Congressional Budget Office
Cost Estimate

June 9, 2020

At a Glance

S. 2800, National Aeronautics and Space Administration Authorization Act of 2019

As ordered reported by the Senate Committee on Commerce, Science, and Transportation on November 13, 2019

By Fiscal Year, Millions of Dollars	2020	2020-2025	2020-2030
Direct Spending (Outlays)	0	20	85
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	20	85
Spending Subject to Appropriation (Outlays)	23	3,098	not estimated

Statutory pay-as-you-go procedures apply?	Yes	**Mandate Effects**	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2030?	< $5 billion	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

The bill would

- Authorize appropriations totaling $22.8 billion in 2020 for activities of the National Aeronautics and Space Administration (NASA) and would provide direction on those activities
- Extend operation of the International Space Station (ISS) through 2030
- Extend NASA's authority to enter into enhanced-use lease (EUL) agreements
- Permit NASA to increase voluntary separation incentive payments from $25,000 to $40,000

Estimated budgetary effects would primarily stem from

- Extending operations of the ISS
- Spending of the authorized appropriations
- Potential use of third-party financing to construct and renovate facilities for energy production, launch, and other specialized uses under EUL agreements

Areas of significant uncertainty include

- Estimating the value of investments and amount of government use of facilities constructed by third parties under EUL agreements

Detailed estimate begins on the next page.

Bill Summary

S. 2800 would authorize appropriations totaling $22.8 billion in 2020 for activities of the National Aeronautics and Space Administration (NASA) and would provide direction on those activities. (In 2020, NASA received appropriations totaling $22.6 billion.) Under S. 2800, operation of the International Space Station (ISS) would continue through 2030.

The bill also would permanently extend NASA's authority to enter into enhanced-use lease (EUL) agreements. Finally, S. 2800 would permit NASA to increase voluntary separation incentive payments from $25,000 to $40,000.

Estimated Federal Cost

The estimated budgetary effect of S. 2800 is shown in Table 1. The costs of the legislation fall primarily within budget function 250 (general science, space, and technology).

Table 1.
Estimated Budgetary Effects of S. 2800

	By Fiscal Year, Millions of Dollars												
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2025	2020-2030
	Increases in Spending Subject to Appropriation												
Estimated Authorization	388	2	2	2	2	4,202	n.e.	n.e.	n.e.	n.e.	n.e.	4,598	n.e.
Estimated Outlays	23	234	105	25	9	2,702	n.e.	n.e.	n.e.	n.e.	n.e.	3,098	n.e.
	Increases in Direct Spending												
Estimated Budget Authority	0	*	5	11	11	11	14	13	13	13	13	37	105
Estimated Outlays	0	*	1	4	7	9	12	12	13	13	13	20	85

Components may not sum to totals because of rounding; n.e. = not estimated; * = between zero and $500,000.

Basis of Estimate

For this estimate, CBO assumes that the bill will be enacted in 2020 and that the authorized and necessary amounts will be appropriated. Estimated outlays are based on historical spending patterns for the affected activities.

Spending Subject to Appropriation

CBO estimates that implementing S. 2800 would cost about $3.1 billion over the 2020-2025 period (see Table 2).

Table 2.
Estimated Increases in Spending Subject to Appropriation Under S. 2800

	By Fiscal Year, Millions of Dollars						
	2020	2021	2022	2023	2024	2025	2020-2025
International Space Station							
Estimated Authorization	0	0	0	0	0	4,200	4,200
Estimated Outlays	0	0	0	0	0	2,700	2,700
NASA Programs							
Authorization[a]	388	0	0	0	0	0	388
Estimated Outlays	23	232	103	23	7	0	388
Voluntary Separation Incentive Payments							
Estimated Authorization	0	2	2	2	2	2	10
Estimated Outlays	0	2	2	2	2	2	10
Total Changes							
Estimated Authorization	388	2	2	2	2	4,202	4,598
Estimated Outlays	23	234	105	25	9	2,702	3,098

a. S. 2800 would authorize appropriations for individual programs of the National Aeronautics and Space Administration totaling $22.8 billion in 2020. Because appropriations for 2020 have already been provided, CBO estimates that implementing S. 2800 would increase authorized spending by $388 million, the difference between the authorized and appropriated amounts for those individual programs.

International Space Station. Current law requires NASA to operate the ISS through 2024. S. 2800 would extend the authorization through 2030. Using information from NASA on the costs to operate the ISS in recent years, CBO estimates that continuing those operations would require funding of more than $4 billion annually starting in 2025. Based on historical spending patterns for ISS operations, CBO estimates that implementing the provision would cost $2.7 billion in 2025 and several billions of dollars after 2025.

NASA Programs. S. 2800 would authorize appropriations totaling $22.8 billion in 2020 for individual NASA programs. In 2020, NASA received appropriations totaling $22.6 billion for those programs. Of that amount, $6,018 million was for exploration; $4,140 million was for space operations; $2,913 million was for safety, security, and mission services; $373 million was for construction. The bill would authorize $6,223 million for exploration; $4,150 million for space operations; $2,935 million for safety, security, and mission services; and $524 million for construction. Thus, CBO estimates that enacting S. 2800 would increase the authorization by $388 million in 2020—the difference between the authorized and appropriated amounts for those programs. (CBO does not estimate any additional outlays for NASA programs that received appropriations in 2020 that are greater than or equal to the amounts authorized under the bill.) Assuming appropriation of the additional amounts, CBO estimates that implementing the bill would cost $388 million over the 2020-2025 period.

S. 2800 also would direct NASA to develop a low-Earth orbit commercialization program, conduct a science mission to Mars, and establish a planetary defense coordination office, among other activities. CBO expects that the authorization of appropriations for 2020 would include the costs of meeting those directives.

Voluntary Separation Incentive Payments. Under current law, NASA may restructure or reshape its workforce by offering payments, sometimes called buyouts, generally capped at $25,000 for employees who agree to separate from the agency. S. 2800 would raise the maximum payment by $15,000, to $40,000.

Using information from NASA about its use of such payments over the past six years, CBO estimates that each year 75 people, on average, would receive the $40,000 payment for voluntary separation. That estimate includes CBO's expectation that the larger payment would induce another 25 people annually to accept a buyout. That combination of higher payments and the expected increase in the number of people voluntarily separating would cost $10 million (or $2 million annually) over the next five years, CBO estimates. (The additional separations would cause some employees to retire sooner than they would have under current law. That cost is discussed under the heading "Direct Spending.")

Other Activities. S. 2800 also would direct the Department of Defense to review ISS projects, the Government Accountability Office to audit certain contracts, and the Office of Science and Technology Policy to study how NASA funds missions of national need. Based on the costs of similar tasks, CBO estimates that any costs to implement those provisions would be insignificant; any spending would be subject to the availability of appropriated funds.

Direct Spending

CBO estimates that enacting S. 2800 would increase direct spending by $85 million over the 2020-2030 period (see Table 3).

Table 3.
Increases in Direct Spending Under S. 2800

	By Fiscal Year, Millions of Dollars												
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2025	2020-2030
Enhanced-Use Lease Agreements													
Estimated Budget Authority	0	0	5	10	10	10	13	13	13	13	13	35	100
Estimated Outlays	0	0	1	3	6	8	11	12	13	13	13	18	80
Retirement Effects of Voluntary Separation Incentive Payments													
Estimated Budget Authority	0	*	*	1	1	1	1	*	*	*	*	2	5
Estimated Outlays	0	*	*	1	1	1	1	*	*	*	*	2	5
Total													
Estimated Budget Authority	0	*	5	11	11	11	14	13	13	13	13	37	105
Estimated Outlays	0	*	1	4	7	9	12	12	13	13	13	20	85

Components may not sum to totals because of rounding; * = between zero and $500,000.

Enhanced-Use Lease Agreements. Currently NASA can lease its underused property to nonfederal entities and, without further appropriation, retain and spend any amounts collected in rent for property maintenance and capital improvements. S. 2800 would permanently extend that authority, which under current law expires on December 31, 2021. The bill also would permit NASA to accept any type of in-kind consideration under EUL agreements. (NASA's current authority to accept in-kind consideration is limited to facilities that produce renewable energy.)

In the past, NASA has used its EUL authority to lease out buildings and land for nonfederal purposes, including education and research. Those leases have ranged from limited reuse to full redevelopment of the properties; they result in no significant net costs to the agency. CBO expects that some of the EUL agreements NASA would enter into during the 2022-2030 period would be similar to those transactions. In those cases, CBO estimates that there would be no significant effect on the deficit because any rent payments, which would be recorded in the budget as reductions in direct spending, would be offset by expenditures soon thereafter.

In addition, based on recent agreements NASA has executed, CBO expects that some EUL agreements would contain terms for third parties to build or renovate facilities for energy production, launch, and other specialized uses. Although NASA could use other authorities to enter into similar agreements with third parties, CBO expects the extension and expansion of in-kind consideration under S. 2800 would accelerate and increase the likelihood of such agreements. CBO also expects that some of those projects would effectively be governmental because they would be located on federal land and thus subject to NASA's control and because NASA, or other federal agencies such as the Department of Defense, would be major users of the services supported by those facilities. Thus, in CBO's view, developing and constructing facilities in that manner are governmental transactions and their costs should be recorded in the budget.[1]

Based on proposed leasing plans and costs for similar facilities, CBO estimates that under EUL agreements made final over the 2022-2030 period, third parties would invest between $750 million and $800 million in facilities for energy production, launch, and other specialized uses. The federal budgetary effects of governmental transactions financed by third parties would depend on the extent and nature of federal support. In CBO's view, transactions supported entirely by private entities should not be reflected on the federal budget because the cost of those activities would be fully born by those nonfederal entities.

However, CBO expects that some third parties would recover at least a portion of their investments through contracts with the federal government for specialized facilities used by NASA or other federal agencies—to launch satellites or other federal payloads into space, for example. In addition, based on the experience of NASA and other agencies that accept certain in-kind consideration under EUL agreements, CBO expects that expanding allowable in-kind consideration could result in renovated or new facilities for the federal government's exclusive use. CBO considers such financing on behalf of the federal government primarily for government activities to be similar to an agency's using federal borrowing authority to improve its physical infrastructure. CBO therefore regards the costs of such transactions to be direct spending and believes the full cost of long-term commitments that obligate the government to make payments in future years should be recorded in the budget.[2]

In recent years, NASA has reported a backlog of at least $1.6 billion worth of maintenance and improvement projects at five locations where it currently leases out space.[3] Based on the federal government's potential share of benefits from any new projects (which CBO estimates would average between 25 percent and 30 percent over the projects' lifetime), CBO expects that NASA would use the EUL authority under S. 2800 to finance the construction of facilities valued at about $100 million—equivalent to roughly 6 percent of NASA's maintenance backlog at those locations. Based on historical spending patterns for

1. For more information, see Congressional Budget Office, *How CBO Determines Whether to Classify an Activity as Governmental When Estimating Its Budgetary Effects* (June 2017), www.cbo.gov/publication/52803 .

2. For more information, see Congressional Budget Office, *Third-Party Financing of Federal Projects* (June 2005), www.cbo.gov/publication/16554.

3. National Aeronautics and Space Administration, *Deferred Maintenance Assessment Report: FY16 NASA-Wide Standardized Deferred Maintenance Parametric Estimate* (September 30, 2016), https://go.usa.gov/xwrsv (PDF, 1.8 MB).

similar activities, CBO estimates that direct spending would increase by $80 million over the 2022-2030 period.

Retirement Effects of Voluntary Separation Incentive Payments. As discussed above, the higher payments for voluntary separation would induce some NASA employees to leave the federal government. Those who are retirement-eligible would, in CBO's estimation, end up retiring 18 months sooner, on average, than they would under current law. Based on information from NASA and from the Office of Personnel Management, a handful of employees each year would receive retirement annuities and health benefits sooner than under current law. In total, CBO estimates, those accelerated payments would increase spending on retirement benefits by $5 million over the 2020-2030 period.

Other Provisions. S. 2800 would authorize NASA to spend, without further appropriation, any royalties received for inventions developed on the ISS by commercial entities using federal resources. Under current law, any such royalties, which are classified in the budget as offsetting receipts, or reductions in direct spending, are deposited into the general fund of the Treasury and their spending is subject to appropriation. Using information from NASA on commercial activity on the ISS and a typical timeframe for developing inventions, CBO estimates that enacting the provision would have no significant effect on direct spending over the 2020-2030 period.

Finally, S. 2800 also would permit NASA to collect and spend donations, which are classified as offsetting receipts, for space exploration. CBO expects that any amounts collected would be insignificant and offset by expenditures; the resulting net effect on direct spending would be negligible.

Uncertainty

CBO aims to produce estimates that generally reflect the middle of a range of the most likely budgetary outcomes that would result if legislation was enacted. However, direct spending under S. 2800 could be higher or lower than CBO's estimate because of the following four sources of uncertainty:

- CBO cannot precisely predict the extent to which NASA would use the EUL extension under S. 2800 in place of its other alternative financing and leasing authorities to facilitate construction of specialized facilities. In such cases, CBO has adopted a convention of assuming a 50 percent chance of an agency's using its discretion as provided in the legislation.

- CBO cannot foresee with certainty the value of third parties' investments in such facilities. Generally, investments of higher value would increase the potential for direct spending.

- CBO cannot predict with certainty whether or how the federal government would use facilities constructed by third parties under EUL agreements. If the federal government is the primary user of the services provided by those facilities, and thus serves as the main source from which third parties would recover their investments, the government's share of indirect financing for and benefits from those projects would be higher, resulting in greater direct spending. However, if the federal government makes little or no use of the services provided by such facilities, the net effect on direct spending could be insignificant. CBO expects that expanding NASA's authority to accept in-kind considerations could increase the potential for projects in which the government is a primary or exclusive user.

- Increases in spending on retirement benefits would be affected by the number of separation payments NASA offered, who received the offers, and whether the offers were accepted. CBO cannot predict those decisions or who would be affected. As a result, spending on retirement benefits could be higher or lower if NASA offered more or fewer buyouts, or if a greater or smaller share of the workforce ended up retiring.

Because of those uncertainties, the budgetary effects of enacting S. 2800 could differ significantly from those provided in CBO's estimate.

Pay-As-You-Go Considerations

The Statutory Pay-As-You-Go Act of 2010 establishes budget-reporting and enforcement procedures for legislation affecting direct spending or revenues. The net changes in outlays that are subject to those pay-as-you-go procedures are shown in Table 4.

Table 4.
CBO's Estimate of the Statutory Pay-As-You-Go Effects of S. 2800, the National Aeronautics and Space Administration Authorization Act of 2019, as Ordered Reported by the Senate Committee on Commerce, Science, and Transportation on November 13, 2019

	By Fiscal Year, Millions of Dollars												
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2020-2025	2020-2030
	Net Increase in the Deficit												
Pay-As-You-Go Effect	0	0	1	4	7	9	12	12	13	13	13	20	85

Increase in Long-Term Deficits

CBO estimates that enacting S. 2800 would not increase on-budget deficits by more than $5 billion in any of the four consecutive 10-year periods beginning in 2030.

Mandates: None.

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