U.S. DEPARTMENT OF ENERGY | Office of Science

HEP and the Federal Budget Process

July 31, 2017

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HEP Civics: The Federal Budget Process

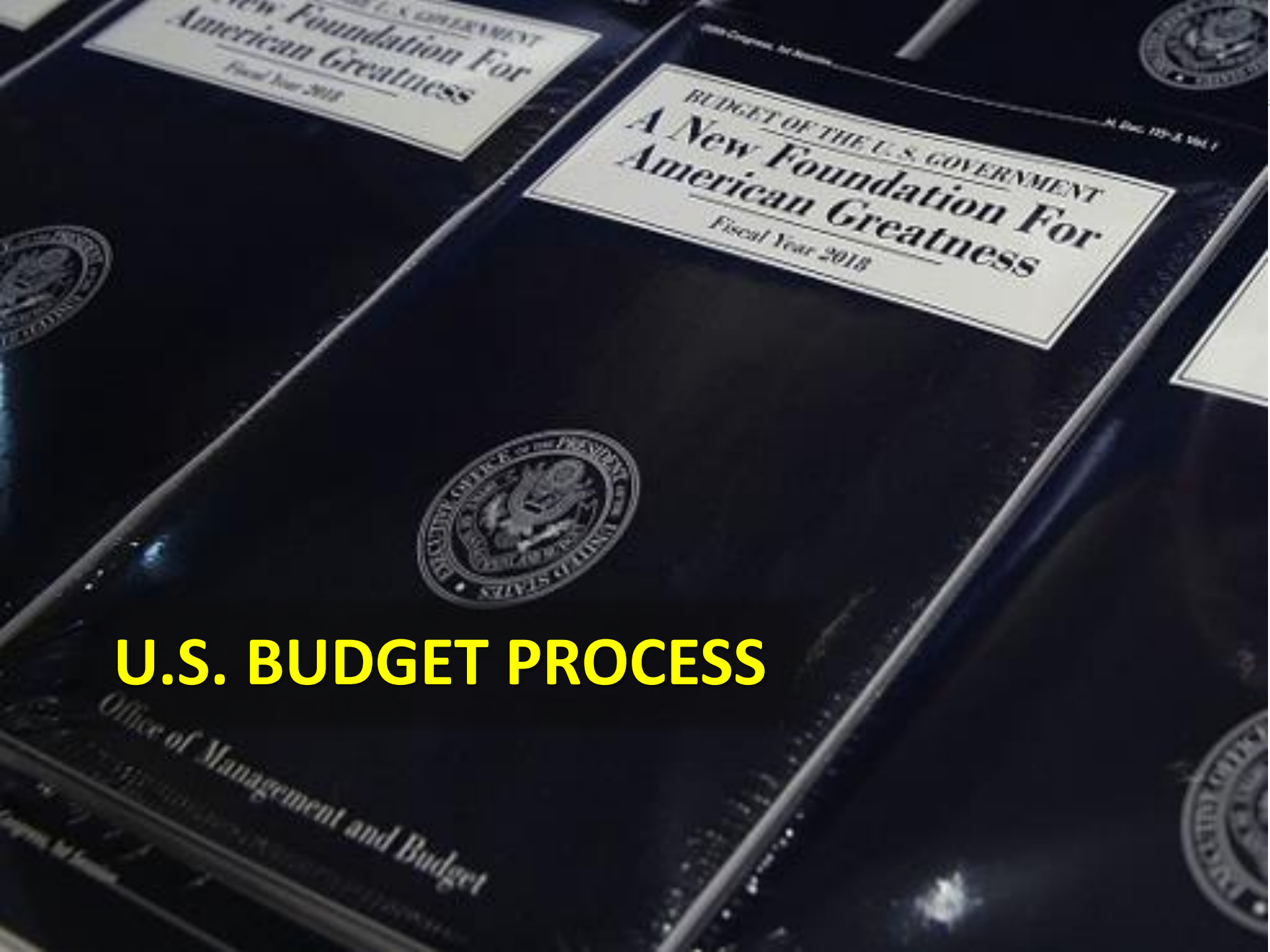
- **This talk will "follow the money" in an aim to illuminate the DOE/HEP role in the Federal budget process**
  - Three phases of the budget process
  - DOE/HEP role in each phase
  - Lab/university/community roles in overall program

- **Along the way, highlight how the P5 report is having a significant impact in all phases of this process**

- **Aim is to give a useful overview, but it is not possible to capture the full details or history of each item discussed!**

Federal Employee Restrictions

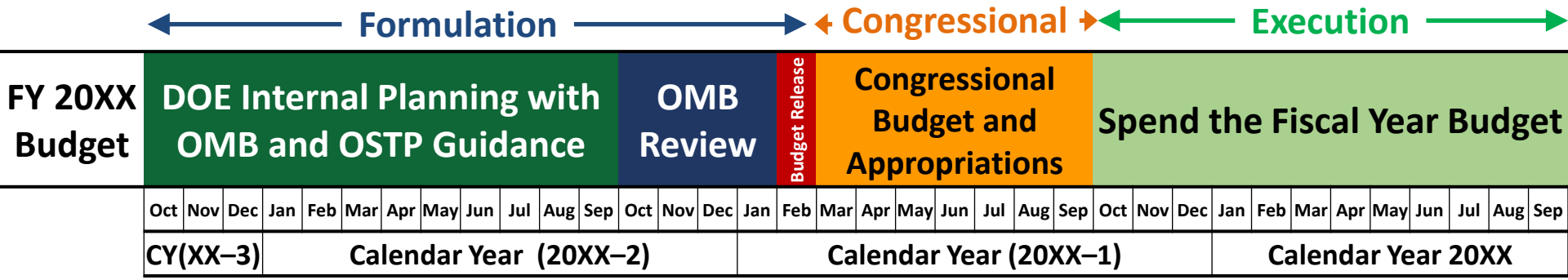
- **Lobbying (http://energy.gov/management/lobbying)**
  - Generally prohibited from contacting or encouraging others to contact a state or federal legislator or executive branch official in an attempt to influence the enactment or modification of legislation or other specified activities
- **Partisan Political Activity (https://osc.gov/Pages/HatchAct.aspx)**
  - In general, executive branch federal employees may not:
    - Use official authority or influence to interfere with an election
    - Solicit or discourage political activity of anyone with business before their agency
    - Solicit or receive political contributions (may be done in certain limited situations by federal labor or other employee organizations)
    - Be candidates for public office in partisan elections
    - Engage in political activity while: on duty, in a government office, wearing an official uniform, or using a government vehicle
    - Wear partisan political buttons on duty
  - Certain employees (incl. Senior Executive Service) are further restricted!
- ***(And more…)***



U.S. BUDGET PROCESS

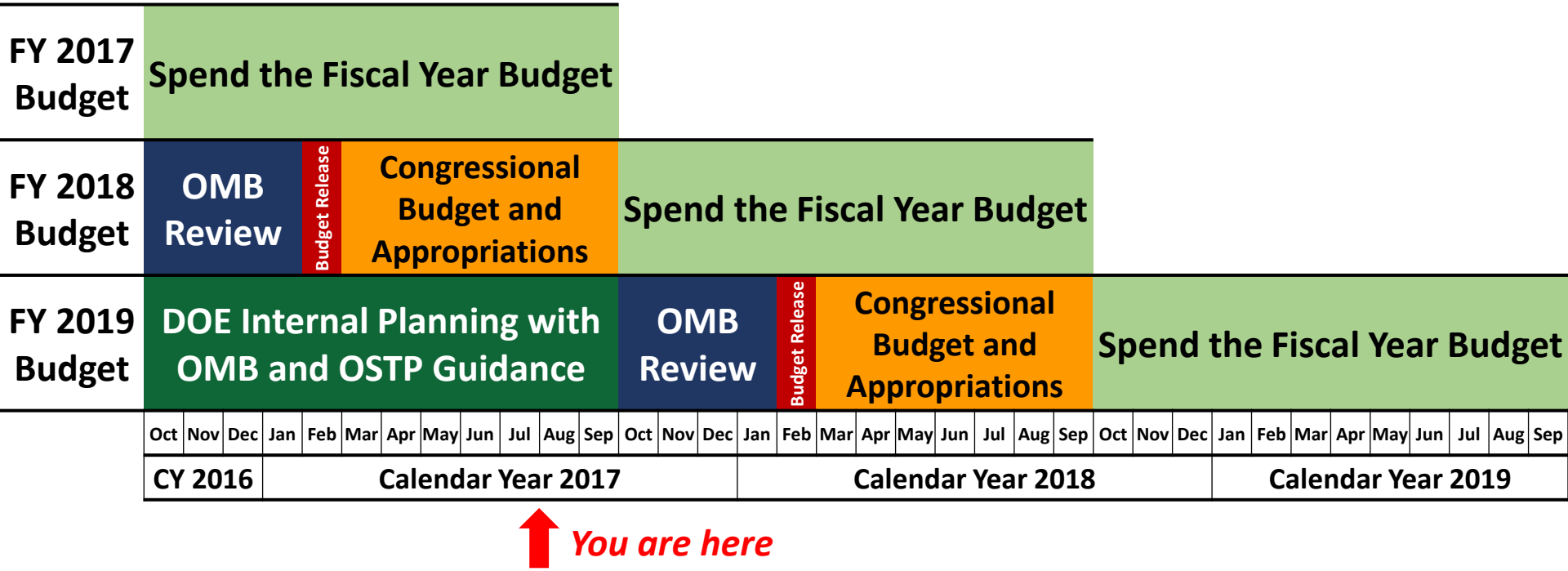
Three Phases of Budget Process

- **Formulation: Executive branch prepares the President's Budget Request**
  - White House Office of Management and Budget (OMB) controls this process, providing guidance to Executive branch agencies
- **Congressional: Enacts laws that control spending and receipts**
  - Congress considers the President's Budget proposals, passes a budget resolution, and enacts the regular appropriations acts and other laws that control spending and receipts
- **Execution: Executive branch agencies carry out program**
  - OMB apportions funds to Executive Branch agencies, which obligate and disperse funding to carry out their programs, projects, and activities



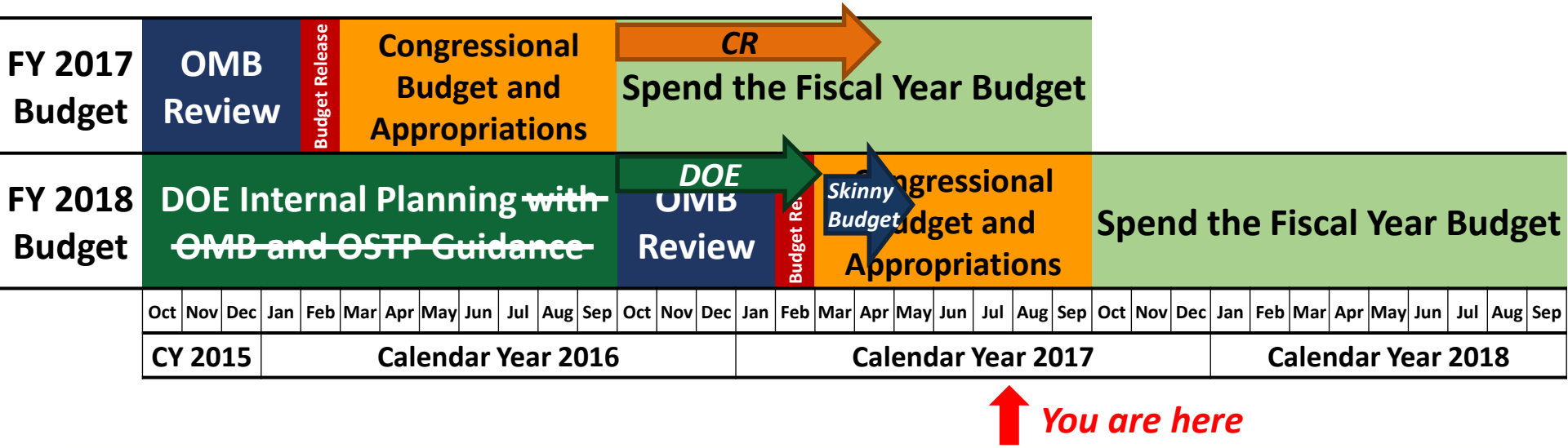
The U.S. Federal Budget Cycle

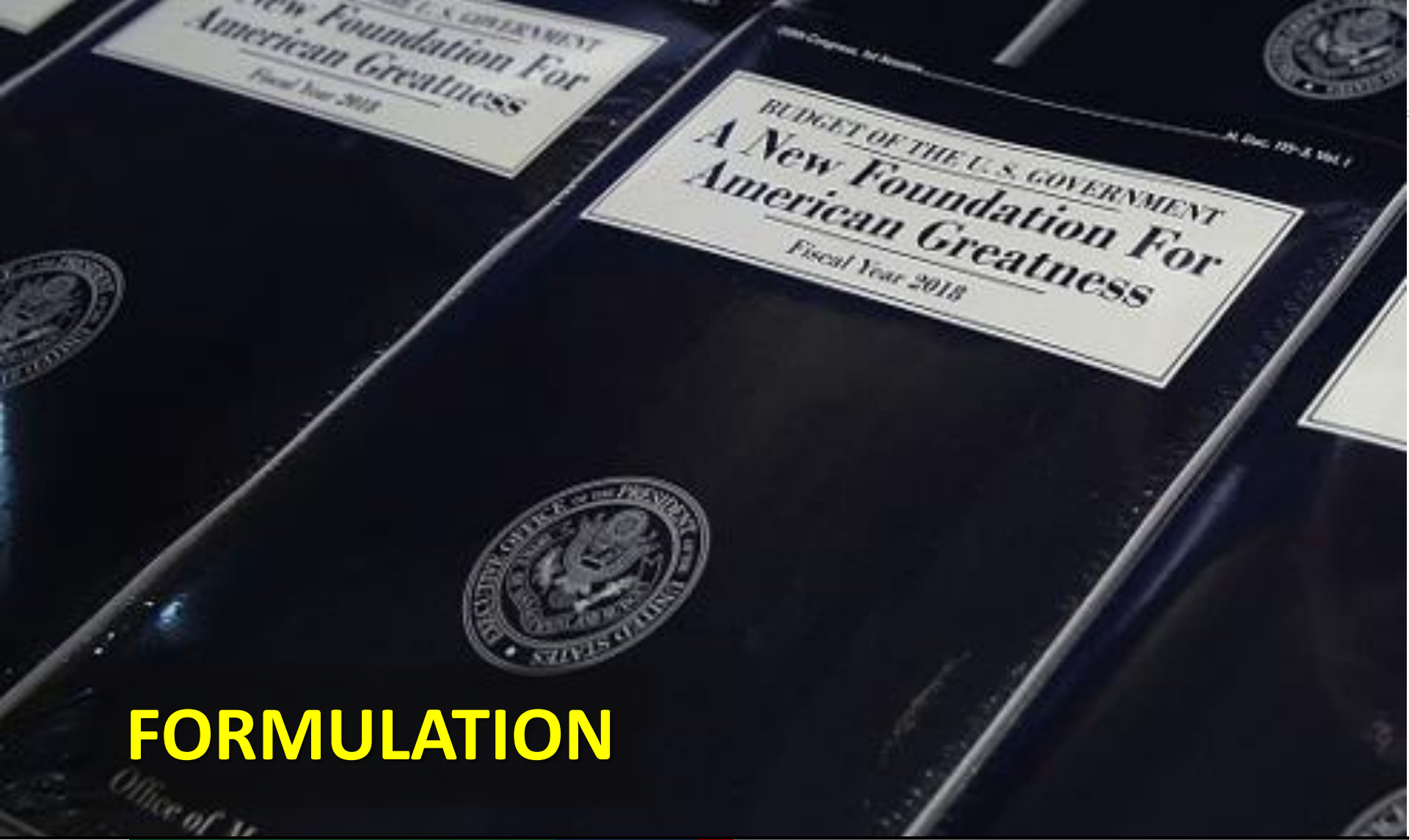
- **Typically, three budgets are being worked on at any given time**
  - Executing current Fiscal Year (FY; October 1 – September 30)
  - White House Office of Management and Budget (OMB) review and Congressional Appropriation for coming FY
  - Agency internal planning for the second FY from now



The U.S. Federal Budget Cycle

- **This year's cycle is not "typical"**
  - Congress used **Continuing Resolutions (CRs)** until passing an appropriation on May 5
  - White House released the **"skinny budget"** on March 13, guiding the budget formulation
  - FY 2018 **President's Budget Request** released on May 23
  - FY 2018 **Congressional Marks released** in June/July





FORMULATION

FY 20XX Budget	DOE Internal Planning with OMB and OSTP Guidance	OMB Review	Budget Release	Congressional Budget and Appropriations	Spend the Fiscal Year Budget

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	CY(XX–3)			Calendar Year (20XX–2)												Calendar Year (20XX–1)												Calendar Year 20XX								

Overview of Budget Formulation Process

Spring

Spring & Summer

June

Sept.

Fall

Late Nov.

Dec.

Jan.

→ **OMB provides policy guidance for Executive branch agency budget requests**
- Absent more specific guidance, agencies start with outyear estimates from previous budget

→ **OMB works with agencies**
- Identify major issues, develop plans for fall review, plan analysis of issues that will require decisions

→ **OMB provides detailed instructions for submitting budget material**

→ **Agencies submit budgets to OMB**

→ **OMB reviews budget proposals**
- Considers Presidential priorities, program performance, budget constraints

→ **OMB provides recommended budget proposal to President and provides passback to agencies**

→ **December: Agencies may appeal to OMB and the President**

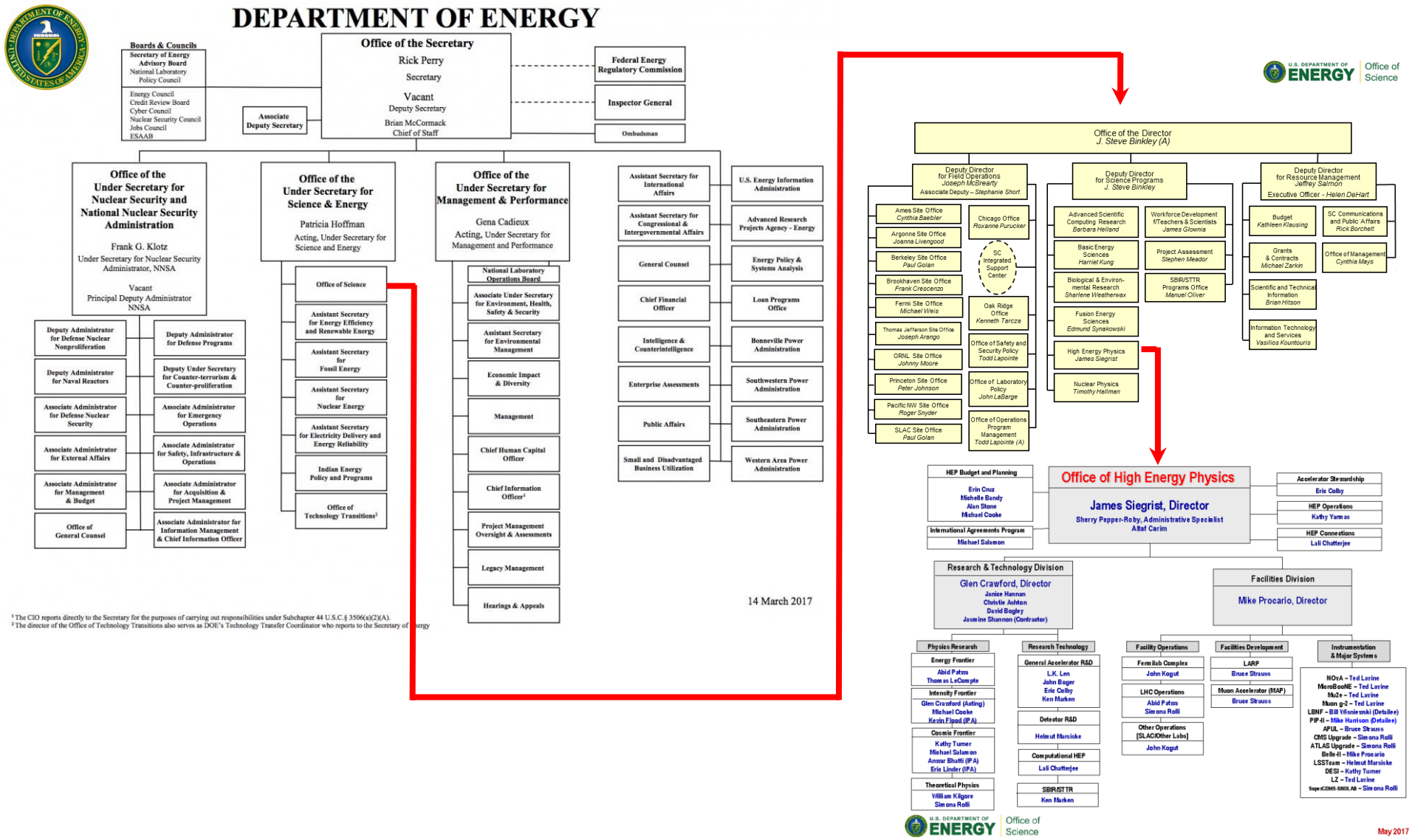
→ **January: Agencies prepare and OMB reviews final congressional budget justification materials**

→ **February: President transmits budget to Congress**

Mission of the Department of Energy

- **The mission of the Energy Department is to ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions.**
  - Catalyze the timely, material, and efficient transformation of the nation's energy system and secure U.S. leadership in clean energy technologies.
  - **Maintain a vibrant U.S. effort in science and engineering as a cornerstone of our economic prosperity with clear leadership in strategic areas.**
  - Enhance nuclear security through defense, nonproliferation, and environmental efforts.
  - Establish an operational and adaptable framework that combines the best wisdom of all Department stakeholders to maximize mission success.

DOE Organization Chart



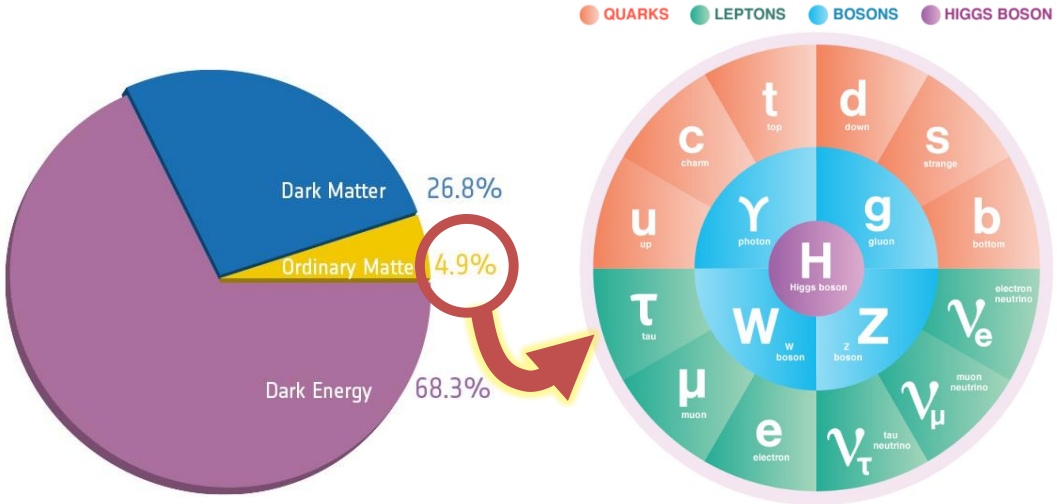
The High Energy Physics Program Mission

…is to understand how the universe works at its most fundamental level:

- Discover the elementary constituents of matter and energy
- Probe the interactions between them
- Explore the basic nature of space and time

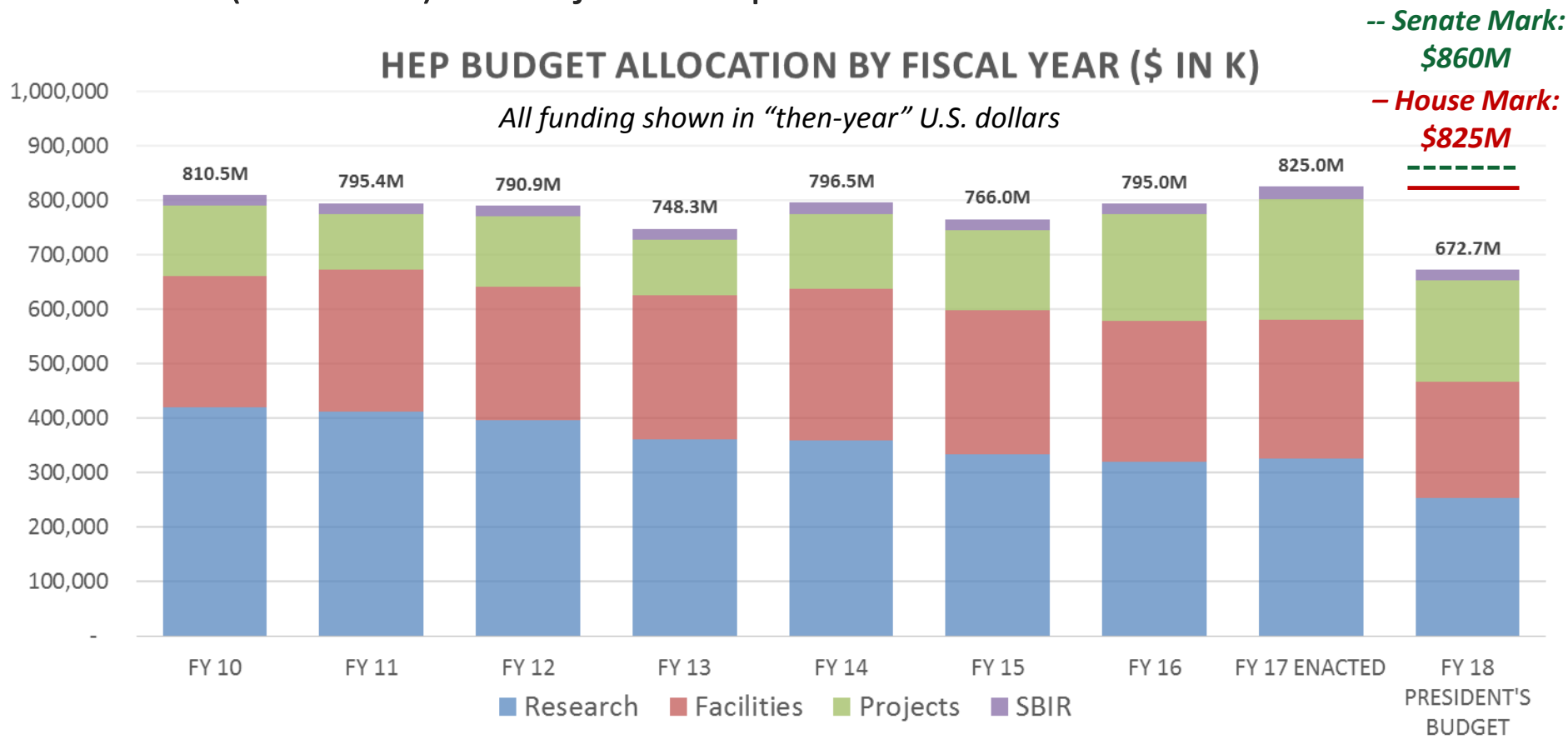
The Office of High Energy Physics fulfills its mission by:

- Building **projects** that enable discovery science
- Operating **facilities** that provide the capability to perform discovery science
- Supporting a balanced **research** program that produces discovery science



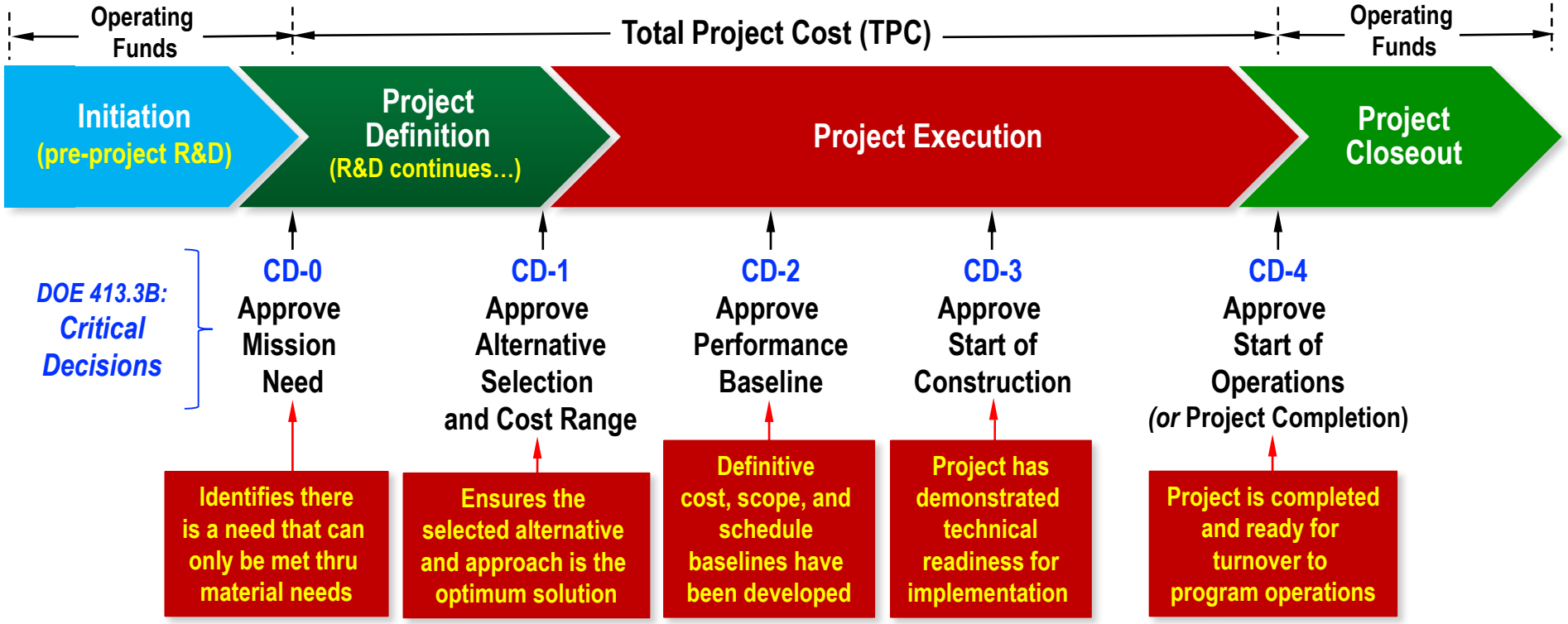
Overall HEP Budget Trend

- **Enabling science results is typically a process that spans many years**
- **For a given experiment:**
  - R&D (Research) → Project → Operations → Research



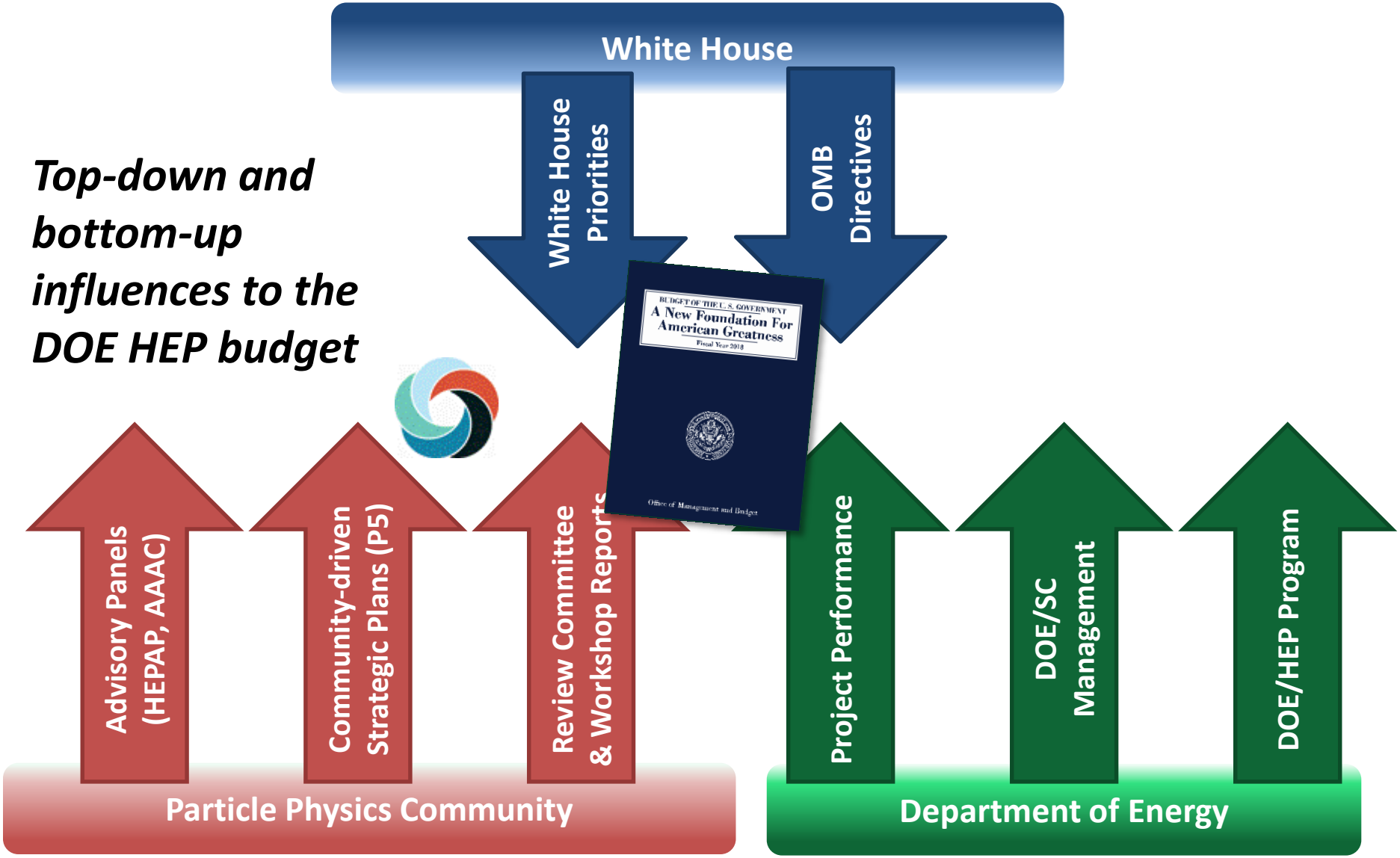
DOE Project Management

- Construction projects and fabrication of large pieces of experimental equipment costing over $10M are managed through a series of "Critical Decision" milestones
- The CD process ensures successful project execution and scientific return on agency investments, but funding must still be appropriated
  - Linked to – *but independent of* – the budget process!

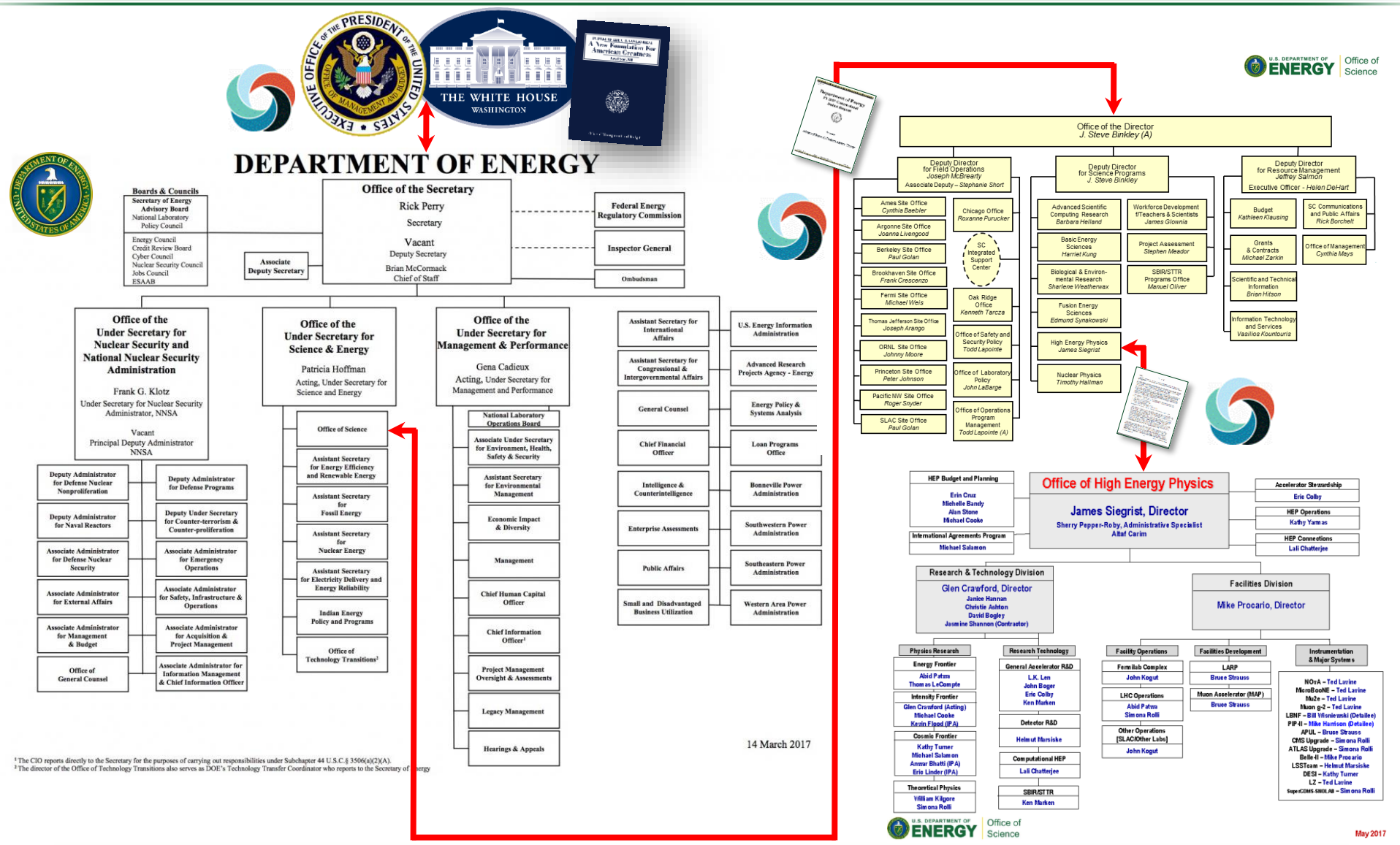


Creating the DOE HEP Budget Request

Top-down and bottom-up influences to the DOE HEP budget

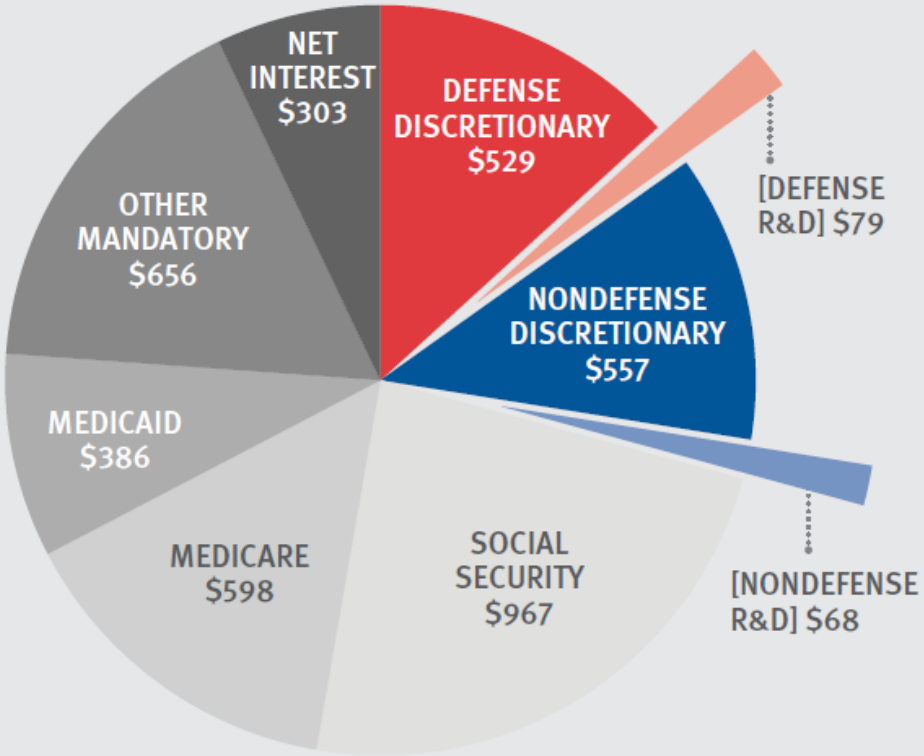


Path to the President's Budget Request



The FY 2017 President's Budget Request

Figure 2: Composition of the Proposed FY 2017 Budget
Total Outlays = $4.1 trillion
(outlays in billions of dollars)



**Approximately $4 billion for R&D is financed through mandatory spending.*
Figures are estimates.
Source: Budget of the United States Government FY 2017. © 2016 AAAS

Figure 3: Base Budget R&D by Agency, FY 2017
(budget authority in billions of dollars)

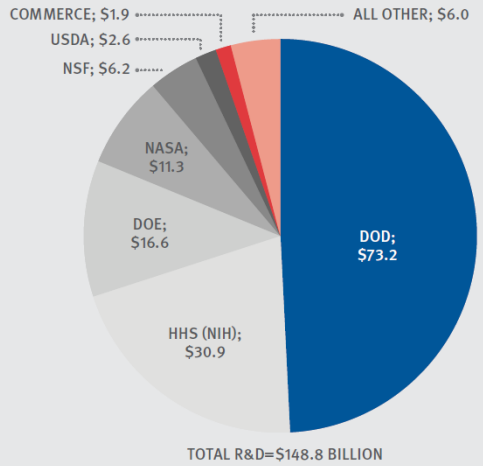
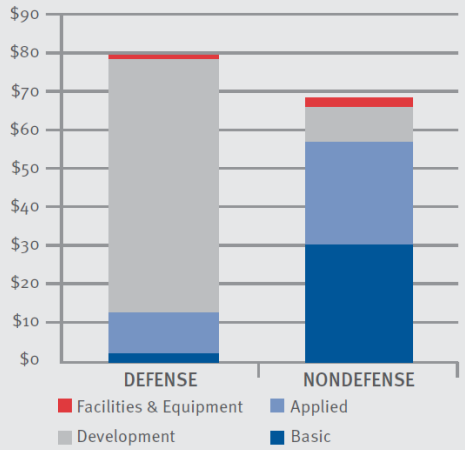


Figure 4: FY 2017 Base Budget R&D by Character
(budget authority in billions)

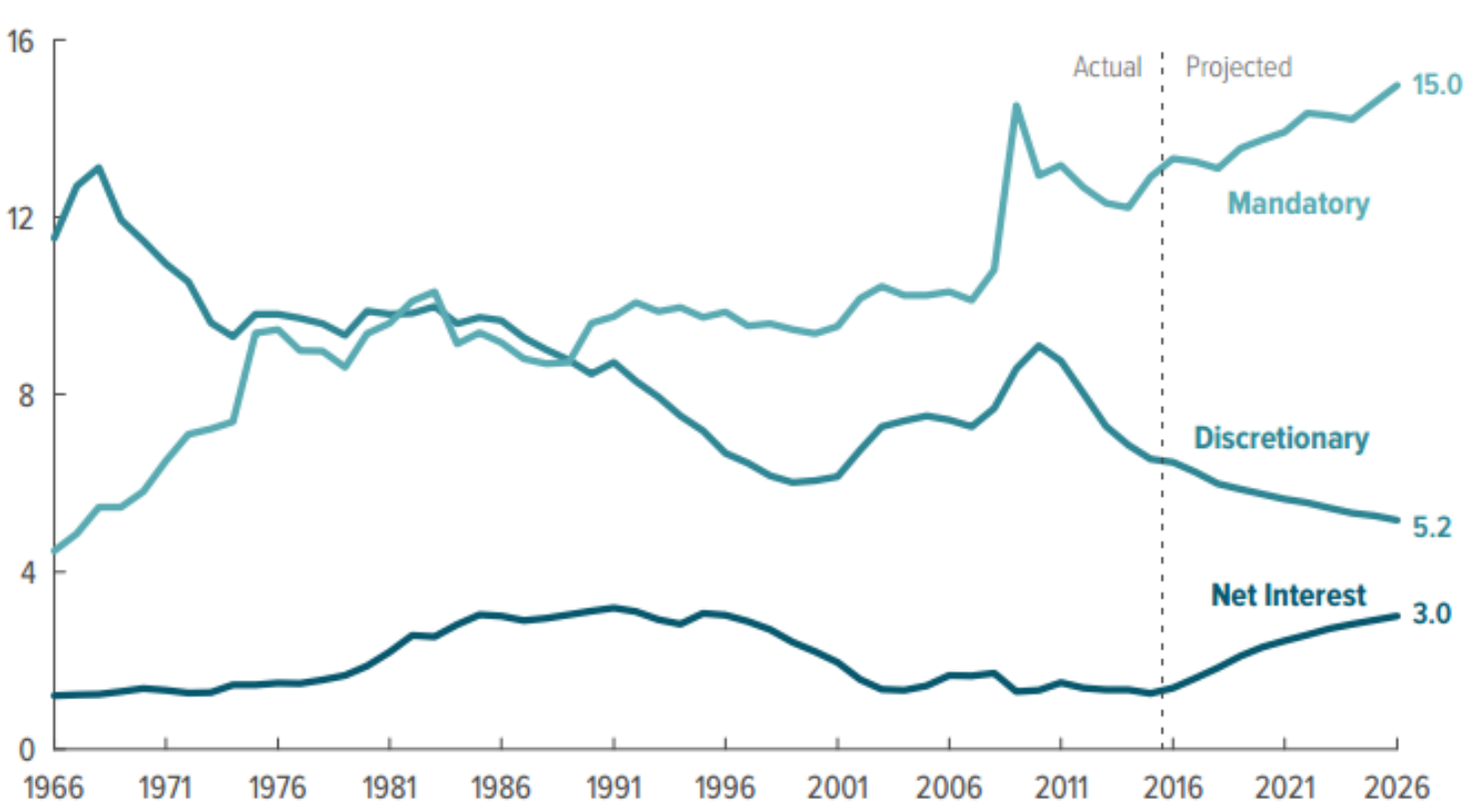


Source: OMB and agency R&D data. © 2016 AAAS

Congressional Budget Office Outlook

Outlays, by Type of Spending

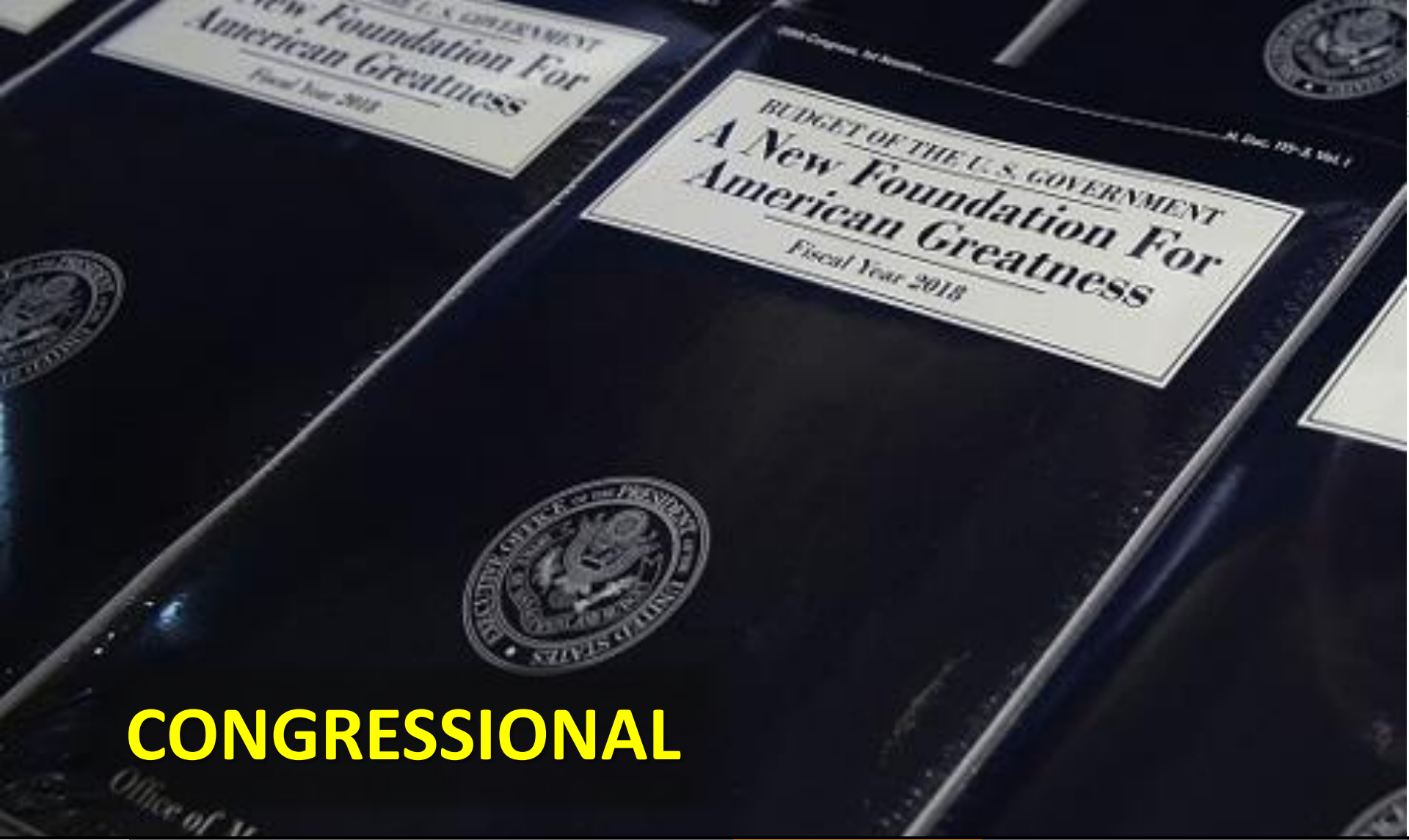
Chart produced January 2015



Under current law, rising spending for Social Security and Medicare would boost mandatory outlays.

Total discretionary spending is projected to fall relative to GDP as funding grows modestly in nominal terms.

At the same time, higher interest rates and growing debt are projected to push up net interest payments.



CONGRESSIONAL

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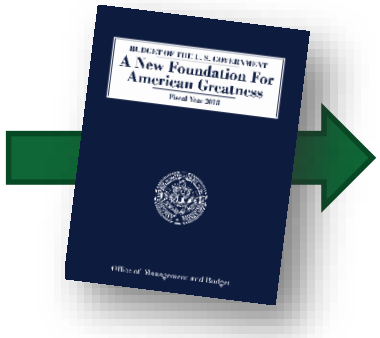
U.S. Budget and Appropriations Process

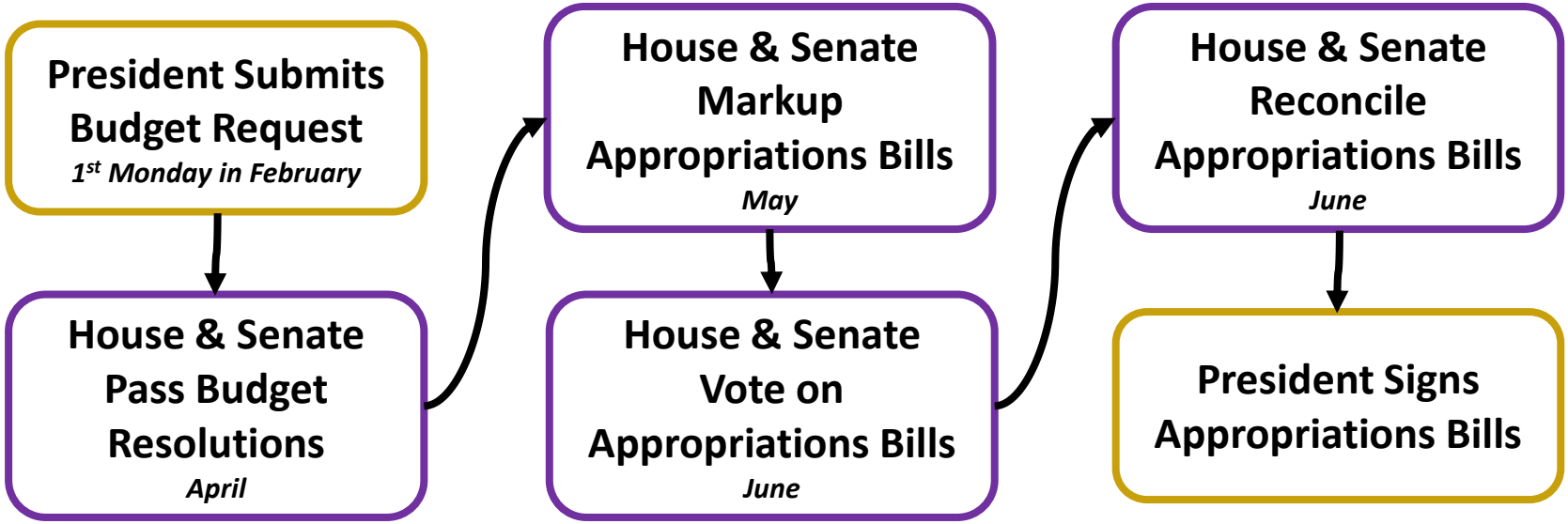


- **President requests, but Congress "holds the purse"**
- **Congressional activity in this phase is a complex process!**
- ***Congressional Budget and Impoundment Control Act of 1974* establishes timetable for the budget process**

On or Before:	Action to be completed:
1st Mon. in Feb.	President submits his budget
<6 weeks after PBR submitted	Committees submit views and estimates to Budget Committees
April 15	Congress completes action on the concurrent resolution on the budget
May 15	Annual appropriation bills may be considered in House
June 10	House Appropriations Committee reports last annual appropriation bill
June 15	Congress completes reconciliation
June 30	House completes action on bills
October 1	Fiscal year begins

Congressional Budget Process

- **Budget Resolution**
  - Overall appropriation committee sets each subcommittee's allocation of spending authority for the next fiscal year and aggregate spending and revenue levels for 5 years
- **Authorization legislation**
  - May create or continue agencies, programs, or activities as well as authorize and recommend funding levels for the subsequent enactment of appropriations
- **Appropriation bills (must originate in House)**
  - 12 bills define discretionary spending and provide the funding for authorized agencies, programs, or activities
  - Energy and Water Development Subcommittee has jurisdiction over DOE



Appropriations Subcommittees

- **Agriculture, Rural Development, Food and Drug Administration, and Related Agencies**
- **Commerce, Justice, Science, and Related Agencies**
  - National Aeronautics and Space Administration
  - National Science Foundation
- **Defense**
- **Energy and Water Development**
  - Department of Energy
- **Financial Services and General Government**
- **Homeland Security**
- **Interior, Environment, and Related Agencies**
  - Specific portions of Department of Health and Human Services
- **Labor, Health and Human Services, Education, and Related Agencies**
  - Department of Health and Human Services (with above exceptions)
- **Legislative Branch**
- **Military Construction, Veterans Affairs, and Related Agencies**
- **State, Foreign Operations, and Related Programs**
- **Transportation, Housing and Urban Development, and Related Agencies**

HEP Role in Congressional Process

- **The budget narrative provides the justification for the level of support in the President's Budget Request**
  - Narrative provides overview of the HEP program, highlights from the past year, and discussion of:
    - Line Item Construction, Major Items of Equipment, New Initiatives or New Starts, Facilities Operations, and Research program plans
  - Tables with detailed breakdown of funding for past year vs. current year vs. budget request
  - Explanation of changes for each line of budget table
- **Agencies usually invited to brief Congress on their budget request**
  - Opportunity to reinforce overall strategy and highlight key elements of the request
    - Recall that Congress must individually approve each DOE project >$10M
  - Informational request for additional detail
  - Respond to requests regarding impact of alternative funding decisions

Department of Energy Research and Innovation Act

- **Passed House under unanimous consent (voice vote) on January 24, 2017**

- **SEC. 305. HIGH-ENERGY PHYSICS.**
  - (a) Sense Of Congress.—It is the sense of Congress that—
    - (1) the Director should incorporate the findings and recommendations of the report of the Particle Physics Project Prioritization Panel entitled "Building for Discovery: Strategic Plan for U.S. Particle Physics in the Global Context" into the planning process of the Department; and
    - (2) the nations that lead in particle physics by hosting international teams dedicated to a common scientific goal attract the world's best talent and inspire future generations of physicists and technologists.
  - (b) International Collaboration.—The Director, as practicable and in coordination with other appropriate Federal agencies as necessary, shall ensure the access of United States researchers to the most advanced accelerator facilities and research capabilities in the world, including the Large Hadron Collider.
  - (c) Neutrino Research.—The Director shall carry out research activities on rare decay processes and the nature of the neutrino, which may include collaborations with the National Science Foundation or international collaborations.
  - (d) Dark Energy And Dark Matter Research.—The Director shall carry out research activities on the nature of dark energy and dark matter, which may include collaborations with the National Aeronautics and Space Administration or the National Science Foundation; or international collaborations.

Report Language Matters!

- **Congress will usually specify top-line budget for a program and sometimes direct specific project or subprogram budget levels**
  - It is up to program management to make things work "within available funds"
- **Example: HEP received $825M in the FY 2017 Congressional Appropriation, about $7M above the FY 2017 President's Budget Request**
  - Congressional direction increased funding for specific MIEs/projects by $9.9M
  - **Difference ($9.9M - $7M = $2.9M) has to come out of the rest of the program**

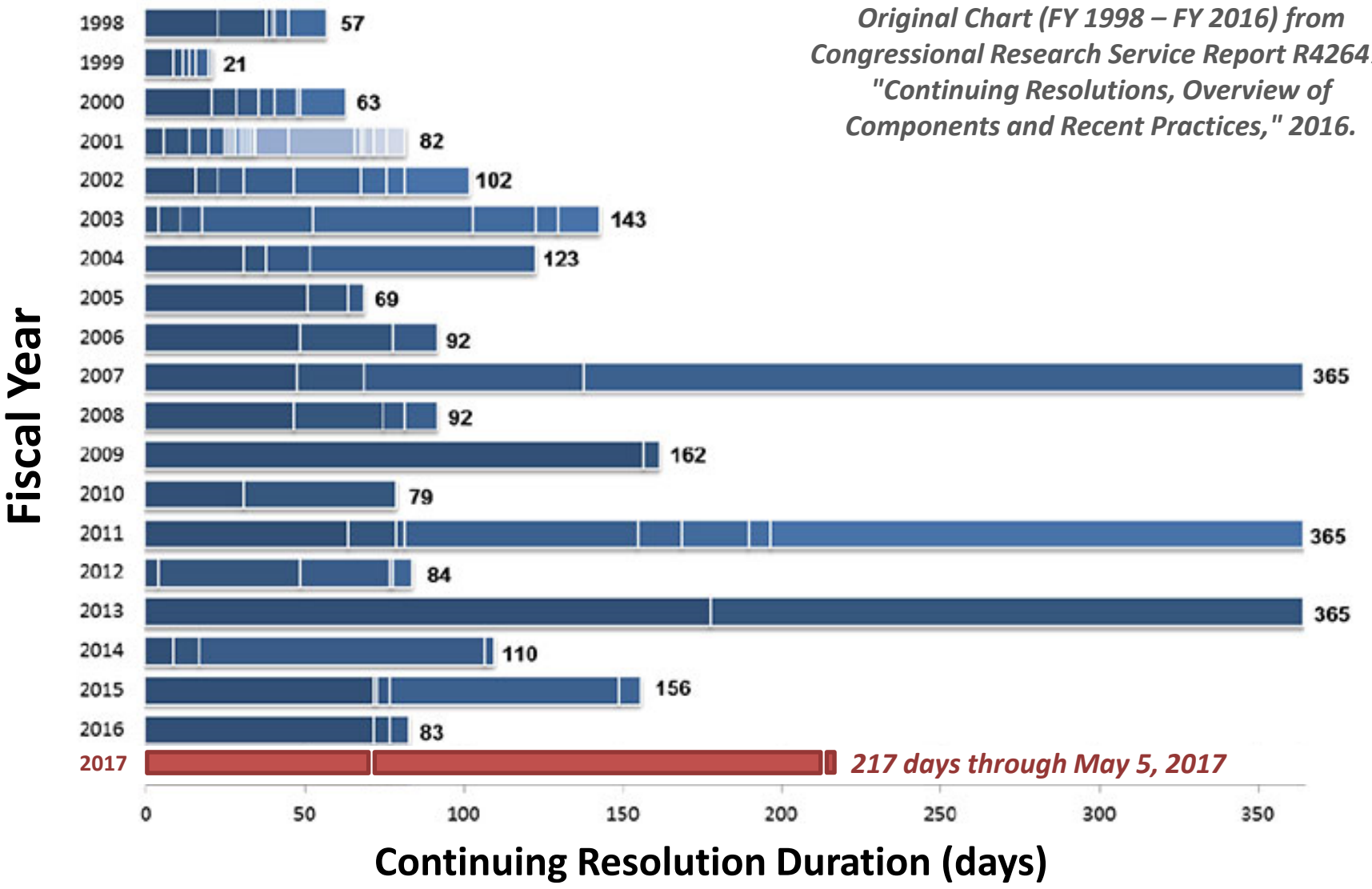
DEPARTMENT OF ENERGY
(Amounts in thousands)

	FY 2016 Enacted	FY 2017 Request	Final Bill
High energy physics:			
Research	728,900	729,476	731,500
Construction:			
11-SC-40 Long baseline neutrino facility / deep underground neutrino experiment, FNAL	26,000	45,021	50,000
11-SC-41 Muon to electron conversion experiment, FNAL	40,100	43,500	43,500
Subtotal, Construction	66,100	88,521	93,500
Subtotal, High energy physics	795,000	817,997	825,000

Breaking the Cycle: Continuing Resolution

- **If the U.S. Congress and the President have not passed all appropriations bills by September 30, a Continuing Resolution (CR) may be passed to avoid a U.S. Government shutdown**
  - Must pass some level of appropriations to have legal authority to spend money!
  - CRs typically extend level of funding from the previous year for a set amount of time *with no significant programmatic changes* (a.k.a. "no new starts")
- **Therefore, a CR may impede the start of new projects**
  - Projects with total cost >$10M must be approved by Congress in an appropriations bill before funding can begin
  - It is possible, though not typical, for CRs to include "anomalies" that would allow new starts
- **A CR may also impact the ramp-up of new projects**
  - DOE is committed to the successful execution of projects that have reached CD-2 and aims to provide the baseline funding profile
  - Projects that have not reached CD-2 are most likely to be impacted under a CR
- **A CR may also impact future-year planning through such effects…**

Duration of CRs: FY 1998 – FY 2017



Original Chart (FY 1998 – FY 2016) from Congressional Research Service Report R42647, "Continuing Resolutions, Overview of Components and Recent Practices," 2016.

EXECUTION

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Budget Execution

- **Start from the general plan laid out in budget formulation, modified by the actual appropriation, taking into account:**
  - Strategic plan for program
  - Available funding vehicles
  - Stewardship of DOE National Laboratories
  - Support for projects
  - Coordination with partners
- **Note that it typically takes some time to translate Congressional Appropriation into detailed agency-level budgets:**
  - Appropriations bills are long and detailed
  - If in a CR, have to resolve current spending level versus final Appropriation
  - Often there are “rescissions” and/or recovery of prior year balances
  - Occasionally there are internal contradictions or errors
  - Agency CFOs have to resolve all this and get agreement with OMB before issuing current FY “allotments” of budget authority

Funding Vehicles

- **DOE National Laboratories**
  - Most are Government Owned/Contractor Operated (GOCO) Federally Funded Research and Development Centers (FFRDCs) and operate under Management and Operating (M&O) contracts
  - Laboratory research is mission driven and funded through Field Work Proposals (FWPs)
    - Comparative reviews of the Lab Research programs held every 3-4 years
  - **Laboratories propose yearly financial plans based on DOE guidance**
    - Mechanisms exist to tune funding each month
- **Universities**
  - **Submit grant proposals in response to a Funding Opportunity Announcement (FOA)**
    - Independent peer review informs the selection of awards
  - Award is ~fixed once made, with typical funding cycle of 3 years
    - Funding adjustments (downward) are possible if circumstances change
    - Changes are also possible through submission of supplementary proposals

Typical FOAs & New Initiatives

- **In recent years, there is one "continual" FOA (DOE/SC Open Solicitation) and these annual FOAs:**
  - Research Opportunities in HEP (a.k.a. Comparative Review FOA)
  - Early Career
  - Accelerator Stewardship

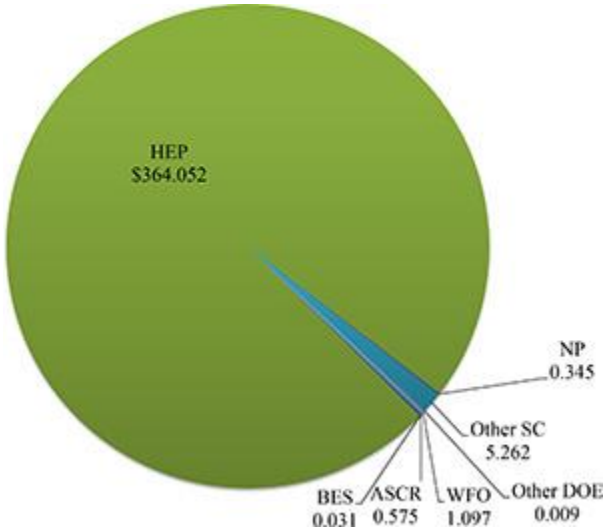
- **FOAs that launch new initiatives are informed through:**
  - Strategic plans 
  - Whitepapers
  - Roundtables
  - Workshops or working groups

Stewardship of DOE National Laboratories

- **Together, the 17 DOE laboratories comprise a preeminent federal research system, providing the Nation with strategic scientific and technological capabilities. The laboratories:**
  - Execute long-term government scientific and technological missions, often with complex security, safety, project management, or other operational challenges;
  - Develop unique, often multidisciplinary, scientific capabilities beyond the scope of academic and industrial institutions, to benefit the Nation's researchers and national strategic priorities; and
  - Develop and sustain critical scientific and technical capabilities to which the government requires assured access.

- **Stewardship of Fermilab is an important part of the HEP mission**

Fermilab



Fermilab Annual Funding by Source

Project Support

- **Successful delivery of construction projects and facilities for science is a central part of the DOE science mission**
  - In particular, Office of Science practice (critical decision [CD] process and Lehman reviews) considered gold-standard in DOE
    - "Failure is not an option"
  - SC has earned the authority to manage projects flexibly
    - This authority is only protected by unblemished project execution and is recognized as essential to SC success
- **DOE is committed to the successful execution of projects that have reached CD-2 and aims to provide the baseline funding profile**
  - Approval of CD-2 establishes the Performance Baseline against which the project success or failure will be measured
  - CD-2 also allows project to request construction/fabrication funds
- **In a difficult budget situation, projects that have not yet reached CD-2 are much more likely to have their profiles adjusted**

Coordination with Partners

- **Many HEP efforts are collaborative and mechanisms exist to make sure that this process goes smoothly and obligations are met**
  - Contributions between partners are typically in-kind

- **The White House Office of Science and Technology Policy (OSTP) ensures that the scientific and technical work of the Executive Branch is properly coordinated**
  - With oversight from OSTP, DOE/HEP coordinates closely with partner agencies, including NASA and NSF, through:
    - Memoranda of Understanding (MOU)
    - Joint Oversight Groups (JOGs)
    - Advisory panels

- **The U.S. State Department can authorize DOE to establish the framework necessary to work with international partners through:**
  - **Science and Technology Agreements (S&TA):** nation-to-nation agreements that acts as legal umbrellas for subsidiary agreements
  - **Implementing Arrangements (IAs):** agency-to-agency agreements for cooperation in broad areas of S&T
  - **Project Annexes (PAs):** Annexes to IAs are agreements that cover project- or subfield-specific cooperative activities


BUDGET OF THE U.S. GOVERNMENT
A New Foundation For American Greatness
Fiscal Year 2018
Office of Management and Budget

FOOTNOTES

DOE Roles and Responsibilities

- **Certain functions are considered "inherently governmental" and reserved for Federal staff, including:**
  - Determination of agency policy, such as determining the content and application of regulations, among other things
  - Determination of Federal program priorities for budget requests
  - Determination of budget policy, guidance, and strategy
  - Approving, awarding and administering government prime contracts
    - Including determining what supplies or services are to be acquired with government funds
- **Moreover, since Federal staff are normally hired following civil service laws, there is a strong precept that contractors must not act as Federal staff and vice versa, e.g.:**
  - Government employees do not directly supervise contractors
  - Federal staff are generally not involved in contractor personnel decisions
- **For all intents and purposes, DOE labs are *prime contractors* and lab employees are *contractor employees***

DOE Lab Roles and Responsibilities

- **Facility Operations and Construction**
  - Performance judged against specified metrics (e.g. pb^{-1}; EVMS)
  - Includes maintenance, upgrades, planning for new facilities
  - User support
- **HEP Research and Technology R&D**
  - Nurture and support HEP research collaborations to enable discovery science
  - Participation in all phases – from design, construction, operations & analysis
  - Particular emphasis on:
    - Management, design, construction and operation of HEP experiments
    - Integration of cross-cutting activities, *e.g.*: computation, simulation and theoretical research, in support of HEP program
    - Exploiting lab infrastructure and resources to develop next-generation particle accelerator and detector technologies for the advancement of HEP and science more broadly

University Roles and Responsibilities (DOE Perspective)

- **HEP Research and Technology R&D**
  - Contribute significantly to HEP research collaborations to enable discovery science
  - Participation in all phases – from design, construction, operations & analysis
  - Particular emphasis on:
    - Advanced training of students and postdocs
    - Data analysis and comparison with theoretical models
    - Vision and theoretical framework for understanding the Standard Model and beyond
    - Novel and innovative concepts and approaches
    - Design of future HEP experiments

Summary: Implementing the P5 Vision

- **The annual Federal budget process is long and complex**
  - Excursions from "standard order" are possible
  - The community-driven P5 strategy plays an important role in all phases of the process

- **Process is continuous, but the response time to stimulus can be long**
  - When the P5 report was released in May 2014, the FY 2015 budget was already in Congress and the FY 2016 budget was being formulated
  - Arguable the full impact (success!) of the P5 report was not fully seen until FY 2016, but continues today

- **Community continues to play an important role in this process**
  - A long-term view is necessary to provide feedback in a context that is most helpful

U.S. DEPARTMENT OF
ENERGY

Office of
Science


BACKUP

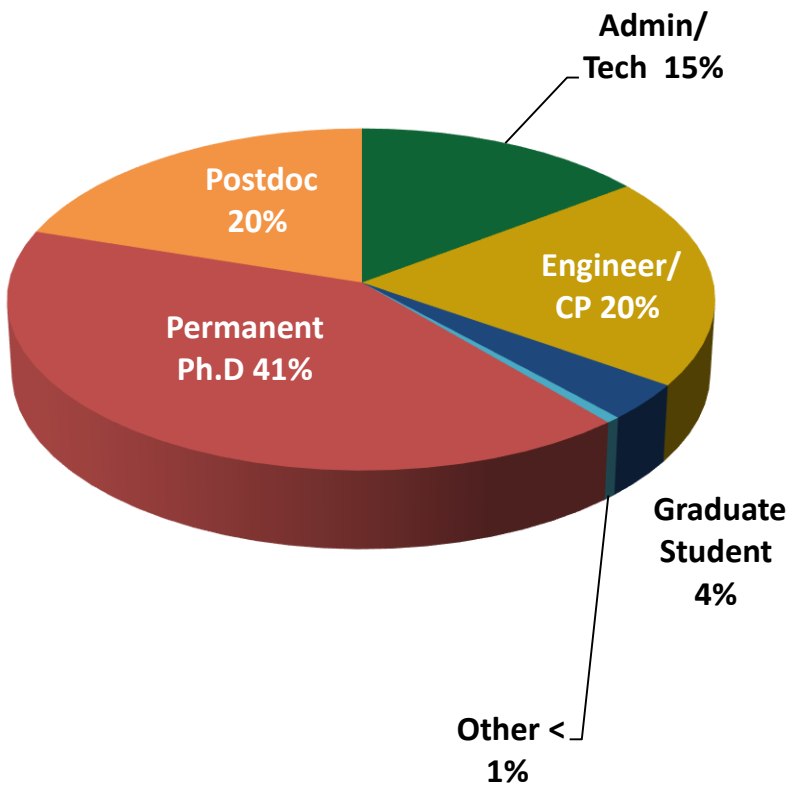
Appropriators Noticed the P5 Report

- **FY 2014 House Energy and Water Development Appropriations Report:**
  - "the Committee supports the Office of Science's challenge to the High Energy Physics community to identify an LBNE construction approach that avoids large out-year funding spikes or to identify viable alternatives with similar scientific benefits at significantly lower cost."
- **FY 2015 House Energy and Water Development Appropriations Report:**
  - "The Committee notes that the high energy physics research community is currently engaged in developing a ten-year plan for U.S. particle physics, which will include a ten-year report by the Particle Physics Project Prioritization Panel under various budget scenarios. The Committee applauds the Department for this undertaking . . ."
- **FY 2016 House Energy and Water Development Appropriations Report:**
  - "The Committee strongly supports the Department's efforts to advance the recommendations of the Particle Physics Prioritization Panel and urges the Department to maintain a careful balance among competing priorities and among small, medium, and large scale projects."
- **FY 2017 House ($823M) and Senate ($833M) marks above President's Request ($818M)**

Laboratory Support

- **Laboratory research is mission driven and funded through Field Work Proposals**
  - Program guidance to the Laboratories is provided by HEP with input from a variety of sources, including:
    - The Laboratories themselves
      - Local strengths and resources
    - Advisory committees
    - Institutional reviews
  - HEP holds comparative reviews of the Research programs of the labs every 3 years.
- **Research job classifications at Laboratories are similar to those at Universities**
  - Major exception is Senior Research Scientists in place of PIs

2013 HEP Lab Research Workforce (FTEs)

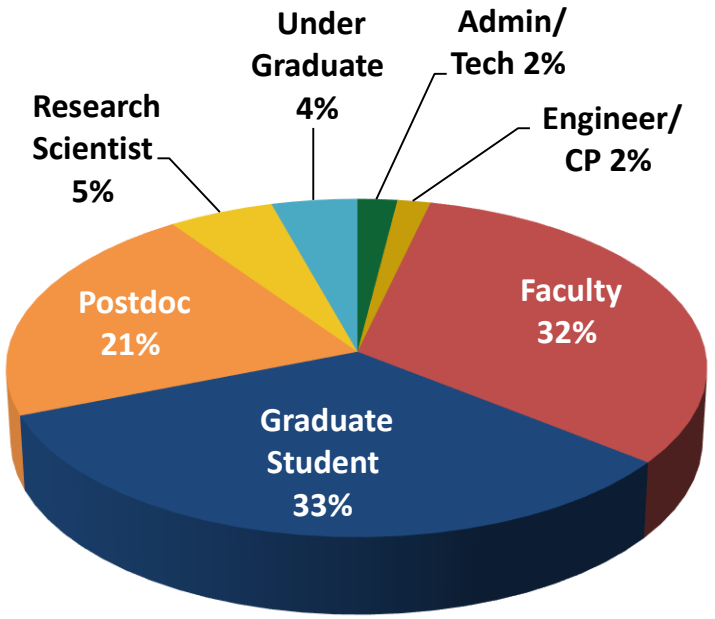


Rounding in percentages may cause total to be less than 100%

University Support

- **University research is supported by a competitive, proposal-driven process**
  - Grants issued after comparative review of proposals submitted to Funding Opportunity Announcements
- **Research job classifications at universities, supported by HEP funding, include the following positions:**
  - Principal Investigator (PI)
    - Tenured or tenure-track permanent Ph.D. staff
  - Research scientist
    - Permanent, non-tenured staff
  - Postdoctoral fellow
    - Term employees with Ph.D.
  - Graduate students
  - Administrative staff
  - Engineers
  - Computer professionals

2013 HEP University Research Workforce (FTEs)



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Laboratory International Agreements

- **In 2012, under Secretary Chu, major changes were made in how DOE operates with respect to international Lab-to-Lab interactions, including:**
  - Memoranda Of Understanding (MOU)
  - International Cooperative Research and Development Agreements (i-CRADA)
  - Strategic Partnership Projects (SPP)
- **A November 17, 2014, delegation order by Secretary Moniz provides further guidance:**
  - Previously, the labs negotiated MOUs with foreign labs in an independent manner, with limited coordination and no HQ clearances required
  - Now, lab-to-lab MOUs cannot be used for R&D collaborations and scientific exchanges, and such activities need to be cleared through the DOE Site Office and DOE HQ before being signed
- **Implications for HEP:**
  - Any R&D collaboration involving DOE laboratories (outside info sharing and workshops) need legally binding agency-to-agency agreements negotiated at the DOE level
  - Better coordination between the labs, DOE, and State Department and greater U.S. Government visibility for HEP international activities

HEPAP Roles (from Charter)

3. Objectives and Scope of Activities. The High Energy Physics Advisory Panel provides advice and recommendations to the Director, Office of Science (DOE), and the Assistant Director, Mathematical & Physical Sciences Directorate (NSF), on the national high energy physics program, which encompasses the conduct of experimental and theoretical high energy physics research and accelerator R&D. The Panel activities include:

a. periodic reviews of the program and recommendations of any changes considered desirable on the basis of scientific and technological advances or other factors such as current projected budgets and status of other international high energy physics efforts;

b. advice on competing long-range plans, priorities, and strategies for the national high energy physics program;

c. advice on recommended appropriate levels of funding to assure a world leadership position and to help maintain appropriate balance among the various elements of the program; and

d. advice on any issues relating to the program as requested by the Director, Office of Science (DOE), and the Assistant Director, Mathematical & Physical Sciences Directorate (NSF).

4. Description of Duties. The duties of the Panel are solely advisory in nature.