

# NATIONAL SCIENCE FOUNDATION

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### Report Memorandum #09-01

#### **Japanese Government S&T-related Budget and Major Programs/Projects for JFY2009 As Approved by the Ministry of Finance on December 21, 2008**

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The Ministry of Finance (MOF) finalized the JFY2009 budget and submitted it to the Diet in December 2009. Traditionally, the MOF's budget goes through the Diet virtually intact in contrast to the US. This report summarizes the MOF's JFY2009 S&T related budget and is compiled from the materials obtained from CSTP (Council for Science and Technology Policy) and MOF. NSF reported last month (<http://www.nsf-tokyo.org/rm08-08.pdf>) on the CSTP's review of individual ministry's requests for their S&T related budgets. Where applicable, changes made by MOF to the initial ministry's request are indicated in this report.

#### Overall S&T Budget for JFY2009

The Japanese Government's total S&T-related budget for JFY2009 is ¥3,554.8 billion (~\$35.5 billion), a very slight decrease of ¥0.7 billion (~\$7 million) from the JFY2008 budget (Table 1). The level of funding is considered extraordinary considering that non-S&T-related budgets

were cut significantly, and epitomizes the Government's high expectation for science and technology. Viewed by ministry by ministry, MEXT (Ministry of Education, Culture, Sports, Science and Technology) receives, as in previous years, 66 percent of the total Japanese Government S&T-related budget (Table 2). The decrease of 28 percent at the Defense Agency is due to the delay in requesting a specific program and it will be included in the budget request for JFY2010. Reference can be made to the previous report on the Japanese Government S&T-related budget request at <http://www.nsftokyo.org/rm08-08.pdf>.

The JFY2009 budget reflects the effect that the Nobel Prize has on the basic research funding. The fact that Japan had four Nobel Laureates (although one of them is a naturalized American) in 2008 has resulted in the budgets for MEXT's competitive funds of grants-in-aid for scientific research (See Table 4) to increase by two percent and basic research programs administered by JST by 2.6 percent, although they normally increase by only one percent per year (see Table 4). Other items that were included in the budget increase over the previous year include funding for the next-generation supercomputer (31 percent increase), realization of regenerative medical care by use of iPS (induced pluripotent stem) cell technology (33 percent increase), internationalization of universities and support for inter-university collaboration (4 percent increase), ALMA (Atacama Large Millimeter/submillimeter Array) program (59 percent increase), graduate school reform (13 percent increase), school science materials (51 percent increase), and R&D on innovative energy technologies (25 percent increase).

On the other hand, the government's block funds to universities that can be used for any purposes will be decreased by one percent in JFY2009 as in previous 5 years. To compensate for this reduction, the level of competitive funding will continue to be expanded as before. Examples are seen in MOE's (Ministry of Education, Culture, Sports, Science and Technology) comprehensive promotion of global environmental research (24 percent increase), waste disposal research (59 percent increase), promotion of environmental research/technology development (39 percent increase), and also MEXT's basic research as mentioned above.

#### CSTP's Review and the Final Budget

Table 3 summarizes the changes MOF made to individual ministry/agency requests for newly proposed programs/projects reviewed by CSTP. CSTP gave a ratings of S, A, B, C. None of the C-rated programs/projects were funded. A lone S-rated program, the METI's new program to develop the next generation batteries, received the requested amount of ¥3,000 million (~\$30 million). All the A-rated programs/projects received some level of funding, with medical

sciences projects faring better than the most. Of 43 B-rated programs/projects, 36 received some level of funding.

Table 4 summarizes the changes MOF made to individual ministry/agency requests for continuing programs/projects reviewed by CSTP. CSTP rated them as “To be accelerated”, “To be promoted”, and “To be decelerated”. In addition, several large projects were reviewed with no recommendations. MOF provided funds to all the “To be accelerated” programs/projects either at the requested level or above the JFY2008 level.

#### Selected Highlights

Below are brief descriptions of the selected programs that are especially relevant to the US S&T community, but were not mentioned in the above sections.

**Brain science:** MEXT’s Comprehensive Brain Research Program has been conducted at RIKEN’s Brain Science Institute (BSI) from its inception in 1997, focusing on the areas of mind and intelligence, neural circuit function, disease mechanism, and advanced technology. MEXT’s budget of ¥9,038 million (~\$90 million) for this program in JFY2009 will slightly decrease from ¥9,321 million (~\$93 million) in JFY2008. In addition to this program, MEXT newly established in JFY2008 five-year competitive program “Brain Research Strategic Program” with the two themes, development of brain machine interface and development of primate animals’ brains. The budget for this program for JFY2008 was ¥1,700 million (~\$17 million) and it will have the same amount budgeted in JFY2009. It should be noted that this competitive program will include in JFY2009 an additional theme on the relationship between brain and difficulties in adapting to the society with a “new” budget of ¥600 million (~\$6 million).

**Green IT Project:** Green IT initiative was established in 2007 by METI (Ministry of Economy, Trade and Industry) to save energy used for IT and for IT to make contributions to save energy, through industry-university-government cooperation. In JFY2008 METI invested ¥3 billion (~\$30 million) for green network systems development, and display technologies using organic electro luminescence. In JFY2009, they will newly invest in silicon power device technologies, green cloud computing, heterogeneous multi core processor, ultra low electric power circuit system, and optical interface-built semiconductor device technologies. The overall investment in Green IT projects in JFY2009 will be ¥5 billion (~\$50 million).

**ICT (Information and Communication Technology) innovation to solve global warming problems:** This is MIC's (Ministry of Internal Affairs and Communications) competitive funding to be newly established in JFY2009 with a budget of ¥390 million (~\$4 million). The solicitation will be announced after April 2009. Companies and universities are eligible to apply with creative and high-risk projects that have the potential to impact ICT fields to make contributions to mitigate the global warming.

**Environment-economy policy study to contribute to the world:** This is a new program to be invested by MOE (Ministry of Environment) to analyze the effects of the economy on preserving the environment, and to establish environmental policy strategies that enable environment and the economy to co-exist. The budget for JFY2009 is ¥400 million (~\$4 million).

**Table 1: S&T-related budget - JFY2009**

Account	JFY2008 Budget (¥ Billion) A	JFY2009 Budget (¥ Billion) B	Increase/ Decrease (¥ Billion)	Increase/ Decrease (%)	JFY2008 Supplemental budget C	Increase/ Decrease B+C/A (%)
S&T-related budget Total (A+B)	3,555.5	3,554.8	-0.7	0.0	240.0	6.7
A: General Account	3,039.8	3,019.1	-20.7	-0.7	205.8	6.1
S&T Promotion Budget	1,362.8	1,377.7	14.9	1.1	59.0	5.4
B: Special Account	515.7	535.7	20.0	3.9	34.1	10.5

**Table 2: S&T-related budget by ministry/agency - JFY2009**

Ministry/Agency	JFY2008 S&T-related Budget (¥ Billion)	JFY2009 S&T-related Budget (¥ Billion)	Increase/ Decrease (%)
Ministry of Education, Culture, Sports, S&T	2,318.2	2,341.3	1.0
Ministry of Economy, Trade and Industry	512.7	531.6	3.7
Ministry of Health, Labour, and Welfare	136.4	135.1	-1.0
Ministry of Agriculture, Forests, and Fisheries	131.6	135.0	2.6
Defense Agency	184.1	131.7	-28.4
Ministry of Internal Affairs and Communications	70.8	70.8	0.0
Ministry of Land, Infrastructure, and Transportation	63.3	67.9	7.4
Cabinet Secretariat	63.8	64.3	0.8
Ministry of Environment	33.1	35.0	5.8
Cabinet Office	18.1	18.0	-0.6
Ministry of Foreign Affairs	11.9	12.6	5.8
Ministry of Justice	6.3	6.4	0.4
Policy Agency	2.4	2.4	-0.2
Ministry of Finance	1.5	1.5	-2.3
Diet	1.2	1.1	-2.5
<b>TOTAL:</b>	<b>3,555.5</b>	<b>3,554.8</b>	<b>0.0</b>

**Table 3: NEW Programs/Projects - JFY2009**

	Program/Project	Ministry/ Agency/ Res. Inst. (Abbreviation in Appendix)	2009 Budget Request by Ministry/ Agency (¥ Million)	2009 MOF Budget (¥ Million)
	NOTES			
Rating	Red letters: Competitive funds			
<b>Life Science</b>				
A	Brain science: strategic promotion program (expanded budget from the previous year)	MEXT	1,000	600
A	Global-scale health issue	MHLW	630	335
A	Comprehensive research on lifestyle-related diseases/intractable diseases: Frontier medical development	MHLW	2,000	2,000
A	Comprehensive research on lifestyle-related diseases/intractable diseases: Collection of bio test materials	MHLW	1,700	1,700
A	Basic technology development to promote application of stem-cell at industries	METI	1,000	1,000
A	Elucidation of light response mechanism of organisms and advanced use of the technology	MAFF	500	400
B	Innovative protein/cell analysis	MEXT	1,385	800
B	Comprehensive research on lifestyle-related diseases/intractable diseases: rare diseases; expansion of target diseases	MHLW	3,859	3,859
B	Low-cost and good-quality processing/industrial agro products (expanded budget from the previous year)	MAFF	134	67
B	Cyclical use of local resources to establish resource-saving agriculture	MAFF	300	210
C	Innovative protein/cell analysis: Facilities	MEXT	315	0
<b>Information Technology</b>				
A	Green IT project: SiC power device; green cloud computing; heterogeneous many core processor	METI/NEDO	Part of 6,800	Part of 5,000
A	Supercomputer: promotion of use	MEXT	161	32
A	Ubiquitous network robots for elderly/disabled: collaboration of multiple number of robots	MIC	Part of 1,000	Part of 550
A	Energy-control home network	MIC	900	725
A	Comprehensive R&D for IT/Energy	MIC/NICT	260	222

A	Live-performance-like communication by innovative 3-dimensional image technology: basic research	MIC/NICT	Part of 1,227	Part of 1,139
A	Basic information strategy program: software to analyze WEB-based society	MEXT	Part of 1,040	Part of 619
A	Market creation by merging IT and service: service engineering research development	METI	Part of 1,875	Part of 1,500
B	Green IT project: low-electric power circuit system; optical interface-built-in semiconductor device	METI/NEDO	Part of 6,800	Part of 5,000
B	Ubiquitous network robots for elderly/disabled: WEB management and analysis for cognitive information; robot service linkage system	MIC	Part of 1,000	Part of 550
B	Advancement of network efficiency by nano ICT	MIC	150	0
B	Mobility support	MLIT	140	104
B	Live-performance-like communication by innovative 3-dimensional image technology: applied research	MIC/NICT	Part of 1,227	Part of 1,139
B	Realization of "digital museum"	MEXT	606	101
B	Market creation by merging IT and service: solution of societal problems	METI	Part of 1,875	Part of 1,500
B	Monitoring of Illegal and harmful information on internet	MIC/NICT	250	200
B	ICT innovation to solve global warming problems	MIC	600	390
C	Next-generation system level design	METI/NEDO	125	0
<b>Environment</b>				
A	Save-water-type and environment-friendly water circulation	METI/NEDO	2,500	1,172
A	Environment-economy policy study to contribute to the world	MOE	600	400
B	Bio-diversity-related technology development	MOE	120	36
B	Clean chemistry	MEXT/RIKEN	350	100
C	Use of data obtained from satellite observations	MOE	12	0
N/A	Stationary global environment observation satellite	MLIT	7,732	7,731
N/A	Carbon dioxide capture and storage (CCS) experiments	METI	4,000	2,260
<b>Energy</b>				
S	Frontier basic science on innovative storage battery	METI-NEDO	3,000	3,000
A	Re-processing of used fuel	METI	2,000	1,596
A	Housing system using next-generation highly-efficient energy	METI/NEDO	150	100
B	Innovative hydrogen manufacturing technology	MEXT/JAEA	1,500	100
B	Innovative energy-saving technology for producing steel from iron ore	METI/NEDO	450	375

B	Green sustainable chemical process	METI/NEDO	1,500	Part of 1,500
B	Abolishment of test research reactors	MEXT	155	106
C	Realization of ocean wind power generation	MOE	400	0
<b>Nanotechnology/Materials</b>				
A	Advanced efficiency of low-cost next-generation solar battery	MEXT/NIMS	350	250
A	Strategy for elements (expanded budget)	MEXT	612	Part of 688
A	Alternative rare materials (expanded budget)	METI/NEDO	600	Part of 1,550
A	Environment technology development using nanotechnology	MEXT	1,000	205
B	Advanced evaluation for semiconductor functional materials	METI/NEDO	120	60
B	Innovative manufacturing technology for save-energy ceramics	METI/NEDO	300	240
B	Next-generation advanced-intensity and anti-heat steel	MEXT/NIMS	795	370
B	New high-temperature resistant, heat-electric energy converting materials for collecting unused heat energy	MEXT/NIMS	363	102
B	Lipid dynamics	MEXT/RIKEN	180	120
B	Optical/quantum research center (expanded budget)	MEXT	900	Part of 1,721
C	Development of new use of electronic microscope	MEXT	158	0
<b>Social Infrastructure</b>				
A	Quick screening of toxic substances	PA	46	46
A	Volcano observation facilities	MEXT/NIED	590	80
A	Comprehensive promotion of research on active fault	MEXT	460	350
A	Marine environment initiative: highly efficient vessels; comprehensive policy for promoting international standards	MLIT	1,689	844
A	Urban system for low-carbon/hydrogen energy society	MLIT	462	139
B	Earthquake observation facilities at middle and deep layers	MEXT/NIED	227	0
B	Highly-sensitive earthquake observation facilities	MEXT/NIED	118	0
B	Wide-area earthquake observation facilities	MEXT/NIED	124	0
B	MP (multi-parameter) radar system	MEXT/NIED	300	0
B	3-dimensional shaking table facilities	MEXT/NIED	750	0
B	Research on the management of social capital like bulwarks	MLIT	13	9
C	Advancement of the prediction of earthquakes in Tokai area (middle of Japan) and prediction of large-scale earthquake in Nankai Trough	MLIT/MRI	Part of Government funds to	0

			MRI	
<b>Intellectual Property/Local S&amp;T/Industry-university-Government Cooperation</b>				
A	Industry-university-government cooperation: strategic centers	MEXT	1,000	175
A	Strategic innovation creation program	MEXT/JST	2,800	550
A	Support for developing research results	MEXT/JST	5,000	3,200
A	Intellectual cluster creation (global centers)	MEXT	3,200	1,400
B	Industry-university-government cooperation: bio venture company creation and patent portfolio	MEXT	600	120
B	Venture business creation by young researchers	MEXT/JST	600	148
B	Service science/engineering	MEXT	504	60
B	Innovation creation in local areas: discovery of excellent researchers in local areas	MEXT/JST	1,867	280
B	Share of advanced research facilities	MEXT	5,000	300
B	Industrial technology R&D	METI	1,000	979
C	Technology transfer center	MEXT	100	0
<b>Personnel Fostering/Public Understanding of Science and Technology</b>				
A	Core science teacher fostering centers	MEXT	930	340
B	Leading IT specialist fostering program: advanced practical S&E specialists fostering	MEXT	1,500	0
B	Compilation and distribution of supplemental materials for math and science education	MEXT	2,512	1,311
<b>Science Diplomacy</b>				
A	Attendance to the G8 S&T Ministerial Meeting	CAO	6	3
A	S&T diplomacy experts exchange	MOFA	6	2
B	S&T policy dialogue with developing countries	CAO	20	10
B	Strategic international cooperative research program (MERGED WITH Science and technology research partnership for sustainable development IN THE CONTINUING PROJECT)	MEXT/JST	1,524	0
B	Bottom-up-type international cooperative research program in cooperation with academic research promotion entities overseas	MEXT/JSPS	600	66
B	Environment prediction R&D and solicitation-based research (part of Asia Pacific Network funds)	MOE	142	31

**Table 4: CONTINUING Programs/Projects - JFY2009**

Program/Project	Ministry/Agency/ Res. Inst. (Abbreviation in Appendix)	2008 Budget (¥ Million)	2009 Budget Request by Ministry/ Agency (¥ Million)	2009 MOF Budget (¥ Million)
<b>NOTES</b>				
<b>Red letters: Competitive funds</b>				
	To be accelerated			
	To be promoted			
	To be decelerated			
	Not rated but reviewed			
<b>Life Science</b>				
Comprehensive database project: comprehensive database	MEXT	1,100	850	850
Comprehensive database project: bioinformatics	MEXT	1,682	1,841	1,841
Comprehensive genomic information for organisms in agriculture, forestry, and fisheries	MAFF	707	707	700
Comprehensive database project	METI	70	70	70
Target protein research program	MEXT	5,200	5,200	5,000
Brain research strategic program	MEXT	1,700	1,700	1,700
Comprehensive brain research program	MEXT/RIKEN	9,321	10,026	9,038
Plant science research program	MEXT/RIKEN	1,519	1,677	1,478
Comprehensive research on immunology/allergy	MEXT/RIKEN	3,261	3,600	3,186
Comprehensive research on developmental/regenerative science	MEXT/RIKEN	4,467	4,847	4,416
Omics basic research	MEXT/RIKEN	505	1,761	1,420
Life molecular system basic research	MEXT/RIKEN	495	586	500
Bio-marker for producing medicine, bio-resources and model animals for producing medicine, next-generation vaccine development, comprehensive research on policy-based medicine production	MHLW	3,664	3,776	3,166
National bio resource project	MEXT	1,400	1,400	1,368
Bio resource program	MEXT/RIKEN	3,181	3,513	3,166
Realization of medical care based on genetic information	MEXT	2,794	2,794	2,718
Genome medical science program	MEXT/RIKEN	1,600	1,766	1,552

Bio diagnosis technology development for realizing medical care that meets individual needs	METI	340	340	340
Biological base for accelerating support for producing genomic medicine	METI	2,806	3,000	2,800
New and recurring infectious diseases research center	MEXT	2,500	2,300	2,064
Comprehensive research on infectious diseases	MHLW	6,008	7,530	6,227
Molecular imaging research program (partially competitive funds)	MEXT/RIKEN/NIRS	3,896	4,244	3,985
Heavy particle radiotherapy cancer treatment research	MEXT/NIRS	5,797	5,357	5,330
Third comprehensive strategic anti-cancer research	MHLW	6,487	6,584	5,835
Subsidies for cancer research	MHLW	1,804	2,213	1,904
Intelligent operation equipment R&D	METI/NEDO	600	800	600
Frontier basic R&D: medical equipment R&D	MHLW	561	550	503
Comprehensive research on longevity/handicapped	MHLW	1,684	1,667	1,388
Comprehensive research on lifestyle-related diseases/intractable diseases: cardiovascular; immunity/allergy; intractable; liver diseases	MHLW	6,591	6,558	6,069
Mental health research	MHLW	1,856	1,819	1,616
Food/medicine risk analyses (comprehensive research on regulatory science including medicine and medical equipment) (those items not included in the "Return to the Society")	MHLW	567	531	489
Basic research in health/medical fields	MHLW/NIBIO	8,169	8,162	8,162
Commercialization of medicine and medical equipment: Bayh-Dole contract fee for R&D on medical products	MHLW/NIBIO	1,200	1,200	800
New functional antibody pharmaceuticals	METI	1,000	1,000	900
Sugar-chain function activation	METI	1,000	1,000	950
Risk analyses of food and medicine: safety/security of foods	MHLW	1,752	1,717	1,531
Highly precise and effective risk management of bird flu and BSE (mad cow disease)	MAFF	700	697	691
Japanese-style livestock feeding by large amount of simple feed	MAFF	519	519	509
Commercialization technology development to promote new agriculture, forestry, and fisheries policies	MAFF	5,200	10,379	6,516
Systematic elucidation of harms and risk mitigation in production/distribution/processing processes	MAFF	549	546	536
New agriculture development genome project	MAFF	4,004	3,985	3,965
Experiments on designated items	MAFF	924	924	924

Commercialization at industries	MAFF	1,400	1,600	900
<b>Basic research to create innovation</b>	MAFF/NARO	6,805	11,440	6,800
Basic technology for advanced manufacturing, using plant functions	METI	1,596	1,596	1,429
Basic technology for environment-friendly manufacturing, using microorganism functions	METI	1,105	1,105	544
Tailor-made human genome research	MHLW	1,438	1,410	791
<b>Information Technology</b>				
Dream chip development project	METI/NEDO	1,200	1,300	1,200
Frontier IT specialists fostering	MEXT	828	1,043	895
MIRAI (millennium Research for Advanced Information Technology)	METI/NEDO	5,000	5,044	4,100
Next-generation process-friendly design technology	METI/NEDO	893	880	690
Semiconductor application chip project	METI/NEDO	1,400	1,238	1,000
Next-generation large-scale display of low-electric power consumption	METI/NEDO	1,173	1,167	445
<b>Device/system technologies for highly-functional/low-electric power consuming computing</b>	MEXT	425	850	430
Spintronics non-volatilization function technology	METI/NEDO	520	585	520
Green-IT project (continued)	METI/NEDO	3,000	Part of 6,800	Part of 5,000
Next-generation robotics artificial intelligent technologies	METI/NEDO	1,500	1,500	1,350
Open source software utilization	METI/IPA	560	565	540
Industry-university cooperation on software engineering	METI/IPA	2,420	2,490	2,369
Secure platform project	METI	800	800	800
Photonic network technologies	MIC/NICT	3,637	4,037	3,602
Next-generation network: common base technology, control technology to deal with high efficiency	MIC/NICT	3,002	2,656	2,617
New-generation network: element technologies for dynamic network, virtual technologies to meet flexible speed and quality and personnel fostering	MIC/NICT	2,130	2,044	2,003
New-generation backbone	MIC	1,296	1,300	1,018
Element technologies for advanced use of frequency in mobile communication system	MIC	3,799	Part of 9,462	3,578
Wireless system: shift to unused frequency zone	MIC	2,328	Part of 9,462	1,821
Cell phone system that meets both terrestrial and satellite	MIC	580	Part of	558

broadcasting			9,462	
Next-generation advanced-efficiency network device	METI/NEDO	1,043	1,043	434
Ubiquitous/platform technologies	MIC	1,500	1,700	1,276
Universal voice/language communication technologies	MIC/NICT	1,480	1,730	1,455
Information navigation project	METI	4,108	4,110	2,598
Trial for stopping cyber attack, including spam mail and phishing	MIC	747	750	596
Countermeasures for information leak	MIC	1,100	1,200	902
Early-stage warning for computer security	MIC	1,869	1,715	1,682
Corporate/individual information security measures	METI/IPA	1,440	1,675	1,484
Strategic promotion of R&D on information communication	MIC	2,573	2,600	2,179
Promotion of private sector basic technology R&D	MIC/NICT	4,200	4,200	2,600
Development and use of supercomputer	MEXT	14,500	21,656	19,000
<b>Environment</b>				
Comprehensive promotion of global environmental research	MOE	3,197	3,955	3,955
Grant for waste disposal study	MOE	1,135	1,335	1,803
21st century climate change prediction program	MEXT	2,232	2,520	1,540
Basic process model for global environmental change prediction	MEXT/ JAMSTEC	1,556	1,309	1,309
Climate change simulation from the whole earth scale to local	MEXT/ JAMSTEC	1,075	1,032	1,032
Establishment of global observation system: This has been merged to another MEXT program: no solicitation will be made in 2009.	MEXT	373	554	0
Non-Freon-type energy-saving air conditioning system development	METI	576	1,037	810
Global environment observation by satellite (GOSAT)	MOE/NIES	665	731	631
Water/heat/matter cycle observation at various scales from basin to globe	MEXT/ JAMSTEC	677	602	602
Chemical substance risk analyses	MHLW	1,281	1,255	1,118
Promotion of environmental research/technology development	MOE	836	1,570	1,160
Carbon dioxide capture and storage (CCS) experiments				
<b>Energy</b>				
Next-generation reactor development	METI	1,250	2,042	1,940
Environment-friendly iron manufacturing process technology development	METI/NEDO	560	1,950	1,120
ITER	MEXT/JAEA	10,298	12,252	11,088
Nuclear energy system	MEXT	5,926	5,829	5,769

High-level radioactive waste disposal R&D	MEXT/JAEA	8,718	8,734	8,734
Geological disposal technology	METI	3,682	3,682	3,652
Full reactor MOX fuel nuclear reactor facilities	METI	3,000	3,155	3,000
New energy technology R&D (solar, wind, new energy venture)	METI/NEDO	4,900	6,572	Part of 7,960
New energy technology field tests (solar and wind)	METI/NEDO	6,688	7,188	Part of 854
Element technology development for solid oxide fuel cell system	METI/NEDO	1,350	2,300	1,200
Practical application of solid oxide fuel cell	METI/NEDO	800	1,600	720
Hydrogen production/transport/storage system	METI/NEDO	1,700	2,500	1,360
Practical strategic technology development for solid polymer fuel cell	METI/NEDO	6,669	8,762	6,699
Frontier research on fuel cell	METI/NEDO	900	1,200	850
Frontier science basic research on hydrogen	METI/NEDO	1,750	2,200	1,125
Establishment of infrastructure for hydrogen-economy society	METI/NEDO	1,400	2,000	900
Frontier basic research on hydrogen reserving materials	METI/NEDO	908	1,400	1,000
Practical application of fuel cell system	METI/NEDO	1,300	1,400	988
Commercialization of highly efficient gas turbine	METI	540	1,845	1,645
Element technology development for ultra-supercritical thermal power generation	METI	200	817	743
Advanced functional converging technology development for refining oil	METI	7,930	4,297	3,600
Innovative next-generation oil-refining technology development	METI	3,960	4,300	4,162
Multi-purpose coal gas production technology development out of the innovative zero-emission coal power generation project	METI/NEDO	Part of 3,251	Part of 4,162	Part of 3,451
Storage and segregation of CO2	METI	1,405	640	580
Molecular gate-functioning CO2 membrane	METI	150	680	430
Entrained flow coal gasification plant	METI	2,067	1,200	1,200
Gas to Liquid (GTL) technologies of natural gas	METI/ JOGMEC	6,000	3,802	3,802
Development of methane hydrate	METI	2,533	4,526	4,526
Superconducting power apparatus with Yttrium	METI/NEDO	3,000	4,000	3,000
Practical application of high-temperature superconducting cable	METI/NEDO	160	800	680
Strategic technology development for commercializing next-generation power storage system	METI/NEDO	5,300	5,840	4,310
<b>Strategic development on save-energy technologies: practical</b>	<b>METI/NEDO</b>	<b>6,900</b>	<b>9,653</b>	<b>7,000</b>

application				
Total of Fast Breeder Reactor (FBR) cycle technology	MEXT/JAEA/ METI	33,368	42,607	40,036
<b>Nanotechnology/Materials</b>				
Sustainable hyper composite technology	METI/NEDO	320	710	643
Nanoelectronics semiconductor: new materials/new structure technology development: Nitrogen-related chemical combination semiconductor board/expitaxial development	METI/NEDO	500	550	370
Nanoelectronics semiconductor: new materials/new structure technology development: New materials and new structure nano electronic devices	METI/NEDO	500	700	600
Innovative advancement of strength and functions of steel materials	METI/NEDO	1,000	1,000	500
Basic technology development for fiber materials having advanced functions and new structures	METI/NEDO	705	705	663
Strategies for elements (continued portion)	MEXT	588	Part of 1,200	Part of 688
Alternate materials for rare metals (continued portion)	METI/NEDO	1,000	Part of 1,600	Part of 1,550
Research on apparatus on molecular imaging	METI/NEDO	960	960	835
Frontier Basic research: medical equipment (nano medicine)	MHLW	1,937	1,898	1,730
Frontier optical science research	MEXT/RIKEN	882	882	875
Optical/quantum science research center (continued portion)	MEXT	1,500	Part of 2,400	Part of 1,721
Nanotechnology network	MEXT	1,727	1,727	1,305
Interdisciplinary and inter-industry nanotechnology challenge: commercialization of innovative materials	METI/NEDO	3,646	3,646	3,600
<b>Monozukuri (Manufacturing)</b>				
Frontier measurement and analysis technology/equipment	MEXT/JST	5,500	7,000	6,300
Simulation software that will be the base for creating innovation	MEXT	500	800	510
Advancement of strategic base technologies carried out at small- and medium-size companies	METI/SMRJ	8,805	6,050	5,400
Green sustainable chemical process	METI/NEDO	600	600	Part of 1,500
Interdisciplinary next-generation device manufacturing technologies	METI/NEDO	1,150	1,150	1,150
Optical catalyst industry creation for realizing recycling society	METI/NEDO	880	880	838

Super hybrid material technology development	METI/NEDO	620	700	620
Super flexible display parts technology development	METI/NEDO	620	648	540
<b>Social Infrastructure</b>				
Tera Herz technology research	MIC/NICT	232	580	401
Comprehensive research on active fault	MEXT	478	353	310
Linkage between possible Tokai-East Tokai-South Tokai Earthquakes	MEXT	495	1,181	501
Focused study/observation/research on strains caused by earthquakes	MEXT	401	863	596
Special project for prevention/mitigation of urban-area large-scale earthquakes	MEXT	1,102	1,404	809
Anti-seismic research, using E-defense	MEXT/NEDO	1,830	1,963	1,812
Advancement of the level of monitoring/modeling of the crust change to mitigate disaster caused by earthquakes and mountain eruptions	MLIT	989	1,227	983
Domestic airplane: high functional technology/clean engine technology R&D	MEXT/JAXA	2,725	2,610	2,166
All weather/high density flight technology	MEXT/JAXA	546	546	546
Advanced system basic technology development for airplanes	METI	537	715	523
Environment-friendly engine for small-size airplanes	METI/NEDO	600	780	600
Next-generation airplane structure materials manufacturing and processing technology development	METI	800	1,040	800
Development of carbon fiber complex materials to save energy	METI	5,000	6,840	6,498
Advanced aerodynamics design	METI	4,100	4,305	4,100
Safe and Secure Society	MEXT	625	1,283	538
<b>Frontier</b>				
Development of basic tool to make use of marine resources:	MEXT	400	800	700
Quasi-zenith satellite system	MIC	1,200	1,560	1,529
Development/operation/usage of Japanese module "Kibo" of the International Space Station	MEXT/JAXA	16,964	15,926	15,371
Advancement of reliability of satellites	MEXT/JAXA	459	550	275
International cooperation experiment, using "Kizuna," supersonic internet satellite	MEXT/JAXA	1,773	1,264	1,264
Next-generation transport system design	METI/NEDO	620	700	620
Space environment reliability verification integrated system (SERVICE) project	METI/NEDO	490	900	656

Next-generation earth observation sensor research	METI/NEDO	1,303	3,060	2,996
Frontier space system by miniaturization	METI/NEDO	604	1,650	1,300
Oil resource remote detection technology	METI	1,600	1,800	1,476
Development and share of X-ray free electron laser	MEXT/ RIKEN	11,000	13,512	10,353
Space Transport System	MEXT	40,464	46,909	39,552
Marine-earth observation system	MEXT	30,885	40,783	30,754
GX Rocket (not reviewed because it was difficult to be reviewed only from S&T viewpoint; It requires to be reviewed from the viewpoints of international contribution and security)	MEXT	5,600	16,000	10,700
<b>Universities/Basic Research/Competitive Funds</b>				
Global COE program	MEXT	33,986	34,488	34,228
ALMA (Atacama Large Millimeter/submillimeter Array)	MEXT	3,101	4,927	4,927
J-PARC (Japan Proton Accelerator Research Complex)	MEXT/JAEA/ KEK	19,044	20,644	14,760
RI Beam Factory	MEXT/RIKEN	3,192	4,087	3,216
Management of the use of Spring-8 facilities	MEXT/RIKEN	9,165	11,197	9,229
Basic research programs, including ERATO, CREST, SORST, ICORP, and PRESTO	MEXT/JST	50,326	57,131	51,640
WPI (World International Premium) program	MEXT	7,109	7,109	7,109
Grants-in-aid for scientific research (Kakenhi)	MEXT	193,200	217,176	196,998
Support for private universities:	MEXT	341,871	354,939	337,422
University facilities improvement	MEXT	41,263	92,240	40,092
Coordination funds for promoting S&T	MEXT	33,800	48,660	36,340
<b>Local S&amp;T/Industry-university-government cooperation/Intellectual property</b>				
Industry-university-government cooperation strategic development program: creation and protection of strategic intellectual property	MEXT	2,819	3,336	2,672
Technology transfer support center	MEXT	2,589	3,070	2,557
World-leading international standardization	METI	2,255	2,223	1,797
Industry-university seeds innovation program	MEXT/JST	2,200	1,860	1,230
Creative seeds development program	MEXT/JST	8,122	6,990	5,500
Innovation creation through shared use of research facilities	MEXT	1,382	1,391	1,391
University-oriented business creation	METI/NEDO	1,750	2,202	2,100
Research grants for industrial technologies	METI/NEDO	4,779	4,876	4,445
Testbed network for frontier research	MIC/NICT	4,006	4,001	3,881

Intelligent cluster creation	MEXT	7,530	8,100	7,530
Industry-university-government cooperative research on urban area	MEXT	4,600	5,500	4,500
<b>Comprehensive support for local area innovation creation</b>	MEXT/JST	11,025	13,313	11,313
Support for establishing industrial clusters	METI	1,139	1,323	1,135
Formation of corporations to create local area innovation	METI	1,116	1,116	881
<b>Local area innovation creation program</b>	METI	7,474	7,066	5,792
<b>Personnel Fostering/Public Understanding of Science and Technology</b>				
Organizational reform for graduate education reform	MEXT	5,070	9,024	5,746
Doctoral and Postdoctoral researcher program	MEXT	15,794	16,968	16,314
Super science high school	MEXT	1,480	1,519	1,487
Science education facilities	MEXT	1,320	2,500	2,000
Okinawa Science and Technology Graduate School	CAO/OIST	10,752	14,873	11,232
Industry-university cooperation personnel fostering program	METI	1,770	1,511	1,511
<b>Science Diplomacy</b>				
Science and technology cooperation to deal with global-scale issues	MOFA/JICA	1,380	3,760	3,284
Science and technology research partnership for sustainable development	MEXT/JST	500	1,348	1,154
Strategic International S&T Cooperation	MEXT/JST	1,250	1,558	1,568
Postdoctoral Fellowship for foreign researchers	MEXT/JSPS	1,492	1,732	1,602
International training for young researchers	MEXT/JSPS	636	893	740
Establishment of network for invited foreign researchers	MEXT/JSPS	6,115	6,029	5,353
Contribution to the OECD science and technology policy committee	METI	6	6	6
Research cooperation program	METI	953	872	872

## Appendix

Abbreviation	Full Name
CAO	Cabinet Office
IPA	Information-technology Promotion Agency
JAEA	Japan Atomic Energy Agency
JAMSTEC	Japan Agency for Marine-Earth Science and Technology
JAXA	Japan Aerospace Exploration Agency
JICA	Japan International Cooperation Agency
JOGMEC	Japan Oil, Gas and Metals National Corporation
JSPS	Japan Society for the Promotion of Science
JST	Japan Science and Technology Agency
KEK	High-energy Accelerator Research Organization
MAFF	Ministry of Agriculture, Forestry and Fisheries
METI	Ministry of Economy, Trade, and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MHLW	Ministry of Health, Labour, and Welfare
MIC	Ministry of Internal Affairs and Communications
MLIT	Ministry of Land, Infrastructure, and Transportation
MOE	Ministry of Environment
MOFA	Ministry of Foreign Affairs
MRI	Meteorological Research Institute
NARO	National Agriculture and Food Research Organization
NEDO	New Energy and Industrial Technology Development Organization
NIBIO	National Institute of Biomedical Innovation
NICT	National Institute of Information and Communication Technology
NIED	National Research Institute for Earth Science and Disaster Prevention
NIES	National Institute for Environmental Studies
NIMS	National Institute of Materials Sciences
NIRS	National Institute of Radiological Sciences
OIST	Okinawa Institute of Science and Technology
PA	Police Agency
RIKEN	Institute of Physical and Chemical Research
SMRJ	Organization for Small and Medium Enterprises and Regional Innovation of Japan