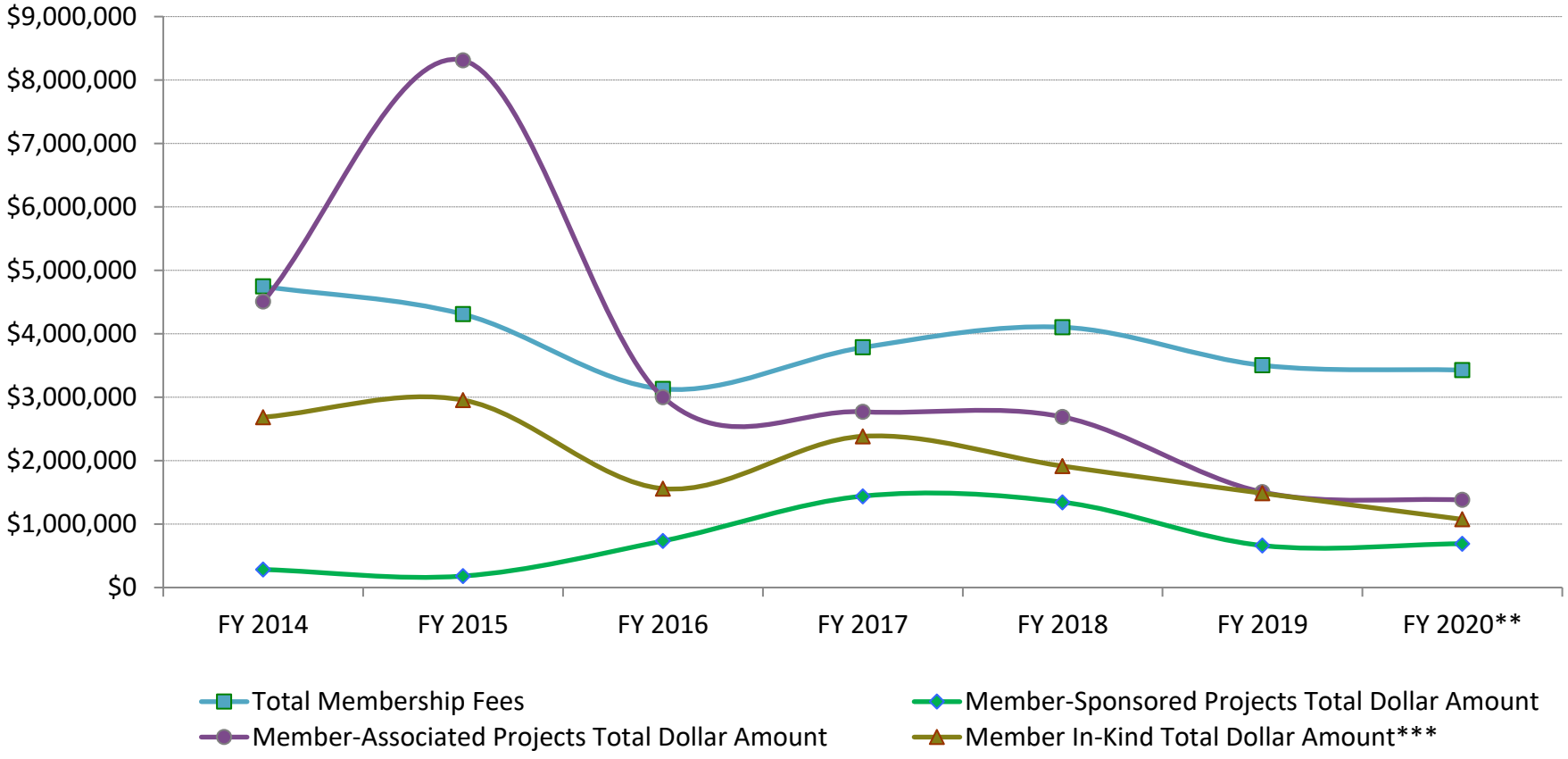
	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020**
Type of Support							
Total Membership Fees	$4,747,675	$4,309,666	$3,132,772	$3,786,620	$4,105,519	$3,505,352	$3,430,622
Member-Sponsored Projects Total Dollar Amount	$285,000	$182,000	$735,122	$1,440,493	$1,344,913	$662,354	$691,321
Member-Associated Projects Total Dollar Amount	$4,508,750	$8,308,585	$3,001,718	$2,772,841	$2,690,570	$1,506,932	$1,382,451
Member In-Kind Total Dollar Amount***	$2,685,819	$2,954,553	$1,560,677	$2,384,789	$1,914,975	$1,486,785	$1,076,199
Total Dollar Amount, Industrial/Practitioner Member Support to Center	***$12,227,244***	***$15,754,804***	***$8,430,289***	***$10,384,743***	***$10,055,977***	***$7,161,423***	***$6,580,593***

** Does not include centers from the Earthquake Technology Sector*

*** Support received by the end of the current reporting year. Includes data for centers that have entered partial data during a no-cost extension (NCE)*

**** Data for this row are from the In-Kind Support reported in the Organizations section.*

20 Industrial/Practitioner Member Support by Year, FY 2014–2020*

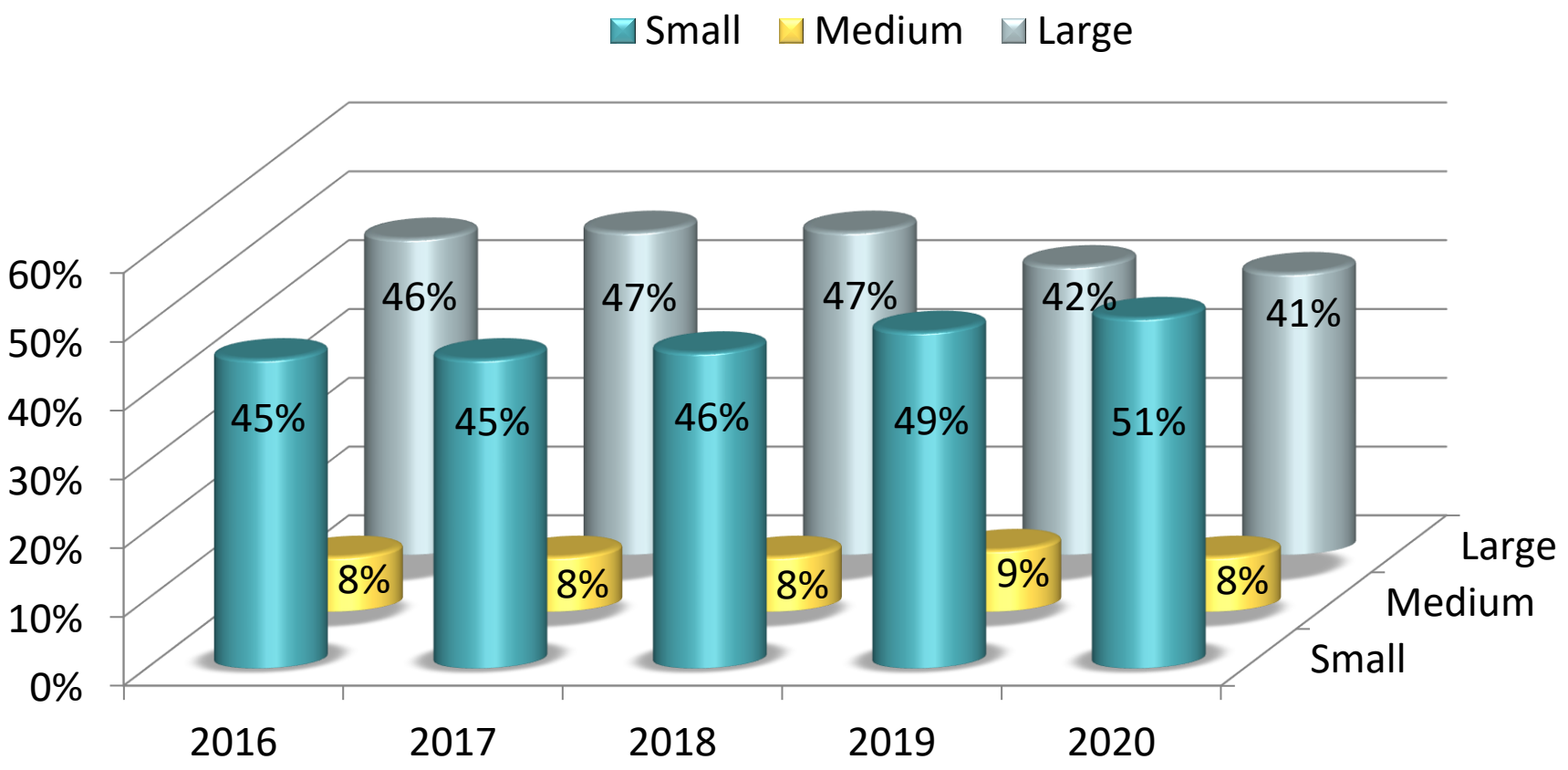


** Does not include centers from the Earthquake Technology Sector*

*** Support received by the end of the current reporting year. Includes data for centers that have entered partial data during a no-cost extension (NCE)*

**** Data for this line are from the In-Kind Support reported in the Organizations section.*

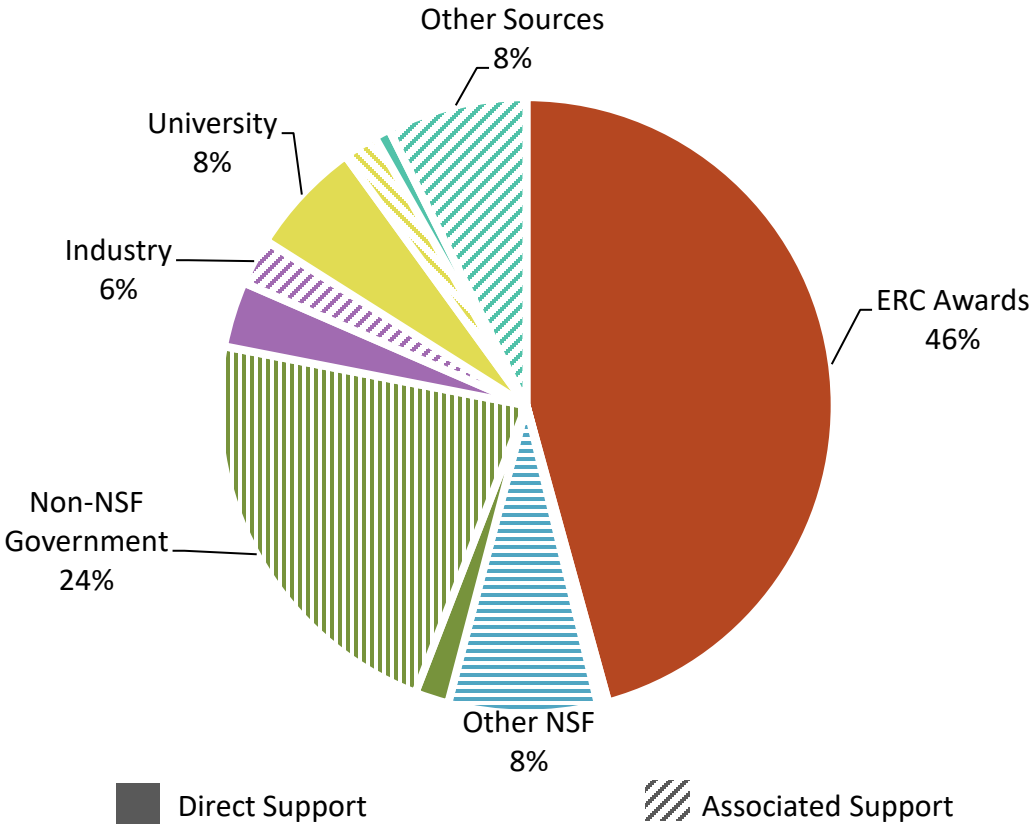
Distribution of Industrial/Practitioner Members by Industry Size, FY 2016–2020



NOTES:

- *The total number of firms is as follows: 2016: 322, 2017: 249, 2018: 276, 2019: 222, 2020: 239*
- *Industry sizes are as follows: Small = <500 employees, Medium = 500–1,000 employees, Large = >1,000 employees*

Total ERC New Cash Support, FY 2020 (15 ERCs)

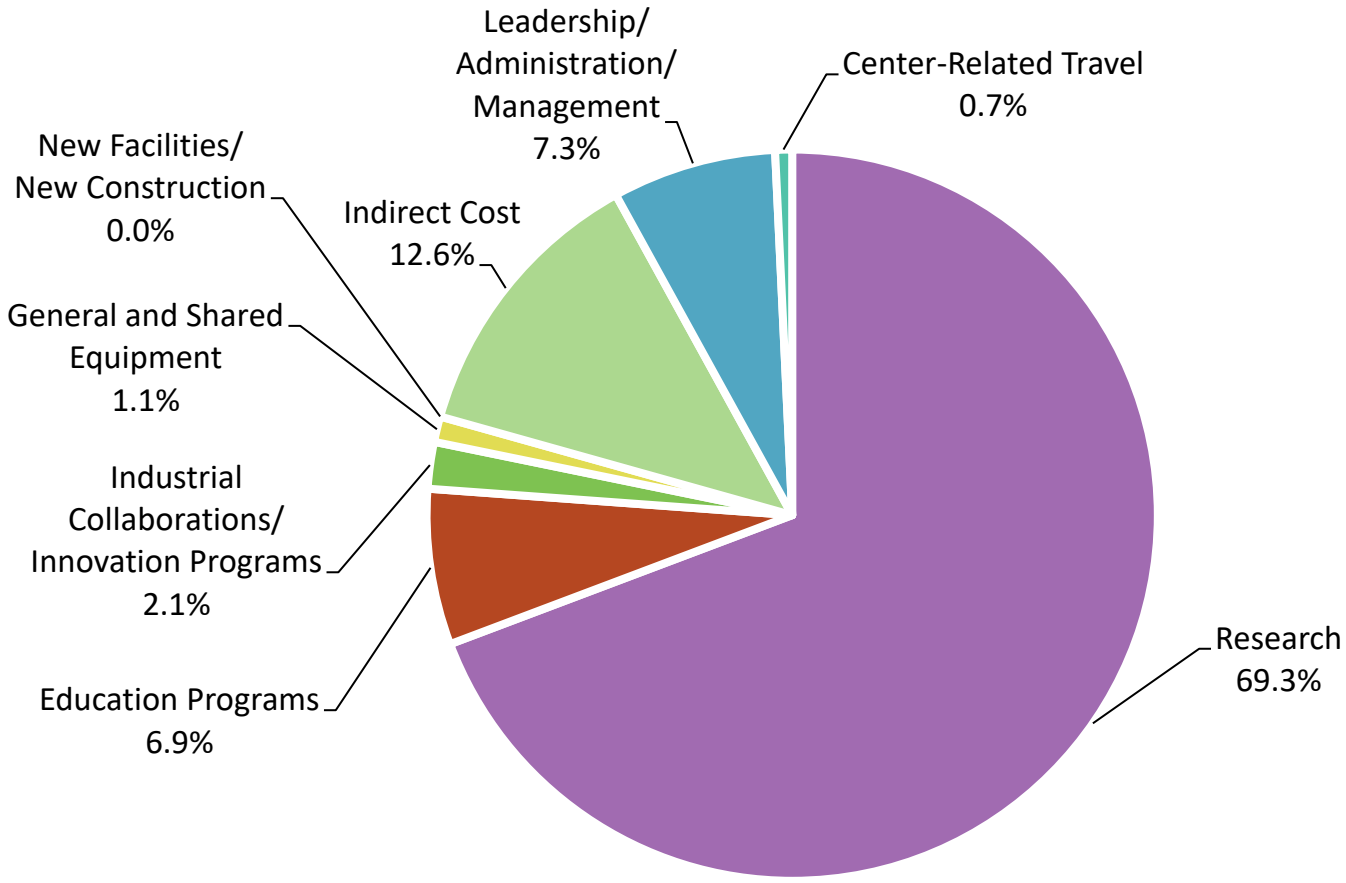


Total value of support: $117 million

NOTES:

- *Percentages shown are Direct Support and Associated Support combined*
- *Non-NSF Government includes U.S. Government (Not NSF), State Government, Local Government, Foreign Government, and Quasi-government Research Organizations*
- *Other Sources include Medical Facilities, Nonprofit Organizations, Private Foundations, Venture Capitalists and Other Sources*

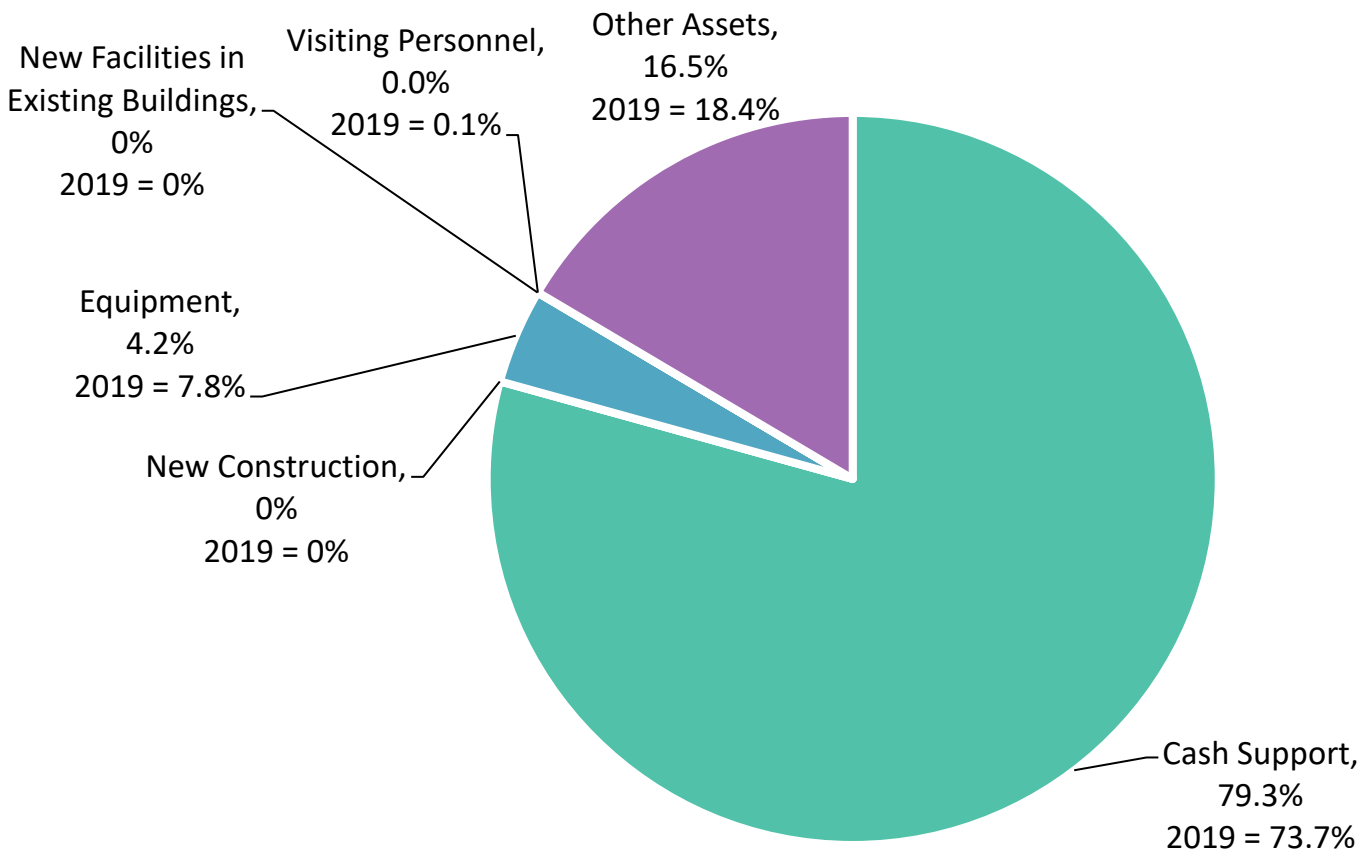
Functional Budgets of ERCs in the Aggregate, FY 2020*



Direct Support total: $123,196,745

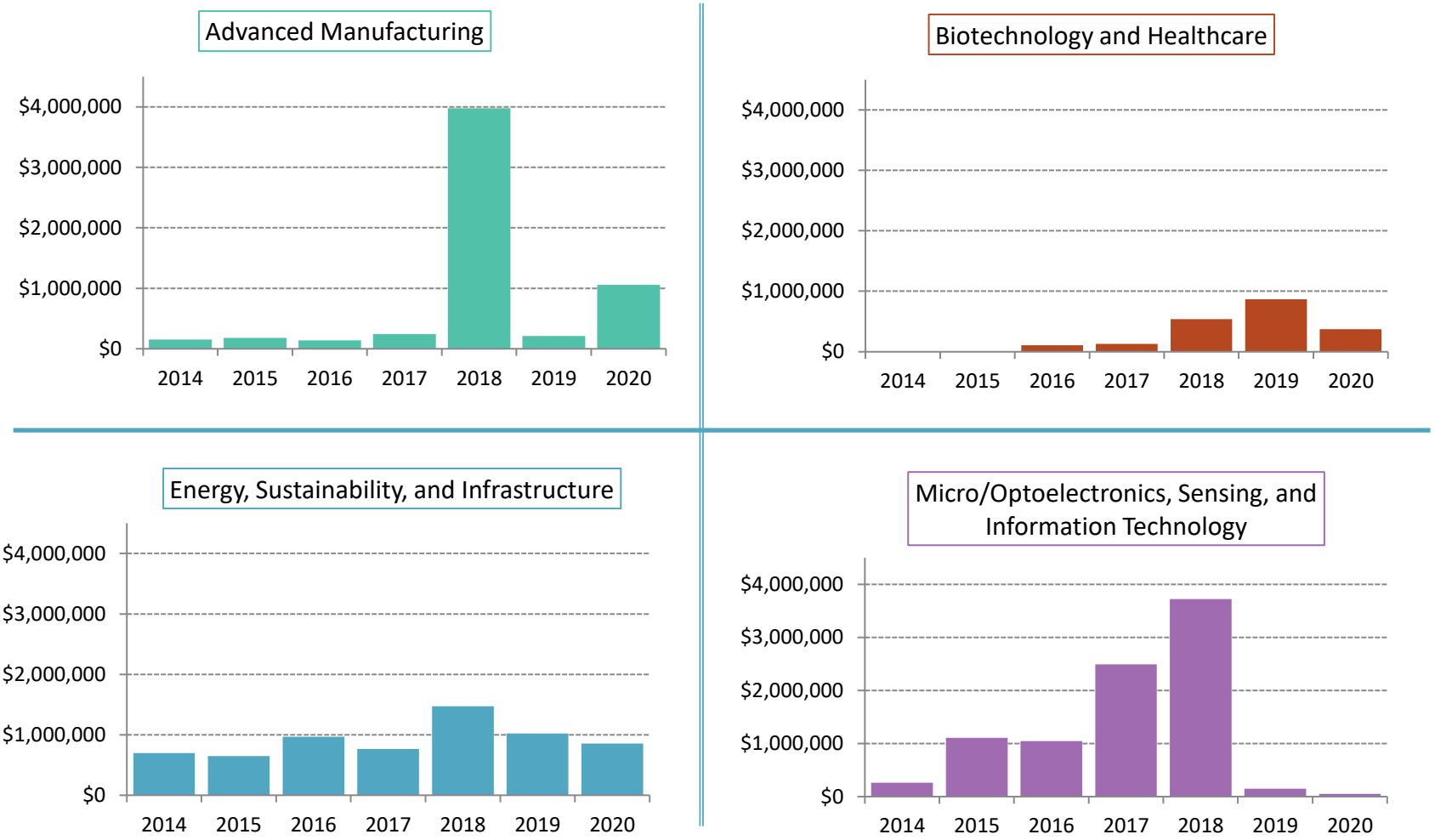
** Includes in-kind support but not residuals*

Industrial/Practitioner New Support to 15 ERCs, FY 2020



Total value of support: $5.1 million

Non-NSF Government Support by ERC Technology Sector, FY 2014–2020*,**,***

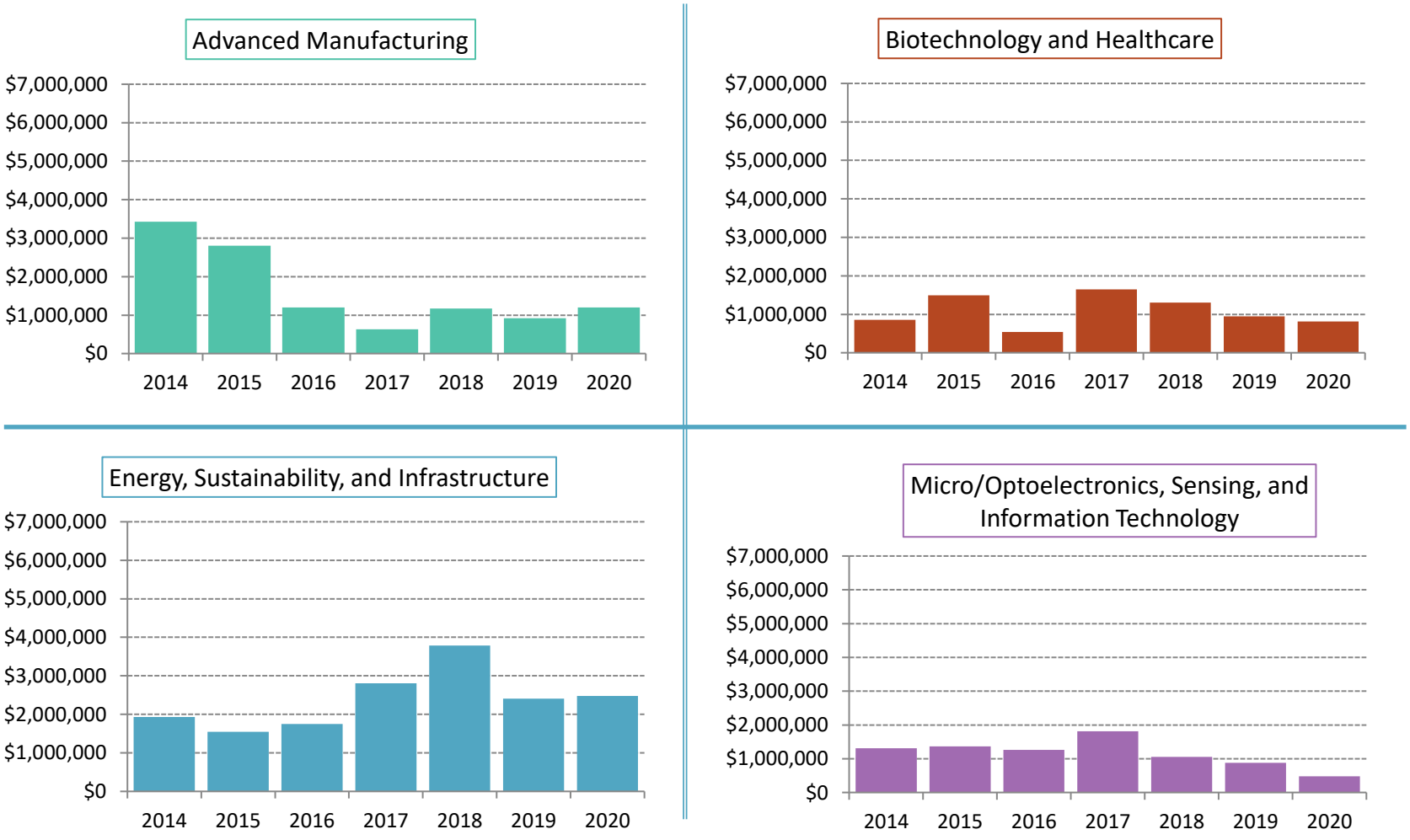


** Does not include centers from the Earthquake Technology Sector*

*** Support includes Unrestricted Cash, Restricted Cash, and In-Kind Support*

**** Includes data for centers that have entered partial data during a no-cost extension (NCE)*

Industry Support by ERC Technology Sector, FY 2014–2020 *,**,***

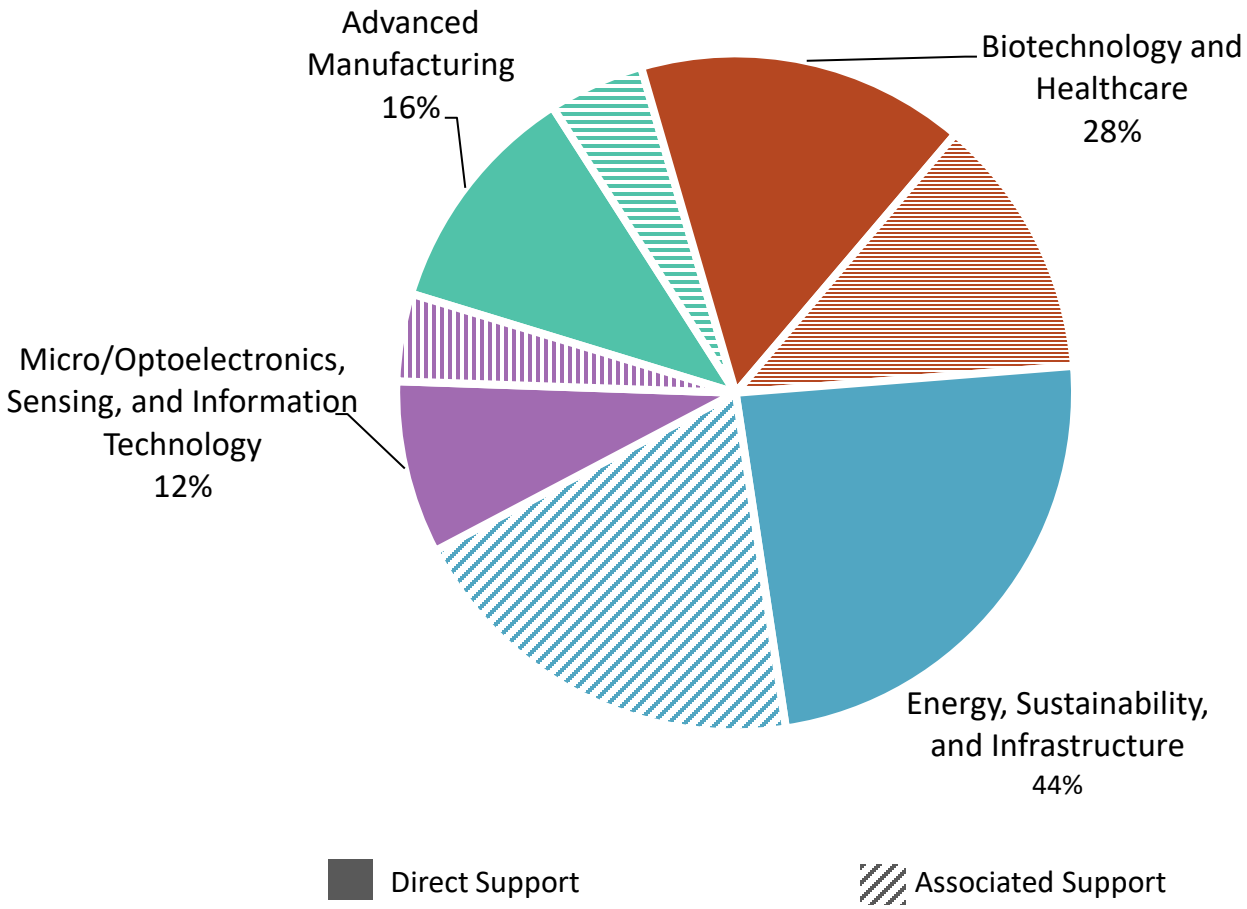


** Does not include centers from the Earthquake Technology Sector*

*** Support includes Unrestricted Cash, Restricted Cash, and In-Kind Support*

**** Includes data for centers that have entered partial data during a no-cost extension (NCE)*

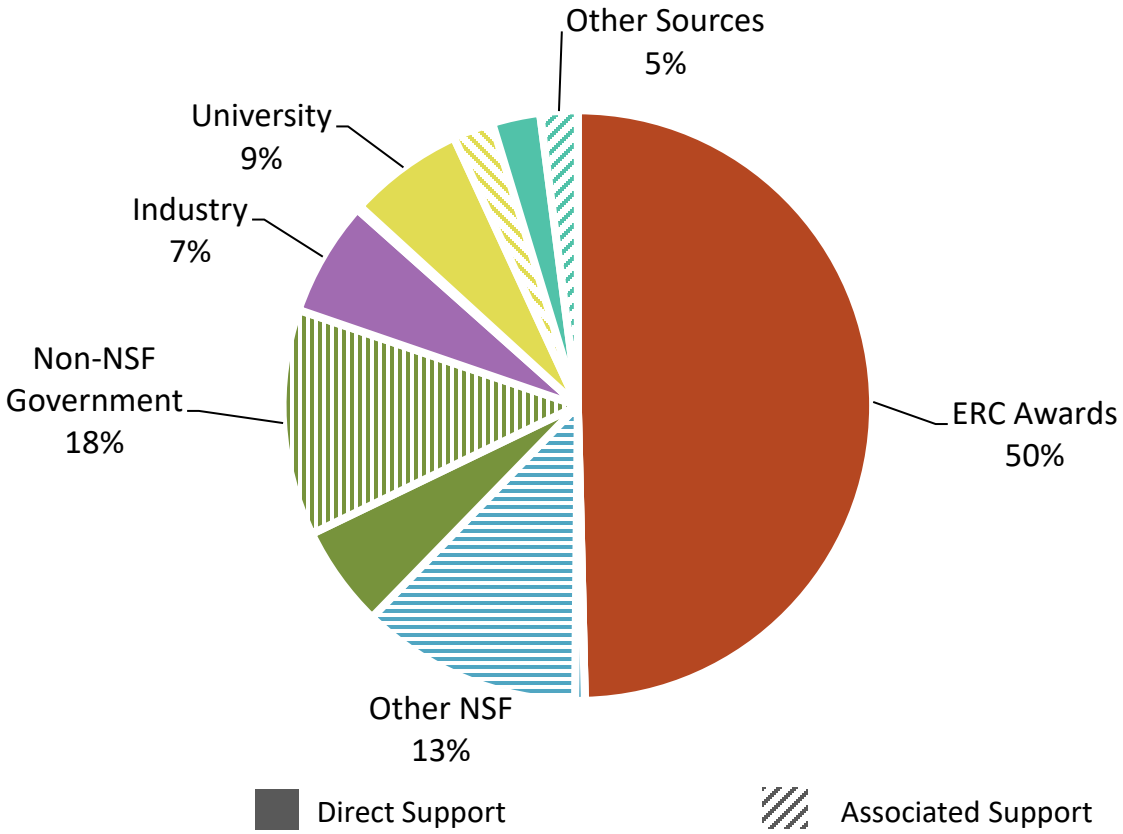
FY 2020 Sources of Support to 15 ERCs, by Technology Sector



Total value of support: $120 million

NOTE: *Sources of Support include Unrestricted Cash, Restricted Cash, In-Kind, and Associated Projects. Residuals are not included*

FY 2020 Support to ERCs in Advanced Manufacturing Sector: 2 Centers (NASCENT, CMaT)

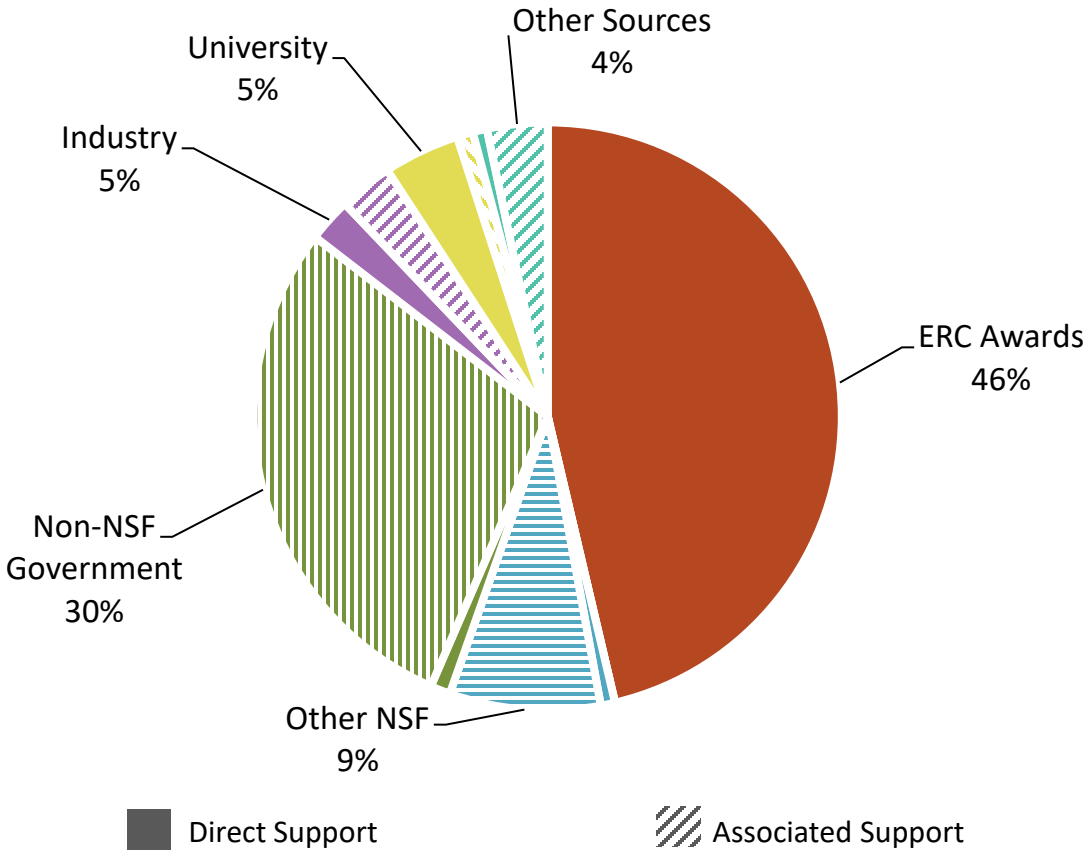


Total value of support: $18.9 million

NOTES:

- *Sources of Support include Unrestricted Cash, Restricted Cash, In-Kind, and Associated Projects. Residuals are not included*
- *Non-NSF Government includes U.S. Government (not NSF), State government, local government, foreign government, and quasi-government research organizations*
- *Other Sources includes medical facilities, nonprofit organizations, private foundations, venture capitalists, and other sources*

29 FY 2020 Support to ERCs in Biotechnology and Healthcare Sector: 5 Centers (ASSIST, CELL-MET, NCAT, PATHS-UP, CNT)

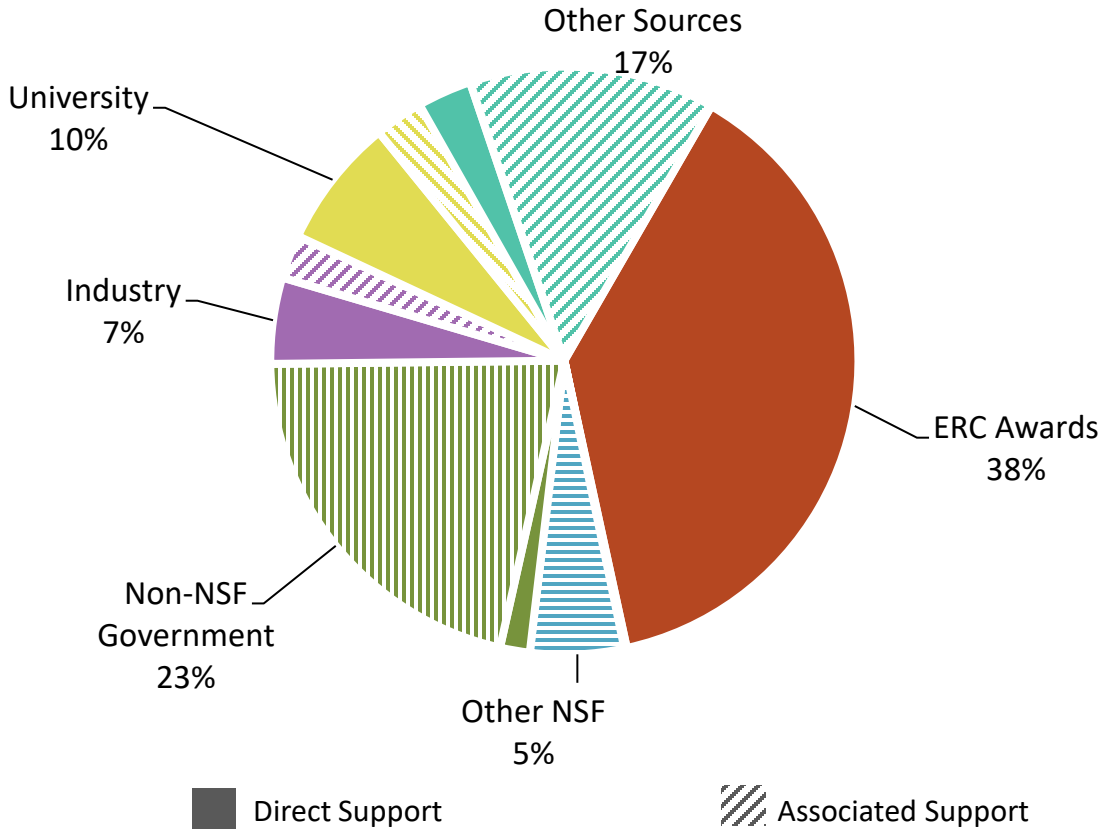


Total value of support: $33.9 million

NOTES:

- *Sources of Support include Unrestricted Cash, Restricted Cash, In-Kind, and Associated Projects. Residuals are not included*
- *Non-NSF Government includes U.S. Government (not NSF), State government, local government, foreign government, and quasi-government research organizations*
- *Other Sources includes medical facilities, nonprofit organizations, private foundations, venture capitalists, and other sources*

30 FY 2020 Support to ERCs in Energy, Sustainability, and Infrastructure Sector: 6 Centers (CBBG, CISTAR, NEWT, QESST, ReNUWIt, CURENT)

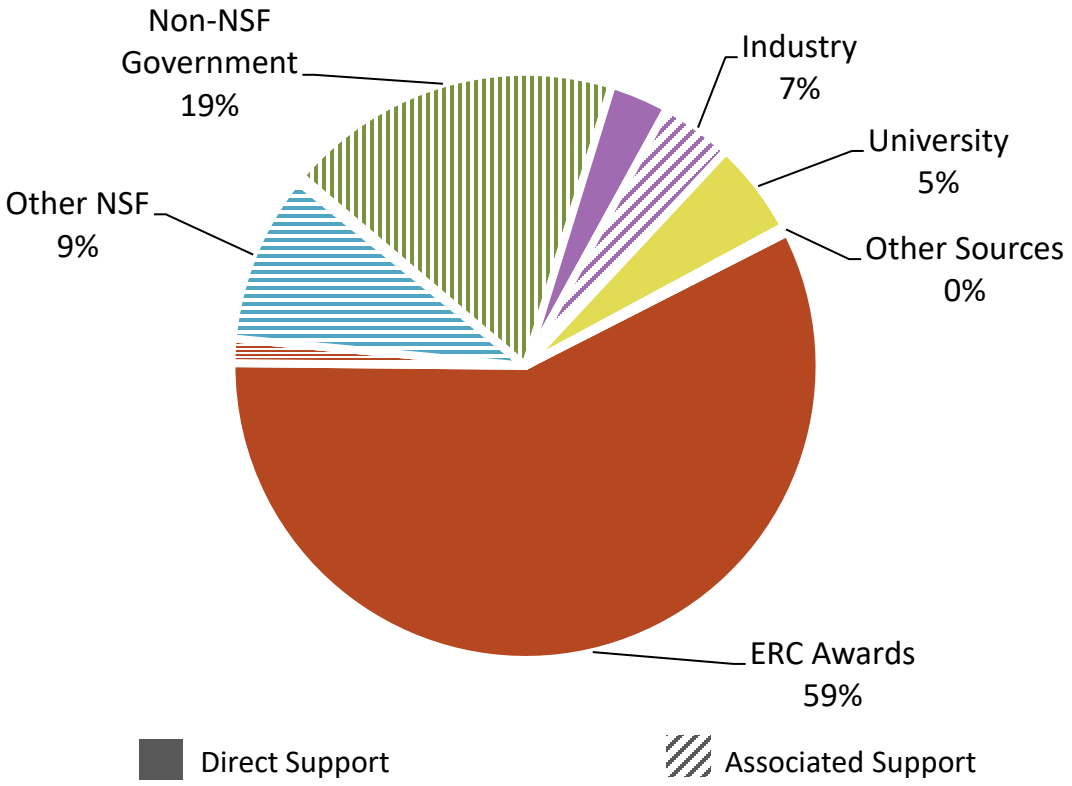


Total value of support: $52.3 million

NOTES:

- *Sources of Support include Unrestricted Cash, Restricted Cash, In-Kind, and Associated Projects. Residuals are not included*
- *Non-NSF Government includes U.S. Government (not NSF), State government, local government, foreign government, and quasi-government research organizations*
- *Other Sources includes medical facilities, nonprofit organizations, private foundations, venture capitalists, and other sources*

31 FY 2020 Support to ERCs in Micro/Optoelectronics, Sensing, and Information Technology Sector: 2 Centers (POETS, TANMS)

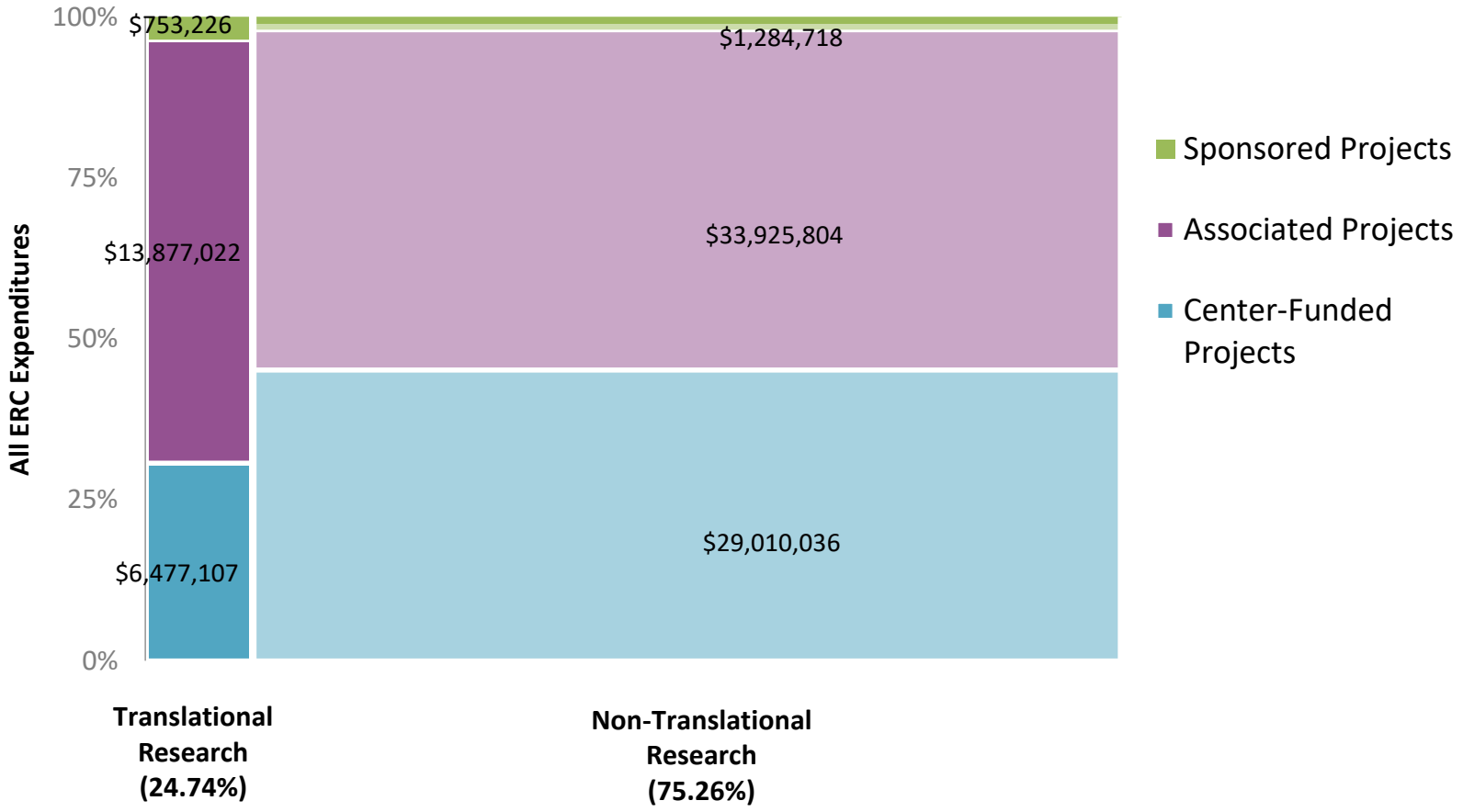


Total value of support: $14.9 million

NOTES:

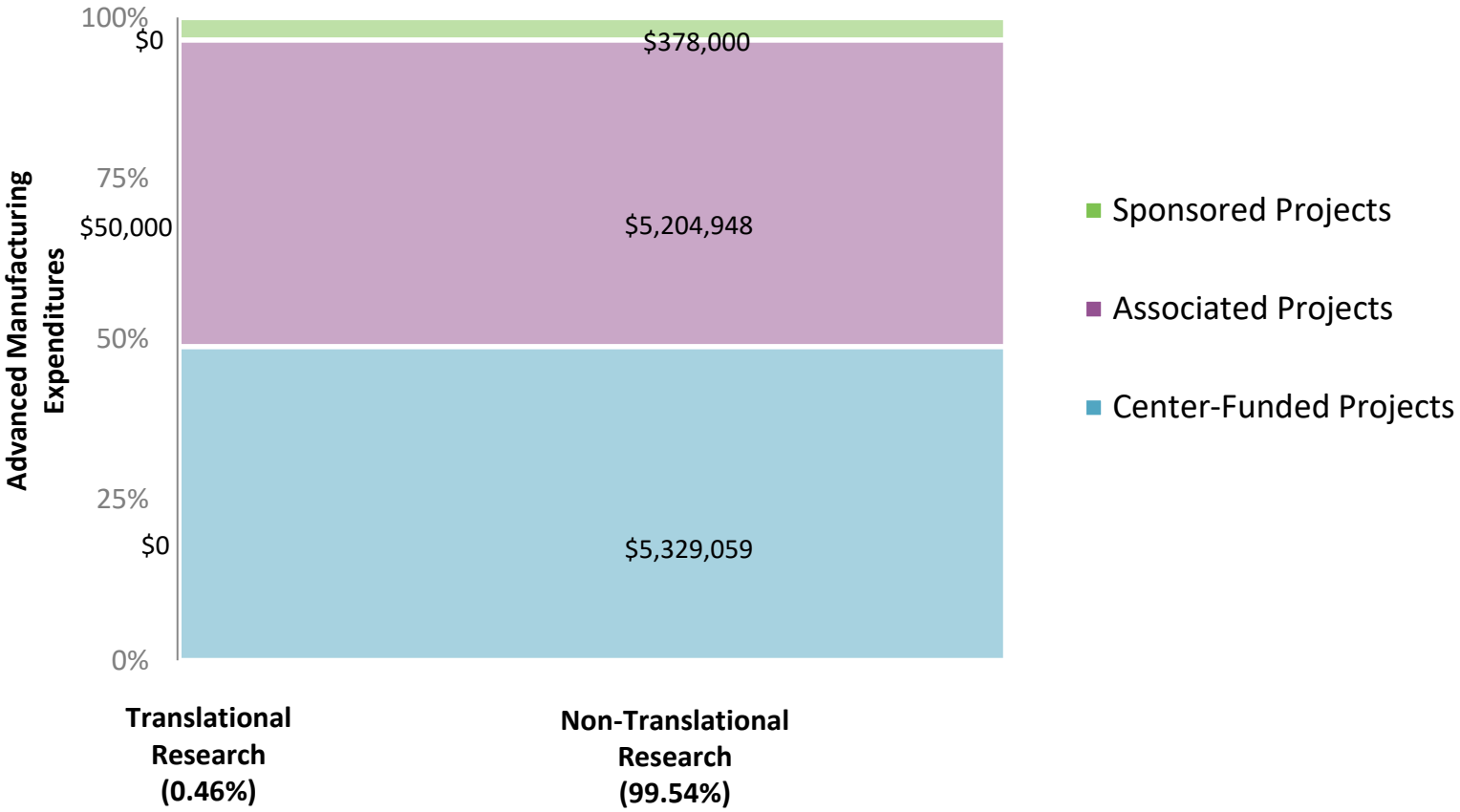
- *Sources of Support include Unrestricted Cash, Restricted Cash, In-Kind, and Associated Projects. Residuals are not included*
- *Non-NSF Government includes U.S. Government (not NSF), State government, local government, foreign government, and quasi-government research organizations*
- *Other Sources includes medical facilities, nonprofit organizations, private foundations, venture capitalists, and other sources*

FY 2020 Expenditures by Type of Research: All ERCs



Total value of support: $85 million

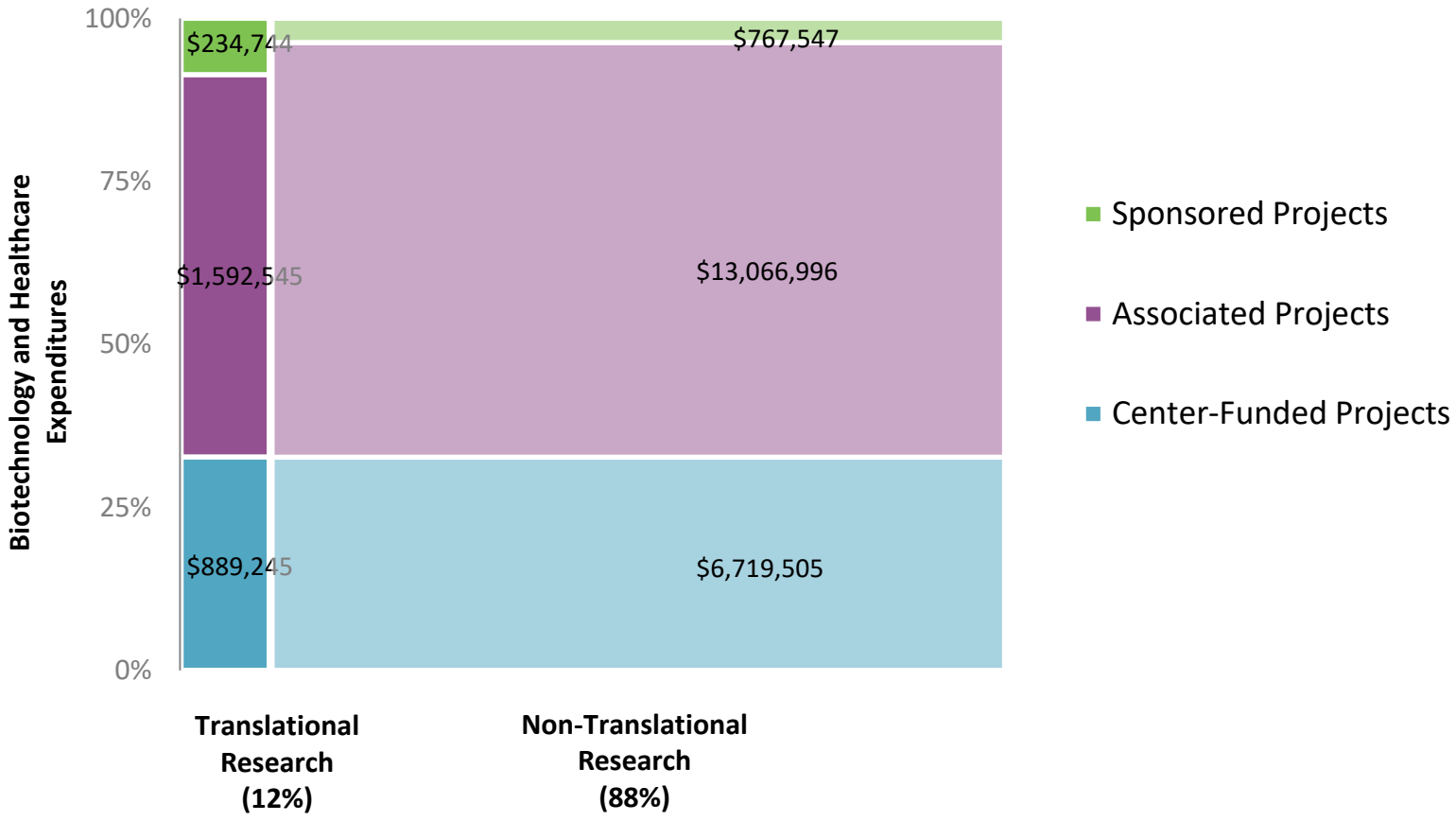
FY 2020 Expenditures by Type of Research: Advanced Manufacturing



Total value of support: $11 million

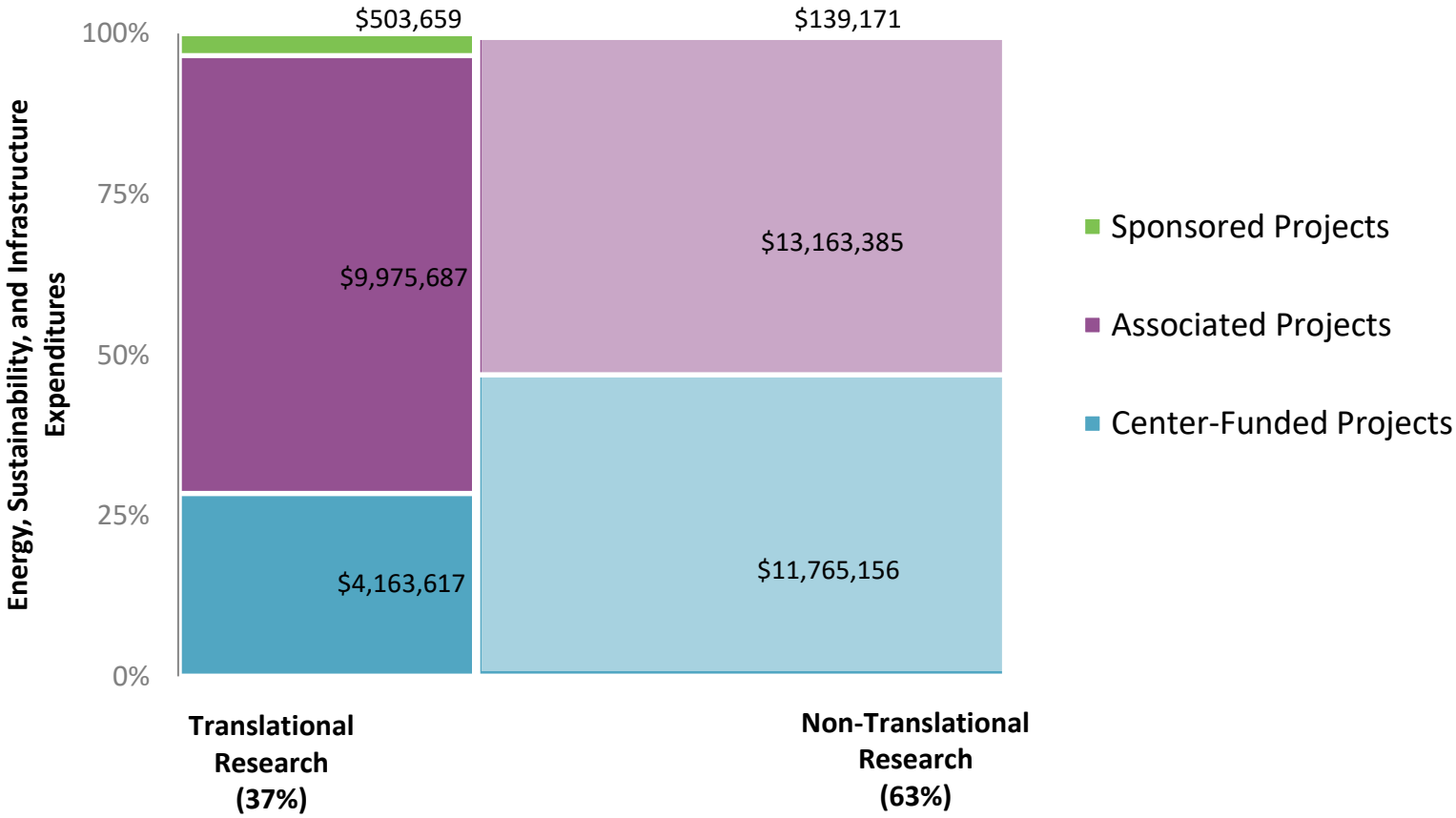
- *$0 and $50,000 corresponds to Translational Research. Area is not visible due to the small relative size*

FY 2020 Expenditures by Type of Research: Biotechnology and Healthcare



Total value of support: $23 million

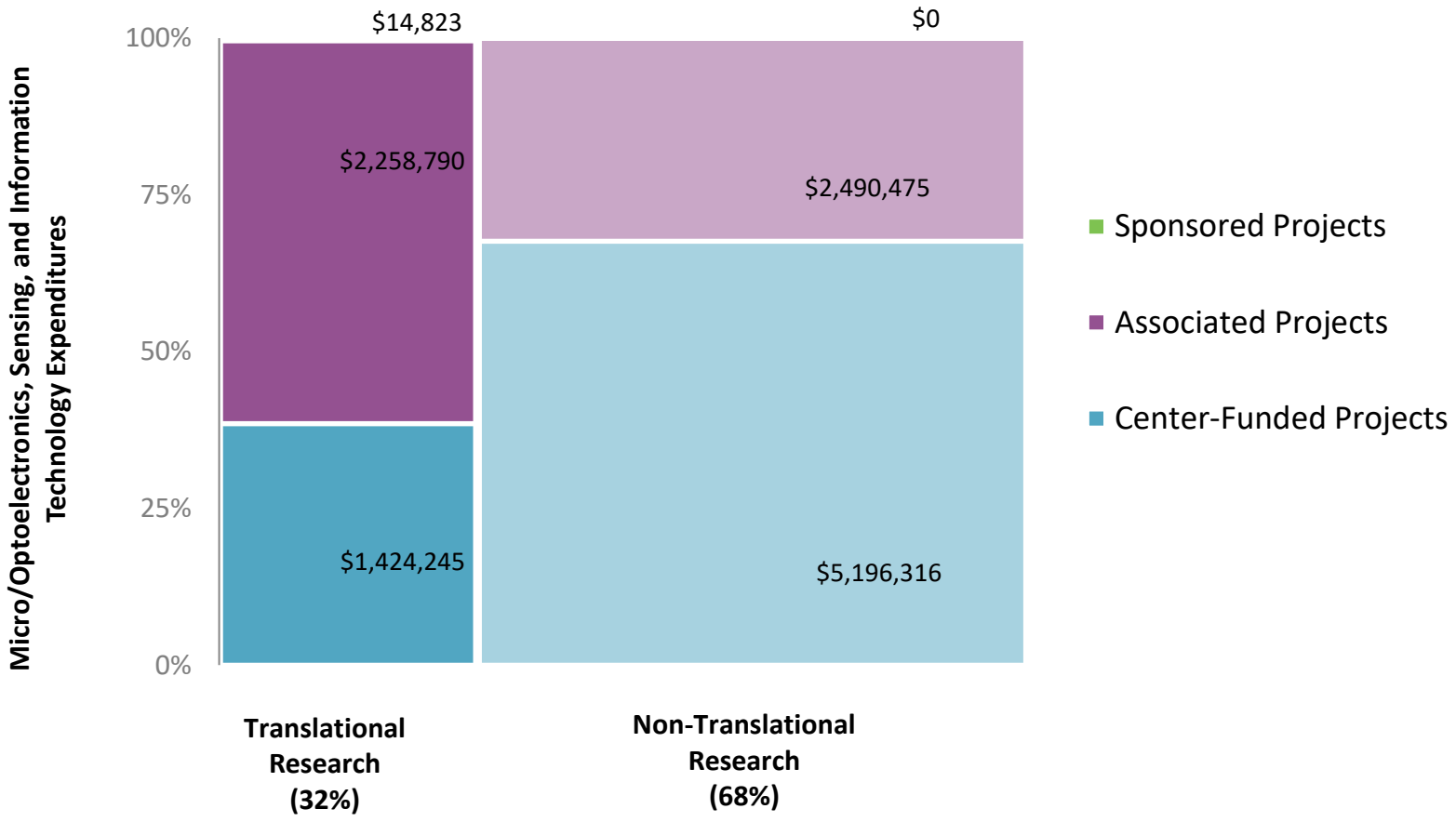
FY 2020 Expenditures by Type of Research: Energy, Sustainability, and Infrastructure



Total value of support: $40 million

- *$139,171 corresponds to Sponsored Projects expenditures for Non-Translational Research. Area is not visible due to the small relative size.*

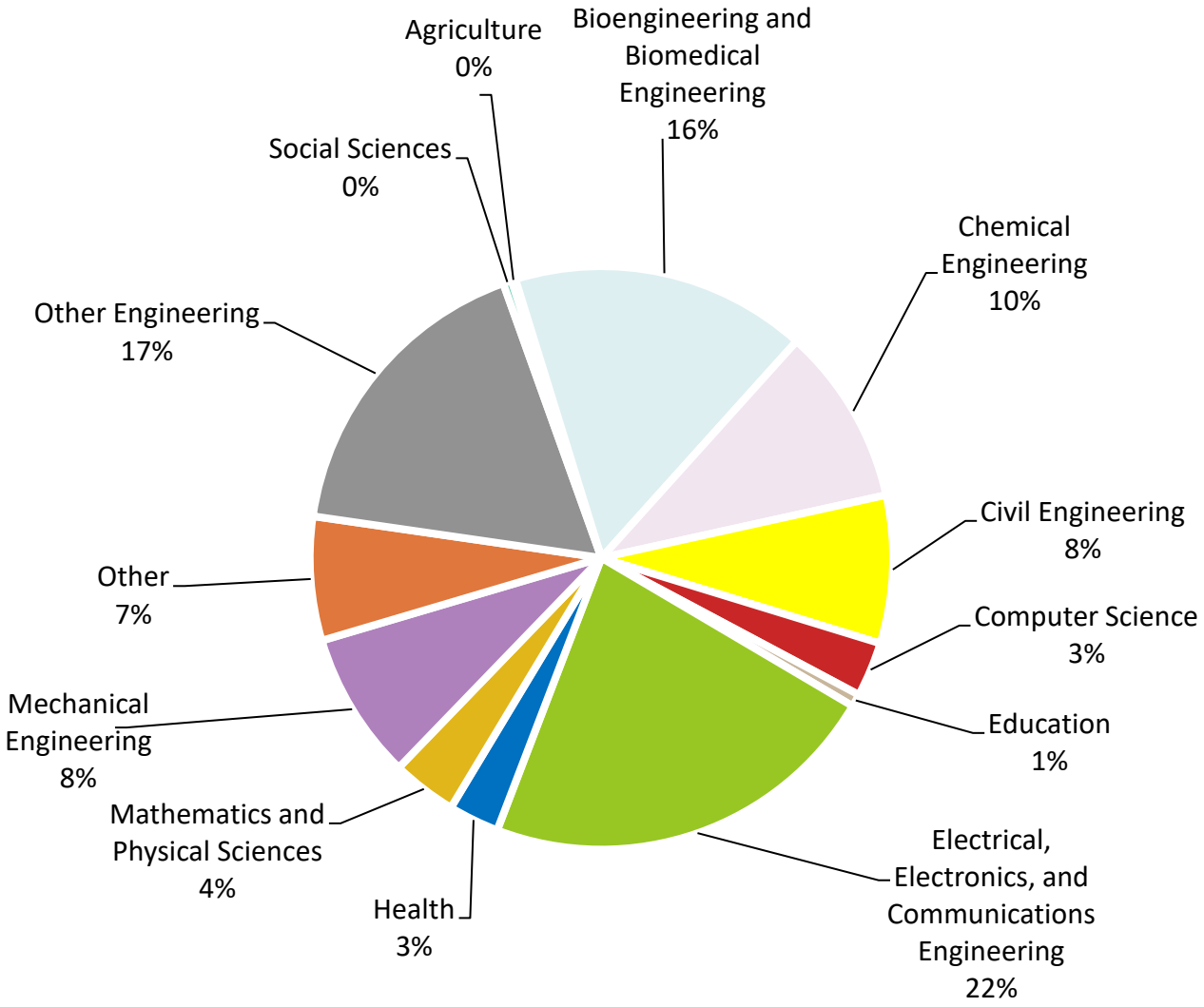
FY 2020 Expenditures by Type of Research: Micro/Optoelectronics, Sensing, and Information Technology



Total value of support: $11 million

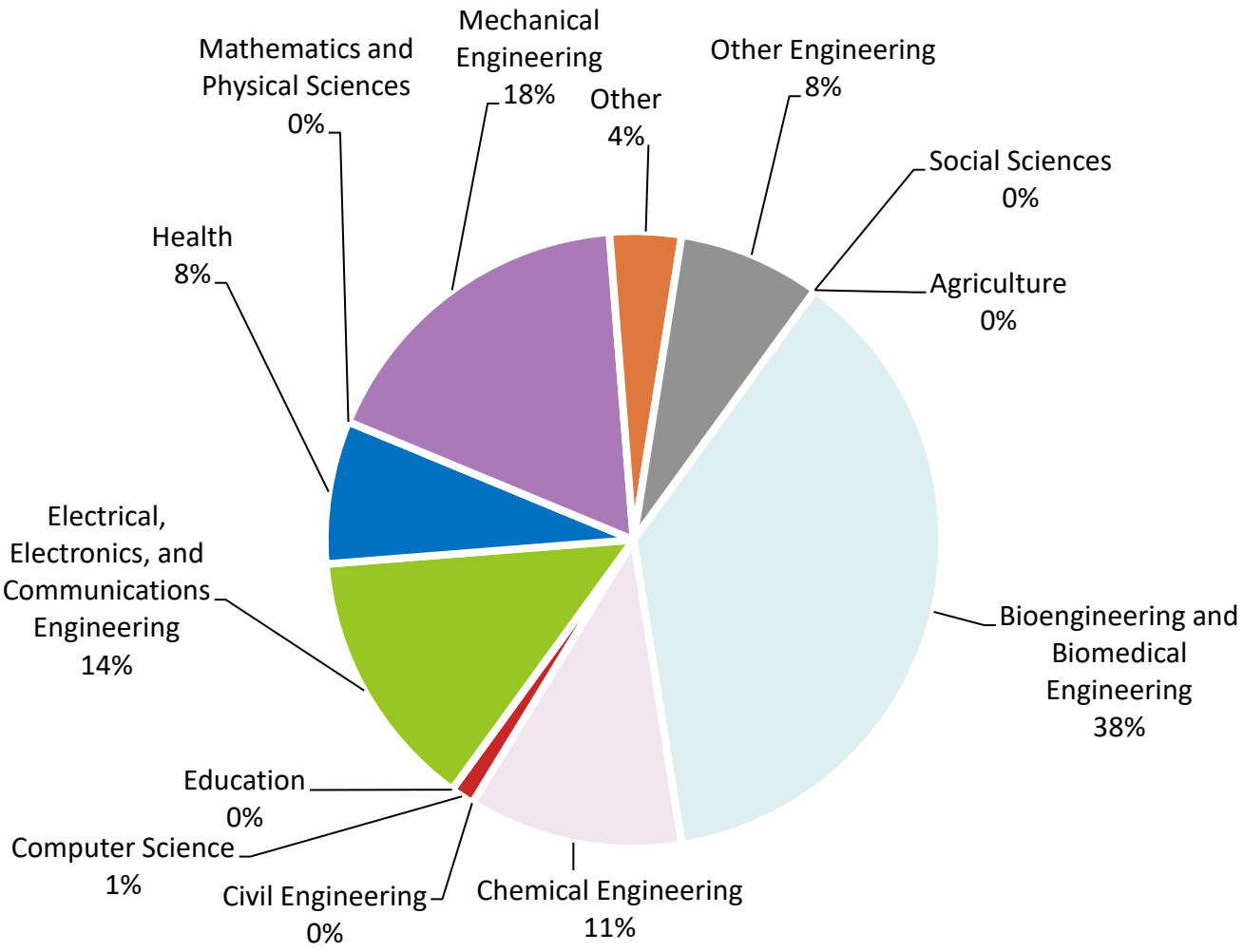
- *$14,823 and $0 corresponds to corresponds to Sponsored Projects expenditures for Translational Research and Non-Translational Research. Area is not visible due to the small relative size.*

All ERC Disciplines, FY 2020



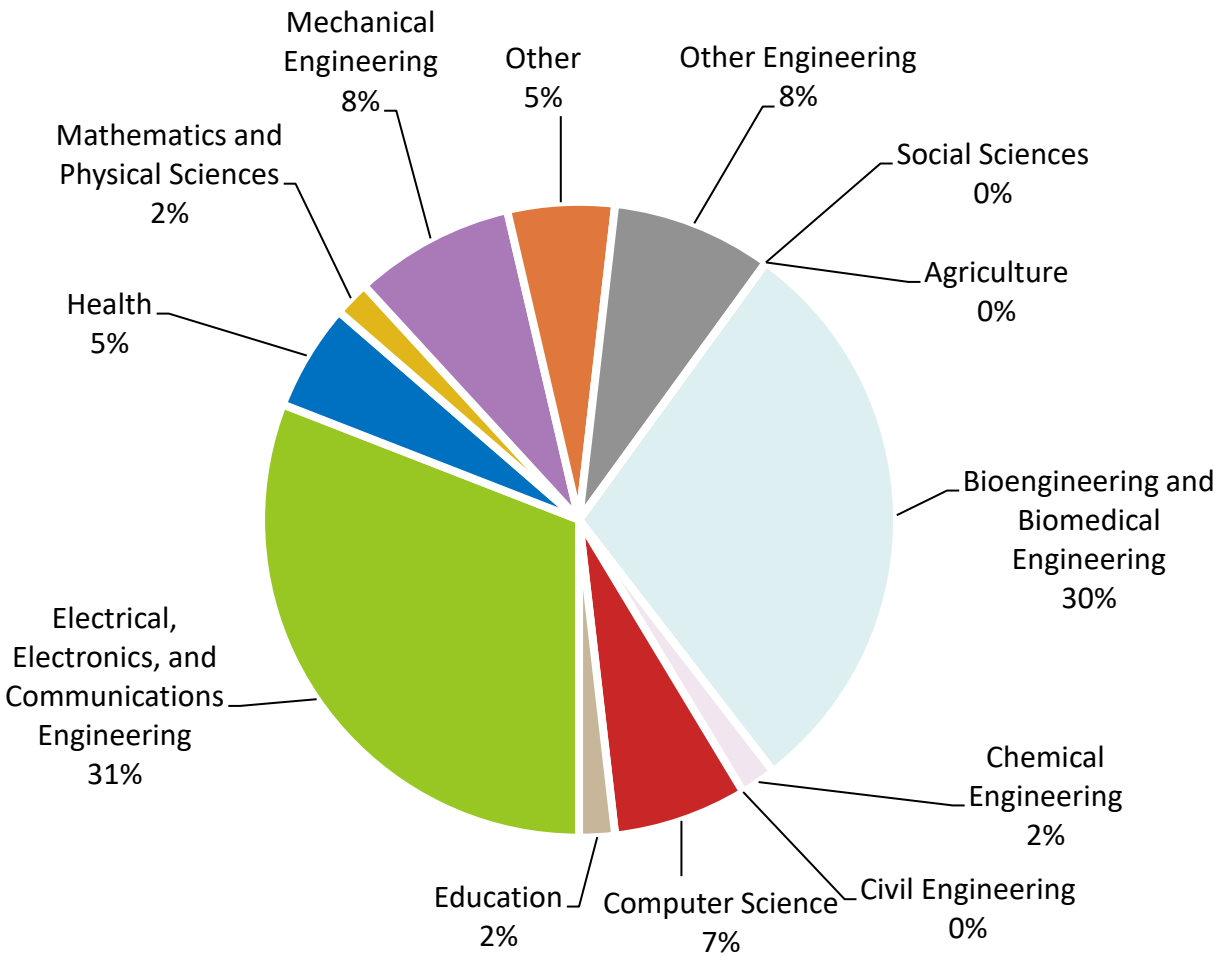
Total number of Project Investigators (PIs): 427

Disciplines by Technology Sector: Advanced Manufacturing, FY 2020



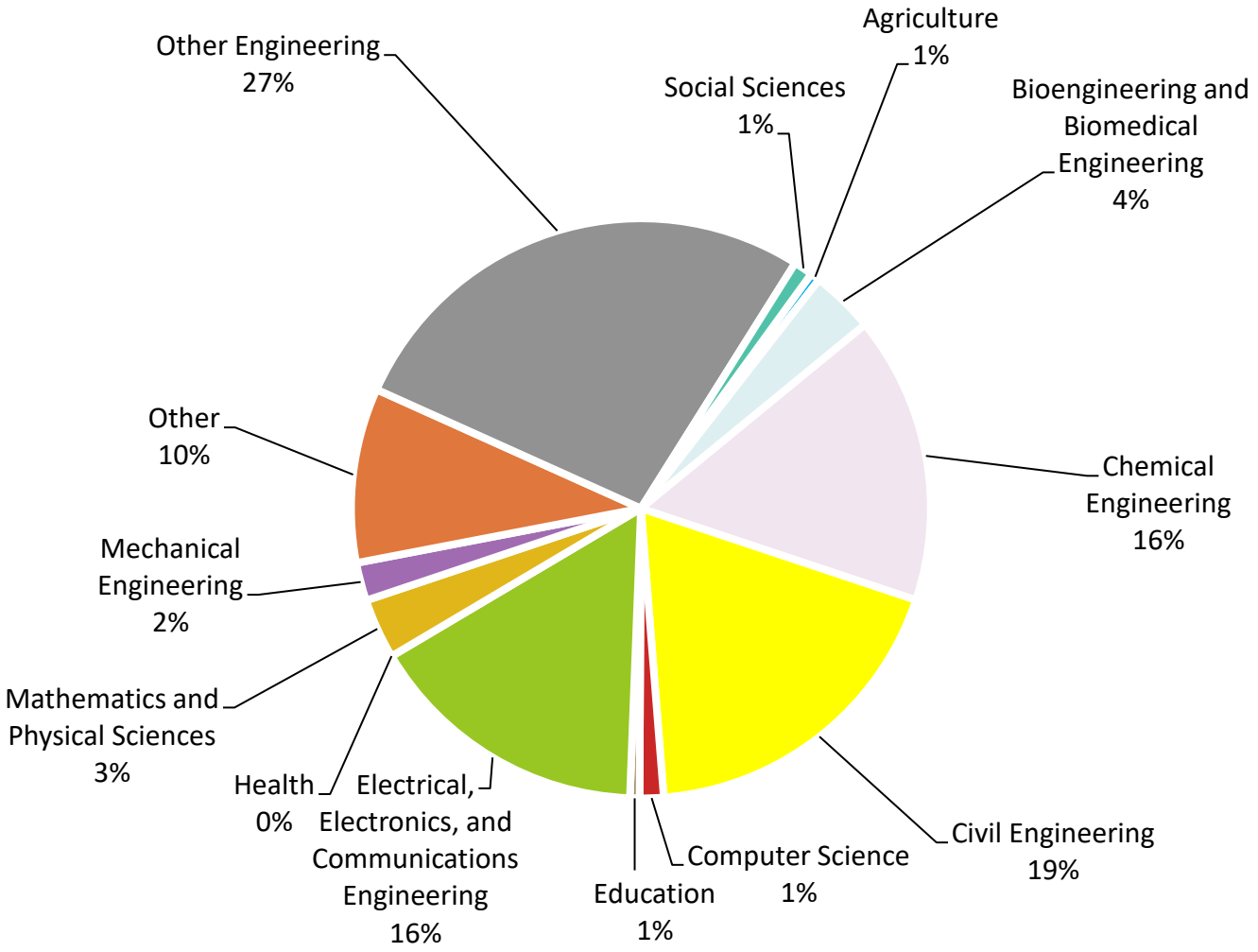
Total number of Project Investigators (PIs): 80

Disciplines by Technology Sector: Biotechnology and Healthcare, FY 2020



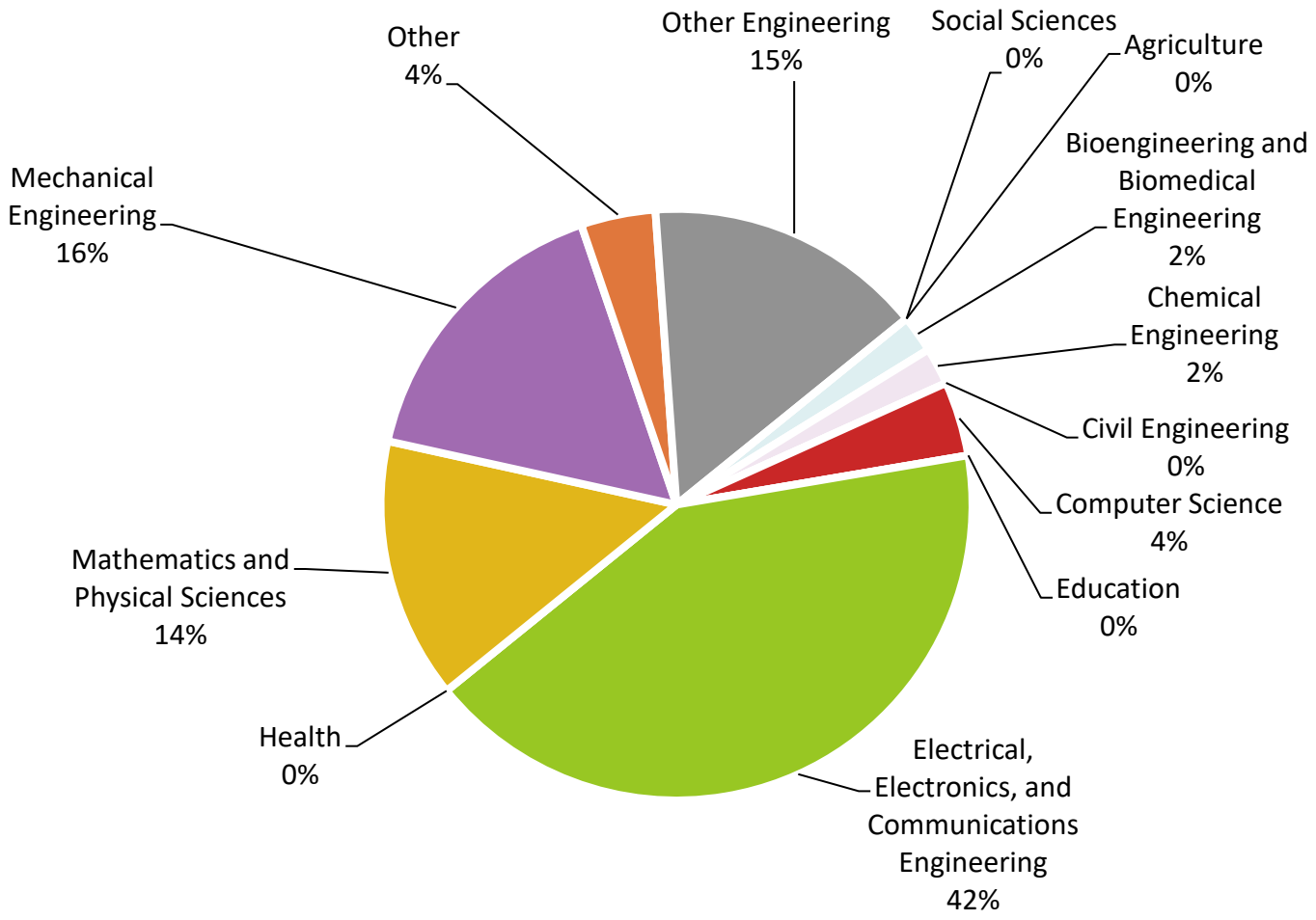
Total number of Project Investigators (PIs): 110

Disciplines by Technology Sector: Energy, Sustainability, and Infrastructure, FY 2020



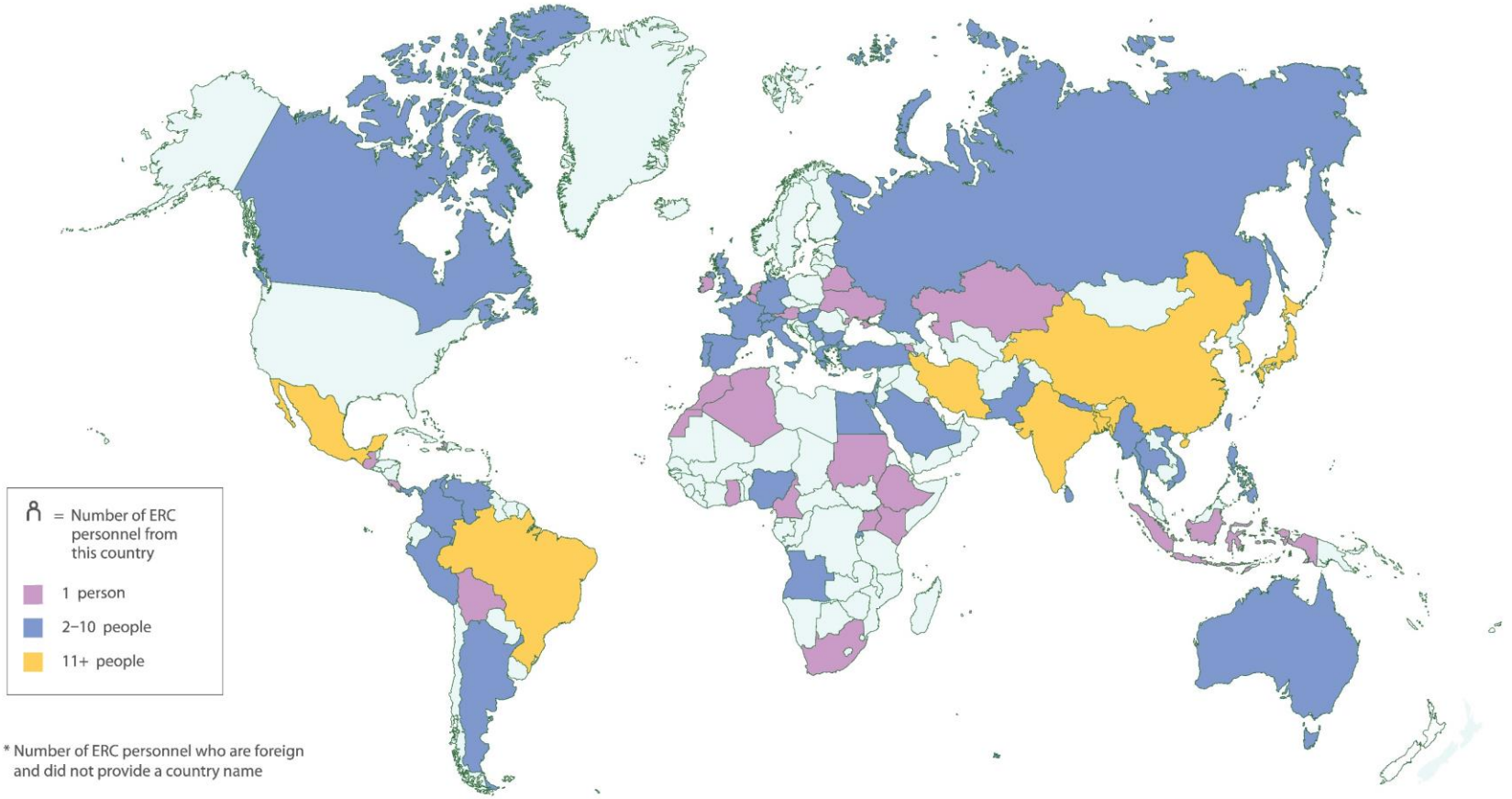
Total number of Project Investigators (PIs): 188

Disciplines by Technology Sector: Micro/Optoelectronics, Sensing, and Information Technology, FY 2020



Total number of Project Investigators (PIs): 49

Country of Citizenship of ERC Foreign Personnel, FY 2020



* Number of ERC personnel who are foreign and did not provide a country name

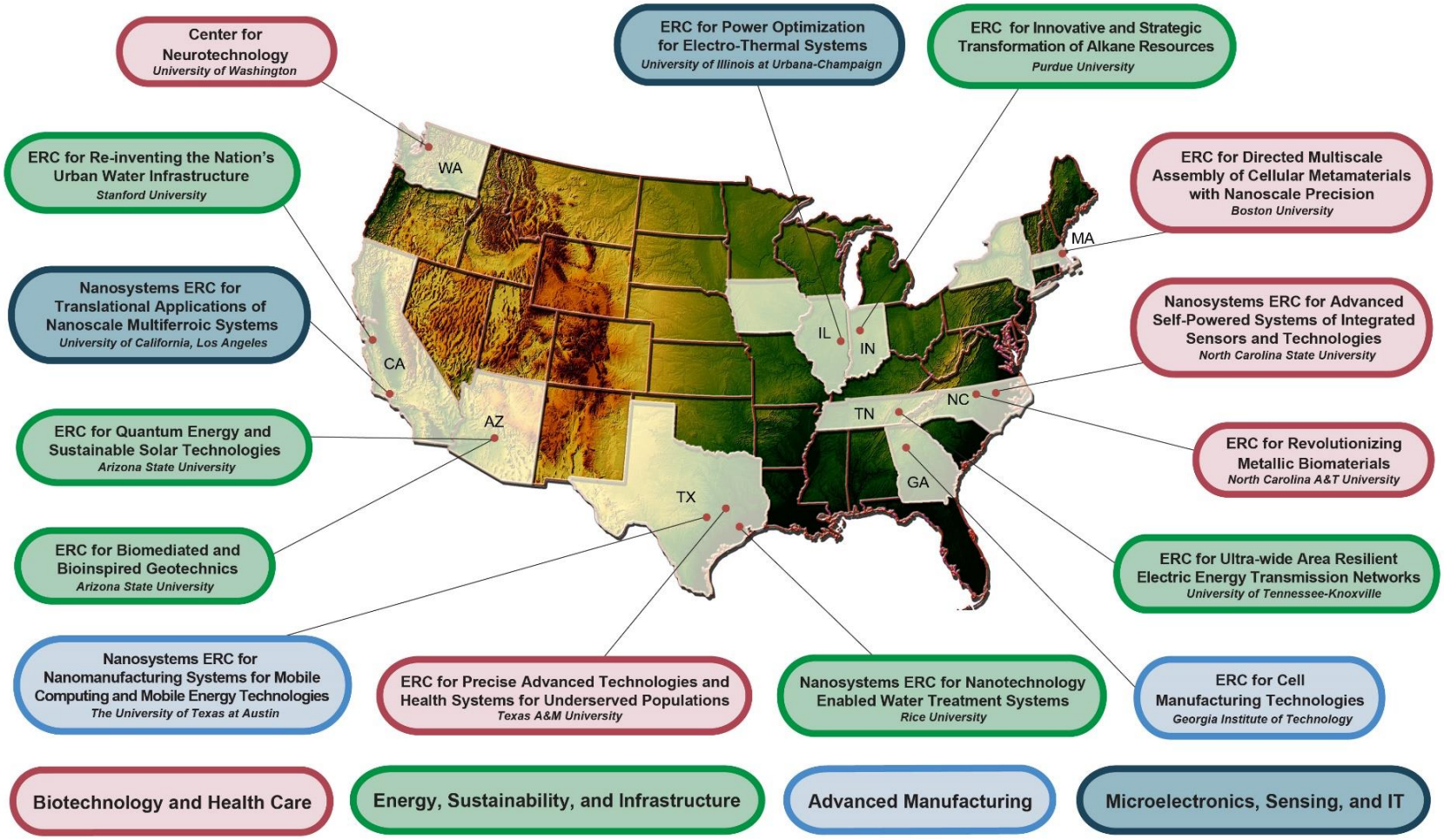
1 person			
Algeria	Bolivia	Ireland	Sudan
Antigua and Barbuda	Cameroon	Kazakhstan	Uganda
	Costa Rica	Kenya	Ukraine
Armenia	Ethiopia	Kuwait	
Austria	Ghana	Mauritius	
Barbados	Guatemala	Morocco	
Belarus	Haiti	Netherlands	
Belgium	Indonesia	South Africa	

2–10 people				
Angola (2)	France (6)	Nepal (2)	Rwanda (2)	Thailand (4)
Argentina (2)	Germany (9)	Nigeria (5)	Saudi Arabia (5)	Turkey (10)
Australia (5)	Greece (8)	Pakistan (7)	Serbia (3)	United Kingdom (7)
Bulgaria (2)	Hong Kong (2)	Panama (3)	Singapore (3)	Venezuela (4)
Burma (2)	Hungary (2)	Peru (5)	Spain (8)	Vietnam (6)
Canada (7)	Israel (4)	Philippines (2)	Sri Lanka (7)	
Colombia (10)	Italy (3)	Portugal (3)	Switzerland (2)	
Egypt (4)	Lebanon (4)	Russia (9)	Taiwan (8)	

11+ people	
Japan	11
Brazil	12
Mexico	14
Bangladesh	25
Iran	36
South Korea	43
India	119
China	257

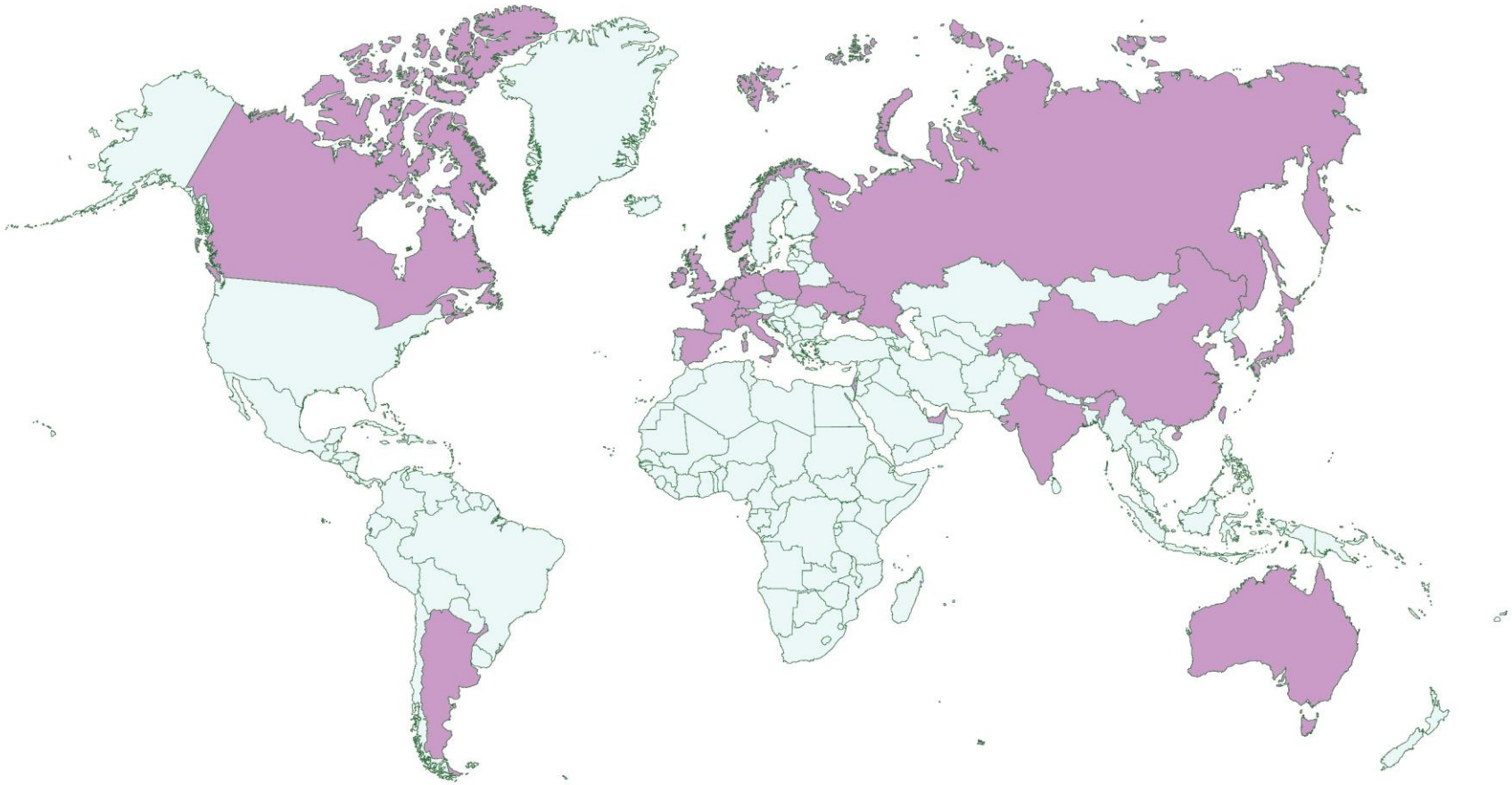
Country Not Reported	14*

Locations of the Active ERCs, FY 2020



Note: All centers are multi-university partnerships; university shown is lead institution.

Locations of Foreign Participating Organizations, FY 2020



Countries with 1- 20 collaborators

Argentina (1)	India (1)	Russia (2)	United Arab Emirates (1)
Australia (2)	Ireland (3)	Singapore (1)	United Kingdom (10)
Belgium (1)	Israel (1)	Slovenia (1)	
Canada (1)	Italy (2)	South Korea (4)	
China (5)	Japan (8)	Spain (1)	
Denmark (3)	Netherlands (3)	Switzerland (3)	
France (4)	Norway (1)	Taiwan (1)	
Germany (6)	Poland (1)	Ukraine (1)	

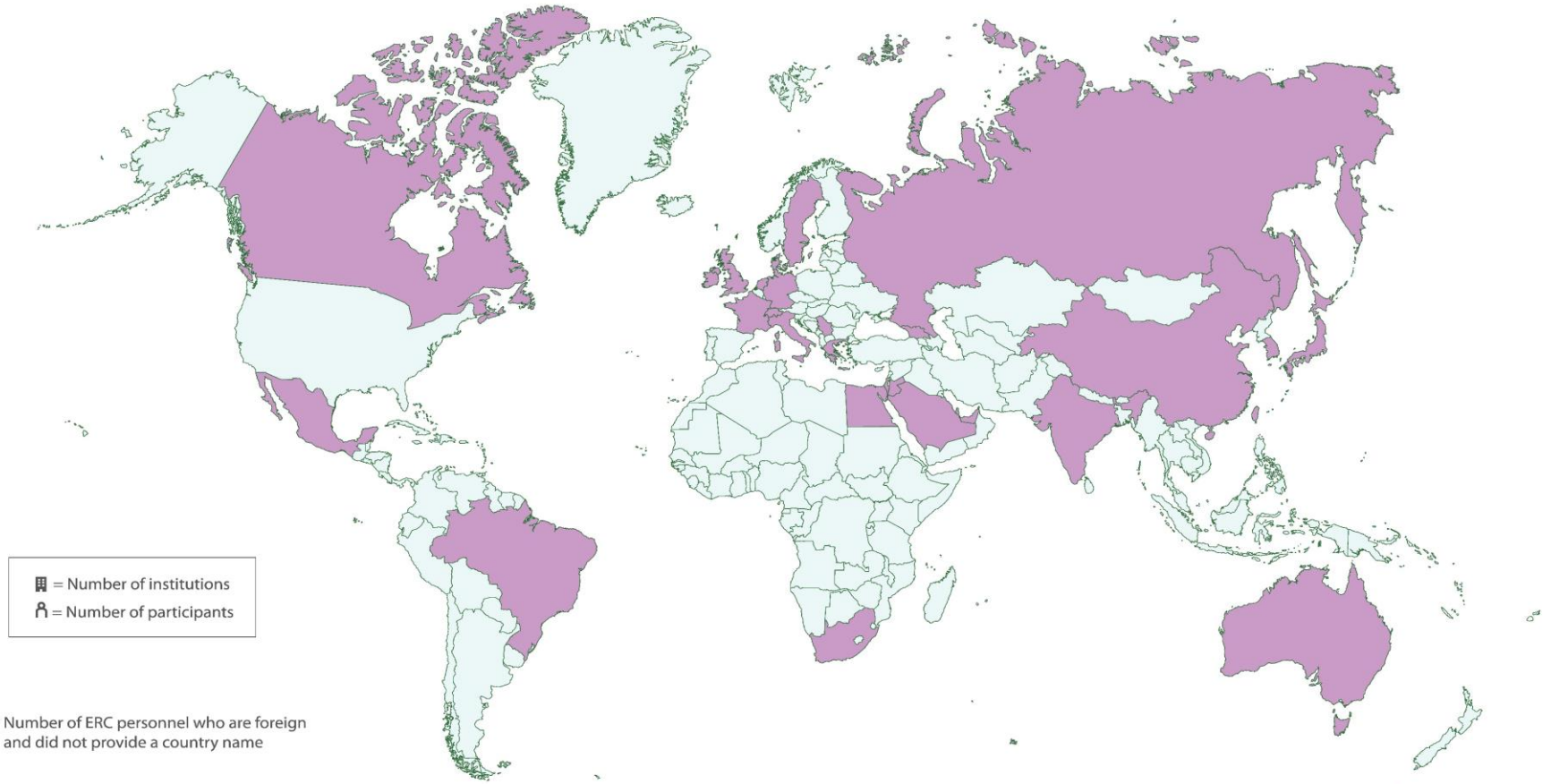
Countries with 21- 40 collaborators

No Countries Reported

Countries with 41+ collaborators

No Countries Reported

Locations of Foreign Participating Institutions, FY 2020



* Number of ERC personnel who are foreign and did not provide a country name

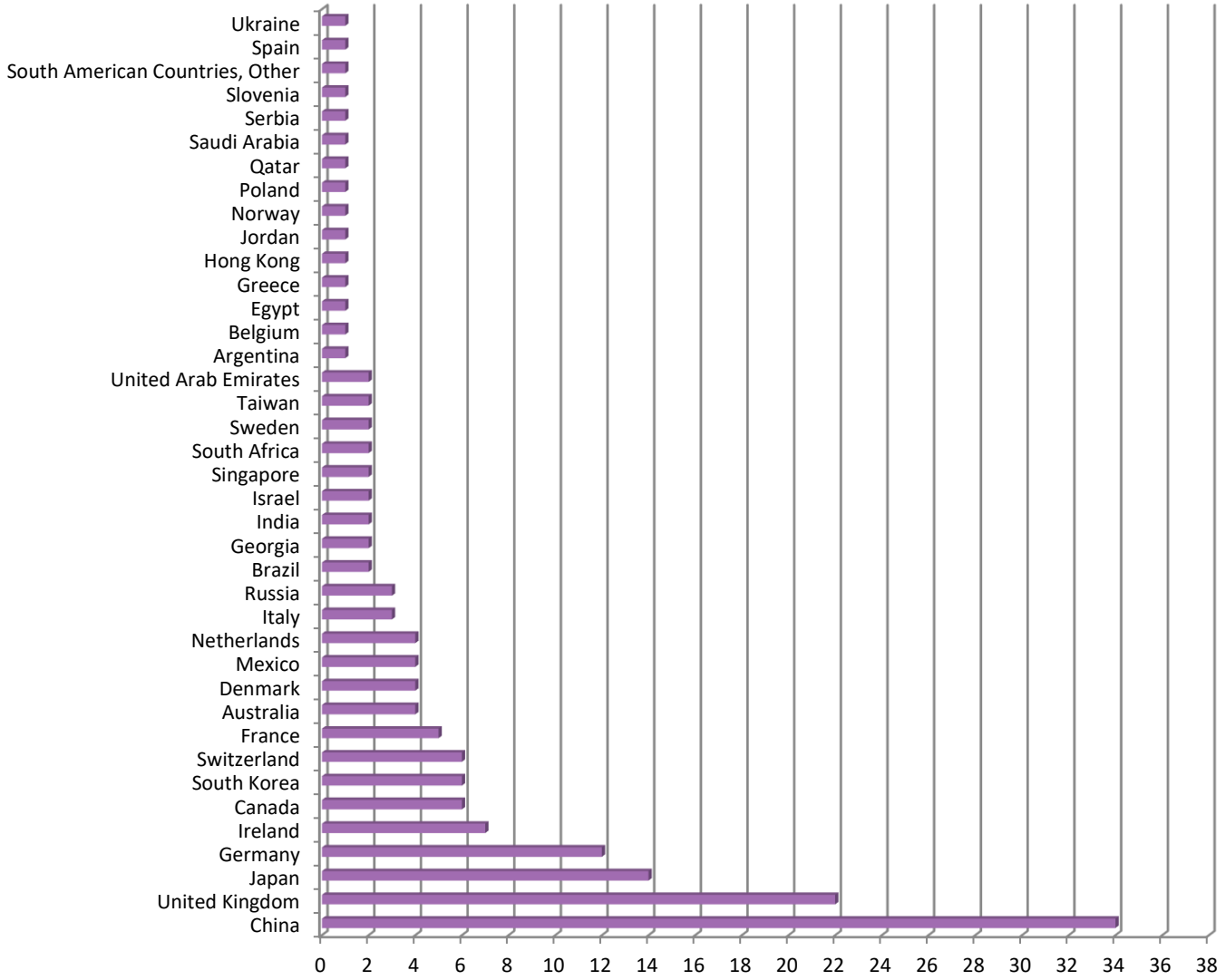
Australia	2	2
Brazil	2	1
Canada	5	4
China	29	19
Denmark	1	0
Egypt	1	0
France	1	1
Georgia	2	0

Germany	6	5
Greece	1	0
Hong Kong	1	1
India	1	0
Ireland	4	10
Israel	1	0
Italy	1	0
Japan	6	5

Jordan	1	1
Mexico	4	0
Netherlands	1	0
Qatar	1	1
Russia	1	5
Saudi Arabia	1	0
Serbia	1	0
Singapore	1	0

South Africa	2	0
South American Countries, Other	1	0
South Korea	2	1
Sweden	2	1
Switzerland	3	5
Taiwan	1	0
United Arab Emirates	1	0
United Kingdom	12	3

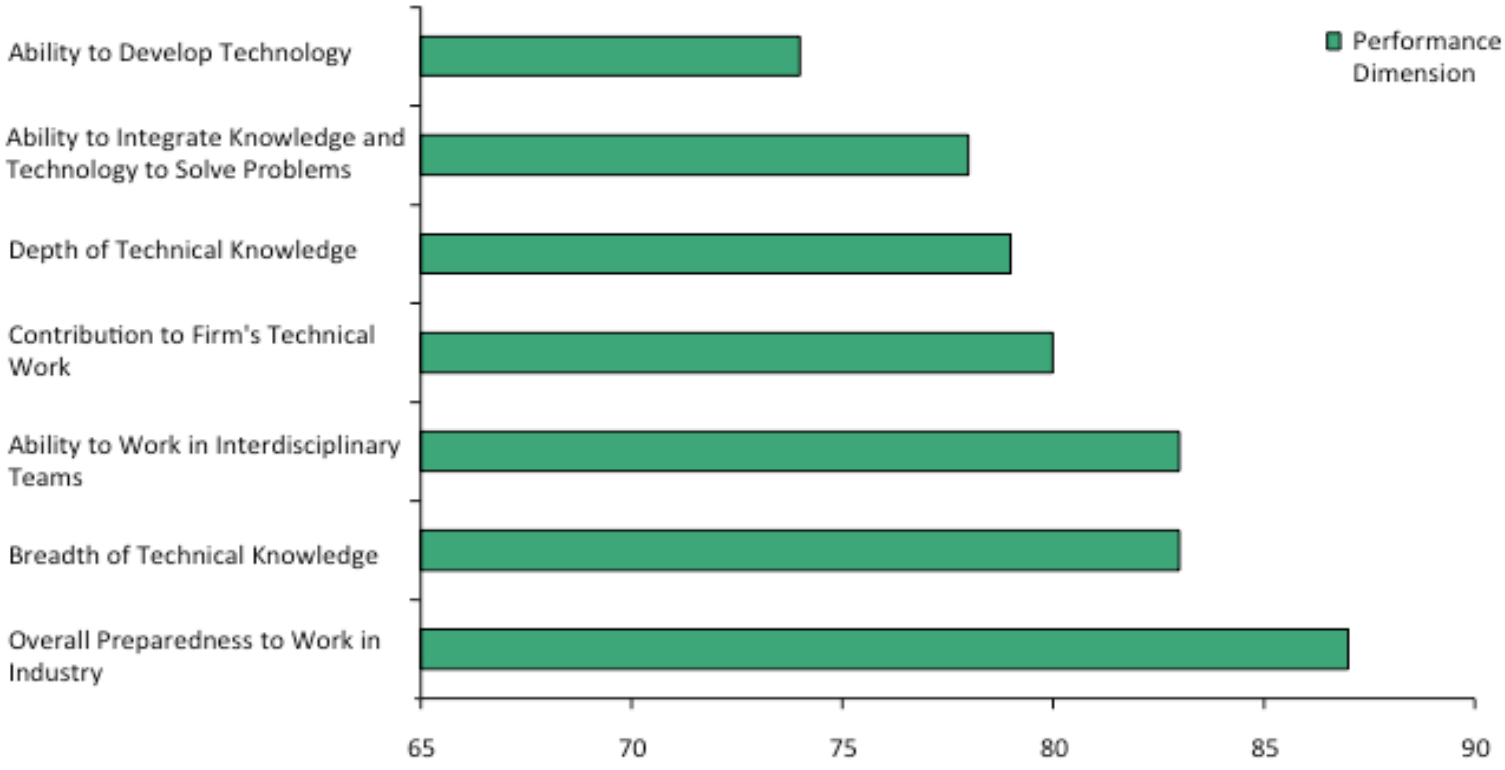
46 Number of Institutions and Organizations With Financial Headquarters Abroad Collaborating With ERCs, by Country of Origin, FY 2020*,**



** Displays counts of Industrial/Practitioner members, Funders of Associated Projects, Funders of Sponsored Projects, Contributing Organizations, Collaborating Institutions, Non-ERC Institutions Providing REU Students, and Foreign Partner Institutions*

*** Community college and Pre-college institutions are excluded*

Comparisons by Member Firms of the Performance of ERC Hires vs. Non-ERC Hires*



* Percentage of industrial supervisors rating the former ERC students/graduates hired by their firms as "Better Than" or "Much Better Than" equivalent hires without ERC experience