

# **The Environment, Climate and Sustainability Program at Harvard College (ECS)**

## **A Proposed New Pathway Concentration Structure**

**Prepared by the Membership of the undergraduate programs subcommittee of the Harvard  
Standing Committee on Climate Education**

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## Introduction

The challenges of responding to climate change and creating an environmentally sustainable world require grappling with a wide range of interlocking issues: scientific, technical, economic, political, cultural, and ethical. To meet these challenges, colleges and universities need to educate generations of future leaders who have been trained, not only in the methods and content of one preferred discipline, but in critical, cross-disciplinary thinking. Put another way, to solve the urgent environmental problems of our time, Harvard needs to train new kinds of citizen-leaders: scientifically-literate social scientists and humanists, humanistically-informed engineers, scientists who understand the challenges of translating facts into responsive policy, and more.

To this end, Harvard College proposes creating a new interdisciplinary pathway concentration structure<sup>1</sup> whose goal is to

- provide students with a choice of structured and rigorous curricular pathways in the area of Climate, Environmental, and Sustainability, each designed to appeal to different strengths and interests
- give students multiple opportunities to cross disciplinary boundaries in ways that will allow them to become the interdisciplinary leaders of tomorrow
- give students multiple opportunities to feel a sense of common purpose and community with one another, whatever their disciplinary focus
- help students build connections between classroom work and needed work in the world.

Harvard currently has several concentrations that allow students to study issues at the intersection of climate, environment and sustainability: the *Environmental Science and Public Policy* concentration, the *Environmental Science and Engineering* concentration, and the *Earth and Planetary Sciences* concentration. The proposal contained in this document is a result of nine months of consultation with faculty stakeholders in all of these programs as well as with others eager to join colleagues in this space. In developing this proposal, we do not envision competing with any of the existing undergraduate programs in FAS; quite the contrary. We envision instead creating a structure that respects and builds on the good work that has already

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<sup>1</sup> The idea of a “*pathway concentration*” would be new at Harvard College, but is well-known as a term and concept to Harvard Medical School and is widely used as a term in many of our peer institutions. The closest existing analog in Harvard College right now to what is being proposed here is the multi-departmental “*track*” program overseen by the Mind, Brain, Behavior Initiative. MBB, however, is not itself a concentration, but rather offers a way of enriching the curricular options available to students who choose to concentrate in one of the participating departments.

happened, while at the same time expanding the tent to include faculty and departments from all four FAS divisions and creating new opportunities for cross-divisional coordination and collaboration.

The proposal contained in this document is powerfully aligned with recommendations from the University report on [The Future of Climate Education at Harvard](#). Having reviewed the efforts of our peer institutions, we believe it would immediately establish Harvard as a leader in undergraduate climate education. Our proposal is bold, but (we think) only at a level appropriate to helping our students rise to the challenges of the world they will inherit. Potential donors would almost certainly be attracted to the vision and motivated to help it grow. Potential new faculty hires in this area would also find a model like this to be attractive – i.e. the ECS program would act as a significant recruitment tool.

## **The Proposal**

### ***Executive summary***

We propose a new program at Harvard College in which students will be able to pursue one of four specialized pathway concentrations in the area of climate, environment and sustainability; will be required to take distribution courses outside of their pathway; and will be required to enroll in custom-designed interdisciplinary courses designed to bring them into the same classroom with students from all the other pathways.

We also propose a new governance and incentive structure that will make it easier for FAS faculty from different departments and divisions to contribute to this program: to teach and learn together in a cross-divisional and cross-departmental community of colleagues all working to create something more impactful than each could hope to realize on their own.

### ***Structural elements of the proposed ECS program***

**Element 1:** Students choose one of four pathway concentrations (8 courses)

- *Humanities and Social Inquiry*
- *Public Policy*
- *Climate Sciences* <sup>2</sup>

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<sup>2</sup> In the STEM pathways, some students may need to complete basic math and statistics courses (for example) before they are ready to fulfill all of their concentration requirements. Such preparatory courses will normally not

- *Climate Technology and Engineering*

Each pathway concentration offers students a chance to develop depth in a specialized approach within the climate, environmental and sustainability space. Most pathway concentrations will also ask their students to cross disciplines and divisions, to ensure they have the requisite training to do their best work.

In addition to the four pathway concentrations above, we are also discussing with colleagues the possibility of a fifth offering at the secondary level, focused on *Biodiversity and Sustainability*. We hope this secondary will in time evolve into a fifth pathway concentration. Students participating in this secondary (the full requirements for which remain undecided) will be fully welcomed into all of the community-building activities of ECS

**Element 2:** Students take distribution courses (2 courses)

These courses aim to expose students to insights, research and methods in pathways outside their own, and also not directly adjacent to their own. The goal of distribution courses is to help students appreciate the importance of the work happening outside of their own specialization, and to begin to understand how the pressing issues of our time require insights from across the academy.

Students pursuing a science or engineering oriented pathway will take two courses from a curated list of social science and humanities offerings. These courses may double count for Harvard College distribution requirements.

Students pursuing a social science or humanities-oriented pathway will take two courses from a curated list of science and engineering offerings. These courses may double count for Harvard College distribution requirements.

**Element 3:** Students take interdisciplinary courses in common (2 courses, plus a third non-credit workshop if pursuing honors)

The interdisciplinary courses taken in common consist of two types: foundational courses (1) and more advanced courses (1).

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be included in the concentration course count, but the program will be committed to making every pathway accessible to all students, regardless of previous training.

*Foundational courses* will be broad, problem-centered courses that aim to expose students to a wide range of approaches and ways of thinking around climate, environment and sustainability topics. They will be targeted to all students considering one or another pathway concentration, but are also suitable for any students wishing a broad introduction to the issues.

*Advanced junior seminars* will bring students from all pathways together. The seminars will be designed to engage students on cases or problems that require them to engage with one another across their different areas of specialization. Many seminars will also have an engaged scholarship or experiential learning element.

*Non-credit senior thesis workshops* will be required for all students pursuing honors. These workshops will meet about six times over the course of the year, and will bring together students from all four pathways to share their research in progress.

Total # of courses for all non-honors pathways: 12

Total # of courses for all honors pathways (includes two-semester senior thesis): 14

**Element 4:** Students participate in co-curricular and community-building events

Students from all pathways will participate in a common robust community-building program, of which the highlight would be a spring senior thesis research festival. The program will also sponsor career recruiting fairs, social events, excursions, facilitated discussions, peer mentoring opportunities, and more. Students in other concentrations will be welcome to benefit from the community-building offerings of the ECS.

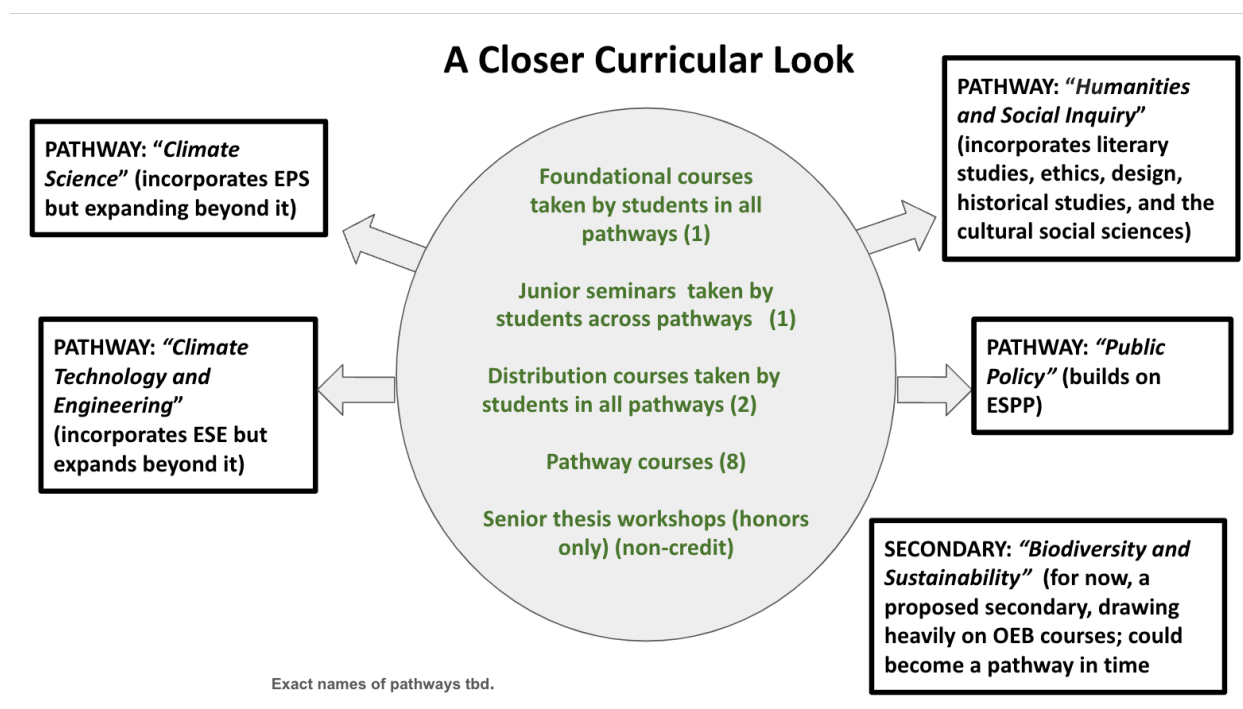


Figure 1: Concentration Structure

### ***What the program might look like***

Some might worry that we don't yet have the capacity to mount such a program and believe that our priority instead should be to make new hires in this area. We disagree. The work is ours to do now, and we should not expect imagined future faculty hires to sort things out for us. Moreover, an inventory we undertook of our current course offerings has made clear that there is in fact ample capacity for us now to begin this work –and beginning is all we can do. As new hires are then made, and the program develops, the program we begin will only get better.

### ***Examples of potential **foundation courses** (all subject to approval)***

GENED 1094 Confronting Climate Change: A Foundation in Science, Technology, and Politics  
 GENED 1018 How to Build a Habitable Planet  
 GENED 1167 Climate Crossroads  
 GENED 1085 Energy Resources and the Environment  
 GENED 1137 The Challenge of Human-Induced Climate Change: Transitioning to a Post Fossil Fuel Future  
 GENED 1158: Water and the Environment

*Wicked problems* (under consideration: a potential new full year course, possibly limited to first years, to be mounted by the Social Sciences division. It would be focused on the entanglement of climate and environmental issues with other critical social science areas of concern like social inequality, food insecurity, migration, disinformation, etc.)

*Examples of potential **distribution courses** for students in a science or engineering-focused pathway (all subject to approval)*

1. ESPP 77: Technology, Environment, and Society
2. SOCIOL 1102: Environmental Sociology
3. SOCIOL 98BG: Climate Sociology
4. ECON 1661: Economics of Climate Change and Environmental Policy
5. EMR 160: Environmental Practices and Indigenous Knowledge Systems
6. Gov 1722 Politics of Climate Change and the Environment
7. RELIGION 1046 Introduction to Religion and Ecology
8. HISTSCI 1980: Burning Books, Fighting Facts: How Individuals & Institutions Resist, Reject, and Destroy Knowledge
9. ESPP 78 Environmental Politics

To fulfill their pathway distribution requirement, students in these pathways will be required to take one approved course in a social science discipline and one approved course in a humanities discipline. All courses can double count for the Harvard College distribution requirement.

*Examples of potential **distribution courses** for students in a social science or humanities-oriented pathway (all subject to approval)*

1. ESE 101 Global Warming Science
2. EPS 109 Earth Resources and the Environment
3. EPS 134 Climate Change Debates: The Reading Course
4. OEB 120: Plants and Climate
5. OEB 65 Conservation biology
6. OEB 55: Ecology: Populations, Communities, and Ecosystems
7. OEB 10: Foundations of Biological Diversity
8. Research at the Harvard Forest—Global Change Ecology

To fulfill their distribution requirement, students will be required to take one approved course in either two distinct science areas (e.g., life science and physical sciences), or one approved

course in a single science area and one course in engineering. All the courses can double-count for the Harvard College distribution requirement.

*Examples of potential **junior seminars** for students in all pathways (all subject to approval)*

We currently do not have any courses in our catalog that fully achieve the pedagogical vision we have for this element of the program, but we look forward to recruiting faculty to develop and teach new offerings. That said, ESPP currently has an interdisciplinary junior seminar program that does capture the spirit of what the ECS junior seminar program aspires to; here are the titles of some of their current curricular offerings:

1. ESPP 90g The Law and Policy of Climate Change: Influencing Decision Makers
2. ESPP 90h Climate, Crops, and Commonwealth
3. ESPP 90m Natural Climate Solutions: Feasible or Fantasy?
4. ESPP 90n Addressing the Global Climate Crisis: Challenges for Both Developed and Developing Economies
5. ESPP 90p Climate Responsibility and Climate Action
6. ESPP 90s The Technology, Economics, and Public Policy of Renewable Energy

*Examples of potential **pathway and secondary courses** (all subject to approval)*

- Humanities and Social Inquiry Pathway
  1. ENGLISH 186CC: Climate Change Literature
  2. HIST-LIT 90GC: Race and the Environment in the Atlantic World
  3. HIST-LIT 90GC: Climate Change and the Global South
  4. COMPLIT 274: Politics of Aesthetics: New Materialisms and Environmental Humanities
  5. ENGLISH 90T: Toxic Rhetoric
  6. BETH 722: Environmental Ethics and Justice (available for college cross-registration)
  7. EMR 151: Quechua, Indigenous Language Revitalization and Global Indigeneity
  8. SES 5409: Climate Justice (available for college cross-registration)
  9. AFVS 160: Modernization in the Visual United States Environment, 1890-2035
  10. ENGLISH 190VE: Voices of Environmental Justice
  11. VIS 2314: Responsive Environments
  12. SCI 6244: Climate by Design
  13. RELIGION 1046 Introduction to Religion and Ecology
  14. History 15Q: Australian Environmental History: Gondwana to Global Warming
  15. History 15W: Warzone Earth: Environmental Histories of War

16. HIST 1973: Re-Wilding Harvard
17. HLS 3248: Rights of Nature

- Public Policy Pathway

1. ESPP 77: Technology, Environment, Society
2. ESPP 160: US Environmental Policy and Policymaking
3. ESPP 180: Climate Change, Health, and Environmental Justice-Focusing on Solutions
4. ESPP 78: Environmental Politics
5. ECON 1661: Economics of Climate Change and Environmental Policy
6. SOCIOL 1102: Environmental Sociology
7. SOCIOL 1110: Public Health and Environmental Injustice
8. SOCIOL 98BG: Climate Sociology
9. GOV 1722: Politics of the Environment and Climate Change
10. HISTSCI 2985: Science, Power, and Politics
11. HISTSCI 1385: Water: The Politics and Uncertain Futures of Drought and Climate Change
12. HLS 2025: Climate and Energy Law and Policy
13. EMR 160: Environmental Practices and Indigenous Knowledge Systems
14. MIT 11.422: Law, Technology, and Public Policy
15. API 165: Energy and Environmental Economics and Policy
16. GH 72: Climate Change and Global Health Equity
17. SUP 663. Land Use and Environmental Law

- Climate Sciences pathway

- 1) EPS-ESE 6 Introduction to Environmental Science and Engineering
- 2) EPS 50 The Fluid Earth: Oceans, Atmosphere, Climate, and Environment
- 3) EPS 53 Marine Geochemistry
- 4) EPS-OEB 56 The History and Evolution of Life on Earth
- 5) EPS-ESE 101 Global Warming Science 101
- 6) EPS/ESE 102 Data Analysis and Statistical Inference in the Earth and Environmental Sciences
- 7) EPS/ES 112 Thermodynamics
- 8) EPS/ESE 132 Introduction to Meteorology and Climate
- 9) EPS/ESE 138 Mysteries of Climate Dynamics
- 10) EPS 139 Paleoclimate as Prologue
- 11) EPS 168 Human environmental data science
- 12) EPS 169 Seminar on Global Pollution

- 13) EPS 187 Biogeochemistry
- 14) ESPP 77 Technology, Environment, and Society
- 15) ESE 109 Earth Resources and the Environment
- 16) ESE 162 Hydrology
- 17) ESE 129 Climate and Atmospheric Physics Laboratory
- 18) ESE 131 Introduction to Physical Oceanography and Climate
- 19) ESE 133 Atmospheric Chemistry

- Climate Technology and Engineering pathway

- 1. Engineering ESE 164: Environmental Chemistry
- 2. ESE-112/181, Thermodynamics by Case Study/Engineering Thermodynamics`
- 3. ESE/EPS 102 Data Analysis and Statistical inference in the Earth and Environmental Sciences
- 4. ESE 109 Earth Resources and the Environment
- 5. ESE 161 Applied Environmental Toxicology
- 6. ESE 163 Pollution Control in Aquatic Ecosystems
- 7. ESE 164 Environmental Chemistry
- 8. ESE 161: Applied Environmental Toxicology
- 9. ESE 166: State of the art instrumentation
- 10. ES 248 Electrochemistry in Energy Materials
- 11. ES 192 Materials Selection and Design
- 12. Physics 129: Energy Science
- 13. SCI 6121/6122 Environmental Systems 1/2
- 14. CS 109 Data Science
- 15. ENG-SCI: Integrative Frameworks for Technology, Environment, and Society I
- 16. MIT 1 .38 : Engineering Geology
- 17. PRO MIT 2 .814 : Exploring Sustainability at Different Scales
- 18. MIT 10 .391: Sustainable Energy

- Biodiversity and Sustainability secondary

- 1. OEB 120: Plants and Climate
- 2. OEB 10 Foundations of Biological Diversity
- 3. OEB 60: Fundamentals of Marine Biology
- 4. OEB 56 Conservation Biology
- 5. MIT 1 .018 TBA2: Fundamentals of Ecology
- 6. OEB 55: Ecology: Populations, Communities, and Ecosystems

7. FYRSEM: Research at the Harvard Forest—Global Change Ecology
8. HEB 1367: African Climate: Earth's history, humanity's future
9. E-PSCI 53: Marine Geochemistry
10. OEB Global Change Biology
11. ESPP 90W: Global Wetlands: Boundary-spanning ecosystems for science, social justice, and public policy
12. E-PSCI 53: Marine Geochemistry
13. EPS 56 The History and Evolution of Life on Earth

## **Proposed Administrative Structure**

Below we lay out what an administrative structure for this program might look like.

*The ECS Steering Committee:* This is the program oversight committee. It is chaired by an ECS Director, appointed by the FAS Dean, and is composed of the leadership of the four pathway concentrations, and several additional at-large members, normally for a maximum of nine members.

- The ECS steering committee is responsible for incentivizing the development and then approving foundation courses, distribution courses, junior seminars, and non-credit senior thesis workshops.
- It is also responsible for creating meaningful opportunities for discussions, brainstorming, and collaboration among the different pathways of this program
- Finally, it acts as a robust champion to the Deans for the resource needs of both the program as a whole and its constituent pathways. The members of the committee will work collaboratively to propose priorities for future FAS/SEAS plans and fund-raising in the area of climate education, including new faculty lines.

*ECS Director:* The ECS Director role will be a rotating position held by each occupant for a maximum five-year term. He or she will be appointed by the FAS Dean. Candidates for this position will normally be senior faculty.

*ECS Program Manager:* The individual holding this role will work closely with the ECS Director on all issues that fall under the purview of the ECS Steering Committee. This includes ensuring that adequate foundation courses, junior seminars and senior thesis workshops are offered each academic year, and implementing any new curricular policies. The Program Manager will

also take the lead in maintaining a robust program of co-curricular activities for all concentrators.

### *Governance of the ECS pathways*

The four pathway concentrations and single secondary are governed and managed by a mix of departments (e.g., EPS, OEB), existing self-standing concentration boards (e.g. ESPP) and newly formed curricular committees (in engineering and the humanities). In many cases, the administrative structures and staff of existing concentrations and programs will be adapted to enable this work, with little if any additional costs.

Because the program as a whole requires students to take two distribution and two interdisciplinary courses, the number of pathway-specific courses over which each pathway concentration has autonomy is limited to eight (given FAS rules about concentration requirements). Students wishing or needing to take a greater number of advanced courses in the area of their pathway (in order, for example, to prepare for graduate school) can be advised on potential secondaries that they may pursue alongside their pathway.

The faculty directors of each pathway will serve on the ECS steering committee(see above). There, among other things, they will be able to advocate for the needs of their pathway, discern opportunities for collaboration, and seek support for any issues they may be facing. Each pathway will also benefit from opportunities to tap into centralized resources for curricular innovation and special activities.

## **Incentivizing Faculty and Departmental Participation**

To support a program like the ECS program, FAS needs a new way of incentivizing its faculty and departments to contribute while still ensuring the excellence of their departmental programs. To this end, we propose several new initiatives:

*A new cross-campus teaching professorship program:* This will be a new program in which our best cross-disciplinary teachers in the ECS space are appointed on a five year basis to .5 “cross-campus teaching professorship” positions by the FAS dean.

The goal of these term appointments is to allow some of our most committed and creative faculty to redirect 50% of their time to building curricular capacity in the climate, environment and sustainability space. This would generally mean developing new courses that do not fit into established departmental categories, developing new interdisciplinary foundational courses and developing and teaching new interdisciplinary junior seminars. All such faculty would also be expected to run one of the interdisciplinary senior thesis workshops.

No additional salary will be associated with this appointment. However, the OUE would provide generous funding to such faculty for curricular innovation.

Because this is a part-time appointment, each year, faculty would develop a clear plan with their chairs for the balance they will strike between their departmental responsibilities and their cross-campus teaching.

*Compensatory lectureships for affected departments:* We recognize that, when faculty join the cross-campus teaching professorship program, they may no longer be able to teach all the core and service departmental courses they would otherwise have offered. To address this problem, FAS will also offer an additional full-time term lectureship to the department of any faculty member who is offered such an appointment. The lectureship will be renewed annually for the duration of the cross-campus professorship appointment. The goal would be to ensure that departments can amply cover all teaching areas that might otherwise be normally covered by the faculty member in question, including service courses and department tutorials.

*Crediting departments for their contributions:* Currently, departments “own” their undergraduate concentration, and are assessed by the FAS Deans in part by student enrollment numbers and student satisfaction. All the pathway concentrations, though, will depend on contributions from faculty based in multiple departments. We need to ensure that they get “credit” for their contributions. For this reason, we suggest that an individual department may “host” a pathway concentration, but that the overall success of the pathway in question will be credited both to the host department and to any other departments that make major contributions to that same pathway. Contributions in questions could include teaching major courses taken by concentrators, serving on pathway-specific curricular committees or prize committees, or advising senior theses.

## **Additional Considerations and Suggestions**

*The creation of an external advisory committee:* To ensure the accountability and success of the program as a whole, and to raise its visibility among alumni and potential donors, we propose creating an external advisory committee, consisting of alumni, faculty from other universities, and leaders from the profit and non-profit sectors, to provide feedback on and input into the developing program.

*Resources for new administrative support:* This program will need an initial investment of short-term administrative labor and resources to create a web presence, develop promotional programming, and generally support a robust transition process.

*Space considerations:* The administrative and community-building hub could be located at the current Harvard University Center for the Environment (28 Oxford St.) which has social space, seminar rooms, and office space.

*Collaboration with the Salata Institute:* The Salata Institute is in a unique position to support this concentration pathway program by making available its university-wide network of potential faculty mentors to concentrators, serving as a clearing house for research opportunities for students, organizing community-building events that bring together students and faculty, collaborating with the Mignogne Center on career exploration workshops, and more. The ECS Steering Committee, based in FAS, should explore, in consultation with the FAS dean, how best to take advantage of this partnership and clarify its formal or informal relationship to the ECS pathway concentration program.

*Student transcripts:* To ensure that the distinctive training of each student is legible to future employers and professional schools, we suggest that, on student transcripts, the concentration pathway name should come first, followed by the program name: e.g., “Climate Technology and Engineering, Program in *Environment, Climate and Sustainability Studies*”, or “Public Policy: Program in *Environment, Climate, and Sustainability Studies*,” etc

## **Proposed Constitutional Provisions**

- Each program member agrees to the collaborative governance structure outlined in this proposal and agrees to work in good faith with other pathway concentration heads to ensure the flourishing of the program as a whole.
- Each program member agrees to advocate for curricular and community-building resources collaboratively rather than competitively. The vision is that we are stronger if we work together.
- FAS/SEAS leadership commits to actively supporting the collaborative vision and especially the goal of growing the whole program collaboratively and avoiding pathway concentration-level zero-sum thinking.
- The program agrees to a process of internal and/or external evaluation, the details of which remain to be determined, designed to benchmark progress on shared goals.