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116TH CONGRESS *2d Session*	SENATE	REPORT 116–253

LEARNING EXCELLENCE AND GOOD EXAMPLES FROM NEW DEVELOPERS ACT OF 2019

R E P O R T

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ON

S. 2597

AUGUST 12, 2020.—Ordered to be printed

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

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Mr. WICKER, from the Committee on Commerce, Science, and Transportation, submitted the following

R E P O R T

[To accompany S. 2597]

[Including cost estimate of the Congressional Budget Office]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 2597) to require the National Oceanic and Atmospheric Administration to make certain operational models available to the public, and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the bill (as amended) do pass.

PURPOSE OF THE BILL

The purpose of S. 2597, the Learning Excellence and Good Examples from New Developers Act of 2019 (LEGEND Act), is to build upon the efforts of previous legislation by making additional operational models available to relevant stakeholders and to utilize any resulting innovations to improve forecasting models. Through collaboration with scientists and engineers at private companies and in academia, the National Oceanic and Atmospheric Administration (NOAA) has an opportunity to greatly advance its forecasting skill and improve the livelihoods of those who depend on forecasting accuracy.

BACKGROUND AND NEEDS

The National Weather Service (NWS) leads NOAA's operational weather forecasting efforts through its mission to provide weather, water, and climate data, forecasts, and warnings to protect life and

property and enhance the Nation's economy.[1] Enhancing forecasting accuracy not only helps protect life, but also property from severe weather conditions. The economic cost of weather- and climate-related disasters has an enormous negative toll on American communities, and the most costly disasters are becoming more frequent.[2] From the agricultural impacts to infrastructure damage, businesses and families face substantial financial gain or loss depending on annual weather trends and longer term climate trends. Experts estimate that between 3 and 6 percent of the annual variability in U.S. GDP is attributed to weather.[3]

Congress has long supported Federal efforts to provide accurate forecasts to strengthen the national economy and provide strong decision-making support to farmers, ranchers, water managers, and small businesses. To move closer to this goal, several laws have been enacted over the last few years focused on building stronger partnerships between government agencies and the private sector to improve the weather forecasting skill of the United States.

On April 18, 2017, the Weather Research and Forecasting Innovation Act of 2017 (the Weather Act) was signed into law to improve NOAA's weather forecasting skill through investment in observational, computing, and modeling capabilities.[4] The bill included a requirement for NOAA's Office of Oceanic and Atmospheric Research to carry out a Weather Research and Forecasting Innovation program, including a technology transfer initiative in coordination with NWS, the academic sector, and private weather companies. Additionally, the bill further allowed for the Secretary of Commerce, and by extension, NOAA, to contract with commercial providers to purchase weather data or to place weather satellite instruments on cohosted payloads.

On January 7, 2019, the National Integrated Drought Information System (NIDIS) Reauthorization Act of 2018 was signed into law to reauthorize the NIDIS program through 2023.[5] The bill amended the Weather Research and Forecasting Innovation Program authorized in 2017 to include authorization for the Earth Prediction Innovation Center (EPIC). EPIC is intended to advance weather modeling and improve the translation of forecasting research into operational models by leveraging private sector innovations, increasing collaboration between governmental and non-governmental scientists and engineers, strengthening and leveraging internal NOAA resources, and creating a community based global research modeling system.

This system is to be usable on public computers and networks outside of NOAA, and hosted by a cost-effective technology like cloud computing. These changes will make the current operational

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[1] National Weather Service, "National Weather Service Mission Statement", 2016 (*https://www.nws.noaa.gov/mission.php*) (accessed Mar. 2, 2020).

[2] National Centers for Environmental Information, "Billion-Dollar Weather and Climate Disasters: Overview", 2019 (*https://www.ncdc.noaa.gov/billions/*). See also, Adam B. Smith, "2018's Billion Dollar Disaster in Context", 2019 (*https://www.climate.gov/news-features/blogs/beyond-data/2018s-billion-dollar-disasters-context*) (accessed Mar. 2, 2020).

[3] National Weather Service, *National Weather Service Enterprise Analysis Report*, Jun. 8, 2017, p. 7 (*https://www.weather.gov/media/about/Final_NWS%20Enterprise%20Analysis%20Report_June%202017.pdf*) (accessed Mar. 2, 2020).

[4] Pub. L. 115–25.

[5] Pub. L. 115–256.

models more nimble and effective, and have the potential to greatly advance NOAA's forecasting skill.

The LEGEND Act intends to clarify and strengthen these efforts by requiring that operational weather models be made available to the public, while including permissive authority for NOAA to make experimental models available. The LEGEND Act also specifically allows the Administrator to withhold from publication any models or data necessary to protect national security interests.

SUMMARY OF PROVISIONS

S. 2597, the Learning Excellence and Good Examples from New Developers Act of 2019, would do the following:

- Make certain operational models publicly available;
- Require a review of models and leverage private sector innovations; and
- Require NOAA to report to Congress on the implementation of LEGEND's mandates.

LEGISLATIVE HISTORY

S. 2597 was introduced on October 15, 2019, by Senator Thune (for himself and Senator Schatz) and was referred to the Committee on Commerce, Science, and Transportation of the Senate. On November 13, 2019, the Committee met in open Executive Session and, by voice vote, ordered S. 2597 to be reported favorably with an amendment.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

S. 2597, LEGEND 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	0	0
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	0	135	not estimated

Statutory pay-as-you-go procedures apply?	No	**Mandate Effects**	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2031?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

S. 2597 would direct the National Oceanic and Atmospheric Administration (NOAA) to publish its weather-forecasting models and associated government-owned data in an open-source format. The bill would require NOAA to periodically review any improvements

made to those open-source models by people outside the government and update its models accordingly. The bill also would require NOAA to report to the Congress on the implementation of S. 2597 within one year of enactment.

Under current law, NOAA provides public access to some of its operational and research models. The agency would need additional resources to provide permanent archive and open-source access to all such models, which currently use many petabytes of data (a petabyte is one million gigabytes).

CBO assumes the bill will be enacted in fiscal year 2020. The bill would require NOAA to implement the requirements over the 2021–2026 period.

Using information from NOAA about the many models and related data that would be made public under the bill and on the cost to convert those data into an open-source format, CBO estimates that implementing S. 2597 would cost $135 million over the 2020–2025 period. NOAA's costs would total nearly $30 million a year, on average, for 45 additional employees and additional equipment and services. Such spending would be subject to appropriation of the necessary amounts.

The costs of the legislation, detailed in Table 1, fall within budget function 300 (natural resources and environment).

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER S. 2597

	By fiscal year, millions of dollars—						
	2020	2021	2022	2023	2024	2025	2020–2024
Estimated Authorization	0	20	35	35	30	30	150
Estimated Outlays	0	10	25	35	35	30	135

The CBO staff contact for this estimate is Robert Reese. The estimate was reviewed by H. Samuel Papenfuss, Deputy Director of Budget Analysis.

REGULATORY IMPACT STATEMENT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported:

NUMBER OF PERSONS COVERED

S. 2597 as reported does not create any new programs or impose any new regulatory requirements, and therefore will not subject any individuals or businesses to new regulations.

ECONOMIC IMPACT

S. 2597 is not expected to have a negative impact on the Nation's economy.

PRIVACY

The reported bill would have no impact on the personal privacy of individuals.

PAPERWORK

S. 2597 would require a report on implementation from NOAA.

CONGRESSIONALLY DIRECTED SPENDING

In compliance with paragraph 4(b) of rule XLIV of the Standing Rules of the Senate, the Committee provides that no provisions contained in the bill, as reported, meet the definition of congressionally directed spending items under the rule.

SECTION-BY-SECTION ANALYSIS

Section 1. Short title.

This section would provide that the bill may be cited as the "Learning Excellence and Good Examples from New Developers Act of 2019".

Section 2. Definitions.

This section would establish definitions for the subsequent terms: "Administration", "Administrator", "model", "operational model", and "open source code".

Section 3. Purposes.

This section would determine the purposes of this Act are to support modeling innovation by providing interested stakeholders access to the models and data used by NOAA and encourage NOAA to resulting innovation as appropriate.

Section 4. Requirement to make certain operational models available to the public.

This section would require NOAA to make any current and future operational models developed by the Administration open source for use by the relevant stakeholders. It would also allow the agency to determine which, if any, experimental models should be made available to the public as open source code.

This section would also allow the Administrator to determine use of government servers or private vendor contracts in carrying out efforts to release modeling source code.

This section also would require a phased implementation of the purpose of the bill. For operational models, this section would require an immediate implementation. For new models that are created or substantially updated following the enactment of this bill, the Administrator would have up to 1 year to make the source code available.

Section 5. Requirement to review models and leverage innovations.

This section would require the Earth Prediction Innovation Center (EPIC) to periodically review the private sector's innovations and improvements to the operational models, and develop and implement a plan to use these improvements.

Section 6. Report on implementation.

This section would require NOAA to submit a report on the implementation of this bill to the Senate Committee on Commerce, Science, and Transportation, the Senate Committee on Appropria-

tions, the House Committee on Science, Space, and Technology, and the House Committee on Appropriations.

Section 7. Protection of national security interests.

This section would give the Administrator the authority to withhold data or models used in operational weather forecasting if the Administrator determines it necessary to protect national security interests.

Section 8. Funding.

This section would require NOAA to carry out the Act using amounts available to the Administrator for fiscal years 2021 through 2026.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in italic, existing law in which no change is proposed is shown in roman):

WEATHER RESEARCH FORECASTING AND INNOVATION ACT OF 2017

* * * * * * *

[15 U.S.C. 8512(b)]

SEC. 102. WEATHER RESEARCH AND FORECASTING INNOVATION.

(a) * * *

(b) PROGRAM ELEMENTS.—The program described in subsection (a) shall focus on the following activities:

(1) * * *

* * * * * * *

(4) A technology transfer initiative, carried out jointly and in coordination with the Director of the National Weather Service, and in cooperation with the United States weather industry and academic partners, to ensure continuous development and transition of the latest scientific and technological advances into operations of the National Weather Service and to establish a process to sunset outdated and expensive operational methods and tools to enable cost-effective transfer of new methods and tools into operations.

[(4)**]** *(5)* Advancing weather modeling skill, reclaiming and maintaining international leadership in the area of numerical weather prediction, and improving the transition of research into operations by—

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