

Global Solutions & Outreach Programs (GSOP)

Program and Execution Plans



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PROLOGUE

Global warming is the most complex and threatening problem ever faced: Stakes are the survival of Modern Civilization. It is both a strategic problem and a strategic threat. The Global Solutions & Outreach Programs (GSOP), presented here, will provide an integrated Global attack on this strategic problem. Country, Regional, and Global Action Plans containing practical, effective solutions and implementing actions will result.

Country Teams will develop Action Plans tailored to the conditions of their Country. Regional Teams will integrate the Country Action Plans into Regional Action Plans, and Global Teams will integrate the Regional Action Plans into Global Action Plans. At that point, participants can tell if the total Global efforts will successfully solve global warming at the scale of Earth. They will know if the plans are economically supportable and socially/politically acceptable. If the initial Action Plans fall short, then the assessment and integration process is repeated until successful Global solutions are identified.

As a practical matter, the GSOP must be centrally funded to allow all Countries to start the programs concurrently: Everyone will be on the same learning curve and Global collaboration can begin immediately. Following the Table of Contents, other key aspects of the GSOP are highlighted in an Executive Summary.

A brief explanation of this GSOP Program and Execution Plans follow. Sections 1-4 present US Baselines for the Country Problem Diagram, Country Operations Personnel Plan, Country Administration Support and Country Start-Up Year Plans, and Country Cost Plan. Sections 5-8 include the Global Cost Plan, US Global Support Center Plan, Global Schedule and Cost Summary, followed by Concluding Remarks.

- The Country Problem Diagram (US Baseline) is structured to focus all participants on common goals. Technical, economic, and social/political Problem Elements are then identified. Solution Work Units are shown to address the problem elements. Collectively, the Solution Work Units are analogous to a statement-of-work. We refer to the execution of the three-year GSOP in all Countries as “Country Operations.” The Country Problem Diagrams cover the three-year period of Country Operations. Country Problem Diagrams will be updated as progress is made and learning builds.
- The Country Operations Personnel Plan (US Baseline) estimates the types and numbers of personnel needed to execute the Solution Work Units in the Country Problem Diagram.
- The Country Administration Support and Country Start-Up Year Plans (US Baseline) present the tasks, staffing, and costs required to provide administration support so that Country Operation Teams can execute the programs. It also includes the tasks, personnel, and costs to start-up GSOP prior to the 3-year programs.
- The Country Cost Plan (US Baseline) pulls together the US costs for Country Operations, Country Administration Support, and Country Start-Up Year into the total four-year GSOP costs for the US.
- The Global Cost Plan presents the total Global cost of the GSOP and the funding levels apportioned to each Country based on ratios of Gross Domestic Products and other factors.

- The US Global Support Center Plan presents the tasks, personnel, and costs needed to provide centralized funding, administration support, recruitment and visibility support, and operations support to all Countries. It will enable all Countries to start up GSOP concurrently.
- The Global Schedule and Cost Summary show the overall schedule of the Country Start-Up Year, and the three years of Country Operations and Country Administration Support. It also includes the schedule to set-up the US Global Support Center prior to the Country Start-Up Year.
- Concluding Remarks explain how key features of the Wicked-Problem Approach are embedded throughout the GSOP Plans. You may gain a feel for the Wicked-Problem Approach's non-business-as-usual aspects. Our overall strategy is to amass the troops Globally and attack the problem in force – "Damm the torpedoes, full speed ahead." (A famous WW II quote.)
- Appendix A provides an alphabetic listing of acronyms and definitions of terms used throughout this document.

All aspects of the GSOP reflect the application of the Wicked-Problem Approach. The Approach was developed and demonstrated to solve complex problems that have technical, economic, and social/political factors snarled together. A six-session Wicked-Problem Approach Problem Facilitator Training Course will be used to train small Country Teams during the Country Start-Up Year and subsequently, all Problem Facilitators.

The specifics of the Wicked-Problem Approach are not included in this document as they are thoroughly covered in the training course. You are encouraged to watch the 20 minute Wicked-Problem Approach Orientation: Real World Applications video available on our website for an overview of the approach, including its discovered and applications: (<https://www.climate-collaboration.com/wicked-problem-training>).



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The authors wish to acknowledge and sincerely thank the following individuals, groups and teams for their many contributions to these Global Solutions and Outreach Programs (GSOP) Program and Execution Plans:

Background: In 2020 when Dr. Tom Rehm, Chemical Engineer, and Dick Hutchinson first met, Tom had a program initiative to provide engineering support to ongoing U.S. climate change initiatives. Dick had just written a book entitled *People's Assessment of Global Warming Plus Adaptations for Advancement and Survival* co-authored by Derle Smith Jr., Astrophysicist, where they proposed using a Wicked-Problem Approach to solve the global warming problem. Tom and Dick saw advantages in combining their initiatives, joined forces, and co-founded the GSOP. Tom then formed a Marketing Team comprised of Eric Townsend, Chemical Engineer, and Bob Romero, R&D and Environmental Specialist. They have worked tirelessly since 2020 to promote the GSOP internationally and to raise program funds. Specifically, they established the GSOP Website: Global Climate Collaboration; they setup the GSOP Climate Collaboration, Inc. 501(C)(3) non-profit organization to receive tax-deductible donations; and they hosted many international webinars to explain, promote, and raise GSOP funding. In addition, they reviewed evolving GSOP Program Plans and provided valuable suggestions. Recently, they reviewed this document and offered a number of value-added comments which we included here. All of these accomplishments were of great assistance to the authors' work. Marketing Team, thank you!

Working in parallel, the authors formed an Operations Team to develop GSOP Program and Execution Plans, and prepared a Wicked-Problem Approach Training Course. We were greatly aided by the following individuals participating on three ad-hoc teams:

The first group was a Technical Team of volunteers formed in 2021 to assist in drafting the first set of GSOP Program Plans that included a Problem Diagram, Personnel Plan and Cost Plan. Team members offered many useful suggestions and excellent peer review. Thank you for your help! The following engineers served on this team:

Kenneth Allsford, Chemical Engineer, PhD	Samuel Goodman, Chemical Engineer, PhD
Philip Black, Chemical Engineer, P.E.	Hans VanBrackle, Chemical Engineer

In 2022, the second group participated in a test of the Wicked-Problem Approach Self-Taught Training taken from Dick's book. Class members attended the six sessions, worked on example wicked problems and provided excellent evaluations of the course. They suggested that we use a specific example of a wicked problem throughout the course. We implemented this suggestion and now use the GSOP as the example wicked problem. We greatly appreciate your support and feedback! The following volunteers participated in the course:

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Philip Black	Archie Hill	Tom Rehm

The list of participants in the course continues on the next page.

Continuation of list of participants in the Wicked-Problem Approach course:

Alex Cannara	Dick Hutchinson	Gopal Salvady
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Paul Comet	Larry Kremer	Kimberly Schoelen
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Mark Friedman	Christin Newell	Vic Andrews
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The third group of young professionals took part in a six-session short course on the GSOP in 2023. They provided excellent peer review, useful suggestions and concluded that the GSOP makes sense. They then formulated guidelines that provided the basis for Country Operations Start-Up Year Teams – key to successful GSOP Global start-up. We greatly appreciate your feedback and contributions! Below are the members of the GSOP short course:

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Israel Nwafor, Industrial Eng., Nigeria
Mourad Shalaby, Social Sci., US.



EXECUTIVE SUMMARY

Global Solutions & Outreach Programs (GSOP)

Enabling Humanity to Survive and Thrive

Problem. The Earth is one integrated system that can only respond to the sum-total of physical actions by all countries and peoples. Our convenience, prosperity, and survival are irrelevant. By burning fossil fuels and releasing CO₂ (carbon dioxide), we the people, have destabilized the entire Earth's energy balance. More energy coming in than going out is causing global warming, which, in turn, drives climate change, rising sea levels, extreme weather, and ocean acidification. We must stabilize the Earth's energy balance to stop further warming, and then adjust it to return to prior conditions. In short, we must solve global warming on Earth's terms, not just on our terms. If we do not solve it on Earth's terms, we do not solve it. This simple reality is being overlooked with dire consequences.

Modern Civilization was built and continues to depend on fossil fuel energy (heating, cooling, food production, transportation, manufacturing, construction). While solving global warming on Earth's terms, we must also solve it on human terms of economic feasibility, social and political acceptability, and within natural and human resources. We must also cope with the ongoing impacts of climate change. If we do not solve it on human terms, we do not solve this problem.

With the scale of Earth and the scope of modern civilization, global warming is the most complex and threatening problem that humanity has ever faced—making it both a strategic problem and a strategic threat. Strategic problems can only be defeated by mounting strategic attacks.

Imperative. We have no other rational choice than to *successfully* solve global warming, on both Earth's terms and on human terms to ensure the future well-being of our children and grandchildren, and the survival of modern civilization.

Critical Oversight. Herein lies our critical oversight: No coordinated, international *engineering* effort is underway or even planned to develop a successful *Global* solution to global warming. This work is not included in the UN and US scientific reports or political plans.

We now have ad-hoc efforts influenced by public and private initiatives, political priorities, vested interests, and market influence – all unlikely to successfully solve Global warming on Earth's terms. Complex technical problems are never solved in this way. For success, engineers always develop integrated designs of bridges, airplanes, ships and rockets before building these integrated systems. As a result of this oversight, global progress over the past decade is abysmal: Atmospheric CO₂ levels, global average temperatures, and ocean levels all continue to rise – unabated.

Proposed Solution. Fortunately, this oversight, and its untenable risks can be avoided at reasonable costs by mounting a strategic attack. The Global Solutions and Outreach Programs (GSOP) will mobilize a world-wide army of younger engineers, economists, and social/political experts in partnership with more senior subject-matter experts to develop Country, Regional and Global Action Plans to solve global warming. Humanity is failing and will fail to overcome global warming unless such plans are developed and implemented.

Wicked-Problem Approach. To do so, we must accept that global warming is an extremely complex problem – a “wicked-problem.” Such problems are a confusing mix of technical, economic and social/political factors snarled together like a Gordian knot. Normal engineering step-by-step methods do not work to solve such problems. Nor do ad-hoc efforts that guess at the correct answers. These problems require a different approach. While working as a chemical engineer for the US Army at Aberdeen Proving Ground, Dr. Dick Hutchinson and colleagues discovered a novel way to solve wicked problems. This proven “Wicked-Problem Approach” is well suited for solving the complex problem of global warming.

GSOP Plan. We will incorporate the Wicked-Problem Approach in the three-year, international Global Solutions & Outreach Programs (GSOP) aimed at solving the global warming problem at the scale of Earth. The GSOP is comprised of two mutually supporting programs. The international Global Solutions Program focuses on developing solutions for all Countries, Regions, and for the entire Earth. The Outreach Program will provide engineering support and advice to each Country’s States/Provinces, communities, and industries taking action on global warming. Together, the two programs will bring local groups into the problem-solving efforts along with Country and international teams. All participants will collaborate as equals and share results through the Internet. Together, they will develop honest, practical solutions that are successful on Earth’s physical terms, and economically and socially/politically successful on human terms. The GSOP teams, directly funded in each Country and independent of government control, will minimize political pressures, corporate interests and other biases.

GSOP Goals. The overall goals of the GSOP are: (1) Halt the net release of CO₂. (2) Adapt to unavoidable climate-change impacts. (3) Stabilize the Earth’s energy balance to halt global warming, (4) Adjust the Earth’s energy balance to return to prior conditions, and (5) Address Ocean acidification and other problems.

Global Solutions Program. This program is comprised of three international People’s Projects that together will develop successful Country, Regional, and Global solutions to global warming. We call these “People’s Projects” because the problem and solutions will affect everyone and because the problem’s complexity demands the best efforts by all people. These projects were first described in Dick’s book, *People’s Assessment of Global Warming Plus Adaptations for Advancement and Survival*, available in hard copy from Amazon.

People’s Project 1 will focus on halting net CO₂ release and adapting to ongoing climate impacts. Teams formed within each Country are needed to thoroughly evaluate all available options to meet these goals. The evaluations will address technical, economic, and social/political factors.

People’s Project 2 will evaluate ways to stabilize and adjust the Earth’s energy balance and to address ocean acidification and other problems. International teams are needed to evaluate each available option. Results will go to each Country for consideration in their Country action plans.

People’s Project 3 will address climate monitoring, modeling, and future projections of the Earth’s energy and CO₂ balances, and Country fuel and energy balances. International teams will evaluate technologies currently in R&D to meet People’s Project 1 and 2 goals. Results will go to each Country for consideration in their Country action plans.

All available options in People’s Projects 1 and 2 and R&D options in People’s Project 3 will be thoroughly evaluated against the same criteria. Technical evaluations will address technical feasibility and readiness; effectiveness in meeting Project Goals; integration problems and solutions and sector impacts; environmental impacts and solutions; community safety; locations, scale, and timing of option implementation; engineering cost estimates; fuel and energy balances; and human, natural, and water resource requirements and availability, including mineral limitations.

The evaluated options from all three People’s Projects will then be periodically integrated by each Country’s GSOP participants into their Country Action Plan. In this way, each action plan will

reflect the conditions and priorities within that Country. The Country plans will then be integrated and re-evaluated Regionally and Globally by international teams to see if they add up to overall Global solutions that successfully meet the five GSOP goals, are economically feasible, and socially/politically acceptable. If not, this process will be repeated during the three-year GSOP to achieve Country, Regional and Global Action Plans that, when implemented, will successfully solve global warming on both Earth's terms and on human terms.

Outreach Program. Each Country's Outreach Program will provide engineering support and advice to States/Provinces, local communities, and industries taking action on global warming. The Global Solutions Program and Outreach Program will have an ongoing exchange of results and good ideas. Local people can assist with social/political evaluations of different options and feed their results into their Country's Global Solutions Program. States/Provinces, local communities and industries may also offer to assist with pilot testing solution options. Thus, the GSOP will have two-way links from States, Provinces, local communities, and industry up through Country and international levels – a broad and powerful focus of many minds.

Cost and Staffing Estimates. We estimate that US execution of the GSOP, including administration support, will cost 373 million US dollars (USD) over the three-year program. Executing the GSOP in the US will require 382 full-time and 2,990 part-time personnel. These professionals will include entry, mid and senior level engineers, economists, social/political experts, and subject-matter experts. They and all GSOP professionals world-wide will all be paid an average US chemical engineering salary of 129 thousand USD per year. Country Administration Support personnel will also be paid at competitive US rates.

GSOP professionals must lead and execute the programs with boldness, energy, and self-interest drive, and not be wedded to business as usual. Many must also be around to help implement the solutions – a key consideration.

By necessity, the GSOP must be an international, Global effort with people in all Countries participating. It cannot be successful on a piecemeal basis: the Earth is one integrated system. Quickly mobilizing and conducting GSOP in all Countries will cost approximately 3.2 billion USD over the three-years of GSOP execution plus two preliminary years to establish the US Global Support Center and conduct a Country Start-Up Year. We seek US and international donations and commitments to secure these funds. We will not start the GSOP until the entire sum is identified.

The US Global Support Center will fund and assist engineers and other professionals to form Country Start-Up Year Teams within each Country. With centralized funding, GSOP will then be initiated together in all Countries around the world, placing everyone on the same learning curve and allowing international collaboration to start immediately.

GSOP Results and Advantages. The GSOP will eliminate a critical oversight and untenable risks by performing the upfront engineering work required to develop successful, integrated Global solutions to the global-warming problem. Direct results will include: a. Country, Regional, and Global Action Plans that can guide future work in all Countries to *successfully* solve global warming – solve it on both Earth's physical terms and on human economic and social/political terms; b. Engineering support for Country's States, Provinces, local communities, and industries to enhance their vital ongoing work; c. Extensive Country and international collaboration, which will build Global consensus and cooperation needed to implement the Action Plans. In this way, the GSOP offers the world's younger generation the unique chance to come together and solve global warming in their own self-interest.



SECTION 1

Country Problem Diagram (US Baseline)

Global Solutions & Outreach Programs (GSOP)

Introduction.

The three-year Global Solutions & Outreach Programs (GSOP) aim to develop Country, Regional, and Global Action Plans. When implemented, they will successfully solve the global warming/climate change problem – a strategic problem that threatens the future wellbeing of our children, grandchildren, future generations, and the survival of Modern Civilization. GSOP participants will use the Wicked-Problem Approach to execute the GSOP in a consistent and collaborative manner.

The GSOP comprises two mutually supporting programs: the international Global Solutions Programs that focus on Country, Regional, and Global solutions, and Outreach Programs within each Country that provide engineering advice and support to States, Provinces, local communities, and industries taking action on global warming. Together, the two programs will bring States, Provinces, local communities, and industry into the problem-solving efforts. All participants will work in concert and share results through the Internet. Together, they will develop honest, practical solutions that are physically successful on Earth's terms by: halting net CO₂ release, stabilizing and adjusting its energy balance, and solving other physical problems. These solutions will also be successful on human terms by being: economically supportable, socially/politically acceptable, and able to cope with unavoidable climate change impacts.

Following, are the three **Global Project Goals** for GSOP in all Countries:

1. Develop Country, Regional and Global Action Plans that will guide future work in all Countries to successfully solve global warming. Solve it on Earth's physical terms and on human economic and social/political terms to:
 - a. Halt the net release of CO₂,
 - b. Adapt to unavoidable climate-change impacts,
 - c. Stabilize the Earth's energy balance to halt warming,
 - d. Adjust the Earth's energy balance to return to acceptable conditions, and
 - e. Address other problems, including methane release and ocean acidification.
2. Provide engineering support to States, Provinces, local communities, and industries in each Country to enhance their vital ongoing work.
3. Achieve extensive Country and international collaboration to build Global consensus and cooperation needed to implement the resulting Action Plans.

The **Global End-State Goals** for the GSOP are as follows: All Countries successfully implement the GSOP Country, Regional, and Global Action Plans; and thus, enable today's young, future generations, and civilization to survive and thrive.

Problem diagrams for each of three People's Projects comprising the Global Solutions Program and for the Outreach Programs will follow.

Note 1: The Country GSOP Plans (US Baseline) presented here will be scaled to each Country's GSOP funding levels and conditions. The scaled plans will be used to define and initiate GSOP in each Country. As engineers, economists, social/political experts, and other subject-matter experts are hired and begin to execute programs, they will further improve their Country Problem Diagram based on their experiences and steep learning curves. This flexibility is a necessary aspect of the Wicked-Problem Approach in solving highly complex wicked problems. The Country Cost Plan is the one exception. The GSOP in all Countries must be executed within the approved and funded budget. US Army experience using the Wicked-Problem Approach demonstrated the ability to operate successfully within budgets.

Note 2: Throughout this document, "Country Operations", and "Country Operations Teams" refer to the efforts and personnel required to execute the GSOP Years 1-3 within each Country. "Country Administration Support" refers to the administration tasks and staff needed to support Country Operations Teams and allow them to concentrate on solving global warming.

Note 3: "Internal Reporting," noted throughout the GSOP Problem Diagram, will continually exchanges GSOP status, information, results, and good ideas within and among all Country Teams. This exchange is needed to build learning, support ongoing collaboration among all participants, and document ongoing results. Supporting this exchange, the US GSOP will provide and maintain an Internal GSOP Global Report Platform. GSOP participants in each Country will use the platform to post their internal GSOP reports along with Regional and Global team results. All GSOP participants will have free access to the platform.

Note 4. The US Global Support Center (described in Section 6) will provide and maintain a Global GSOP Public Website for public release of results Globally. Country GSOP Public Progress Reports will also be prepared by each Country Administration Support, Recruitment and Visibility Sub-Team to periodically inform their Country's public, government officials, and GSOP sponsors on Country GSOP progress.

Note 5. Personnel assigned to the three People's Projects and the Outreach Program will work on Country Teams, Regional Teams, and Global Teams. Country Team members will work together to execute their designated tasks. The majority of personnel working on People's Project 1 will work on Country Teams to evaluate and integrate climate solution options. Some will work on Regional Teams to integrate Country results and systems at their Regional level. Others will work on Global Teams to integrate Regional results and systems at the Global level. Most of the staff on People's Projects 2 and 3 will work on Global Teams to evaluate solution options to meet their respective Project's objectives. Members of Regional and Global Team will remain within their respective Countries and collaborate Regionally and Globally through the Internet. All personnel assigned to the Outreach Program will be on Country Teams. To accomplish their designated tasks, the three People's Projects and the Outreach Program will each be staffed by the types and numbers of personnel as shown in Section 2. Country Operations Personnel Plan (US Baseline).

Note 6. The GSOP requires the focused collaboration of people in all Countries. It is not a simple program – many parts must work and fit together. To assist with this complexity, we strove to make these Program and Execution Plans as simple and understandable as possible by: Writing in “basic engineering” with non-complex sentences. (We are not out for literary awards!) We chose titles and terms that are descriptive of their functions. We capitalized the terms used repeatedly throughout the document and included them in Appendix A, Acronyms and Definitions. In addition, we tried to be consistent in the wording of terms. We capitalized “Country,” “Regional,” and “Global” to imply that these refer to the program participants’ Country, Region and Globe. As a motivator, participants must feel ownership of their GSOP. Having understandable Program and Execution Plans is paramount to their success. Thus, our attempts to “keep it simple.”

Problem Diagram Schematic.

The Problem Diagram Schematic shown in Figure 1 is a thumbnail view of a Problem Diagram. It includes Project Goals and End-State Goals, Problem Elements and Solution Work Units. The Project Goals are the objectives for each of the three People’s Projects and for the Outreach Program. The End-State Goals present what is to be accomplished in a broader, longer-term sense by meeting the Project Goals. The Problem Elements break the global warming problem into technical, economic and social/political problem elements. The Solution Work Units, analogous to a statement of work, present the efforts needed to overcome the Problem Elements.

In the following, for each of the three GSOP People’s Projects and for the Outreach Program, we include the Tier 1 Project and End-State Goals, the Tier 2 Problem Elements, and the Tier 3 Solution Work Units.

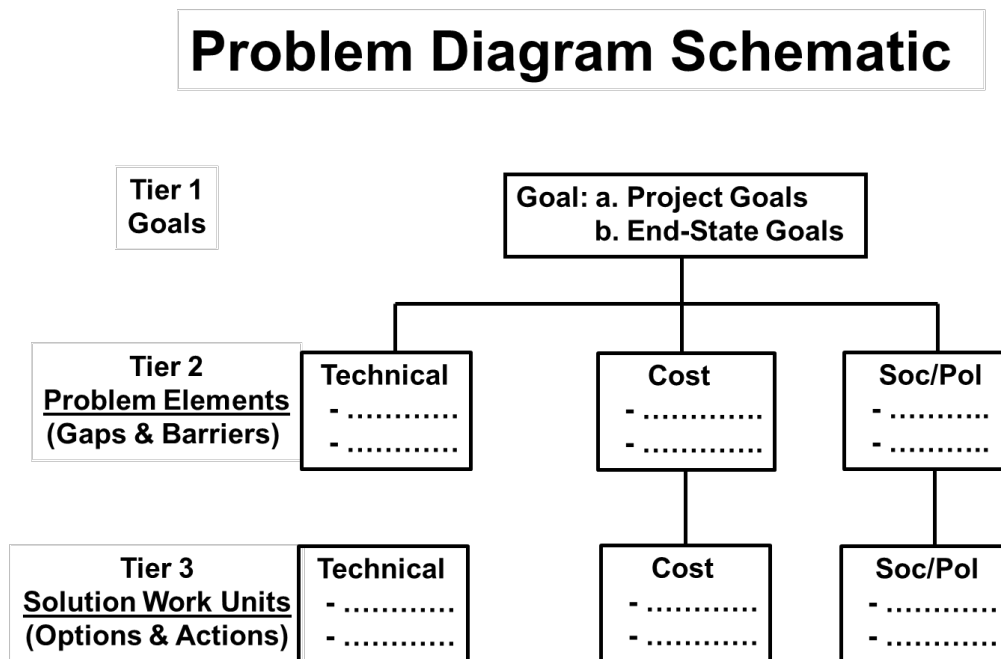


Figure 1. Problem Diagram used to define the Wicked-Problem Approach problem-solving effort.

Global Solutions Program (Comprised of People's Projects 1, 2 and 3)

People's Project 1: Halt Net Release of CO₂ and Adapt to Unavoidable Climate Change Impacts

Project 1 Goals

Project Goal: Identify and evaluate available options to halt the net release of atmospheric CO₂, and adapt to unavoidable climate change impacts by years 2050, 2075 and 2100. Develop integrated Country strategies and Country Action Plans that are technically feasible and effective in achieving Global Project Goals, and in being economically supportable and socially/politically acceptable by *the people*. Assist to develop international Regional and Global strategies and Action Plans that are likewise technically feasible and effective, economically supportable and socially/politically acceptable and will, when implemented, successfully overcome global warming. Interface closely with the Outreach Program to provide a two-way flow of information and collaboration between local and Country levels to achieve a broad and powerful focusing of many minds.

End-State Goal: All Countries successfully implement the GSOP Country, Regional, and Global Action Plans; and thus, enable today's young, future generations, and civilization to survive and thrive.

People's Project 1 will be executed by Country, Regional and Global teams.

People's Project 1 Problem Elements (Questions and Barriers)

1. Organization Problem Elements – Country Teams

(1) How best to select, orient, organize and facilitate Country Teams and sub-teams to accomplish People's Projects 1?

2. Standardization and Information Technology Problem Elements – Country and Global Teams

(1) Standard parameters need to be selected and agreed upon for use in this project so that results can be accurately shared, compared, and integrated both within the Country and Globally.

(2) A robust Internal GSOP Global Report Platform is required to facilitate GSOP communications and collaboration within each Country as well as Regionally and Globally.

3. Option Evaluations: Halt the net release of atmospheric CO₂ by years 2050, 2075 and 2100

Problem Elements – Country Teams

(1) What is the current Country, regional, and worldwide energy consumption by type of energy and associated releases of CO₂ from each energy type?

(2) What are the available, proven options to fill energy needs within a Country that do not produce greenhouse gases? What are the standardized technical evaluation criteria that each option must be evaluated against? What are the results of evaluating each option against these criteria? What options are available for consideration?

4. Option Evaluations: Adapt to unavoidable climate change impacts by years 2050, 2075 and 2100 Problem Elements. – Country Teams

- (1) From what areas and how many people within the Country will be forced to evacuate due to expected levels of ocean rise by years 2050, 2075 and 2100?
- (2) From what areas and how many people within the Country will be forced to evacuate due to expected rises in temperatures by years 2050, 2075 and 2100?
- (3) From what areas and how many people within the Country will be otherwise severely impacted by anticipated climate changes via rainfall, storms, and temperatures by years 2050, 2075 and 2100?
- (4) What are practical options to cope with and mitigate these impacts? What are the results of evaluating each option on standardized technical evaluation criteria?

5. Integration and Internal Reporting Problem Elements – Country Teams

- (1) What would be an integrated Country system to successfully halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075 and 2100? First, consider available options from People's Projects 1 and 2, and then combine available options and R&D options from People's Projects 1, 2 and 3. What are the outstanding problems to achieving the desired integrations? How can these problems be overcome?
- (2) What is the resulting best practical system that balances technical, economic and social/political factors.
- (3) With this integrated strategy, what would the Country total annual net release of CO₂ be by the years 2050, 2075, and 2100? Based on the integrated strategy, what would the anticipated total Country contributions be to halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and address ocean acidification and other problems by years 2050, 2075 and 2100?
- (4) How can this strategy be successfully implemented?
- (5) Once a successful Global strategy is developed, what are the plans to implement the Country strategy?
- (6) How can Country and international project participants be kept informed of GSOP progress and results?
- (7) What information needs to be exchanged between the Outreach Program and the Global Solutions Program and how is this to be accomplished?

6. Economic Problem Elements – Country Teams

- (1) How can the cost analyses be determined on a consistent basis within the Country, Regionally, and Globally?
- (2) What is the Country capital, operating and total yearly costs of an integrated strategy to successfully halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075 and 2100?
- (3) How can these costs be funded and what is the affordability of paying these costs?
- (4) How can economic barriers be overcome?
- (5) The Integration Team needs to be kept informed of economic assessment results.

7. Social/Political Problem Elements – Country Teams

- (1) How can social/political evaluations be conducted to determine social/political acceptability for each option considered in Projects 1, 2 and 3?
- (2) What are the social/political acceptability and barriers of an integrated system to successfully halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075 and 2100?
- (3) How can these barriers be overcome to successfully achieve the integrated strategy?
- (4) The Integration Team needs to be kept informed of the social/political assessment results.

8. Regional Integration, Coordination and Internal Reporting Problem Elements – Regional Teams

- (1) What Regional information is needed regarding CO₂ release?
- (2) What Regional information is needed regarding contributions to meeting GSOP goals?
- (3) How can a Regional response system integrate the Country response systems?
- (4) What are the outstanding Regional integration problems and how can they be overcome?
- (5) How can this integrated Regional strategy be successfully implemented?
- (6) What are the collective results from each Region by years 2050, 2075 and 2100?
- (7) What progress reports are needed and how will they be shared?
- (8) Coordination with the Regional teams will be needed.

9. Regional Economics Problem Elements – Regional Teams

- (1) What will be the Regional capital, operating and total yearly costs to meet GSOP goals by years 2050, 2075 and 2100?
- (2) How can these costs be paid for and what is the Regional affordability?
- (3) How can economic barriers be overcome?
- (4) What progress reports are needed and how will they be shared?

10. Regional Social/Political Problem Elements – Regional Teams

- (1) What are the social/political acceptability and barriers for each Region to meet GSOP goals by years 2050, 2075 and 2100?
- (2) How can these barriers be overcome to successfully achieve integrated Regional strategies?
- (3) What progress reports are needed and how will they be shared?

11. Global Integration, Coordination and Internal Reporting Problem Elements – Global Teams

- (1) What Global information is needed regarding CO₂ release?
- (2) What Global information is needed regarding contributions to meeting GSOP goals?
- (3) By implementing the integrated Global strategy, what will Global conditions be with respect to GSOP goals by years 2050, 2075 and 2100?
- (4) What can be done if these conditions are not acceptable?
- (5) Can more intense or additional available options be implemented to meet GSOP goals?
- (6) Are there key technical barriers to successfully meeting GSOP goals?
- (7) What technologies in R&D (People's Project 3) can overcome these key technical barriers?
- (8) How best to determine if additional and more intense available options plus R&D technologies from People's Project 3 can achieve GSOP goals?
- (9) How can a Global response system integrate the Regional response systems?
- (10) What are the outstanding Global integration problems and how can they be overcome?
- (11) How can the successful integrated Global strategy be successfully implemented?
- (12) What are the final results from Global strategy?

- (13) What progress reports are needed and how will they be shared?
- (14) Coordination with the Global teams will be necessary.

12. Global Economics Problem Elements – Global Teams

- (1) What will be the Global capital, operating and total yearly costs to meet GSOP goals by years 2050, 2075 and 2100?
- (2) How can these costs be paid for and what is the Global affordability?
- (3) How can economic barriers be overcome?
- (4) What progress reports are needed and how will they be shared?

13. Global Social/Political Problem Elements – Global Teams

- (1) What are the social/political acceptability and barriers Globally to meet GSOP goal by years 2050, 2075 and 2100?
- (2) How can these barriers be overcome to successfully achieve the integrated Global strategy?
- (3) What progress reports are needed and how will they be shared?

People's Project 1 Solution Work Units (Options and Actions)

1. Organization Work Units – Country Team

a. Project 1 Organization Team – Country Team

The organization team for Project 1 is composed of the project-level Problem Facilitators who will provide overall project coordination.

- (1) Evaluate and select other Project 1 Problem Facilitators. They, in turn, will evaluate and select full-time and part-time applicants. Full-time participants may select part-time applicants. Applicants will be recruited by the Country Administration Support, Recruitment and Visibility Sub-Team.
- (2) A training course will be provided to train a small cadre of Problem Facilitators on the Wicked-Problem Approach. They will in-turn train other Problem Facilitators and full-time staff using a “train-the-trainer approach.” Additional information is provided in Section 3. Country Administration Support and Country Start-Up Year Plans (US Baseline) and in Section 6. US Global Support Center Plan.
- (3) Organize the project teams in accordance with the Country problem diagram, personnel and cost plans.
- (4) Mentor and empower other Problem Facilitators to coordinate and lead all aspects of the GSOP and to instill a bottom-up, empowered environment. Together, all participants will execute the GSOP based on their Country Problem Diagram, Personnel and Cost plans.
- (5) Internal Reporting – Prepare Project 1 quarterly progress reports suitable for public release and place them on the Internal GSOP Global Report Platform.

b. GSOP Coordinating Committee – Country Team

The GSOP Coordination Committee is comprised of the project-level Problem Facilitators from the three People's Projects and the Outreach Program.

- (1) With overall authority, coordinate Country Operations. Select one member to serve as a Country Operations point-of-contact. Work by consensus.
- (2) Orient the Country Technical Advisory Committee (C-TAC) on the GSOP, the Wicked-Problem Approach, introduce participants, and provide periodic presentations of progress and results to the C-TAC.

(3) Internal Reporting – Consolidate Project 1, 2 and 3, and Outreach Program progress reports into quarterly Country progress reports suitable for public release and place them on the Internal GSOP Global Report Platform. The Country Administration Support, Recruitment and Visibility Sub-Team will use the reports to prepare public updates and post them on the Country GSOP Public Website.

2. Standardization and Information Technology Work Units – Country and Global Teams

a. Standardization Parameters – So that results can be accurately compared and integrated within each Country and Regionally and Globally, select and agree upon standard parameters for use throughout the GSOP. Standardized parameters should include standardized units of measurement for mass, energy, greenhouse gas concentration, temperature, and other parameters. The Standardization and Information Technology teams must work together internationally to reach agreement on these parameters. The teams will provide standardization support to People's Projects 1, 2, and 3 teams. The Standardization Teams will document the agreed to standard parameters and post them on the Internal GSOP Global Report Platform.

b. Information Technology – Identify, select, establish and support an Internal GSOP Global Report Platform to enable the communication and collaboration of thousands of engineers, economists, social/political experts and subject-matter experts working on the GSOP in all Countries around the world. The Internal GSOP Global Report Platform will be used to store and distribute Country, Regional and Global reports and results. The US GSOP will establish and maintain this platform for use by all Countries.

3. Option Evaluations: Halt the net release of atmospheric CO₂ by years 2050, 2075 and 2100 Work Units – Country Teams

(1) Baseline – Identify the current Country energy consumption by type of energy and associated release of CO₂ from each energy type.

(2) In order to halt the net release of atmospheric CO₂ by years 2050, 2075 and 2100, identify available, proven options and sources of information for each category listed below. As a starting point, consider the Attachment 1, Partial List of Climate Solution Options that includes 140 options. Survey within the Country and internationally for additional categories and options to meet above objectives. Include options supported with government funding and those supported privately or commercially. Select options most suited to Country conditions for evaluation. Then, evaluate each selected option using the Attachment 2, Technical Evaluation Criteria.

Option Categories: Clean Energy
 Energy Storage
 Winter Energy Sources
 Energy Transmission
 Energy Conservation
 Social actions

Industrial Carbon Capture and Sequestering

(3) To obtain factual information and data to enable your assessments, seek out and engage with experts in government, industry, universities and climate action groups. Provide assistance to the Country Integration and Internal Reporting Team as needed.

(4) Internal Reporting – Prepare a Project 1 semi-annual report of technical evaluation results; address each option evaluated in the prior six months. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100.

4. Option Evaluations: Adapt to unavoidable climate change impacts by years 2050, 2075 and 2100 Work Units. – Country Teams

(1) Ocean Rise – Project from what areas and how many people will be forced to evacuate due to expected levels of ocean rise by years 2050, 2075 and 2100.

(2) Temperature Rise – Project from what areas and how many people will be forced to evacuate due to expected rises in temperatures by years 2050, 2075 and 2100.

(3) Severe Weather – Project from what areas and how many people will be otherwise severely impacted by anticipated climate change via rainfall, storms, temperatures by years 2050, 2075 and 2100.

(4) In order to adapt to unavoidable climate change impacts by years 2050, 2075 and 2100, identify available, proven options and sources of information. As a starting point, consider the Attachment 1, Partial List of Climate Solution Options that includes 140 options. Survey within the Country and internationally for additional categories and options to meet above objectives. Include options supported with government funding and those supported privately or commercially. Select options most suited to Country conditions for evaluation. Then, evaluate each selected option using the Attachment 2, Technical Evaluation Criteria.

(5) To obtain factual information and data to enable your assessments, seek out and engage with experts in government, industry, universities and climate action groups. Provide assistance to the Country Integration and Internal Reporting Team as needed.

(6) Internal Reporting – Prepare a Project 1 semi-annual report of technical evaluation results; address each option evaluated in the prior six months. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100.

5. Integration and Internal Reporting Work Units – Country Teams

(1) Option Integration – Integrate available options from People's Projects 1 and 2 into practical systems (and systems of systems) of successful Country climate solutions that best suit Country conditions. *Successful* climate solutions must: halt the net release of atmospheric CO₂; adapt to ongoing climate-change impacts; help to stabilize the Earth's energy balance to halt global warming; adjust the Earth's energy balance to return to prior conditions; and addressing ocean acidification and other problems by years 2050, 2075 and 2100.

(2) Integration Problems – *Practical* climate-solution systems must all work together – they may not. Identify First-Order Integration Problems among selected solution options that do not work together. *Practical* climate-solution systems must also work together with Country sectors with which they interface and depend. Identify Second-Order Integration Problems between climate solution systems and other Country sectors. In order to have workable climate solution systems, First-Order Integration Problems must be solved. Second-Order Integration Problems must be addressed by adjusting the climate solution system, or by altering Country sector operations, or by a combination of these. Third-Order Integration Issues involve the impacts of climate solution system on Country sectors.

As necessary, set up integration focus teams to: a. Identify available and R&D options to solve each First-Order and Second-Order Integration Problem, b. Evaluate each integration solution option using the Attachment 2, Technical Evaluation Criteria, including Criteria #6 on Integration, c. Integrate the best integration solutions into the Country climate system, and d. As needed, request

support from the Outreach Program to identify “sector engineers” willing to assist on specific integration problems. Also, request support through international collaboration.

To address Third-Order Integration Issues, the Outreach Program teams will recruit engineers working within each of their Country’s economic sectors. They will request that the sector engineers review the integrated climate systems, identify sector impact issues, and propose sector accommodations to resolve the sector impact issues. The Outreach Program teams will assemble the results into sector impact reports. They will provide the reports to the Integration Team for review and consideration.

(3) Technical, Economic and Social/Political Evaluations – Combine and balance technical, economic and social/political evaluations into best practical integrated Country systems by the years 2050, 2075 and 2100.

(4) Country Contributions – Based on the best practical integrated systems, determine what the Country total annual release of CO₂ will be by the years 2050, 2075, and 2100. Similarly, determine the anticipated total Country contributions to halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth’s energy balance to halt global warming, adjust the Earth’s energy balance to return to prior conditions, and address ocean acidification and other problems by years 2050, 2075 and 2100. Make assessments of the integrated systems to fulfill the goals by applying the Attachment 2, Technical Evaluation Criteria.

(5) Determine the Country’s fuels and energy balances for the starting year and estimate the energy balance for years 2050, 2075 and 2100. Consider the Attachment 2, Technical Evaluation Criteria # 11, Fuel and Energy Balances.

(6) Implementation – Determine how the best practical integrated systems can be successfully implemented by the years 2050, 2075 and 2100.

(7) To maximize rapid commercialization of the most promising technologies, share technology assessments from People’s Project 3 with those who fund academic research.

(8) Interfacing – Interface with your Outreach Program teams to: obtain good ideas to overcome global warming; to assist in pilot testing solution options; and to share Global Solutions Program results with States, Province, local communities and industries. Receive quarterly Outreach Program reports and distribute them through the Internal GSOP Global Report Platform.

(9) Based on the results and recommendations from the Global Coordination, Integration and Internal Reporting Team of the need for additional and/or more intensive available options that can be taken to successfully meet Global Project Goals, repeat the above option integration assessments with additional and more intensive available options included.

(10) Based on recommendations from the Global Coordination, Integration and Internal Reporting Team, repeat the above integration assessments with additional and more intensive available options, and with additional prioritized technologies in R&D included.

(11) Country Action Plans – Develop Country Action Plans describing the best practical integrated global warming solution systems by years 2050, 2075 and 2100. Include approaches for implementing the optimal solutions for each Country. These capstone documents should include summaries of selected option evaluations from People’s Projects 1, 2 and 3 along with economic and social/political evaluations, barriers, and ways to overcome the barriers; integration problems and solutions; Country energy and fuel balances for starting year and years 2050, 2075 and 2100; Country contributions to meeting Project 1 and 2 goals for these same years; and good ideas on global warming solutions, and pilot testing opportunities from the Outreach Programs. Additionally, identify the most promising research and development technologies that merit expedited commercialization.

(12) Internal Reporting – Prepare a Project 1 semi-annual report of integration results for the best practical Country integrated climate systems. The report will be the Country Action Plans and

updates. Include balancing of technical, economic and social/political evaluations. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100. Include the Project 1 semi-annual reports of technical evaluation results, the economic assessment results, and social/political assessment results. Post the report on the Internal GSOP Global Report Platform.

6. Economics Work Units – Country Teams

- (1) Baseline – Determine how economic analyses can be made on a consistent basis.
- (2) Review the engineering estimates of the total capital, operating, and yearly costs of the best practical integrated systems to successfully halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts; and help to stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075 and 2100.
- (3) Interface with the Integration Team to arrive at best practical integrated systems that balance technical, economic and social/political factors and assist in preparing Country Action Plans.
- (4) Identify how these costs can be funded and determine the affordability and barriers of paying these costs taking into account the Country's economic situation.
- (5) Determine how the economic barriers can be overcome to successfully achieve the best practical integrated systems.
- (6) Repeat the above assessments as required with additional and more intensive available options, and prioritized technologies in R&D included.
- (7) Internal Reporting – Provide semi-annual Project 1 economic assessment results and post them on the Internal GSOP Global Report Platform.

7. Social/Political Work Units – Country Teams

- (1) Interface with the Outreach Program to obtain State, Province, local community and industry evaluations of social/political acceptability for each evaluated option in Projects 1, 2 and 3. Assess the social/political acceptability and barriers of integrated systems. Determine how social/political barriers can be overcome to successfully achieve the best practical integrated systems,
- (2) Estimate the social/political acceptability and barriers of integrated systems to successfully halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts; and help to stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075 and 2100.
- (3) Interface with the Integration Team to arrive at best practical integrated systems that balance technical, economic and social/political factors and assist in preparing Country Action Plans.
- (4) Determine how social/political barriers can be overcome to successfully achieve the best practical integrated systems.
- (5) Repeat the above assessments as required with additional and more intensive available options, and prioritized technologies in R&D included.
- (6) Internal Reporting – Provide semi-annual Project 1 social/political economic assessment results and post them on the Internal GSOP Global Report Platform.

8. Regional Integration, Coordination and Internal Reporting Work Units – Regional Teams

- (1) Integrate Country Action Plans into Regional Action Plans considering technical, economic, and social/political factors. Identify Regional integration problems. Set up Regional integration focus teams to find available and R&D options to resolve integration problem. Include the best integration solutions into the Regional Action Plans.

- (2) Based on the Country Action Plans, determine what the Regional annual release of CO₂ will be by the years 2050, 2075, and 2100.
- (3) Based on the Country Action Plans, determine the total anticipated Regional contributions to halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075 and 2100.
- (4) Based on the results and recommendations from the Global Coordination, Integration and Internal Reporting Team for additional and more intensive available options, repeat the above assessments using updated Country Action Plans to produce updated Regional Action Plans.
- (5) Based on the results and recommendations from the Global Coordination, Integration and Internal Reporting Team of the need to include prioritized technologies in R&D, repeat the above assessments using re-updated Country Action Plans to produce re-updated Regional Action Plans.
- (6) Prepare Regional Action Plans to successfully meet the above goals and achieve acceptable conditions by the years 2050, 2075 and 2100.
- (7) Determine how the Regional Action Plans can be successfully implemented. Identify technical, economic and social/political barriers and ways to overcome the barriers.
- (8) The Regional Teams should select POC's to assist in Regional and Global coordination.
- (9) Internal Reporting – Prepare a Regional semi-annual report of integration results for the best practical Regional integrated climate systems and Regional Climate Action Plan. Include balancing of technical, economic and social/political evaluations. Include the semi-annual Regional economic assessment results, and Regional social/political assessment results. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100. Post the report on the Internal GSOP Global Report Platform.

9. Regional Economics Work Units – Regional Teams

- (1) Based on the Country Action Plans within each Region, estimate the total anticipated capital, operating and yearly costs for each Region to halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts; and help to stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075 and 2100.
- (2) Identify how these costs can be paid for and determine the Regional affordability and barriers of paying these costs.
- (3) Determine how the economic barriers can be overcome to successfully implement the Regional Action Plan.
- (4) Assist the Regional Integration and Reporting team to develop the Regional Action Plans.
- (5) Repeat the above assessments as required with additional and more intensive available options, and prioritized technologies in R&D that are included in the updated and re-updated Country Action Plans.
- (6) Internal Reporting – Provide semi-annual Regional economic assessment results and post them on the Internal GSOP Global Report Platform.

10. Regional Social/Political Work Units – Regional Teams

- (1) Based on Country Action Plans within each Region, estimate the anticipated social/political acceptability and barriers for each Region to halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075 and 2100.

- (2) Determine how social/political barriers can be overcome to successfully implement the Regional Action Plans.
- (3) Assist the Regional Integration and Reporting team to develop the Regional Action Plans.
- (4) Repeat the above assessments as required with additional and more intensive available options, and prioritized technologies in R&D that are included in the updated and re-updated Country Action Plans.
- (5) Internal Reporting – Provide semi-annual Regional social/political assessment results and post them on the Internal GSOP Global Report Platform.

11. Global Integration, Coordination and Internal Reporting Work Units – Global Teams

- (1) Integrate Regional Action Plans into Global Action Plans considering technical, economic, and social/political factors. Identify Global integration problems. Set up Global integration focus teams to find available and R&D options to resolve integration problem. Include the best integration solutions into the Global climate system.
- (2) Based on the Regional Action Plans, determine what the Global annual release of CO₂ will be by the years 2050, 2075, and 2100.
- (3) Based on the Regional Action Plans, determine the total anticipated Global contributions to halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075 and 2100.
- (4) Based on implementing the Regional Action Plans, project Global conditions with respect to CO₂ atmospheric levels, Global average temperatures, ocean levels, evacuation areas and populations, severe weather conditions, ocean acidification and other problems by the years 2050, 2075, and 2100.
- (5) If these conditions are not acceptable, identify additional and more intense available options that can be taken to successfully halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by the years 2050, 2075 and 2100.
- (6) Repeat Country, Regional and Global assessments with these additional and/or more intense available options in order to meet the above goals and achieve acceptable conditions.
- (7) If acceptable conditions cannot be achieved using available options (People's Projects 1 and 2), then identify key technical barriers to successfully meeting the above goals and achieve acceptable conditions by the years 2050, 2075 and 2100.
- (8) Identify technologies in R&D (People's Project 3) that can overcome these key technical barriers and prioritize these technologies.
- (9) Repeat Country, Regional and Global assessments with additional and/or more intense available options from People's Projects 1 and 2 plus the prioritized R&D technologies from People's Project 3 in order to meet the above goals and achieve acceptable conditions by the years 2050, 2075 and 2100.
- (10) Prepare Global Action Plans to successfully meet the above goals and achieve acceptable conditions by the years 2050, 2075 and 2100.
- (11) Determine how the Global Action Plans can be successfully implemented. Identify technical, economic and social/political barriers and ways to overcome the barriers.
- (12) The Global Teams should select POC's to assist in coordinating Global Team activities.
- (13) Internal Reporting – Prepare a Global semi-annual report of integration results for the best practical Global integrated climate systems and Global Climate Action Plan. Include balancing of technical, economic and social/political evaluations. Include the semi-annual Regional economic

assessment results, and Regional social/political assessment results. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100. Post the report on the Internal GSOP Global Report Platform.

12. Global Economics Work Units – Global Teams

- (1) Based on the Regional Action Plans, estimate the anticipated total Global capital, operating and total yearly costs to successfully halt the net release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems on a Global basis by years 2050, 2075, and 2100.
- (2) Identify how these costs can be paid for and determine the Global affordability and barriers of paying these costs.
- (3) Determine how the economic barriers can be overcome to successfully achieve the Global Action Plans.
- (4) Assist the Global Integration and Reporting team to develop the Global Action Plans.
- (5) Repeat the above assessments as required with additional and more intensive available options, and prioritized technologies in R&D that are included in the updated and re-updated Regional Action Plans.
- (6) Internal Reporting – Provide semi-annual Global economic assessment results and post them on the Internal GSOP Global Report Platform.

13. Global Social/Political Work Units – Global Teams

- (1) Based on the Regional Action Plans, estimate the anticipated Global social/political acceptability and barriers to successfully halt the release of atmospheric CO₂, adapt to ongoing climate-change impacts, stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and addressing ocean acidification and other problems by years 2050, 2075, and 2100.
- (2) Determine how these barriers can be overcome to successfully implement the Global Action Plans.
- (3) Assist the Regional Integration and Reporting team to develop the Global Action Plans.
- (4) Repeat the above assessments as required with additional and more intensive available options, and prioritized technologies in R&D that are included in the updated and re-updated Regional Action Plans.
- (5) Internal Reporting – Provide semi-annual Global social/political assessment results and post them on the Internal GSOP Global Report Platform.

People's Project 2. Stabilize and Adjust the Earth's Energy Balance, and Address Ocean Acidification and Other Problems

People's Project 2 Goals

Project Goal: Identify and evaluate available options to stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions, and address ocean acidification and other problems by the years 2050, 2075, and 2100.

End-State Goal: All Countries successfully implement the GSOP Country, Regional and Global Action Plans thereby enabling today's young, future generations, and civilization to survive and thrive.

The goals of People's Project 2 are Global in nature. Therefore, Project 2 Evaluation Teams will be Global and comprised of people from each Country's People's Project 2.

People's Project 2. Problem Elements (Questions and Barriers)

1. Organization Problem Elements – Country Teams

(1) How best to select, orient, organize and facilitate Country Teams and sub-teams to accomplish People's Projects 2?

(2) How best to organize and support Global teams to accomplish People's Project 2?

2. Standardization and Information Technology Problem Elements – Addressed in People's Project 1

3. Option Evaluations: Stabilize the Earth's energy balance to halt global warming, and adjust the Earth's energy balance to return to prior conditions by years 2050, 2075 and 2100 Problem Elements – Global Teams

(1) What are the available, proven options to meet these Project 2 goals and what are the standardized technical evaluation criteria that each approach must be evaluated against? What are the results of evaluating each option against these criteria?

4. Option Evaluations: Address ocean acidification and other problems by years 2050, 2075 and 2100 Problem Elements – Global Teams

(1) What are the available, proven options to meet these Project 2 goals for ocean acidification and other problems and what are the standardized technical evaluation criteria that each option must be evaluated against? What are the results of evaluating each option against these criteria?

5. Global Coordination and Internal Reporting Problem Elements – Global Teams

(1) How best to assemble results from Global teams working on each option, and to prepare internal summary progress reports every 3 months with all participating Countries? How can these efforts and teams be coordinated?

6. Integration and Internal Reporting Problem Element – Addressed in People's Project 1

7. Economics Problem Elements – Addressed in People's Project 1

8. Social/Political Problem Elements – Addressed in People's Project 1

People's Project 2 Solution Work Units (Options and Action)

1. Organization Work Units – Country Teams

a. Project 2 Organization Team – Country Team

The organization team for Project 2 is composed of the project-level Problem Facilitators who will provide overall project coordination.

(1) Evaluate and select other Project 2 Problem Facilitators. They, in turn, will evaluate and select full-time and part-time applicants. Full-time participants may select part-time applicants. Applicants will be recruited by the Country Administration Support, Recruitment and Visibility Sub-Team.

(2) A training course will be provided to train a small cadre of Problem Facilitators on the Wicked-Problem Approach. They will in-turn train other Problem Facilitators and full-time staff using a “train-the-trainer approach.” Additional information is provided in Section 3. Country Administration Support and Country Start-Up Year Plans (US Baseline) and in Section 6. US Global Support Center Plan.

(3) Organize the project teams in accordance with the Country problem diagram, personnel and cost plans.

(4) Mentor and empower other Problem Facilitators to coordinate and lead all aspects of the GSOP and to instill a bottom-up, empowered environment. Together, all participants will execute the GSOP based on their Country Problem Diagram, Personnel and Cost plans.

(5) Internal Reporting – Prepare quarterly progress reports suitable for public release and place them on the Internal GSOP Global Report Platform.

b. GSOP Coordinating Committee – Country Team

The GSOP Coordination Committee is comprised of the project-level facilitators from the three People’s Projects and the Outreach Program.

(1) With overall authority, coordinate Country Operations. Select one member to serve as a Country Operations point-of-contact. Work by consensus.

(2) Orient the Country Technical Advisory Committee (C-TAC) on the GSOP, the Wicked-Problem Approach, introduce participants, and provide periodic presentations of progress and results to the C-TAC.

(3) Internal Reporting – Consolidate Project 1, 2 and 3, and Outreach Program progress reports into quarterly Country progress reports suitable for public release and place them on the Internal GSOP Global Report Platform. The Country Administration Support, Recruitment and Visibility Sub-Team will use the reports to prepare public updates and post them on the Country GSOP Public Website.

2. Standardization and Information Technology Work Units – Addressed in People’s Project 1

3. Option Evaluations: Stabilize the Earth’s energy balance to halt global warming, and adjust the Earth’s energy balance to return to prior conditions by years 2050, 2075 and 2100 Work Units – Global Teams

(1) In order to stabilize the Earth’s energy balance to halt global warming and adjust the Earth’s energy balance to return to prior conditions by years 2050, 2075 and 2100, identify available, proven options and sources of information for each category listed below. As a starting point, consider the Attachment 1, Partial List of Climate Solution Options that includes 140 options. Survey within the Country and internationally for additional categories and options to meet above objectives. Include options supported with government funding and those supported privately or commercially. Select options most suited to Country conditions for evaluation. Then, evaluate each selected option using the Attachment 2, Technical Evaluation Criteria.

Option Categories: Direct CO₂ removal and sequestering
Ocean fertilization
Restore ecosystems
Agriculture practices
Direct CO₂ removal
Solar blocking atmospheric based
Solar blocking space-based
Alter surface albedo

(2) To obtain factual information and data to enable your assessments, seek out and engage with experts in government, industry, universities and climate action groups. Provide assistance to the Country Integration and Internal Reporting Team as needed.

(3) Internal Reporting – Prepare a semi-annual report of technical evaluation results; address each option evaluated in the prior six months. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100. Post results on the Internal GSOP Global Report Platform.

4. Option Evaluations: Address ocean acidification and other problems by years 2050, 2075 and 2100 Work Units – Global Teams

(1) In order to address ocean acidification and other problems by years 2050, 2075 and 2100, identify available, proven options and sources of information for each category listed below. As a starting point, consider the Attachment 1, Partial List of Climate Solution Options that includes 140 options. Survey within the Country and internationally for additional categories and options to meet above objectives. Include options supported with government funding and those supported privately or commercially. Select options most suited to Country conditions for evaluation. Then, evaluate each selected option using the Attachment 2, Technical Evaluation Criteria.

Option Categories: Ocean acidification
Methane release
Refrigeration release

(2) To obtain factual information and data to enable your assessments, seek out and engage with experts in government, industry, universities and climate action groups. Provide assistance to the Country Integration and Internal Reporting Team as needed.

(3) Internal Reporting – Prepare a semi-annual report of technical evaluation results; address each option evaluated in the prior six months. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100.

5. Global Coordination and Internal Reporting Work Units – Global Teams

(1) Serve as a Global POC for coordinating with each Project 2 Global team on your selected Project 2 options.

(2) Internal Reporting – Assemble results from Global Teams working on each option into a Project 2 semi-annual report of technical evaluation results; address all option evaluated in the prior six months. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100. Post results on the Internal GSOP Global Report Platform.

6. Integration and Internal Reporting Work Units – Addressed in People's Project 1

7. Economics Work Units – Addressed in People's Project 1

8. Social/Political Work Units – Addressed in People's Project 1

People's Project 3. Climate Monitoring, Modeling and Projections, and Advanced Technologies

People's Project 3 Goals

Project Goal: Identify ways to accurately monitor and model the Earth's energy and CO₂ balances, to project future conditions, and to estimate Country fuel and energy balances. Identify, evaluate and prioritize technologies currently in R&D to meet the goals of People's Projects 1 and 2. Support and promote international cooperation to test and develop best options.

End-State Goal: All Countries successfully implement the GSOP Country, Regional and Global Action Plans thereby enabling today's young, future generations, and civilization to survive and thrive.

The goals of People's Project 3 are Global in nature. Therefore, Project 3 Evaluation Teams will be Global and comprised of people from each Country's People's Project 3.

People's Project 3 Problem Elements (Questions and Barriers)

1. Organization Problem Elements – Country Teams

- (1) How best to select, orient, organize and facilitate Country Teams and sub-teams to accomplish People's Projects 3?
- (2) How best to organize and support Global Teams to accomplish People's Projects 3?

2. Standardization and Information Technology Problem Elements – Addressed in People's Project 1

3. Climate Monitoring, Models and Future Conditions Problem Elements – Global Teams

- (1) What are the ways and available data to monitor the Earth's energy and CO₂ balances?
- (2) Can simplified engineering models of the Earth's energy and CO₂ balances be developed using available monitoring data and other existing models?
- (3) How can each option's contributions to stabilize and adjust the Earth's energy balance and to reach net zero CO₂ be evaluated?
- (4) Engineering projections of future conditions based on implementing options from People's Projects 1, 2 and 3 are needed for evaluations. How do these results compare to other predictive climate models?

4. Option Evaluations: Advanced technologies in R&D Problem Elements – Global Teams

- (1) What are the advanced options currently in R&D to halt the net release of atmospheric CO₂, to adapt to unavoidable climate change impacts, to stabilize and adjust the Earth's energy balance to halt global warming and return to prior conditions, and to address ocean acidification and other problems?
- (2) How can these technologies be prioritized to help focus ongoing and future R&D and provide support to these developments?

5. Global Coordination and Internal Reporting Problem Elements – Global Teams
 - (1) How best to assemble results from Global Teams working on each option, and to prepare internal summary progress reports every 3 months with all participating Countries? How can these efforts and teams be coordinated?
6. Integration and Internal Reporting Problem Elements – Addressed in People’s Project 1
7. Economics Problem Elements – Addressed in People’s Project 1
8. Social/Political Problem Elements – Addressed in People’s Project 1

People’s Project 3 Solution Work Units (Options and Action)

1. Organization Work Units – Country Teams

a. Project 3 Organization Team – Country Team

The organization team for Project 3 is composed of the project-level Problem Facilitators who will provide overall project coordination.

- (1) Evaluate and select other Project 3 Problem Facilitators. They, in turn, will evaluate and select full-time and part-time applicants. Full-time participants may select part-time applicants. Applicants will be recruited by the Country Administration Support, Recruitment and Visibility Sub-Team.
- (2) A training course will be provided to train a small cadre of Problem Facilitators on the Wicked-Problem Approach. They will in-turn train other Problem Facilitators and full-time staff using a “train-the-trainer approach.” Additional information is provided in Section 3. Country Administration Support and Country Start-Up Year Plans (US Baseline) and in Section 6. US Global Support Center Plan.
- (3) Organize the project teams in accordance with the Country problem diagram, personnel and cost plans.
- (4) Mentor and empower other Problem Facilitators to coordinate and lead all aspects of the GSOP and to instill a bottom-up, empowered environment. Together, all participants will execute the GSOP based on their Country Problem Diagram, Personnel and Cost plans.
- (5) Internal Reporting – Prepare Project 3 quarterly progress reports suitable for public release and place them on the Internal GSOP Global Report Platform.

b. GSOP Coordinating Committee – Country Team

The GSOP Coordination Committee is comprised of the project-level facilitators from the three People’s Projects and the Outreach Program.

- (1) With overall authority, coordinate Country Operations. Select one member to serve as a Country Operations point-of-contact. Work by consensus.
- (2) Orient the Country Technical Advisory Committee (C-TAC) on the GSOP, the Wicked-Problem Approach, introduce participants, and provide periodic presentations of progress and results to the C-TAC.
- (3) Internal Reporting – Consolidate Project 1, 2 and 3, and Outreach Program progress reports into quarterly Country progress reports suitable for public release and place them on the Internal GSOP Global Report Platform. The Country Administration Support, Recruitment and Visibility Sub-Team will use the reports to prepare public updates and post them on the Country GSOP Public Website.

2. Standardization and Information Technology Work Units – Addressed in People’s Project 1

3. Climate Monitoring, Models, Future Conditions, and Country Fuel and Energy Balances Work Units – Global Teams

- (1) Identify ways, available models and available data to monitor and project the Earth’s energy, CO₂ balances, and sea levels.
- (2) Using these, develop user-friendly engineering models of the Earth’s energy and CO₂ balances, and ocean levels. These models will be used to support the technical evaluation of each option in meeting GSOP goals that include halting the net release of CO₂, coping with climate change impacts, and stabilizing and adjusting the Earth’s energy balance, and addressing other problems including ocean acidification and methane release.
- (3) Identify or develop spreadsheets to estimate Country fuel and energy balances. Consider Technical Evaluation Criteria # 11 in Attachment 2 as a starting point.
- (4) Develop engineering projections of future Global conditions based on results from People’s Projects 1, 2 and 3. Compare results to other predictive climate models.
- (5) Provide support to People’s Project 1 Integration and Internal Reporting Team, and Regional and Global Integration, Coordination and Internal Reporting Teams to apply the Earth’s energy and CO₂ balances, and Country fuel and energy balances in preparing their technical evaluation of options and integrated systems.
- (6) Internal Reporting – Prepare a semi-annual report of climate monitoring, models, future conditions and Country fuel and energy balances. Post the report on the Internal GSOP Global Report Platform.

4. Option Evaluations: Advanced technologies in R&D Work Units – Global Teams

(1) In order to meet the objectives of People’s Projects 1 and 2, identify advanced options currently in R&D for four categories listed below. As a starting point, consider the Attachment 1, Partial List of Climate Solution Options that includes 140 options. Survey within the Country and internationally for additional categories and options to meet above objectives. Include options supported with government funding and those supported privately or commercially. Select options most suited to Country conditions for evaluation. Then, evaluate each selected option using the Attachment 2, Technical Evaluation Criteria.

- Halt the net release of atmospheric CO₂
Option Categories: Clean Energy
Energy Storage
Winter Energy Sources
Energy Transmission
Energy Conservation
Social Actions
Industrial Carbon Capture and Sequestering
- Adapt to unavoidable climate change impacts
Option Categories: Social actions
- Stabilize and adjust the Earth’s energy balance to halt global warming and return to prior conditions
Option Categories: CO₂ removal and sequestering:
Ocean fertilization
Restore ecosystems

Option Categories: Agriculture practices
 Direct CO₂ removal
 Solar blocking atmospheric based
 Solar blocking space-based
 Alter surface albedo

- Address ocean acidification and other problems

Option Categories: Ocean acidification
 Methane release

(2) To obtain factual information and data to enable your assessments, seek out and engage with experts in government, industry, universities and climate action groups. Provide assistance to the People's Project 1 Integration and Internal Reporting Team, and Regional and Global Integration, Coordination and Internal Reporting Teams as needed.

(3) Internal Reporting – Prepare a semi-annual report of technical evaluation results; address each option evaluated in the prior six months. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100. Post results on the Internal GSOP Global Report Platform.

5. Global Coordination and Internal Reporting Work Units – Global Teams

(1) Serve as a Global POC for coordinating with each Project 3 Global team on your selected Project 3 options.

(2) Internal Reporting – Assemble results from Global Teams working on each option into a Project 3 semi-annual report of technical evaluation results; address all option evaluated in the prior six months. Provide evaluation results for the three-time frames: years 2050, 2075 and 2100. Include semi-annual Project 3 report of climate monitoring, models, future conditions and Country fuel and energy balances. Post results on the Internal GSOP Global Report Platform.

6. Integration and Internal Reporting Work Units – Addressed in People's Project 1

7. Economics Work Units – Addressed in People's Project 1

8. Social/Political Work Units – Addressed in People's Project 1

Outreach Program

The Outreach Program will provide teams of engineers in each State or Province. The teams will support and interface with State, Province, local community and industry groups taking action to overcome global warming. This support will evolve based on needs. A two-way flow of progress reports, assistance and good ideas will result.

Outreach Program Goals

Program Goal: Provide engineering support and advice to States, Provinces, local communities and industries that are taking action on: clean energy; CO₂ reductions; improved efficiencies; adaptations to climate change impacts; and other global warming solutions. By interfacing closely with the Global Solutions Program, achieve a broad and powerful focusing of many minds.

End-State Goal: All Countries successfully implement the GSOP Country, Regional and Global Action Plans thereby enabling today's young, future generations, and civilization to survive and thrive.

The GSOP Outreach Program will be executed by teams within each Country.

Outreach Program Problem Elements (Questions and Barriers)

1. Organization Problem Elements – Country Teams

(1) How best to select, orient, organize and facilitate State, Province teams to accomplish the Outreach Program? How best to interface with Country climate action groups to inform them of the GSOP, share results, and obtain factual information. How best to document and share Country, State, Province outreach?

2. Standardization and Information Technology Problem Elements – Addressed People's Project 1

3. State, Province, Local Community and Industry Outreach Problem Elements – State, Province Teams

(1) How best to interface with State, Province, local communities and industries to become aware of their groups and actions on global warming?

(2) How best to provide engineering assistance to States, Province, local communities and industry on their climate change efforts?

(3) How best to inform States, Provinces, local communities and industry on the GSOP?

(4) How best to inform and explain GSOP results to States, Provinces, local communities and industry?

(5) How best to assess solution system impacts on Country sectors?

(6) How best to exchange good ideas between the GSOP and States, Provinces, local communities and industry?

(7) How best to plan and carry out pilot testing of promising options?

4. Social/Political Problem Elements – State, Province Teams

(1) How best to gain State, Province, local communities and industries assistance to provide social/political evaluations of GSP options and systems?

5. Internal Reporting Problem Elements – Country, State, Province Teams

(1) How can Country participants be kept informed of Outreach Program progress and results?

(2) What information needs to be exchanged between the Outreach Program and the Global Solutions Program and how is this to be accomplished?

Outreach Program Solution Work Units (Options and Actions)

1. Organization Work Units – Country Teams

a. Outreach Program Organization Team – Country Team

The organization team for the Outreach Program is composed of the project-level Problem Facilitators who will provide overall project coordination.

- (1) Evaluate and select other Outreach Program Problem Facilitators. They, in turn, will evaluate and select full-time and part-time applicants. Full-time participants may select part-time applicants. Applicants will be recruited by the Country Administration Support, Recruitment and Visibility Sub-Team.
- (2) A training course will be provided to train a small cadre of Problem Facilitators on the Wicked-Problem Approach. They will in-turn train other Problem Facilitators and full-time staff using a “train-the-trainer approach.” Additional information is provided in Section 3. Country Administration Support and Country Start-Up Year Plans (US Baseline) and in Section 6. US Global Support Center Plan.
- (3) Organize the project teams in accordance with the Country problem diagram, personnel and cost plans.
- (4) Mentor and empower other Problem Facilitators to coordinate and lead all aspects of the GSOP and to instill a bottom-up, empowered environment. Together, all participants will execute the GSOP based on their Country Problem Diagram, Personnel and Cost plans.
- (5) Internal Reporting – Prepare Outreach Program quarterly progress reports suitable for public release and place them on the Internal GSOP Global Report Platform.

b. GSOP Coordinating Committee – Country Team

The GSOP Coordination Committee is comprised of the project-level facilitators from the three People’s Projects and the Outreach Program.

- (1) With overall authority, coordinate Country Operations. Select one member to serve as a Country Operations point-of-contact. Work by consensus.
- (2) Orient the Country Technical Advisory Committee (C-TAC) on the GSOP, the Wicked-Problem Approach, introduce participants, and provide periodic presentations of progress and results to the C-TAC.
- (3) Internal Reporting – Consolidate Project 1, 2 and 3, and Outreach Program progress reports into quarterly Country progress reports suitable for public release and place them on the Internal GSOP Global Report Platform. The Country Administration Support, Recruitment and Visibility Sub-Team will use the reports to prepare public updates and post them on the Country GSOP Public Website.

2. Standardization and Information Technology Work Units – Addressed in People’s Project 1

3. State, Province, Local Community and Industry Outreach Work Units – State, Province Teams

- (1) Many States, Provinces and local communities, industries, and climate action groups are concerned and taking action on global warming. Interface with these action groups to inform them of the GSOP, offer to keep them updated on results, and ask what factual information they can provide on options to overcome global warming.
- (2) Support the action groups to development and implement their climate action plans.
- (3) Offer awareness training on the Global Solutions Program, the Wicked-Problem Approach and the Outreach Program.
- (4) Provide and explain results from the Global Solutions Program to keep all State, Province, local communities and industries well informed. As requested, assist them to implement the best GSOP climate solution options and integrated systems.
- (5) Recruit engineers in each of the Country sectors and request that they review the integrated Country climate solution systems and provide: a. Their assessment of sector impacts, b. Their proposals of sector accommodations to resolve sector impact issues, and c. Their suggestions regarding the climate solution systems. Assist your Country Integration Internal Reporting Team to

recruit technical experts willing to assist in solving specific integration problems. Provide results to the Project 1 Integration and Internal Reporting Team. (Refer to Attachment 2, Technical Evaluation Criteria #6 on Integration for additional information.)

(6) Document action groups' good ideas and evaluations of proven and new technologies. Provide this information to the Project 1 Integration and Internal Reporting Team.

(7) Work with action groups to pilot test promising options from the Global Solutions Program.

4. Social/Political Work Units – State, Province Teams

(1) In cooperation with Project 1 Social/Political team, request State, Province, local community and industry provide social/political evaluations of climate solution options and systems. Provide these evaluations to the Project 1 Social/Political Team.

5. Internal Reporting Work Units – Country and State, Province Teams

a. Country Internal Reporting – Outreach Program Problem Facilitators

(1) Consolidate each State, Province internal semi-annual reports into Country Outreach Program semi-annual report. Include: good ideas; social/political evaluations of GSOP options and systems; action groups initiatives and results; pilot testing plans and results; a catalog of State, Province, local communities, industries, and climate action groups taking action on global warming; their POC and contact information; a summary of their efforts; and types of factual information they can provide. Include similar information on Country climate action groups. Post the reports on the Internal GSOP Global Report Platform.

b. State, Province Internal Reporting – State, Province Teams

(1) Prepare Outreach Program semi-annual reports for each State, Province. Include: a summarize good ideas; social/political evaluations of GSP options and systems; action groups initiatives and results; and pilot testing plans and results; a catalog of State, Province, local communities, industries, and climate action groups taking action on global warming; their POC and contact information; a summary of their efforts; and types of factual information they can provide. Include similar information on Country climate action groups. Post the reports on the Internal GSOP Global Report Platform.

Overview of GSOP Execution Process.

The Figure 2 GSOP flow diagram shows the iterative international evaluation and integration of global warming solutions. Teams of engineers in each Country will work on available climate solutions to meet People's Project 1 goals. Global Teams from each Country will work on available solutions to meet People's Project 2 goals. People's Project 3 Global Teams will evaluate R&D solutions to meet People's Project 1 and 2 goals. The Country Outreach Programs will provide social/political evaluations of solution options and systems. Each Country will then evaluate and integrate the solutions from the three People's Projects and input from the Outreach Program into Country Actions Plans.

GSOP Flow Diagram

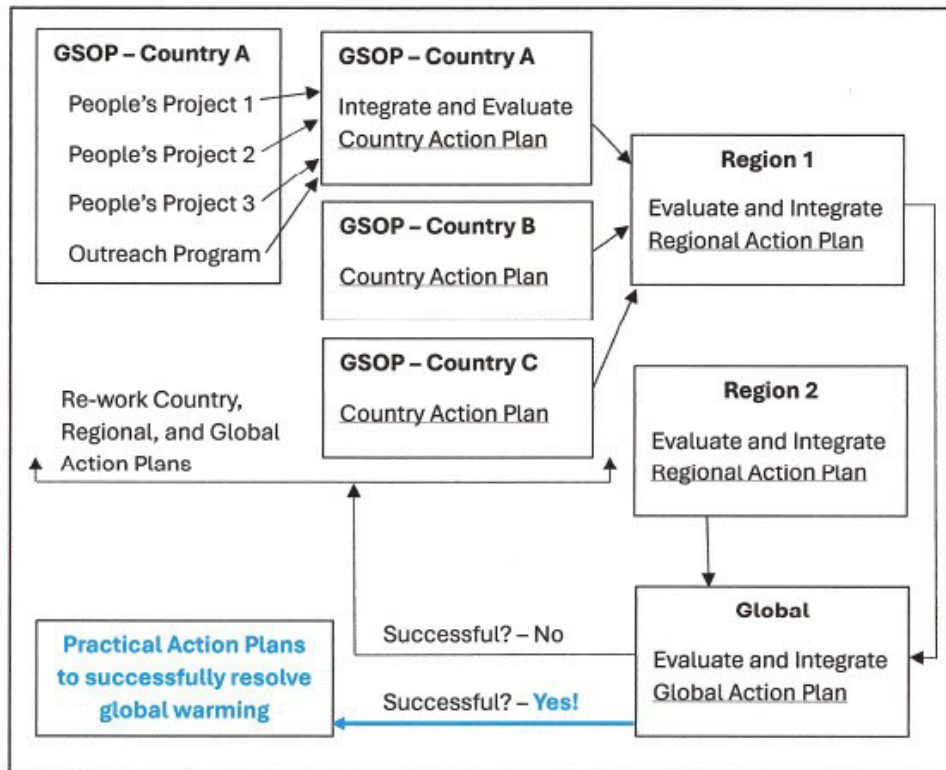


Figure 2. Flow diagram of Country Operations showing iterative international evaluation and integration of global warming solutions until global success is achieved.

Regional teams comprised of GSOP participants from each Country will evaluate and integrate the Country Action Plans into Regional Action Plans. Global Teams comprised of GSOP participants from each Country will then evaluate and integrate the Regional Action Plans into a Global Action Plan. It is only at this point that GSOP participants can see if the Country and Regional Action Plans will add up to successful Global solutions. To be successful, the Global Action Plan must solve global warming at the scale of Earth and on Earth's physical terms to: Halt the net release of CO₂; Adapt to unavoidable climate-change impacts; stabilize the Earth's energy balance to halt global warming; adjust the Earth's energy balance to return to prior conditions; and address Ocean acidification and other problems. The plans must also be successful on human terms of economic achievability and socially/politically acceptability.

If the initial Global Action Plan is not successful in meeting these goals, then the entire process must be repeated (iterated) by going back and revising the Country and Regional plans until the Global Action Plan will successfully overcome Global Warming. In this way, each Country will be in charge of its Country Action Plan, while achieving overall global success by working together. With these repetitive evaluations and integrations of Country, Regional and Global solutions, everyone will know what must be done to resolve global warming. We will go from false hopes on our favorite climate solutions, and false confidence in current market practices, to confidence that we can solve our planetary problem. This iterative approach is depicted in Figure 2.

Attachment 1

Partial List of Climate Solution Options

Sources of climate solution options

The climate solution options listed here are taken from the following references:

- a. *Beyond Carbon Neutral: How We Fix the Climate Crisis Now*, authored by Samuel M. Goodman, PhD, New Degree Press, Copyright © 2021, which provides an integrated selection of options that can be immediately implemented to overcome global warming. (BCN p #)
- b. *Drawdown, The Most Comprehensive Plan Ever Produced to Reverse Global Warming*, edited by Paul Hawken, Penguin Books, (2017), which provides an extensive list of options, both available now and others in R&D for confronting global warming. (DD p #) Project Drawdown has continued to work on options to solve global warming and provides updated evaluations and options on their website at: <https://drawdown.org/>
- c. *Climate Restoration, The Only Future That Will Sustain the Human Race*, authored by Peter Fiekowsky with Carole Douglass, Rivertown's Books, 2022. (CR p #)
- d. *Speed & Scale*, authored by John Doerr, Portfolio/Penguin (2021). (S&S p #)

For each of the solution options we provide the reference abbreviations noted above and the page number in the document.

Climate Solutions Options for People's Projects 1, 2 and 3

People's Project 1. Halt release of CO₂ and Adapt to Climate Change

Halt net release of CO₂

Clean energy

1. Electric vehicles. A switch to Electric vehicles will reduce fossil fuel use, but we must decarbonize the power grid to make a difference. (BCN p 21).
2. Electric Vehicles to reduce carbon dioxide release. (DD p 142)
3. Electric Bikes are a rage in China and reduce energy requirements. (DD p 146)
4. Hybrid Cars improve fuel efficiency with a combination of electric and gas/diesel engines. (DD p 148)
5. Nuclear. Continue operating existing nuclear facilities and reprocess our spent fuel to prolong their operation. (BCN p 38). (DD p 18)
6. Photovoltaics. Use photovoltaics to convert energy contained in sunlight into electricity. (BCN p 52)
7. Solar thermal. Harvest sunlight to generate steam and turn a turbine and generate electricity. A solar thermal plant is mostly composed of massive mirrors (BCN p 56). (DD p 14)

8. Solar farms. Large solar farm installations in the desert will be solar thermal plants with energy storage capabilities that generate electricity during the day and night (BCN p 61). (DD p 8)
9. Distributed solar. Spread individual solar panels over a large area to generate the same amount of power. The panels are light enough to be placed on buildings (BCN p 63). (DD p 10)
10. Onshore Wind Farms. Generate electricity with the Great Plains being a prime location because of its relatively fast and consistent winds. Bigger blades and turbines can convert that energy more efficiently (BCN p 71). (DD p 2)
11. Offshore Wind Farms. Similar to onshore wind farms for generating electricity. The towers and blades have the same shape, and they're arranged in lines spread out over a large area. The towers are attached to the seafloor (BCN p 73). (DD p 2)
12. Micro Wind for small local electric needs. (DD p23)
13. Fresh water hydropower. Resources are dams that already power a substantial portion of our grid. Some dams were never electrified and could be easily upgraded. The older fleet could be recapitalized with better generators and turbines (BCN p 82). (DD p 27)
14. Salt water energy. Tidal barrages require an entire shoreline area to be walled in, with a gap every so often with a rotor, not unlike a wide-area dam. Installing subsurface turbines to capture the energy of tides is another option still in R&D (BCN p 85) (DD p 12). The most commonly presented way for harnessing waves puts the generators out from the shore on the ocean's surface in the form of floating pontoons or buoys anchored to the seafloor and connected to the shore by undersea cables. Test cases were made to prove this approach, but none are scaled to full grid-scale implementation. (BCN p 88)
15. Geothermal. Heat is drawn from within the Earth. That heat is used to create steam and turn a turbine and generator to make electricity with constant production. Alternately, marginal geothermal regions can add to our energy to replace the majority of traditional furnaces and low-temperature industrial applications continuously and without the need for additional storage (BCN p 95). (DD p 6)
16. Ammonia is being considered as an alternative to bunker fuels for transport ships. (CR p 67)
17. Electrify transportation. (S&S p 1)
18. Decarbonize the Grid. (S&S p 29)
19. Clean hydrogen. (<https://doi.org/10.1093/ce/zkae112>)
20. Sustainable Aviation Fuel development. Sustainable Aviation Fuel (SAF) State-of-Industry Report: State of SAF Production Process, Sustainable Aviation Fuels | Department of Energy

Energy Storage (Necessary as we rely on intermittent and non-dispatchable renewable sources for the bulk of our transition. (BCN p 105)

1. Batteries. Rechargeable batteries for energy storage have improved rapidly over the past several decades. They include lithium-ion, nickel-cadmium (NiCd) and nickel-metal hydride (NiMH) (BCN p 106). (DD p 34)
2. Thermal Storage. Molten salts from solar thermal power generation are pumped into insulated tanks while other power sources feed the grid. When they're needed, those salts are used to generate steam to make electricity. Excess electricity can be used to heat salts to later produce steam and generate electricity. (BCN p 110) (DD p 32)
3. Pumped hydropower. Water is moved uphill to artificially create the conditions for hydropower. When there is excess energy on the grid, water is pumped to a reservoir at a high elevation from a lower reservoir. (BCN p 113) (DD p 32)
4. Compressed air. Compressed air is stored underground until it is passed over a turbine when needed to generate electricity. The main problem is finding appropriate locations. (BCN p 116)

5. Multi-Layered Energy Storage. Will include thermal storage augmented by pumped hydropower, compressed air and a small amount of NiCd batteries are options. (BCN p 117)
6. A smart grid is an interconnected system where power-consuming devices talk to utilities over the Internet to control some of their functionality. However, there is no way such a system would be secure enough not to threaten the grid and everything attached to it. (BCN p 119), (DD p 5)

Winter energy sources (Renewable energy is, on the whole, less plentiful in winter and must be dealt with. (BCN p 123)

1. Wood. Burning wood creates a complete cycle where no net carbon is released, hence *carbon neutral*. The bottleneck for harvesting wood is the amount of land we dedicate to growing trees. Meeting just 1 percent of our yearly energy needs would require a forest approaching the size of South Carolina. A similar area of solar panels would provide 22 percent of all our energy needs (BCN p 124). (DD p 16)
2. Ethanol. Grain alcohol is another carbon neutral biofuel we derive from plant matter. However, it provides substantially less energy than wood per acre. (BCN p 126)
3. Synthetic Biofuels. Jet fuels must be either fossil fuels or a carbon neutral option biofuel and synthetic fuels. Synthetic fuels can be produced using the Fischer-Tropsch process with energy from wind and solar. (BCN p127, 129)
4. Trash gas. Microbes eat organic trash and produce methane as a byproduct, which could help meet seasonal energy shortfalls (BCN p 313). (DD p 26)
5. Waste-to-Energy to better deal with waste, while still releasing carbon dioxide. (DD p 28)

Energy transmission

1. Upgrade the US electrical transmission system. The system requires upgrading to improve reliability, and to handle greater electricity demands and altered electrical sources, i.e., renewables. Grid Flexibility to deal with intermittent and on-demand energy supplies is an aspect. (DD p 30)

Energy conservation

1. Reduce shipping. Reduce the shipping industry by cutting back on globalization and increase domestic manufacturing to reduce energy needs. (BCN p 152)
2. Long-lasting goods. A way to conserve energy use is to require manufacturers to only produce long-lasting goods (BCN p 183). 24. The need for jet fuel could be cut by reducing air travel through cultural change. (BCN p 190)
3. Cogeneration of electricity and heat for buildings. (DD p22)
4. Solar Water to heat water for domestic use. (DD p 36)
5. Mass Transit use may decline but bus rapid transit is popular in S. America. (DD p 136)
6. High-Speed Rail up to 270 mph can greatly reduce carbon dioxide emissions but are costly. (DD p 138)
7. Ship's fuel efficiency can be improved with improved designs. (DD p 140)
8. Ride Sharing can expand and reduce energy requirements. (DD p 144)
9. Airplanes can reduce fuel needs with improved designs and on-ground procedures. (DD p 150)
10. Trucks can reduce fuel needs with better designs and operating procedures. (DD p 152)
11. Telepresence can reduce business air travel and unproductive time while saving energy. (DD p 154)
12. Trains fuel efficiencies can be improved with better designs and converting to electric. (DD p 156)
13. Industrial Recycling can be enhanced by mandating extended producer responsibility. (DD p 160)

14. Net Zero buildings designed to conserve energy and use sun radiation. (DD p84)
15. Green roofs with vegetation and cool roofs to reflect the sun's energy. (DD p90)
16. LED lighting saves energy. (DD p92)
17. Heat pumps can reduce fuel requirements for heating buildings. (DD p94) New generations of electric heat pumps can further reduce fuel needs. (CR p 65)
18. Smart glass can admit or block sun's radiation to reduce energy requirements for air conditioning and heating. (DD p96)
19. Smart thermostats adjust building temperature to improve energy efficiency. (DD p98)
20. District heating uses central plants for heating and cooling of homes. (DD p99)
21. Insulation can be retrofitted or designed into buildings to reduce energy use. (DD p101)
22. Water distribution can be improved by reducing leaks, saving pumping energy. (DD p104)
23. Building automation can improve energy efficiency. (DD p106)
24. Clean up industry. (S&S p 117)
25. Fix Food. (S&S p 63)
26. Protect nature. (S&S p 91)

Social actions

1. Plant-Rich Diet and cut back on eating meat. (DD p 38)
2. Clean Cookstoves to reduce household toxic fumes that kill people and release carbon dioxide. (DD p 44)
3. Women Small Holders provides more resources and improves productivity of women farmers. (DD p 76)
4. Family Planning requires providing free access to contraception plus education. (DD p 78)
Restoring population to sustainable levels through small families will help greatly in overcoming global warming and other sustainability issues. (CR p 162)
5. Educating Girls makes them better stewards with fewer children. (DD p 80)
6. Household Recycling can cut energy needs by using recycled materials for virgin feedstock. (DD p 158)
7. Water Saving – Home by using low-flow taps and shower-heads can cut carbon dioxide emissions. (DD p 170)
8. Walkable Cities to conserve transportation energy. (DD p86)
9. Bike Infrastructure to increase bike usage and reduce energy needs. (DD p88)

Industrial carbon capture and sequestering

1. Capture, separate and compress CO₂ emissions from power plants and large industrial plants before they enter the atmosphere using additional equipment at the tail end of industrial processes. However, capturing and sequestering the emissions from fossil fuel sources will only delay the needed transition and will do nothing about the carbon already in the atmosphere. (BCN p 176). Several commercially feasible technologies have been demonstrated. Reduction in power plant efficiency due to added energy requirement needs to be considered.
2. Remove carbon. (S&C p 139)

Adapt to unavoidable climate change impacts

Social actions and other options to be determined

People's Project 2. Stabilize and Adjust the Earth's Balance, and Address Ocean Acidification and Other Problems

Stabilize the Earth's energy balance to halt warming and adjust the Earth's energy system to return to prior conditions

Ocean fertilization and cultures

1. Ocean fertilization. Fertilizing the oceans with nitrogen fertilizer or iron as chloride (FeCl_2) could remove carbon dioxide from the air. (BCN p 144) Seaweed and marine permaculture can also remove great quantities of atmospheric CO_2 . (CR p 98) Fertilizing the ocean with iron can restore ocean health while removing great quantities of atmospheric CO_2 . (CR p 115)

Restore ecosystems

1. Farmland Restoration where land has been farmed out and no longer productive. (DD p 41)
2. Mangroves and marshes. Restore these interfaces between the ocean and land, to store large quantities of carbon dioxide without further effort. Layers upon layers build up over time, removing substantial quantities of carbon dioxide from the atmosphere. (BCN p 148)
3. Ocean meadows. Fostering underwater meadows of seagrass can remove atmospheric carbon dioxide. BCN (p 151)
4. Swamps and bogs. Protect and restore swamps and bogs to take out and store vast quantities of atmospheric carbon. (BCN p 158)
5. Peatlands sequester carbon and must be preserved. (DD p 122)
6. Forests. Expand Forests to rapidly draw down atmospheric carbon. (BCN p 161)
7. Temperate Forest protection and restoration reduces carbon release and sequesters carbon. (DD p 128)
8. Afforestation involves planting trees on land previously cleared in natural diverse varieties. (DD p 132)
9. Grassland. Protect and restore grassland to sequester carbon. (BCN p 163)
10. Forest protection: stop clearing of old growth forest and other forest land. (DD p108)
11. Coastal wetlands sequester carbon and mitigate storm surges, must be protected. (DD p112)
12. Tropical forests continue to be cleared and must be protected. (DD p114)
13. Peatlands sequester carbon and must be preserved. (DD p122)

Agricultural practices

1. Change farming practices to better sequester carbon, even during cultivation, and to preserve soil health through no-till planting or the use of cover crops to hold soils together. (BCN p 166)
2. Change our diets away from farm-raised animals and expand vegetable proteins to reduce the amount of farmland and use it to meadows and forests to sequester carbon. (BCN p 168)
3. Bamboo grows fast, sequesters carbon and can be grown on degraded land. (DD p117)
4. Agro-forestry nurtures trees alongside crops. (DD p118)
5. Perennial Biomass yields useful products year after year without replanting. (DD p121)
6. Indigenous Peoples' Land Management practices conserve forest, cut carbon release. (DD p124)
7. Reduced Food Waste among many players in the food chain. (DD p 42)
8. Multi-strata Agroforestry to improve crop diversity and sustain soils. (DD p 46)
9. Improved Rice Cultivation to reduce methane release. (DD p 48)
10. Silvo-pasture to integrate trees, pasture for livestock. (DD p 50)
11. Regenerative Agriculture to restore degraded land. (DD p 54)
12. Nutrient Management to reduce run off and waste. (DD p 56)

13. Tree Intercropping uses diversity to improve soil health and sequester carbon. (DD p 58)
14. Conservation Agriculture avoids tilling, helps to retain moisture and improve the soil. (DD p 60)
15. Composting to convert organic matter into stable soil carbon and improve the soil. (DD p 62)
16. Biochar is produced by burning organic waste under a layer of soil and builds soil carbon content. (DD p 64)
17. Tropical Staple Trees produce food products annually without replanting. (DD p 66)
18. Farmland Irrigation techniques can reduce energy and improve crop yields with drip or spray. (DD p 68)
19. Managed Grazing simulates natural grazing with animals moving from one area to another. (DD p 72)
20. Agro-forestry nurtures trees alongside crops to yield many advantages and is spreading. (DD p 118)
21. Perennial Biomass yields useful products year after year without replanting saving energy. (DD p 121)
22. Indigenous Peoples' Land Management practices conserve forests and avoid carbon release. (DD p 124)

Direct CO₂ removal and sequestering

1. Direct air capture. Directly capture carbon dioxide from the atmosphere by freezing it out of the air or use chemical capture techniques. The downside is energy requirements. (BCN p 174)
2. Capture and sequester. Burn new trees, shrubs, and grasses and capture the resulting concentrated stream of carbon dioxide for sequestration. (BCN p 176)
3. Store carbon dioxide. Store captured carbon dioxide by pumping it underground at a site with the appropriate geology. Tests are still underway to prove it as a permanent solution. Mineralization is a process that can sequester carbon within certain kinds of rock to form calcium carbonate. It is a slow process as shown by several small test cases. (BCN p 177)
4. Building with carbon. Building with laminated timber would be another way to sequester carbon (BCN p 182).
75. Alternative Cement using fly ash from burning coal can reduce carbon dioxide release. (DD p 162)
5. Recycling Paper releases less carbon dioxide than using fresh fiber from trees. (DD p 166)
- 78 Bioplastic can reduce emissions and sequester carbon. (DD p 168)
6. Removing CO₂ from power-plant exhaust and converting it into synthetic limestone is a demonstrated process and offers a way to sequester CO₂ that would otherwise go into the atmosphere. The process can also be used to sequester CO₂ from direct air capture plans. (CR p 83)

Solar blocking

1. Atmosphere and space-based. One option to reverse climate change is to add specific chemicals, such as sulfuric acid or hydrogen sulfide, into the atmosphere to reflect sunlight back into space. Placing mirrors in space is another option. Neither approach will address ocean acidification. (BCN p 187)

Alter surface albedo

Ocean acidification and other problems

Ocean acidification

Note: The above are examples of developing technical solutions for which the references do not have specific examples. Participants will be adding to this list.

Methane release

1. Landfill methane can be collected and burned for electricity (much lower warming potential). (DD p100)

Refrigeration release

1. Refrigeration releases of CFC refrigerants reduced and alternatives for CFCs found. (DD p 164)

People's Project 3. Advanced technologies (currently in R&D)

Halt net release of CO₂

Clean energy

1. New energy sources. Energy sources for carbon capture and sequestration may include new nuclear capacity that is still in R&D. (BCN p 181) Small modular nuclear reactors (SMRs) that have many safety and fuel use advantages over today's nuclear power plants are under intense development in the US, Canada and other countries.
2. Artificial Leaf to produce synthetic fuel from sunshine, water, carbon dioxide and bacteria. (DD p 182)
3. Solid-State Wave Energy converts the kinetic energy of waves to electricity. (DD p 187)
4. Ocean Farming with sea weeds and shellfish removes nitrogen and mercury and gives biofuels. (DD p 206)
5. Smart Grids communicate between suppliers and consumers to improve efficiencies and deal. (DD p 209)
6. Cold fusion using quantum confinement or lattice confinement is now showing promise as an energy source. (CR p 68)
7. Illinois Clean Fuels has a process to convert municipal solid waste into jet fuel. (CR p 66) Carbon Engineering is developing sustainable aviation fuel with its "air to fuels" process, which filters CO₂ from air and combines it with hydrogen to form synthetic aviation fuel. (CR p 66)

Energy storage

1. Iron-air batteries may provide greatly expanded levels of electricity storage, even at utility-scale levels. (CR p 63)
2. Flow batteries may also provide utility-scale levels by storing liquid electrolytes, vanadium or iron, in tanks. (CR p 64)

Winter energy sources

Energy transmission

Energy conservation

1. Autonomous Vehicles gain fuel efficiency by following each other closely. (DD p 184)
2. Living Buildings Challenge is a standard for sustainable buildings. (DD p 188)
3. Smart Highways will recharge electric vehicles as they pass and have photovoltaic surfaces. (DD p 196)

4. Hyperloop involves passing pods of people or cargo through a tunnel at high speeds. (DD p 198)

Social actions

Industrial carbon capture and sequestering

Adapt to unavoidable climate change impacts

Stabilize the Earth's energy system to halt warming and adjust the Earth's energy system to return to prior conditions

Ocean fertilization

1. Ocean fertilization. Fertilizing the oceans with nitrogen fertilizer or iron as chloride (FeCl_2) could remove carbon dioxide from the air. (BCN p 144) Seaweed and marine permaculture can also remove great quantities of atmospheric CO_2 . (CR p 98) Fertilizing the ocean with iron can restore ocean health while removing great quantities of atmospheric CO_2 . (CR p 115)

Restore ecosystems

1. Repopulating the Mammoth Steppe by converting it back to grasslands with wild herbivores. (DD p 172)

Agriculture practices

1. Pasture Cropping involves planting crops in a living perennial pasture without breaking the soil. (DD p 175)
2. Intensive Silvo-pasture mixes grasses, trees, leguminous shrubs and grazing animals. (DD p 181)
3. Microbial Farming uses combinations of microorganisms to fertilize the soil. (DD p 200)
4. Perennial Crops, grains and cereals, and oilseed plants, avoid tilling and sequester carbon. (DD p 203)

Direct CO_2 removal and sequestering

1. Solid carbon. Store solid carbon by converting a concentrated stream of carbon dioxide to solid carbon or carbonates suitable for safe disposal. Ways to do so are currently in R&D. (BCN p 179)
2. Enhanced Weathering of Minerals, olivine, spread on land and shallow water to uptake CO_2 . (DD p 176)
3. Marine Permaculture by creating suspended kelp forests. (DD p 178)
4. Direct Air Capture takes carbon dioxide from the air and concentrates it for sequestering. (DD p 192)
5. Industrial Hemp is environmentally superior to cotton and can substitute with processing. (DD p 202)
6. Building with Wood sequesters carbon and avoids CO_2 release from cement manufacture. (DD p 210)
7. React CO_2 with hydrogen to produce hydrocarbons useful for chemicals/plastics. This is very difficult chemistry and is still in R&D phase.

Solar blocking atmospheric based

Solar blocking space-based

Alter surface albedo

Address Ocean Acidification and Other problems

Ocean acidification

Methane release

1. A Cow Walks onto a Beach and ate seaweed that improved milk production and reduced methane release. Research is focusing on red algae to improve digestion and reduce methane. (DD p 2040)
2. Enhanced methane oxidation in the atmosphere can accelerate the removal of methane and reduce concentrations. (CF p 142)

Attachment 2

Technical Evaluation Criteria (For Both Available and R&D Options)

Listing of technical evaluation criteria for climate solution options and systems

1. Technical Feasibility and Readiness
2. Effectiveness: Halt Net CO₂ Release
3. Effectiveness: Stabilize and Adjust Earth's Energy Balance
4. Effectiveness: Correct Ocean Acidification and Other Problems /
5. Effectiveness: Cope with Climate Change Impacts
6. Integration Problems and Solutions and Sector Impacts
7. Environmental Impacts and Solutions
8. Community Safety
9. Locations, Scale and Timing of Option Implementation
10. Engineering Cost Estimates
11. Fuel and Energy Balances
12. Human, Natural and Water Requirements and Availability, Including Mineral Limitations

One-page explanations and suggestions for each criterion

These criteria were selected to reach practical, effective results. The integrated systems from the GSOP must work together when they are implemented. In the following, we offer a one-page discussion of each of the technical evaluation criteria. For two of the criteria, we provide an EXCEL spreadsheet to assist.

These discussions should not be taken as guidance. All GSOP participants will be on a steep learning curve and will become experts in their solution evaluation and integration tasks. We provide these discussion sheets as a starting point and to assist you in applying the criteria to climate solution options. You need the flexibility to refine your evaluation and integration approaches as your learning grows.

Technical Evaluation Criteria

1. Technical Feasibility and Readiness

Discussion.

1. A first step is to determine the development status of the selected solution option according to the following categories:

- a. Laboratory scale R&D. Bench or hood scale experimentation to prove out and refine the option science and process.
- b. Pilot scale development. Experimental equipment configured to demonstrate and refine the option for commercial scale-up and application.
- c. Demonstration scale. An option configured as a commercial scale unit of production and performing all the functions of a commercial unit that fully demonstrates a commercial operation.
- d. Commercial scale (1 site). An initial commercial-scale application of the option with products utilized for end purposes. Example: electric power production and feeding into a commercial grid.
- e. Commercial scale (multiple sites). The option is implemented at commercial scale at multiple sites within a Country and perhaps internationally.

2 Based on what you learn in Step 1, estimate the time required to go from the current development status to commercial-scale production at 1 or more sites.

3. Based on what you learn through Steps 1 and 2, assess your confidence that the option can and will be developed for commercial application. Please rank your confidence as:

- a. High confidence that the option can and will be commercialized.
- b. Medium confidence that the option can and will be commercialized.
- c. Low confidence, high uncertainty that the option can and will be commercialized.

4. Then prepare a summary of the option, its development status, your estimates 2 and 3 above with explanations, and points of contact for your information.

A Technology Readiness Level (TRL) scale was developed by NASA in the 1970's and has since been adopted by various organizations, including the U.S. Department of Defense and the European Space Agency. It provides a standardized framework of nine levels for evaluating the maturity of technologies throughout their development lifecycle. The scale is widely used in research and development, project management and funding applications. Please consider applying the NASA TRL scale in your feasibility and readiness evaluations. The following references explain the NASA TRL scale and mention other TRL scales.

1. <https://technologywealth.com/knowledge/technology-readiness-levels-trl/>
2. <https://www.defproc.co.uk/insights/technology-readiness-level-trl-explained/>
3. <https://skoge.folk.ntnu.no/prost/proceedings/aiche-2008/data/papers/P119345.pdf>

Technical Evaluation Criteria

2. Effectiveness: Halt Net CO₂ Release

Discussion.

Option effectiveness in halting the net release of CO₂ relates to a Country's carbon balance. The carbon balance is comprised of the following components measured in kilo-grams (Kg) of carbon in the CO₂ released into or removed from the atmosphere on a yearly basis:

Emissions:

- a. Fossil Fuel Emissions (E_{FOS}) from burning fossil fuels (coal, oil products, natural gas) and includes the carbon released by cement manufacture (40% from burning fossil fuels and 60% from heating limestone). Examples of emissions sources include transportation, electric power generations, manufacturing.
- b. Land Use Change that includes deforestation (E_{LUC}).

Sinks:

- a. Ocean uptake of carbon by dissolving CO₂ from the atmosphere (S_{OCEAN}).
- b. Land uptake of carbon by vegetation through photosynthesis (S_{LAND}).
- c. Carbon removal and sequestering from air or oceans (S_{CRS}).

Growth:

- a. Atmosphere growth of carbon in the form of measured levels of CO₂ (G_{ATM}).

Ocean uptake and atmospheric growth can only be measured as global quantities. To reach no net release of carbon globally, both quantities must be 0 at the global level:

$$(E_{FOS} + E_{LUC}) - (G_{ATM} + S_{OCEAN} + S_{LAND} + S_{CRS}) = 0$$

In actuality, measurements are imperfect and the sum is set equal to the Carbon Budget Imbalance, B_{IM} . In 2022 the Earth's carbon balance was measured as:

$$(9.9 \text{ GTC Fossil Fuel Emissions} + 1.2 \text{ GTC Land Use Change}) - (4.6 \text{ GTC Atmospheric Growth} + 2.8 \text{ GTC Ocean Sink} + 3.8 \text{ GTC Land Sink}) = -0.1 \text{ GTC Carbon Budget Imbalance}$$

(GTC means Giga Tons of carbon in the CO₂ released, removed or growth.)

At the Country level, we must focus on the net release of CO₂ (carbon) into the atmosphere:

$$\text{Country Net Carbon Release: } CNR = (E_{FOS} + E_{LUC}) - (S_{LAND} + S_{CRS})$$

The goal is for each Country's Net Carbon Release to be equal to 0.

Country estimates of Fossil Fuel Emissions can be made from the quantities of coal, oil and gas used as fuel each year, plus the quantities of carbon released by heating limestone during cement manufactured each year. Carbon release from Land Use Changes can be estimated from the areas of forest that areas burned or cleared each year. The land sink of CO₂ (carbon) from vegetation can be estimated from the areas and types of land coverings. Within the GSOP People's Project 3, international teams will develop engineering models to estimate carbon balances to assist with these assessments. Net CO₂ (carbon) release should be assessed for the years 2050, 2075 and 2100.

Technical Evaluation Criteria

3. Effectiveness: Stabilize and Adjust Earth's Energy Balance

Discussion.

During Earth's natural climate cycles, Antarctic temperatures rose in warm intervals and fell in ice ages by around 10 deg C (degrees Centigrade) every 100,000 years. At the same time, atmospheric CO₂ levels rose and fell by around 100 parts-per-million (ppm). Osman and colleagues (Ref 1) looked at the temperature rise since the last ice-age 10,000 years ago up to the Industrial Revolution in 1850. They estimated that Global average temperatures rose by 7 deg C as compared to a 10 deg C rise of Antarctic average temperatures. They attributed 83 % of this temperature rise to the 100 ppm rise in CO level. Thus, $0.83 \times 7 \text{ deg C} = + 5.8 \text{ deg C}$ rise that was caused by the 100 ppm rise in atmospheric CO₂.

Over just the past 70 years between 1950 and 2020, atmospheric CO₂ levels rose an additional 103 ppm over pre-industrial levels due primarily to burning fossil fuels. Result: If nature repeats itself, can't we expect over a 5 deg C temperature rise above pre-Industrial temperatures at today's CO₂ levels? This level of temperatures rise would be a disaster for civilization.

Your tasks in GSOP People's Project 2 are to determine how to halt, then reverse Global temperature rise to return to favorable temperatures by years 2050, 2075 and 2100. The Earth's energy balance can only be measured at the scale of Earth. However, each Country's contributions over time to the Earth-scale energy balance can be estimated for their selected options and summed. Country contributions can then be summed in order to project the Earth's Energy balances by years 2050, 2075 and 2100.

Key Country parameters affecting energy balance:

Net release of carbon as CO₂ per year as estimated in Technical Evaluation Criteria 2.

Change in albedo (absorption/reflection) of sun's energy from Country surfaces.

Other methods of removal and sequestering CO₂.

Key Global parameters affecting energy balance:

Global atmospheric CO₂ levels and changes.

Ocean and land albedo from ice coverage and land surface changes.

Changes in cloud cover.

Space-based changes in sun's energy striking the Earth.

The Global Teams in People's Project 3 working on Climate Monitoring, Models and Future Conditions will develop user-friendly engineering models of the Earth's energy balance to assist Country Option Evaluation Teams and Integration and Internal Reporting Teams. These teams can then assess Country contributions to stabilizing the Earth's energy balance and returning to favorable conditions.

Relevant references include:

1. Globally resolves surface temperatures since the Last Glacial Maximum" by Matthew B. Osman et. al., *Nature* 599, 239-244(201). <https://www.nature.com/articles/s41586-021-03984-4>
2. Department of Energy developed GREET® (Greenhouse gases, Regulated Emissions, and Energy use in Technologies) life cycle analysis to assess the environmental impacts associated with technologies, fuels, products, and energy systems across various stages of the supply chain (GREET | Department of Energy)

Technical Evaluation Criteria

4. Effectiveness: Correct Ocean Acidification and Other Problems.

Discussion.

Global warming has resulted from the release of CO₂ into the atmospheric by burning fossil fuels. The oceans absorb CO₂ to form carbonic acid, H₂CO₃, which then dissociates into H⁺ ions, an acidic proton, and HCO₃⁻, bicarbonate ions. As a result, dissolved CO₂ makes the oceans slightly more acidic. Since the industrial revolution the pH of surface ocean waters has fallen by 0.1 pH units. This might not sound like much, but the pH scale is logarithmic, so this change represents a 30 increase in acidity. The ocean's average pH is now around 8.1, which is basic, but as the ocean continues to absorb more CO₂, the pH decreases and the ocean becomes more acidic. Ocean acidification is already impacting many ocean species, especially organisms like oysters and corals that make hard shells and skeletons by combining calcium and carbonate from seawater.

A warming planet means a warming ocean, and a change in water temperature—as little as 2 degrees Fahrenheit—can cause coral to drive out algae. Coral bleaching matters because once these corals die, reefs rarely come back. With few corals surviving, they struggle to reproduce, and entire reef ecosystems, on which people and wildlife depend, deteriorate. Between 2014 and 2017 around 75% of the world's tropical coral reefs experienced heat-stress severe enough to trigger bleaching. The most direct way to stop coral bleaching is to halt the rise of global average temperatures by stabilizing and adjusting the Earth's energy balance and by reducing atmospheric levels of CO₂.

Another significant environmental impact leading to global temperature rise is the release of methane (CH₄). The two primary sources today are leaks in producing and transporting methane, and in domestic animal digestion release. Future melting of Arctic permafrost may release large amounts of additional methane. Methane has a more potent green-house affect than CO₂, but it does not last as long in the atmosphere as CO₂. However, atmospheric methane decomposes into CO₂, which does last for a long time and must be taken into account. You will need to estimate the amounts of methane released per year in your Country and relate that to your contribution to global temperature rise. Then, you will be able to evaluate options to reduce the amounts of methane released. Methane release should be assessed by years 2050, 2075 and 2100.

Relevant references include:

1. NOAA article on Ocean Acidification. Website: <https://www.noaa.gov/education/resource-collections/ocean-coasts/ocean-acidification>
2. The Coral Restoration Foundation in Florida is actively working to restore coral reefs by growing and transplanting corals. Website: [Home - Coral Restoration Foundation](#)
3. Great Barrier Reef Restoration: In Australia, the Great Barrier Reef Marine Park Authority has been implementing various restoration projects to combat coral bleaching. [Reef Restoration - Great Barrier Reef Foundation - Great Barrier Reef Foundation](#)
4. Coral Triangle Initiative: The Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF) is a multilateral partnership of six countries (Indonesia, Malaysia, Papua New Guinea, the Philippines, Solomon Islands, and Timor-Leste) working together to sustain marine and coastal resources. Website: <https://coraltriangleinitiative.org>

Technical Evaluation Criteria

5. Effectiveness: Cope with Climate Change Impacts

Discussion.

As a first step, you will need to assess your Country's vulnerability to ongoing and expected climate change impacts between now and years 2050, 2075 and 2100. These impacts may include:

- Rising temperatures that can impact human and animal survival, agriculture, and energy demand for air conditioning.
- Drought that can impact agriculture, water supplies, and fires.
- Weather extremes resulting from global warming that can cause destructive hurricanes, cyclones, typhoons, and tornados. These extremes can, in turn, cause excessive rain leading to flooding that results in land erosion, landslides, and crop destruction.
- Rising sea levels that can impact land use and availability, and require evacuations.

You will need to estimate the effectiveness of different options in mitigating your Country's climate change impacts. Then you can estimate the costs to implement your selected options to cope with climate change impacts. Finally, you can estimate your Country's remaining financial loss with your selected options implemented. The total cost to your Country in coping with climate change impacts will be the total cost of implementing your selected options plus your Country's remaining financial loss. These assessments should cover the periods between now and years 2050, 2075 and 2100 and address technical evaluation criteria numbers 6 through 12 applied to the mitigation options.

Relevant examples include:

1. The Task Force on Climate-Related Financial Disclosures (TCFD) provides a framework for companies to disclose climate-related financial information. This framework is particularly relevant for the insurance industry, as it helps insurers assess and disclose the impact of climate change on their underwriting portfolios.
2. The TCFD framework is structured around four key areas: Governance, Strategy, Risk Management, and Metrics and Targets. For the insurance industry, the TCFD recommendations emphasize the importance of assessing climate-related risks in underwriting portfolios. This includes evaluating physical risks (e.g., extreme weather events), transition risks (e.g., policy changes), and litigation risks (e.g., legal actions related to climate change).
3. The United Nations Environment Program Finance Initiative (UNEP FI) has developed comprehensive guidance for the insurance industry to implement the TCFD recommendations. This guidance helps insurers identify and disclose the impact of climate change on their businesses, focusing on scenario analysis to assess climate-related risks and opportunities.

Technical Evaluation Criteria

6. Integration Problems and Solutions and Sector Impact

Discussion.

Global warming is impacting all peoples and sectors of society. Successful climate solutions most work together as systems in order to solve this most complex problem. Integration problems will likely arise as individual solutions are integrated into systems. Further, the integrated solution systems will likely impact all peoples and sectors of society. The vast number of sector impacts may number in the thousands to tens of thousands. While integration problems and sector impacts must be faced, addressing “all” such problems present an open-ended goal. To be executable, GSOP efforts on such problems must be prioritized. We suggest the following three levels.

First Order Integration Problems are those found while integrating solution options into Country, Regional, and Global solution systems. As an example, integrating intermittent wind and solar electric generation into electric transmission and supply grids present problems. These problems must be solved in order to have workable climate solution systems. The Integration and Internal Reporting Teams in People’s Project 1 have the lead in identifying and solving these First-Order Integration Problems in accordance with People’s Project 1 Solution Work Unit #5(1).

Second Order Integration Problems are those involving solution systems and Country sectors with which they interact and depend. Limitations of needed natural resource is an example. These problems must be solved by adjusting the climate solution system, or by altering Country sector operations, or by a combination of both. The Integration and Internal Reporting Teams in People’s Project 1 have the lead in identifying and solving the Second-Order Integration Problems in accordance with People’s Project 1 Solution Work Unit #5(1).

Third Order Sector Impact Issues are the vast number of sector impacts resulting from implementing the GSOP Country, Region, and Global solution systems. These impact issues can be identified and addressed by “Sector Engineers” who work in each of the Country’s economic sectors. The Outreach Program’s State, Province, Local Community and Industry Outreach teams have the lead for recruiting Sector Engineers for each sector within each State or Province, and assisting them in accordance with Outreach Program Solution Work Unit #3(5).

As Sector Engineers are recruited for each sector in each State or Provinces, the Outreach Teams will encourage them to collaborate on ways to resolve Sector impacts. In this way, a number of engineers will be brought together to identify and resolve each sector impact. This pragmatic approach is executable within the three-year GSOP. It will greatly broaden helpful involvement in the GSOP and will result in a large number of Sector Engineers who understand the global warming problem and how to go about solving it. It will lay the groundwork for implementing climate solutions across each Country’s economic sectors.

US sectors include: Construction, Transportation, Forestry and Logging, Health Care, Education Services, Information, Retail, Finance and Insurance, Mining, Manufacturing, Wholesale Trade, Public Finance, Utilities, Professional and Business, Accommodation, Arts and Entertainment, Agriculture, Information Technology, Technology, and Energy Supply.

Technical Evaluation Criteria

7. Environmental Impacts and Solutions

Discussion.

The discussion outlines criteria for evaluating environmental impacts of global warming solution options, as well as global warming caused disruptions. Criteria include types of impacts, sources of information, severity rankings, mitigation measures and their effectiveness, as well as associated mitigation costs.

Types of Environmental Impacts for Evaluation	<i>Global Warming Option impacts include deforestation, pollution, contamination, and urban and land use changes. Global Warming-based disruptions encompass wildfires, heat rise, floods, hurricanes, volcanic eruptions, droughts, and disease outbreaks.</i>
Information Sources	• Literature searches to identify the environmental impacts of the options • Interface with industry • Query the government agencies • Any non-profit organization or society
What are the environmental impacts of the selected option or global warming disruptions?	<i>Please list the specific impacts for the selected option or global warming disruptions.</i>
What is the relative severity for each of these impacts? How would you rank?	<i>Serious Impact -Must be mitigated Medium Impact- High desire to mitigate. Low Impact – Low-cost mitigation or could accept the Impact.</i>
How would you mitigate each of these impacts? How effective are each of these measures?	<i>Serious Impact -Mitigation Measures and Effectiveness Medium Impact- Mitigation Measures and Effectiveness Low Impact – Low-cost Mitigation Measures and Effectiveness</i>
What would the costs be for each of these different mitigation measures?	<i>Serious Impacts – Mitigation Costs (Project Capital Costs, and Production Operating Costs) Medium Impacts- Mitigation Costs (Project Capital Costs, and Production Operating Costs) Low Impacts – Mitigation Costs (Project Capital Costs, and Production Operating Costs)</i>

Relevant examples include:

1. Restoration Ecology: This includes planting native species, reintroducing keystone animals, forest preservation, and removing invasive species.
2. Adaptive Land Management: This involves implementing controlled burns, rotational grazing, or agroforestry techniques to replicate natural ecological processes.
3. Green Infrastructure: Creating wetlands, urban forests, or permeable surfaces promotes biodiversity and reduces pollution.
4. Policy and Protection: Establishing and enforcing; protecting areas & anti-pollution regulations.

Technical Evaluation Criteria

8. Community Safety

Discussion.

This discussion outlines the evaluation criteria for community safety associated with global warming solution options. These general community safety issues are not site specific, but are inherent for each solution option. Criteria include information sources, identity of community safety issues, severity rankings, mitigation measures and their effectiveness, as well as associated mitigation costs.

Information Sources	• <i>Literature searches to identify the safety impacts of the options</i> • <i>Interface with the industry</i> • <i>Query the government agencies</i> • <i>Any non-profit organization or society</i>
What are the key community safety issues for each of the selected option?	<i>Please list the specific safety issues for the selected option.</i>
What is the relative severity of each of these community safety issues? How would you rank?	<i>Serious Impact -Must be mitigated</i> <i>Medium Impact- High desire to mitigate.</i> <i>Low Impact – Low-cost mitigation or could accept the Impact.</i>
How would you mitigate each of these community safety issues? How effective will they be?	<i>Serious Impact -Mitigation Measures and Effectiveness</i> <i>Medium Impact- Mitigation Measures and Effectiveness</i> <i>Low Impact – Low-cost Mitigation Measures and Effectiveness</i>
What would the cost be for each of these different mitigation measures?	<i>Serious Impacts – Mitigation Costs (Project Capital Costs, and Production Operating Costs)</i> <i>Medium Impacts- Mitigation Costs (Project Capital Costs, and Production Operating Costs)</i> <i>Low Impacts – Mitigation Costs (Project Capital Costs, and Production Operating Costs)</i>

Examples of Community Safety Measures:

1. Incident Rates: Tracking lagging indicators like injury frequency, severity, and near-miss reports.
2. Risk Communication: Inform communities about potential hazards (e.g., chemical releases, flaring events)?
3. Emergency Preparedness: Coordinate with local responders, drills, and public alert systems.
4. Environmental Monitoring: Monitor air, water, and noise quality data and share information transparently with the public.

Technical Evaluation Criteria

9. Locations, Scale and Timing of Option Implementation

Discussion.

As a first step, you may identify the locations throughout your Country where you could and would want to apply each selected option.

Then, select the commercial scale of one unit of production for the selected option. Then you could select the numbers of units of production you would plan for each of your selected Country sites and the years that you plan to install them. Totaling across all the selected sites will provide your total Country installation plan by year for your selected option. These plans should target the three end-point years: years 2050, 2075, and 2100.

These figures will feed into your Technical Evaluation Criteria 9. Engineering Cost Estimate for each of your Country's selected option. A spreadsheet will be available to assist you with your engineering cost estimates for each option.

Technical Evaluation Criteria

10. Engineering Cost Estimates

Discussion.

The GSOP engineering cost estimates of climate options must be simple and transparent. They also need to be standardized to allow the various selected options to be summed into total Country costs, as well as into Regional and Global costs. Economists will then use the engineering cost estimates to conduct Country, Regional and Global economic analyses to determine how these costs can be resourced.

Your engineering cost estimates for each option need to take into account the number of years and your estimated costs of the “Project Phase” to design, build and start-up one Commercial Scale Unit of Production. The Total Loan for the project is the Project Phase cost plus interest on the loan during the Project Phase. The Total Loan is paid off using the mortgage formula during the years of Operations Phase, nominally 30 years.

Costs during the Operations Phase when products are produced include yearly labor, supplies, and maintenance costs, mortgage payments, profits, and taxes. These costs can be summed and divided by the yearly number of products produced to determine the cost per product. For example: USD Cost/Watt-hour (Wh) of electricity.

We offer three EXCEL files to assist Country Teams to estimate their costs for one “Commercial Scale Unit of Production” for each of your selected solution options. For example, one commercial scale unit of production might be a 100 wind-turbine unit for use in a wind farm to generate electricity. A wind farm could contain a number of commercial scale units.

The three EXCEL files correspond to 1, 2, and 3-year lengths of the Project Phase, which includes the time and cost to design, build and start-up your selected unit of production. These files are titled: “10. Eng Cost Est EXCEL, 1 yr Project Phase,” “10. Eng Cost Est EXCEL, 2 yr Project Phase” and “10. Eng Cost Est EXCEL, 3 yr Project Phase.” These files allow you to enter the number of commercial scale production units for your selected option that you plan to build in your Country each year between now and year 2100. The summations at the bottom show the yearly totals from 2025 through 2100 of your Country Total Loan (CTL), Country Production Costs (CPC) per year, and Country Products Produced (CPP) per year for a selected solution option. A further explanation is included on the first page of each of the three EXCEL files.

Consider People’s Project 1, option evaluation and integration aimed at adapting to unavoidable climate change impacts by years 2050, 2075 and 2100. You will need to estimate the Project Phase and Operating Phase costs for each of your selected options to adapt to climate change impacts. These costs will be included in your total Country climate solution system costs like the other solution options for years 2050, 2075 and 2100. Then, estimate the residual damage costs of unavoidable climate impacts even with the selected adaptation options implemented. This cost needs to be added to the total cost of your climate solution system to reach the total Country costs for overcoming global warming.

A relevant reference is: Cost of Wind Energy Review: 2024 Edition Tyler Stehly, Patrick Duffy, and Daniel Mulas Hernando National Renewable Energy Laboratory November 2024. Website: [Wind Market Reports: 2024 Edition | Department of Energy](#)

Technical Evaluation Criteria

11. Fuel and Energy Balances

Discussion.

Modern Civilization was built and now depends on fossil fuels to heat, cool and power almost all aspects of our daily lives. One of the most difficult aspects of dealing with global warming is the need to stop burning fossil fuels and switch to alternate energy sources to halt the release of CO₂. Overcoming this challenge is central to the Global Solution's three People's Projects as well as the Outreach Program. Fuel and energy balances are needed to project the results of implementing future climate solution systems at Country, Regional and Global levels.

We have found that current Country energy balances are detailed and complex. For example, the International Energy Agency (IEA) tracks energy balances for 185 countries (<https://www.iea.org>) and will provide their detailed data for a licensing fee. We plan to investigate this data source further. Here, we provide a relatively simple EXCEL spreadsheet that you can populate with data specific to your Country. The spreadsheet begins with your Country fuel balance showing the types and quantities of fuels consumed in a given year. Knowing energy content per quantity of fuel, the spreadsheet then converts the fuel balance into an energy balance. You need to know fuel quantities because they are the economic basis for buying and selling energy. You need the energy balance to see what your current and projected energy uses will add up to. Can you meet the GSOP goals and sustain your Country energy use? Can you cut your energy use and make up the difference with improvements in efficiencies? If neither is possible, then a reduction in standard of living may be necessary. Thus, the importance of having Country, Regional and Global fuel and energy balances. A further explanation is included on the first page of the 11. Fuel and Energy Bal EXCEL file.

The following fuel types are included in the fuel and energy EXCEL spreadsheets:

- Gasolene
- Diesel fuel
- Home heating oil
- Jet fuel
- Natural gas
- Coal
- Uranium U3O8
- Electricity

You may wish to include more fuel types in the spreadsheets.

The production of electricity from fuels and renewables is also included. The amounts of fuels and electricity used in transportation is also projected.

The spreadsheets use the following units of measure:

- Liters for gasolene, diesel fuel, home heating oil, and jet fuel
- Standard cubic meters for natural gas
- Kilograms for coal and uranium
- Watt-hours for electricity
- Joules of energy for all fuels and energy types

A relevant reference is: Website: [Energy Flow Charts, Lawrence Livermore National Laboratory](#)

Technical Evaluation Criteria

12. Human, Natural and Water Requirements and Availability Including Mineral Limitations

Discussion.

As the Option Evaluation teams consider solution options in People's Projects 1, 2 and 3, they should note the types and quantities of human resources, natural resources, and water required for each option. Integration and Internal Reporting teams can then sum the requirements as they integrate the options into Country climate systems. Regional and Global integration teams can then sum the system requirements at Regional and Global levels. Resource availabilities can also be assessed by the respective integration teams at Country, Regional and Global levels and compared to the resource requirements at each level. Key shortfall areas can then be identified and ways to cope with the resource limitations can be identified and assessed.

Human resource requirements should include the types and numbers of highly skilled personnel required during the project and operations phases of each implemented option. Engineers, scientists and subject-matter experts are examples of highly skilled personnel in limited supply. Ways to cope with shortfalls may include expanded education, training and apprenticeship programs.

Natural resource requirements include minerals recovered through mining and other costly and environmentally impactful operations. Examples are lithium, nickel and cobalt minerals used in rechargeable lithium-ion batteries. Some natural resources not currently in short supply may become scarce if their demand greatly increases. Therefore, the lists of natural resources tracked for each option should be broad to avoid overlooking a future critical resource shortfall.

Certainly, there is no Global water shortage taking into account the world's oceans. However, fresh waters required for human consumption, agriculture and many processes are in critically short supply in many areas. Additional water required by climate solution options must be assessed in the locations where the options will be applied and address competing requirements.

Identifying future shortfalls in human, natural and water resources is a key objective of this evaluation criteria. Solutions to these shortfalls must be available or alternate approach approaches found. Solutions may include increase resource production, and alternate technical routes that avoid or reduce the need for a given resource. Technical Evaluation Criteria 6. Integration Problems and Solutions and Sector Impacts will be used to find solutions to these problems.

Relevant references include:

1. United Nations Educational, Scientific and cultural Organization – Skills Development and Climate Action Plan. [UNESCO-UNEVOC skills development and climate change action plans.pdf](#)
2. Project Drawdown. [Human Resources and Operations Climate Change Action Guide, Project Drawdown®](#)
3. Climate Action Competency Framework [Climate Action Competency Framework Resource, Embedding Project](#)
4. Natural Resources: [Climate-Smart Mining: Minerals for Climate Action](#), Global Water Requirements: [Water for Climate Actions, UN-Water](#)



SECTION 2

Country Operations Personnel Plan (US Baseline)

Global Solutions & Outreach Programs (GSOP)

Introduction.

“Country Operations” encompasses the tasks, personnel and costs to execute the Solution Work Units within Section 1. Country Problem Diagram (US Baseline). In Section 3, we present the Country Administration Support and Country Start-Up Year tasks, staffing and costs required to support Country Operations.

Note. Each Country will need to scale the US baseline operations personnel numbers to their Country’s level of GSOP funding. Each Country Operations Start-Up Year Team will be trained on ways to accomplish the scaling in addition to receiving training on the Wicked-Problem Approach and GSOP.

Country Operations Personnel Plan.

This Country Operations Personnel Plan is based on the GSOP Problem Diagram and associated Solution Work Units. The plan shows the personnel for each Work Unit along with the team structure. We suggest the following personnel selection and hiring priorities:

- Priority 1: Hire project/program level Problem Facilitators.
- Priority 2: Hire other Problem Facilitators (Priority 1 facilitators hire Priority 2 facilitators).
- Priority 3: Hire other full-time personnel (Priority 2 facilitators hire Priority 3 full-time staff).
- Priority 4: Hire part-time personnel as needed (Priority 2 and 3 staff hire part-time staff)

Personnel positions are abbreviated as follows:

- Problem Facilitators are designated “PF.” These are full-time personnel.
- Full-time personnel are designated “FT.” These include the Problem Facilitators.
- Part-time personnel (4 hr./week) are designated “PT.”

Four personnel specialties are required:

- Engineers
- Economists
- Social/Political Experts
- Subject Matter Experts (SME)

The numbers of full-time co-located personnel are also indicated in the personnel plan.

The ratio of part-time staff to full-time Country Operations staff is 7 to 1. We suggest part-time staff be selected and hired as their need and specialties are identified. Part-time staffing levels are based on working 4 hours per week, or 1 tenth time. Based on your needs, you may convert 10 part-time positions to 1 full-time position. Part-time subject-matter experts may be paid on an hourly basis as consultants.

People's Project 1.

1. Organization Work Units

a. Project 1 Organization Team

1 Team, 3 PF (Project 1 Core Team)

Total Personnel: Engineers: 3 FT/0 PT; PF: 3 (Co-locate 3 FT)

b. GSOP Coordinating Committee

Staffed by Project 1 Organization Team, a above

2. Standardization and Information Technology Work Units

a. Standardization Parameters

1 Team, 2 PF

Total Personnel: Engineers: 6 FT/ 20 PT, PF: 2 (Co-locate 4 FT)

b. Information Technology

1 Team, 2 PF

Total personnel: Engineers: 8 FT/ 20 PT; SME 2 FT/0 PT; PF: 2 (Co-locate 10 FT)

3. Option Evaluations: Halt the net release of atmospheric CO₂ by years 2050, 2075 and 2100 Work Units

Based on 62 options under 6 categories

a. 1 Overall Team, 3 PF, Engineers: 3 FT/0 PT; PF: 3 (Co-locate 3 FT).

b. 3 Sub-teams, each grouping a portion of the sub-sub-teams shown nest, 2 PF over each of 3 sub-teams, = Engineers: 6 FT/0 PT; PF: 6 (Co-locate 6 FT)

c. 31 Sub-sub-teams for 62 options (evaluate 1 option/6 months = 2 options/year), 2 PF over each sub-sub team; Engineers: 2 FT/18 PT; SME: 0 FT/2 PT each sub-sub team = Engineers 62 FT/558 PT; SME: 0 FT/62 PT; PF: 62 (Co-locate 0)

Total personnel a, b and c: Engineers: 71 FT/558 PT; SME: 0 FT/62 PT; PF: 71 (Co-locate 9 FT)

4. Option Evaluations: Adapt to unavoidable climate change impacts by years 2050, 2075 and 2100 Work Units.

Based on an assumed total of 15 options TBD

a. 1 Overall Team, Engineers: 3 FT/0 PT; PF: 3 (Co-locate 3 FT)

b. 8 Sub-teams for 15 options (evaluate 1 option/6 months = 2 options/year), 2 PF over each sub-team; Engineers: 2 FT/18 PT; SME: 0 FT/2 PT each sub-team = Engineers: 16 FT/144 PT; SME 0 FT/16 PT; PF: 16 (Co-Locate 2 FT).

Total personnel a and b: Engineers: 19 FT/144 PT; SME: 0 FT/16 PT; PF: 19 (Co-locate 5 FT)

5. Integration and Internal Reporting Work Units

1 Team, 2 PF

Total personnel: Engineers: 10 FT/ 20 PT; PF: 2 (Co-locate 10 FT)

6. Economics Work Units

1 Team, 2 PF

Total personnel: Economists: 5 FT/ 10 PT; PF: 2 (Co-locate 5 FT)

7. Social/Political Work Units

1 Team, 2 PF

Total personnel: Social/Political Experts: 5 FT/ 10 PT; PF: 2 (Co-locate 5 FT)

8/11. Regional & Global Integration, Coordination and Internal Reporting Work Units

1 Team, 2 PF

Total personnel: Engineers: 2 FT/ 10 PT; PF: 2 (Co-locate 2 FT)

9/12. Regional & Global Economics Work Units

1 Team, 2 PF

Total personnel: Economists: 2 FT/ 10 PT; PF: 2 (Co-locate 2 FT)

10/13. Regional & Global Social/Political Work Units

1 Team, 2 PF

Total personnel: Social/Political Experts: 2 FT/ 10 PT; PF: 2 (Co-locate 2 FT)

Totals for Project 1: Engineers: 119 FT/772 PT; Economists: 7 FT/20 PT;

Social/Political Experts: 7 FT/20 PT; Subject Matter Experts: 2 FT/78 PT

Total FT 135/ PT 890; Problem Facilitators: 109; Co-locate: 57

People's Project 2.

1. Organization Work Units

a. Project 2 Organization Team

1 Team, 3 PF (Project 2 Core Team)

Total Personnel: Engineers: 3 FT/0 PT; PF: 3 (Co-locate 3 FT)

b. GSOP Coordinating Committee

Staffed by Project 2 Organization Team, a above

2. Standardization and Information Technology Work Unit – Addressed in People's Project 1

3. Option Evaluations: Stabilize the Earth's energy balance to halt global warming, adjust the Earth's energy balance to return to prior conditions by years 2050, 2075 and 2100 Work Units

Based on 43 options under 7 categories

- a. 1 Overall Team, 3 PF, Engineers: 3 FT/0 PT; PF: 3 (Co-locate 3)
- b. 2 Sub-teams, each grouping a portion of the sub-sub-teams shown nest, 2 PF over each of 2 sub-teams = Engineers: 4 FT/0 PT; PF: 4 (Co-locate 4)
- c. 22 Sub-sub-teams for 43 options (evaluate 1 option/6 months = 2 options/year), 2 PF over each sub-sub-team; Engineers: 2 FT/18 PT; SME: 0 FT/2 PT each sub-sub team = Engineers: 44 FT/396 PT; SME: 0 FT/44 PT; PF: 44 (Co-locate 0)
- Total personnel a, b and c: Engineers: 51 FT/396 PT; SME: 0 FT/44 PT; PF: 51 (Co-locate 7)

4. Option Evaluations: Address ocean acidification and other problems years 2050, 2075 and 2100 Work Units

Based on an assumed total of 15 options TBD

- a. 1 Overall Team, 3 PF overall, Engineers: 3 FT/0 PT; PF: 3 (Co-locate 3)
- b. 8 Sub-teams for 15 options (evaluate 1 option/6 months = 2 options/year), 2 PF over each sub-team; Engineers: 2/18; SME: 0 FT/ 2 PT each sub-sub team = Engineers 16/144 PT; SME: 0 FT/16 PT; PF: 16 (C-locate 0)
- Total personnel a and b: Engineers: 19 FT/144 PT; SME: 0 FT/16 PT; PF: 19 (Co-locate 3)

5. Global Coordination and Internal Reporting Work Units

1 Team, 2 PF

Total personnel: Engineers: 2FT/10 PT; PF: 2 (Co-locate 2)

6. Integration and Internal Reporting Work Unit – Addressed in People’s Project 1

7. Economics Work Units – Addressed in People’s Project 1

8. Social/Political Work Units – Addressed in People’s Project 1

Totals for Project 2: Engineers: 75 FT/550 PT; Subject Matter Experts: 0 FT/60 PT

Total FT 75/ PT 610; Problem Facilitators: 75; Co-locate: 15

People’s Project 3.

1. Organization Work Units

a. Project 3 Organization Team

1 Team, 3 PF (Project 3 Core Team)

Total Personnel: Engineers: 3 FT/0 PT; PF: 3 (Co-locate 3 FT)

b. GSOP Coordinating Committee

Staffed by Project 3 Organization Team, a above

2. Standardization and Information Technology Work Unit – Addressed in People’s Project 1

3. Climate monitoring, models and future conditions, and Country fuel and energy balances Work Units

1 Team, 2 PF

Total personnel: Engineers 5 FT/20 PT; SME: 0 FT/20 PT; PF: 2 (Co-locate 5)

4. Option Evaluations: Advanced technologies in R&D Work Units

- Option Evaluations: Halt the net release of atmospheric CO₂
Based on a total of 11 options
a. 1 Overall Team, 2 PF, Engineers: 2 FT/0 PT; PF: 2 (Co-locate 2)
b. 6 Sub-teams for 11 options (evaluate 1 option/6 months = 2 options/year), Engineers: 2 FT/18 PT; SME: 0 FT/2 PT each sub-sub team = Engineers: 12 FT/108 PT; SME: 0 FT; 12 PT; PF: 12 (Co-locate 0)
Total personnel a and b: Engineers: 14 FT/108 PT; SME: 0 FT/ 12 PT; PF: 14 (Co-locate 2)
- Option Evaluations: Adapt to unavoidable climate change impacts
Based on an assumed total of 10 options TBD.
a. 1 Overall Team, 2 PF, Engineers: 2 FT/0 PT; PF: 2 (Co-locate 2).
b. 5 Sub-teams for 10 options (evaluate 1 option/6 months = 2 options/year), Engineers 2 FT/18 PT; SME: 0 FT/2 PT each sub-sub team = Engineers: 10 FT/90 PT; SME: 0 FT/ 10 PT; PF: 10 (Co-locate 0).
Total personnel a and b: Engineers: 12 FT/90 PT; SME: 0 FT/10 PT: PF: 12 (Co-locate 2)
- Option Evaluations: Stabilize and adjust the Earth's energy balance to halt global warming and return to prior conditions
Based on a total of 11 options
a. 1 Overall Team, 2 PF, Engineers: 2 FT/0 PT; PF: 2 (Co-locate 2)
b. 6 Sub-teams for 11 options (evaluate 1 option/6 months = 2 options/year), Engineers: 2 FT/18 PT; SME: 0 FT/2 PT each sub-sub team = Engineers: 12 FT/108 PT; SME: 0 FT; 12 PT; PF: 12 (Co-locate 0)
Total personnel a and b: Engineers: 14 FT/108 PT; SME: 0 FT/ 12 PT; PF: 14 (Co-locate 2)
- Option Evaluations: Address ocean acidification and other problems
Based on an assumed total of 10 options TBD
a. 1 Overall Team, 2 PF, Engineers: 2 FT/0 PT; PF: 2 (Co-locate 2)
b. 5 Sub-teams for 10 options (evaluate 1 option/6 months = 2 options/year), Engineers 2 FT/18 PT; SME: 0 FT/2 PT each sub-sub team = Engineers: 10 FT/90 PT; SME: 0 FT/ 10 PT; PF: 10 (Co-locate 0)
Total personnel a and b: Engineers: 12 FT/90 PT; SME: 0 FT/10 PT: PF: 12 (Co-locate 2)

5. Global Coordination and Internal Reporting Work Units

1 Team, 2 PF

Total personnel: Engineers 2 FT/10 PT PF: 2 (Co-locate 2)

6. Integration and Internal Reporting Work Unit – Addressed in People's Project 1

7. Economics Work Units – Addressed in People's Project 1

8. Social/Political Work Units – Addressed in People's Project 1

Totals for Project 3: Engineers: 62 FT/426 PT; Subject Matter Experts: 0 FT/64 PT

Total FT 62/PT 490; Problem Facilitators: 59; Co-locate: 18

Outreach Program.

1. Organization Work Units

a. Outreach Program Organization Team

1 Team, 3 PF (Outreach Program Core Team)

Total Personnel: Engineers: 10 FT/0 PT; PF: 3 (Co-locate 10)

b. GSOP Coordinating Committee

Staffed by Outreach Program Organization Team, a above

2. Standardization and Information Technology Work Unit – Addressed in People’s Project 1

3. State, Province, Local Community and Industry Outreach Work Units– State, Province Teams

50 Teams, 2 PF per team, Engineers: 2 FT/18 PT; SME: 0 FT/2 PT per team = Engineers: 100 FT/900 PT; SME: 0 FT/100 PT; PF: 100 (0 co-locate)

Total Personnel: Engineers: 100 FT/900 PT; SME: 0 FT/ 100 PT; PF: 100 (Co-locate 0)

4. Social/Political Work Units – State, Province Teams (Staff included in Work Units 3 above)

5. Internal Reporting Work Units – Country, State, and Province Teams (Staff included in Work Units 1 and 3 above)

Totals for Outreach Program: Engineers: 110 FT/990 PT; Subject Matter Experts: 0 FT/100 PT

Total FT 110/PT 1000; Problem Facilitators: 103; Co-locate: 10

Summary, Country Operations Personnel, People’s Projects 1, 2 and 3 plus Outreach Program (US Baseline)

Totals for Project 1: Engineers: 119 FT/772 PT; Economists: 7 FT/20 PT;

Social/Political Experts: 7 FT/20 PT; Subject Matter Experts: 2 FT/78 PT

Total FT 135/ PT 890; Problem Facilitators: 109; Co-locate: 57

Totals for Project 2: Engineers: 75 FT/550 PT; Subject Matter Experts: 0 FT/60 PT

Total FT 75/ PT 610; Problem Facilitators: 75; Co-locate: 15

Totals for Project 3: Engineers: 62 FT/426 PT; Subject Matter Experts: 0 FT/64 PT

Total FT 62/PT 490; Problem Facilitators: 59; Co-locate: 18

Totals for Outreach Program: Engineers: 110 FT/990 PT; Subject Matter Experts: 0 FT/100 PT

Total FT 110/PT 1000; Problem Facilitators: 103; Co-locate: 10

Total Country Operations personnel (US Baseline):

Engineers:	366 full-time and 2,648 part-time
Economists:	7 full-time and 20 part-time
Social/Political Experts:	7 full-time and 20 part-time
Subject Matter Experts:	<u>2 full-time and 302 part-time</u>
GSOP Totals:	382 full-time and 2,990 part-time
Problem Facilitators:	346 full-time
Co-locate:	100 full-time



SECTION 3

Country Administration Support and Country Start-Up Year Plans (US Baseline)

Global Solutions & Outreach Programs (GSOP)

Introduction.

Success in solving global warming using the Wicked-Problem Approach requires that the many international efforts be initiated simultaneously during a Country Start-Up Year – why? Because: a. participants in all Countries will be placed on the same learning curve and b. Global collaboration can commence immediately beginning in GSOP Year 1. In consequence, the following needs result:

1. A Country Administration Support Team must be fully established and functioning during the Country Start-Up Year to enable Country Operations to begin the following year (GSOP Year 1). The Country Administration Support Teams must then function throughout each Country's GSOP Years 1-3.
2. A Country Operations Start-Up Year Team must be established and function during the Country Start-Up Year to prepare for full Country Operations the following year (GSOP year 1). At the end of the Country Start-Up Year, the Country Operations Start-Up Year Team will become a part of the Country Operation Teams.
3. A US Global Support Center (presented in Section 6) must be resourced and set up prior to the Country Start-Up Year. The Center is required to fund and assist the Country Administration Support Team and Country Operations Start-Up Year Team to form and function during the Country Start-Up Year.
4. Contractor and consultant support may be required by the Country Administration Support Team and Country Operations Start-Up Year Team.
5. This document presents US Baseline tasks, staffing and costs to establish and operate the Country Administration Support Team and the Country Operations Start-Up Year Team.
6. Each Country will need to scale the US Baseline tasks, staffing and cost figures to their Country's level of GSOP funding. Each Country Operations Start-Up Year Team will be trained on ways to accomplish the scaling. They will also receive training on the Wicked-Problem Approach and GSOP.

Note: Throughout this document, “Country Operations”, and “Country Operations Teams” refer to the tasks, personnel and costs required to execute GSOP within each Country. “Country Administration Support” refers to the administration tasks and staff needed to support Country Operations and to allow the Country Operations Teams to concentrate on solving global warming.

Country Administration Support Team Start-Up Year Tasks.

1. The US Global Support Center will recruit, select, and hire an Administration Support Director and a Deputy Administration Support Director in each Country to oversee all Country Administration Support Team functions including recruiting, selecting, and hiring Administration Support Team staff.
2. The Administration Support Directors must establish or acquire a legal non-profit non-government organization in their Country to accept and administer Country GSOP program money and to provide other necessary administration support functions. The non-profit organization must function in accordance with their Country’s legal requirements.
3. The Directors must scale their Country Administration Support Team tasks, staffing and cost to their Country GSOP funding level.
4. The Personnel, Finances and Legalities Sub-Team will handle all administration, personnel, financial and legal support functions to enable the Country start-up including the following:
 - Recruit, select and hire other full-time, onsite Personnel, Finances and Legalities Sub-Team staff.
 - Recruit, select and hire other full-time, onsite Recruitment and Visibility Sub-Team staff.
 - With support and concurrence of the US Global Support Center, hire the Country Operations Start-Up Year Team staff.
5. The Recruitment and Visibility Sub-Team will:
 - Select and acquire office space for Country Administration Support and Country Operations Teams collocated participants.
 - Begin recruiting engineers, economists, social experts and subject-matter experts for the Country Operations Teams needed to execute GSOP in accordance with the Country GSOP scaled plans.
 - Interface with the Professional Societies of engineers, economists and social/political experts to inform them of the Country GSOP and to ask them to inform their members of Country GSOP employment opportunities.
6. Contract Support and other expenses will include:
 - Provide legal advice through contract support.
 - Provide website contract support.
 - Costs of advertising Country GSOP positions as part of personnel recruitment.
 - Costs of renting office space for co-located Country Administration Support and Country Operations staff.
 - Costs of relocating the co-located staff.
 - Other support as needed.

Country Administration Support Team Follow-On Tasks (GSOP Years 1-3).

1. The Personnel, Finances and Legalities Sub-Team will handle all administration, personnel, financial and legal support functions to enable the Country Administration Support Team and Country Operations Teams to function.
2. The Recruitment and Visibility Sub-Team will:
 - Continue recruiting engineers, economists, social experts and subject-matter experts for the Country Operations Teams as needed to execute the Country GSOP scaled plans.
 - Establish and maintain a “Country Technical Advisory Committee” (C-TAC) of senior technical experts for independent GSOP peer review, guidance and assistance.
 - Interface with and inform Country public officials, corporate leaders, donors and the public of the Country GSOP and its results.
 - Interface with the Professional Societies of engineers, economists and social/political experts, inform them of the Country GSOP and to ask them to inform their members of GSOP employment opportunities.
 - Prepare and distribute Country GSOP Public Progress Reports to periodically inform their Country’s public, government officials, and GSOP sponsors of progress.
 - Establish, maintain and update a Country GSOP Public Website.
3. Contract Support and other expenses will include:
 - Costs of Country Technical Advisory Committee consultants.
 - Provide on-call legal advice and support.
 - Provide website support.
 - Costs of advertising Country GSOP positions as part of personnel recruitment.
 - Costs of renting office space for co-located Country Administration Support and Country Operations staff.
 - Costs of relocating the co-located staff.
 - Other support as needed.

Country Operations Start-Up Year Team Tasks.

1. Receive and complete training on Wicked-Problem Approach and GSOP provided by US Global Support Center. Then, serve as Wicked-Problem Approach trainers as additional problem-facilitators (leaders) are hired and report during GSOP Year 1 of Country Operations. Read and discuss the People’s Assessment of Global Warming book to obtain a broad understanding of the global warming problem.
2. Scale the US Baseline Country Problem Diagram, Country Operations Personnel Plan, Country Administration Support and Country Start-Up Year Plans, and Country Cost Plan to meet Country levels of GSOP funding and priorities. These plans will serve as Country GSOP plans during Country Start-Up Year and GSOP Year 1. Operations Start-Up Year Teams must provide their scaled plans to the US Global Support Center for review and approval. Provide the scaled Country plans to the Country Administration Support Team to guide their recruitment efforts.

3. Evaluate and select candidates provided by Country Administration Support Teams for hire during GSOP Year 1 of Country Operations.
4. Assist the Country Administration Support Team to perform its functions during the Country Start-Up Year.

Country Administration Support Team Start-Up Year and Follow-On Years Staffing.

1. The US Global Support Center will recruit, select and hire and pay the Administration Director and Deputy Administration Support Directors until they can acquire a legal non-profit non-government entity to accept and administer Country GSOP program money. The Directors will initially work remotely until they acquire a GSOP non-profit organization and rent GSOP office space. They will then co-locate with their Country Administration Support Team. The Directors will then recruit and select the following Country Administration Support staff.
2. Personnel, Finances and Legalities Sub-Team. (16, All co-located.)
 - Administrators for payroll and fringe benefits (health care, disability insurance, employee owned retirement account, sick and annual leave). (3 Bachelor degrees)
 - Comptroller to oversee budget and money in and out. (2 Analysts)
 - Accountant to track finances. (2 Accounts)
 - Administration Assistants for Country Administration Support Team and Country Operations Teams. (1 Administration Assistant for Country Administration Support Team, and 4 for the People's Project 1, 2 and 3 teams and for the Outreach Program team.)
 - Bachelor degree to acquire office space for colocated participants and administrate office space rental, travel expenses, moving/relocation expenses, temporary duty station expenses. (2 Bachelor degrees)
 - Bachelor degrees to hire candidates after selection by Country Operations Start-Up Year Team. (2 Bachelor degrees)
3. Recruitment and Visibility Sub-Team. (5, All co-located.)
 - Two engineers, one economist and one social/political expert, and one communication/marketing specialist.

Note: Contract Support staff will work remotely unless on temporary duty at the GSOP office.

Total Country Administration Support Team staffing, all co-located: 23

Country Operations Start-Up Year Team Staffing.

The US Global Support Center will recruit, and select the following Country Operations Start-Up Year staff for hiring by the Country Administration Support Team.

- Four full-time engineers, Problem Facilitators for People's Projects 1, 2, 3 and Outreach Program.
- One full-time economist, Problem Facilitator
- One full-time social/political expert, Problem Facilitator

Total Country Operations Start-Up Year staff for US is 6.

Country Administration Support Cost per year (GSOP Years 1-3)

2 Directors of Country Administration Support = $2 * 180.6 \text{ K USD/yr.} = 361.2 \text{ K USD/yr.}$

Personnel, Finances and Legalities Sub-Team:

Position	Cost/yr	+	40% Overhead	# Positions	Cost/yr
7 Bachelor degrees	70 K USD	x 1.4 =	98 K USD	x 7 =	686 K USD
2 Analysts	82 K USD	x 1.4 =	114.8 K USD	x 2 =	229.6 K USD
2 Accounts	82 K USD	x 1.4 =	114.8 K USD	x 2 =	229.6 K USD
5 Admin. Assistants	40 K USD	x 1.4 =	56 K USD	x 5 =	<u>280 K USD</u>
Total:				16	1,425.2 K USD

Recruitment and Visibility Sub-Team: 2 Engineers, 1 economist, 1 social/political expert, and 1 communications/marketing expert = $5 * 180.6 \text{ K USD/yr.} = 903.0 \text{ K USD/yr.}$

Contract Support and other expenses will include:

- Cost of Country Technical Advisory Committee consultants.
- Provide legal advice through contract support.
- Provide website contract support.
- Costs of advertising Country GSOP positions as part of personnel recruitment.
- Costs of renting office space for co-located Country Administration Support and Country Operations staff.
- Costs of relocating the co-located staff.
- Other support as needed.

Total cost estimate for contract support: 406 K USD/yr.

Total Country Administration Support cost/yr = $(361.2 \text{ K USD} + 1,425.2 \text{ K USD} + 903.0 \text{ K USD} + 406 \text{ K USD/yr.}) = 3,095.4 \text{ K USD/yr.}$

Total Country Administration Support with 5% contingency = $3,095.4 \text{ K USD/yr.} * 1.05 = 3,250.2 \text{ K USD/yr.} = 3.250 \text{ M USD/yr.}$

Total Country Administration Support for GSOP Years 1-3 = $3.250 \text{ M USD/yr.} * 3\text{yr.} = 9.750 \text{ M USD}$

Country Administration Support Cost for the Country Start-Up Year

The Country Administration Support costs will be the same for the Country Start-Up Year as for GSOP Years 1-3 except: Because of start-up uncertainty, we increase the contingency factor from 5% to 10%.

Total Country Administration Support for Country Start-Up Year with 10% contingency = $3,095.4 \text{ K USD} * 1.1 = 3,404.9 \text{ K USD} = 3.405 \text{ M USD}$

Country Operations Start-Up Year Team Costs.

4 Engineers (Facilitators for People's Projects 1, 2 ,3 and Outreach Program)

1 Economist (Facilitator)

1 Social/Political Expert (Facilitator)

Total: $6 * 180.6 \text{ K USD} = 1,083.6 \text{ K USD}$

Total Country Operations Start-Up Year Team with 10% contingency = $1,083.6 \text{ K} * 1.1 = 1,192.0 \text{ K USD} = 1.192 \text{ M USD}$

Total Country Administration Support Team and Country Operations Start-Up Year Team Costs

Total Country Administration Support Team and Country Operations Start-Up Year Team Costs for the Country Start-Up Year = $3.405 \text{ M USD} + 1.192 \text{ M USD} = 4.597 \text{ M USD}$

Total Country Administration Support Costs for the Country Start-Up Year + GSOP Years 1-3 = $4.597 \text{ M USD} + 9.750 \text{ M USD} = 14.347 \text{ M USD}$

Notes: The following are suggestions from a senior Human Resources Administrator:

- a. Start off with small admin staff and expanding as needed – easier to hire than fire.
- b. Consider linking GSOP organization to an established organization such as a university to obtain administration support. A university might agree if they see advantages in doing so – prestige of attaching GSOP to the school, and student and faculty involvement on a part-time basis.
- c. Consider office equipment and software. Having one software system to do all the needed admin functions is desirable. Should be used elsewhere beforehand to have bugs removed.
- d. For full-time and part-time GSOP staff (including Country Administration Support people), have agreements to renew on an annual basis. Also, agree to x months' notice before terminating at will.
- e. Other considerations include child care, life insurance, "flexible spending accounts" administered by employee to buy things on tax deferred basis, Fair Labor Standards, Employment records for each employee, affirmative action records if use government funding, travel, moving/relocation expenses, temporary duty station expenses, health care (7-8K USD per year per full-time employee. disability insurance, defined retirement account (Employee owned with non-profit contributing 10%), sick leave, and annual leave.
- f. Use a consulting firm to plan and help to set-up Country Administration Support Team and functions.
- g. Small Business practices will apply to GSOP in US.



SECTION 4

Country Cost Plan (US Baseline)

Global Solutions & Outreach Programs (GSOP)

Introduction.

In the US Country Cost Plan, we calculate the costs for Country Operations using the full-time and part-time staffing estimates from the Country Operations Personnel Plan (US Baseline), Section 2. Country Operations costs are then added to the Country Administration Support and Country Start-Up Year costs in Section 3 to determine the total US Country cost. The personnel salary and costs per year are explained below. These figures will be used to estimate Country Operations costs for all Countries

Country Operations Cost Basis.

The full-time salary for Country Operations personnel is 129,000 USD/year. This labor rate is based on the *Chemical Engineering Progress* 2023 survey of average Chemical Engineering salary of 122,000 USD/year plus a 5% incentive for accepting GSOP 3-year positions. The resulting full-time salary is 129,000 USD/Year.

This salary corresponds to 62 USD/hr. for 40-hour work week, 52 weeks/yr.

A 40% overhead rate is added to each full-time Operations salary to determine the annual labor cost. The resulting full-time labor cost/year = $129,000 \text{ USD} \times 1.4 / 1000 = 180.6 \text{ K USD/year}$.

The annual salary for part-time participants working 4 hours/week (1/10th time) = $129,000 \text{ USD/year} \times 0.1 = 12,900 \text{ USD/year}$. A 20% overhead rate is added to each part-time Operations salary. The resulting part-time participant labor cost/year = $12,900 \text{ USD/year} \times 1.2 / 1000 = 15.5 \text{ K USD/year}$.

Manpower Estimate from Section 2. Country Operations Personal Plan (US Baseline)

US Baseline Country Operations Total full-time personnel: 382
US Baseline Country Operations Total part-time personnel: 2,990

Country Operations Cost Estimate with 5% Contingency Added.

Country Operations cost for 3-years with 5% contingency in M USD =
((# full-time Country Operations personnel * (FT labor cost of 180.6 K USD/yr.) * 3 years * 1.05 contingency) + (# part-time County Operations personnel * (PT labor cost of 15.5 K USD/yr. * 3 yr. * 1.05 contingency))/1000

Multiplying out the constants results in the following simplified formula: US Country Operations cost for 3 years with 5% contingency in millions of US dollars (M USD) = (0.56889 * # full-time Country Operations Personnel) + (0.048762 * # part-time Country Operations Personnel).

With the US Country Operations full-time and part-time personnel levels inserted, the US Country Operations cost for 3 years with 5% contingency in M USD = (0.56889 * 382 full-time Country Operations Personnel) + (0.048762 * 2,990 part-time Country Operations Personnel) = 363.114 M USD.

The corresponding US Country Operations cost per year = 363.114 M USD / 3 = 121.038 M USD/year (GSOP Years 1-3).

Country Administration Support and Country Start-Up Year Costs (US Baseline) from Section 3.

Total Country Administration Support Costs for Country Start-Up Year + GSOP Years 1-3 = 4.597 M USD + 9.750 M USD = 14.347 M USD

Total Country GSOP Cost (US Baseline).

Total US Country Cost (4 years) = 3 Year Country Operation Cost of 363.114 M USD + 4-years Country Administration Support and Country Operations Start-Up Year Cost of 14.347 M USD = 377.461 M USD



SECTION 5

Global Cost Plan and Scaling Country Plans

Global Solutions & Outreach Programs (GSOP)

Introduction.

The estimates of GSOP Global costs and manpower presented here are based on detailed Country Plans (US Baseline) that include the Country Problem Diagram, Country Operations Personnel Plan, Country Administration Support and Country Start-Up Year Plans, and Country Cost Plan. The Global Cost Plan scales the US Baseline figures for different sized countries as explained below. The plan is presented in an EXCEL spreadsheet. It provides a way to move forward and gives every Country a meaningful way to have their own GSOP.

Explanation of the Global Cost Plan and Spreadsheet.

Regional estimates were initially developed by multiplying US Baseline figures times the ratios of Region gross domestic product (GDP) to US gross domestic product (GDP). The resulting estimates were then modified as explained below.

Please refer to the GSOP-World Summary page in Figure 3 and Figure 3 Continued, which shows excerpts from the GSOP Global Cost Plan Excel. The six world Regions are listed in column A. The GDP for each Region is listed in column B and are shown in billions (B) of US dollars (USD). The GDP figures come from the World Bank 2022 data base for each Country, which are summed to provide each Region's GDP. In a few cases, the World Bank listed a Country without showing a GDP. GDP figures were found on the Internet and inserted for these Countries. The ratio of each Region's GDP to the US GDP is listed in column C. US Baseline costs are multiplied by these ratios for the initial estimate of GSOP costs for each Region, column D. After seeing the initial results in column D, we quickly saw the need for adjustments.

The initial GSOP costs estimates for South America and Africa (in column D) are far too low given their populations and area. Even Europe costs were less than the US. We addressed this situation by setting the baselines for South America, Africa and Europe equal to the baseline figures for North America, thus treating these four regions in an equal way. We raised the funding and staffing levels of Oceania to 30% of the US Baseline figures. In light of the high population of China and Asia, and their high GDPs, we set the baseline for China equal to that of the US. We then raised the other Asian countries in the proportion of their GDPs to China's GDP.

Please refer to the GSOP-Africa Final Revisions page shown in Figure 4. This page shows the estimates for each Country in Africa. The Excel spreadsheet contains many more columns of information on personnel numbers and cost figures than shown here. If we include more columns in these examples, the print becomes too small to read. So, we limited the information shown here to

overall cost figures. All GSOP participants will have access to the full GSOP Global Cost Plan Excel spreadsheets.

The North American Baseline Figures shown in Figure 4 for Africa are taken from Figure 5, N. American Baseline estimates in columns E, F and G. The Africa Countries and their GDP are listed in columns B and C. The ratios of Country GDP to Africa total GDP are listed in column D. These ratios were then multiplied times the N. America Baseline figures to determine each Country's estimates shown Columns E, F and G.

When we viewed these results, we noted that some small countries with small GDP ended up with almost no staff or money. To correct this untenable situation, we made a final revision by setting a minimum staffing level for each Country of 2 full-time engineers, 2 part-time economists, 2 part-time social/political experts, and 4 part-time subject-matter experts. To assure that each Country would have sufficient Administration Support and Start-Up Year funding and staff, we scaled the US Baseline figures to different GSOP funding levels. All of the GSOP Regional Final Revision pages include these minimum staffing levels.

All Country Operations full-time personnel world-wide are to be paid an average US Chemical Engineering salary of 129,000 USD/year. Applying 40% overhead, the full-time Country Operations personnel cost is 180,600 USD/Year. The corresponding cost for part-time Country Operations personnel working 4 hours/week (1/10th time) with 20% overhead is 15,500 USD/year. Country Operations staffing levels are based on personnel requirements to execute the Solution Work Units in the Country Problem Diagram (US Baseline). Costs are calculated from the full-time and part-time staffing levels and the above labor costs. The Figure 3 GSOP Global Cost Plan - World Summary also includes costs to set-up and then operate the US Global Support Center throughout the Country Start-Up Year and GSOP Years 1-3. The US Global Support Center is detailed next in Section 6. Figures 5 through 9 show excerpts from the GSOP Global Cost Excel for the other 5 Regions

We believe that this estimating strategy is objective and rational. Larger countries with large GDPs generally have high levels of industrialization and have released more CO₂ than Countries with lower levels of GDPs. For example, the US has the highest GDP of any Country and has cumulatively released more CO₂ than any other Country. As a result, countries with high GDPs have much work to do to overcome global warming. All GSOP assessments will be shared with all countries through the Internet to the benefit of both large and small Countries.

In summary, the Global Cost Plan provides a way to move forward and gives every Country a meaningful way to participate and have their own the GSOP. Each Country can always contribute more money to their GSOP. Referring to Figure 3, the total GSOP 5-year cost is 3.2 B USD. This figure includes 30 M USD set aside as an "unknown-unknown contingency." This fund, shown in Figure 3 (Continued), will be resourced to the US Global Support Center during the two preliminary years ahead before GSOP Years 1-3. If the monies are not needed in that period, they will be carried forward to meet future unexpected needs.

GSOP Global Cost Plan – World Summary

A	B	C	D	E	F	G
World Regions	GDP, Billion USD	Region GDP/US GDP	Initial Region GSOP Total Cost, M USD	Final Region GSOP Operations Cost, Years 1-3, M USD	Final Region GSOP Admin, Years 1-3, + Start-Up Year Cost, M USD	Final Region GSOP Total Cost , Years 1-3, + Start-Up Year, M USD
US Baseline	25,463		377.462			
Regions:						
Africa	2,947	0.116	44	456.6	89.9	546.5
North America	30,235	1.187	447	472.3	55.5	527.7
South America	4,213	0.165	62	433.2	33.9	467.1
Asia	35,883	1.409	530	753.4	88.3	841.7
Europe	25,046	0.984	370	465.5	89.0	554.4
Oceania	1987	0.078	29	133.6	25.3	158.9
World Totals:	100311	3.939	1482	2714.5	381.9	3096.4
					US Global Support Center Country Start-Up Year + Years 1-3, M USD	75.9
					US Global Support Center Set-Up, M USD	24.5
					Total Global GSOP Cost, M USD	3196.8
					Round Global GSOP Cost, B USD	3.2
				Note: The 3.2 B USD Global GSOP Cost includes 30 M USD set aside as unknown-unknown contingency during the US Global Support Center Set-UP and the Country Start-Up Year.		

Figure 3. World summary of GSOP Global Cost Plan showing total GSOP costs. Figure 3 is continued on next page.

GSOP Global Cost Plan – World Summary (Continued)

A	N	O	P	Q	R	S
World Regions	Full Time Sub Mat Experts	Part Time Sub Mat Experts	Country Start-Up Year Cost, M USD	GSOP Operatons Cost/Year, Years 1-3, M USD	GSOP Admin Spt Cost/Year, Years 1-3, M USD	Total GSOP Costs/Year, Years 1-3, M USD
US Baseline						
Regions:						
Africa	0	457	33.5	152.2	18.8	171.0
North America	2	471	20.8	157.4	11.6	169.0
South America	0	366	12.1	144.4	7.3	151.7
Asia	2	688	31.9	251.1	18.8	269.9
Europe	0	469	33.3	155.2	18.6	173.7
Oceania	1	156	9.7	44.5	5.2	49.7
World Totals:	5	2606	141.3	904.8	80.2	985.1
		US Global Support Center Start-Up Year, M USD	14.5		US Global Support Center/year, Year 1-3, M USD	13.8
		US Global Support Center Set-Up, M USD	14.5			
		Total GSOP for Start-Up Year, M USD	170.3		Total GSOP/year, Years 1-3, M USD	998.9
		Round to, M USD	200		Round to, M USD	1,000
	Note: 30 M USD of round-up set aside as unknown-unknown contingency. Apportion 20 M USD to US Global Support Center Start-Up Year (14.5 + 20 M USD = 34.5 M USD) and 10 M USD to US Global Support Center Set-Up (14.5 + 10 M USD = 24.5 M USD)					

Figure 3 (Continued). World summary of GSOP Global Cost Plan showing yearly GSOP costs

GSOP Global Cost Plan – Africa Final Revision

A	B	C	D	E	F	G
	African Countries	Country GDP, Billion USD	Country GDP/Region GDP, Billion USD	GSOP 3 yr Operations Cost, M USD	GSOP 3 Yr Admin Sp + Start-Up Yr Cost, M USD	Total GSOP 4 yr Cost, M USD
	North America Baseline, USD	30,235		431.172	17.036	448.208
	Africa Final Revised	2,947.3		456.647	89.898	546.545
1	Nigeria	477.39	0.1620	69.621	4.316	73.937
2	Egypt, Arab Rep.	476.75	0.1618	69.528	4.316	73.844
3	South Africa	405.87	0.1377	59.191	4.316	63.507
4	Algeria	191.91	0.0651	28.554	2.909	31.463
5	Morocco	134.18	0.0455	20.365	2.909	23.274
6	Ethiopia	126.78	0.0430	19.316	2.254	21.570
7	Kenya	113.42	0.0385	16.283	2.254	18.537
8	Angola	106.71	0.0362	15.331	2.254	17.585
9	Tanzania	75.71	0.0257	10.934	2.254	13.188
10	Ghana	72.84	0.0247	10.527	2.254	12.781
11	Côte d'Ivoire	70.02	0.0238	10.127	2.254	12.381
12	Congo, Dem. Rep.	58.07	0.0197	8.431	2.254	10.685
13	Sudan	51.66	0.0175	7.523	2.254	9.777
14	Tunisia	46.66	0.0158	6.814	2.254	9.068
15	Libya	45.75	0.0155	6.685	2.254	8.939
16	Uganda	45.56	0.0155	6.657	2.254	8.911
17	Cameroon	44.34	0.0150	6.484	2.254	8.738
18	Zambia	29.78	0.0101	4.438	1.433	5.871
19	Senegal	27.68	0.0094	4.153	1.433	5.586
20	Guinea	21.23	0.0072	3.275	1.433	4.708
21	Gabon	21.07	0.0071	3.254	1.433	4.687
22	Zimbabwe	20.68	0.0070	3.200	1.433	4.633
23	Botswana	20.35	0.0069	3.156	1.433	4.589
24	Burkina Faso	18.88	0.0064	2.957	1.433	4.390
25	Mali	18.83	0.0064	2.949	1.433	4.382
26	Mozambique	17.85	0.0061	2.816	1.433	4.249
27	Benin	17.40	0.0059	2.755	1.433	4.188
28	Madagascar	14.95	0.0051	2.423	1.102	3.525
29	Congo, Rep.	14.62	0.0050	2.376	1.102	3.478
30	Niger	13.97	0.0047	2.289	1.102	3.391
31	Rwanda	13.31	0.0045	2.199	1.102	3.301
32	Malawi	13.16	0.0045	2.213	1.102	3.315
33	Mauritius	12.90	0.0044	2.199	1.102	3.301
34	Chad	12.70	0.0043	2.189	1.102	3.291
35	Namibia	12.61	0.0043	2.184	1.102	3.286
36	Equatorial Guinea	11.81	0.0040	2.142	1.102	3.244
37	Mauritania	10.38	0.0035	2.068	1.102	3.170
38	Togo	8.13	0.0028	1.951	1.102	3.053
39	Somalia	8.13	0.0028	1.951	1.102	3.053
40	South Sudan	7.21	0.0024	1.903	1.102	3.005
41	Eswatini	4.85	0.0016	1.780	1.102	2.882
42	Liberia	4.00	0.0014	1.736	1.102	2.838
43	Sierra Leone	3.97	0.0013	1.734	1.102	2.836
44	Djibouti	3.52	0.0012	1.711	1.102	2.813
45	Burundi	3.07	0.0010	1.688	1.102	2.790
46	Lesotho	2.55	0.0009	1.661	1.102	2.763
47	Central African Republic	2.38	0.0008	1.652	1.102	2.754
48	Cabo Verde	2.31	0.0008	1.648	1.102	2.750
49	Gambia, The	2.27	0.0008	1.646	1.102	2.748
50	Eritrea	2.10	0.0007	1.637	1.102	2.739
51	Guinea-Bissau	1.63	0.0006	1.613	1.102	2.715
52	Seychelles	1.59	0.0005	1.611	1.102	2.713
53	Comoros	1.24	0.0004	1.593	1.102	2.695
54	São Tomé and Príncipe	0.55	0.0002	1.528	1.102	2.630
	AfricaTotals:	2,947.3	1.0000	456.647	89.898	546.545

Figure 4. Cost plan for Africa Region that includes final revisions.

GSOP Global Cost Plan – N. America Final Revision

A	B	C	D	E	F	G
	N. American Countries	Country GDP, Billion USD	Country GDP/Region GDP, Billion USD	GSOP 3 yr Operations Cost, M USD	GSOP 3 Yr Admin Sp + Start-Up Yr Cost, M USD	Total GSOP 4 yr Cost, M USD
	US Baseline, USD	25,463		363.115	14.347	377.462
	N. America Baseline = US Baseline x GDP NA/GDP US	30,235.0		431.172	17.036	448.208
	N. Amerian Final Revised	30,235.0		472.254	55.479	527.733
1	United States	25462.70	0.8422	363.115	14.347	377.462
2	Canada	2139.84	0.0708	30.919	2.909	33.828
3	Mexico	1414.19	0.0468	20.886	2.909	23.795
4	Cuba	545.22	0.0180	7.843	2.254	10.097
5	Dominican Republic	113.64	0.0038	2.145	1.102	3.247
6	Puerto Rico	113.43	0.0038	2.144	1.102	3.246
7	Guatemala	95.00	0.0031	2.044	1.102	3.146
8	Panama	76.52	0.0025	1.943	1.102	3.045
9	Costa Rica	68.38	0.0023	1.899	1.102	3.001
10	El Salvador	32.49	0.0011	1.704	1.102	2.806
11	Honduras	31.72	0.0010	1.700	1.102	2.802
12	Trinidad and Tobago	27.90	0.0009	1.679	1.102	2.781
13	Haiti	20.25	0.0007	1.638	1.102	2.740
14	Jamaica	17.10	0.0006	1.621	1.102	2.723
15	Nicaragua	15.67	0.0005	1.613	1.102	2.715
16	Bahamas, The	12.90	0.0004	1.598	1.102	2.700
17	Bermuda	7.55	0.0002	1.569	1.102	2.671
18	Cayman Islands	6.03	0.0002	1.561	1.102	2.663
19	Barbados	5.64	0.0002	1.558	1.102	2.660
20	Virgin Islands (U.S.)	4.20	0.0001	1.551	1.102	2.653
21	Greenland	3.24	0.0001	1.545	1.102	2.647
22	Aruba	3.13	0.0001	1.545	1.102	2.647
23	Belize	2.82	0.0001	1.543	1.102	2.645
24	Curaçao	2.70	0.0001	1.543	1.102	2.645
25	St. Lucia	2.07	0.0001	1.539	1.102	2.641
26	Antigua and Barbuda	1.76	0.0001	1.537	1.102	2.639
27	British Virgin Islands	1.70	0.0001	1.537	1.102	2.639
28	Sint Maarten (Dutch part)	1.57	0.0001	1.536	1.102	2.638
29	Grenada	1.26	0.0000	1.535	1.102	2.637
30	Turks and Caicos Islands	1.14	0.0000	1.534	1.102	2.636
31	St. Kitts and Nevis	0.96	0.0000	1.533	1.102	2.635
32	St. Vincent and the Grenadines	0.95	0.0000	1.533	1.102	2.635
33	St. Martin (French part)	0.77	0.0000	1.532	1.102	2.634
34	Dominica	0.61	0.0000	1.531	1.102	2.633
	North AmericaTotals:	30,235.0	1.0000	472.254	55.479	527.733

Figure 5. Cost plan for N. America Region that includes final revisions.

GSOP Global Cost Plan – S. America Final Revision

A	B	C	D	E	F	G
	S. American Countries	Country GDP, Billion USD	Country GDP/Region GDP, Billion USD	GSOP 3 yr Operations Cost, M USD	GSOP 3 Yr Admin Sp + Start-Up Yr Cost, M USD	Total GSOP 4 yr Cost, M USD
	North America Baseline, USD	30,235		431.172	17.036	448.208
	S. America Final Revision	4,212.9		433.212	33.908	467.120
1	Brazil	1,920.1	0.4558	195.902	8.378	204.280
2	Argentina	632.8	0.1502	64.560	4.316	68.876
3	Venezuela, RB	482.4	0.1145	49.218	2.909	52.127
4	Colombia	343.9	0.0816	35.462	2.909	38.371
5	Chile	301.0	0.0715	31.204	2.909	34.113
6	Peru	242.6	0.0576	25.409	2.909	28.318
7	Ecuador	115.0	0.0273	11.611	2.254	13.865
8	Uruguay	71.2	0.0169	7.258	2.254	9.512
9	Bolivia	43.1	0.0102	4.485	1.433	5.918
10	Paraguay	41.7	0.0099	4.357	1.433	5.790
11	Guyana	15.4	0.0036	2.087	1.102	3.189
12	Suriname	3.6	0.0009	1.660	1.102	2.762
	S. America Totals:	4,212.9	1.0000	433.212	33.908	467.120

Figure 6. Cost plan for S. America Region that includes final revisions.

GSOP Global Cost Plan – Asia Final Revision

A	B	C	D	E	F	G
	Asia Countries	Country GDP, Billion USD	Country GDP/Region GDP, Billion USD	GSOP 3 yr Operations Cost, M USD	GSOP 3 Yr Admin Sp + Start-Up Yr Cost, M USD	Total GSOP 4 yr Cost, M USD
	China = US Baseline, Asian countries ratrioed to China	17,963		363.115	14.347	377.462
	Asia Final Revised	35,883.1		753.391	88.318	841.709
1	China	17,963	1.0000	363.114	14.347	377.461
2	Japan	4,231	0.2355	85.531	4.316	89.847
3	India	3,385	0.1884	68.214	4.316	72.530
4	Korea, Rep.	1,665	0.0927	33.970	2.909	36.879
5	Indonesia	1,319	0.0734	27.186	2.909	30.095
6	Saudi Arabia	1,108	0.0617	23.052	2.909	25.961
7	Israel	522	0.0291	10.427	2.254	12.681
8	United Arab Emirates	508	0.0283	10.142	2.254	12.396
9	Thailand	495	0.0276	9.903	2.254	12.157
10	Singapore	467	0.0260	9.344	2.254	11.598
11	Bangladesh	460	0.0256	9.215	2.254	11.469
12	Vietnam	409	0.0228	8.207	2.254	10.461
13	Malaysia	406	0.0226	8.158	2.254	10.412
14	Philippines	404	0.0225	8.119	2.254	10.373
15	Iran, Islamic Rep.	389	0.0216	7.810	2.254	10.064
16	Pakistan	377	0.0210	7.575	2.254	9.829
17	Hong Kong SAR, China	360	0.0200	7.248	2.254	9.502
18	Iraq	264	0.0147	5.373	2.254	7.627
19	Qatar	237	0.0132	4.846	1.406	6.252
20	Kuwait	185	0.0103	3.856	1.406	5.262
21	Oman	115	0.0064	2.543	1.406	3.949
22	Uzbekistan	80	0.0045	2.106	1.102	3.208
23	Sri Lanka	74	0.0041	2.063	1.102	3.165
24	Myanmar	59	0.0033	1.955	1.102	3.057
25	Jordan	47	0.0026	1.869	1.102	2.971
26	Turkmenistan	46	0.0025	1.856	1.102	2.958
27	Bahrain	44	0.0025	1.847	1.102	2.949
28	Nepal	41	0.0023	1.821	1.102	2.923
29	Cambodia	30	0.0017	1.743	1.102	2.845
30	Lebanon	23	0.0013	1.694	1.102	2.796
31	Macao SAR, China	22	0.0012	1.686	1.102	2.788
32	Yemen, Rep.	20	0.0011	1.668	1.102	2.770
33	West Bank and Gaza	19	0.0011	1.665	1.102	2.767
34	Mongolia	17	0.0009	1.649	1.102	2.751
35	Brunei Darussalam	17	0.0009	1.648	1.102	2.750
36	Lao PDR	16	0.0009	1.641	1.102	2.743
37	Afghanistan	15	0.0008	1.633	1.102	2.735
38	Syrian Arab Republic	11	0.0006	1.608	1.102	2.710
39	Kyrgyz Republic	11	0.0006	1.606	1.102	2.708
40	Tajikistan	10	0.0006	1.603	1.102	2.705
41	Maldives	6	0.0003	1.572	1.102	2.674
42	Timor-Leste	3	0.0002	1.551	1.102	2.653
43	Bhutan	3	0.0001	1.546	1.102	2.648
44	Korea, Dem. People's Rep.	0	0.0000	1.528	1.102	2.630
	AsiaTotals:	35,883.1	1.9976	753.391	88.318	841.709

Figure 7. Cost plan for Asia Region that includes final revisions.

GSOP Global Cost Plan – Europe Final Revision

A	B	C	D	E	F	G
	Europe Countries	Country GDP, Billion USD	Country GDP/Region GDP, Billion USD	GSOP 3 yr Operations Cost, M USD	GSOP 3 Yr Admin Sp + Start-Up Yr Cost, M USD	Total GSOP 4 yr Cost, USD
	North America Baseline, USD	30,235		431.172	17.036	448.208
	Europe Final Revised	25,045.5		465.461	88.974	554.435
1	Germany	4,072	0.1626	69.887	4.316	74.203
2	United Kingdom	3,071	0.1226	52.699	4.316	57.015
3	France	2,783	0.1111	47.846	2.909	50.755
4	Russian Federation	2,240	0.0895	38.729	2.909	41.638
5	Italy	2,010	0.0803	34.890	2.909	37.799
6	Spain	1,398	0.0558	24.659	2.909	27.568
7	Netherlands	991	0.0396	16.738	2.254	18.992
8	Türkiye	906	0.0362	15.317	2.254	17.571
9	Switzerland	808	0.0322	13.677	2.254	15.931
10	Poland	688	0.0275	11.682	2.254	13.936
11	Sweden	586	0.0234	9.975	2.254	12.229
12	Norway	579	0.0231	9.864	2.254	12.118
13	Belgium	579	0.0231	9.853	2.254	12.107
14	Ireland	529	0.0211	9.029	2.254	11.283
15	Austria	471	0.0188	8.063	2.254	10.317
16	Denmark	395	0.0158	6.795	2.254	9.049
17	Romania	301	0.0120	5.224	2.254	7.478
18	Czech Republic	291	0.0116	5.043	2.254	7.297
19	Finland	281	0.0112	4.881	1.433	6.314
20	Portugal	252	0.0101	4.420	1.433	5.853
21	Kazakhstan	221	0.0088	3.919	1.433	5.352
22	Greece	219	0.0087	3.894	1.433	5.327
23	Hungary	179	0.0071	3.250	1.433	4.683
24	Ukraine	161	0.0064	2.957	1.433	4.390
25	Slovak Republic	115	0.0046	2.237	1.102	3.339
26	Bulgaria	89	0.0036	2.073	1.102	3.175
27	Luxembourg	82	0.0033	2.032	1.102	3.134
28	Azerbaijan	79	0.0031	2.010	1.102	3.112
29	Belarus	73	0.0029	1.973	1.102	3.075
30	Croatia	71	0.0028	1.962	1.102	3.064
31	Lithuania	70	0.0028	1.958	1.102	3.060
32	Serbia	64	0.0025	1.917	1.102	3.019
33	Slovenia	62	0.0025	1.908	1.102	3.010
34	Latvia	41	0.0016	1.780	1.102	2.882
35	Estonia	38	0.0015	1.761	1.102	2.863
36	Cyprus	28	0.0011	1.702	1.102	2.804
37	Iceland	28	0.0011	1.698	1.102	2.800
38	Georgia	25	0.0010	1.679	1.102	2.781
39	Bosnia and Herzegovina	25	0.0010	1.678	1.102	2.780
40	Armenia	20	0.0008	1.647	1.102	2.749
41	Albania	19	0.0008	1.643	1.102	2.745
42	Malta	18	0.0007	1.637	1.102	2.739
43	Moldova	14	0.0006	1.616	1.102	2.718
44	North Macedonia	14	0.0005	1.611	1.102	2.713
45	Channel Islands	12	0.0005	1.600	1.102	2.702
46	Kosovo	9	0.0004	1.586	1.102	2.688
47	Monaco	9	0.0003	1.580	1.102	2.682
48	Liechtenstein	7	0.0003	1.572	1.102	2.674
49	Isle of Man	7	0.0003	1.569	1.102	2.671
50	Montenegro	6	0.0002	1.565	1.102	2.667
51	Faroe Islands	4	0.0001	1.550	1.102	2.652
52	Andorra	3	0.0001	1.548	1.102	2.650
53	Gibraltar	2	0.0001	1.540	1.102	2.642
54	San Marino	2	0.0001	1.539	1.102	2.641
	EuropeTotals:	25,045.5	1.0000	465.461	88.974	554.435

Figure 8. Cost plan for Europe Region that includes final revisions.

GSOP Global Cost Plan – Oceania Final Revision

A	B	C	D	E	F	G
	Oceania Countries	Country GDP, Billion USD	Country GDP/Region GDP, Billion USD	GSOP 3 yr Operations Cost, M USD	GSOP 3 Yr Admin Sp + Start-Up Yr Cost, M USD	Total GSOP 4 yr Cost, M USD
	US Baseline, USD, Revised Oceania = 0.3 * US Baseline	25,463		363.115	14.347	377.462
	Oceania Final Revised	1,987.3		133.585	25.304	158.889
1	Australia	1,675.4	0.8431	91.838	4.316	96.154
2	New Zealand	247.2	0.1244	14.513	2.254	16.767
3	Papua New Guinea	30.6	0.0154	2.125	1.102	3.227
4	New Caledonia	10.1	0.0051	1.724	1.102	2.826
5	Guam	6.1	0.0031	1.647	1.102	2.749
6	French Polynesia	6.1	0.0031	1.646	1.102	2.748
7	Fiji	4.9	0.0025	1.624	1.102	2.726
8	Solomon Islands	1.6	0.0008	1.559	1.102	2.661
9	Vanuatu	1.0	0.0005	1.547	1.102	2.649
10	Northern Mariana Islands	0.9	0.0004	1.545	1.102	2.647
11	Samoa	0.8	0.0004	1.544	1.102	2.646
12	American Samoa	0.7	0.0004	1.542	1.102	2.644
13	Tonga	0.5	0.0002	1.537	1.102	2.639
14	Micronesia, Fed. Sts.	0.4	0.0002	1.536	1.102	2.638
15	Marshall Islands	0.3	0.0001	1.533	1.102	2.635
16	Kiribati	0.2	0.0001	1.532	1.102	2.634
17	Palau	0.2	0.0001	1.532	1.102	2.634
18	Nauru	0.2	0.0001	1.531	1.102	2.633
19	Tuvalu	0.1	0.0000	1.529	1.102	2.631
	Oceania Totals:	1,987.3	1.0000	133.585	25.304	158.889

Figure 9. Cost plan for Oceania Region that includes final revisions.

Scaling GSOP Plans to Allocated Country Funding Levels.

Country Operations Start-Up Year Teams will scale US Baseline Program and Execution Plans into their Country Program and Execution Plans. They will tailor their plans to their Country's funding, personnel levels, and priorities. The resulting Country plans include the Country Problem Diagram, Country Operations Personnel Plan, Country Administration Support and Country Start-Up Year Plans, and Country Cost Plan. Country Operations Start-Up Year Teams will use the GSOP Global Cost Plan Excel as a basis for developing their Country plans.

During the Country Start-Up Year, each member of each Country Operations Start-Up Year Team will receive 6 two-hour sessions of a Wicked-Problem Approach Problem Facilitator Training Course. A final Session 7 will provide training on the scaling process. To assist, we will also provide

scaling worksheets and Excel tools. Each Country Operations Start-Up Year Team will then prepare their initial GSOP Plans. To do so, the teams will edit the US Baseline Plans into their Country Plans. The baseline plans have gone through five years of development and refinement and will serve as a starting point.

The start-up teams will use their initial plans to select priority personnel for hiring in GSOP Year 1 of Country Operations. The teams can refine their Country Plans as additional personnel are brought onboard. As learning builds and results come together, Country Operations Teams will continue to update their plans throughout GSOP Years 1-3.



SECTION 6

US Global Support Center Plan

Global Solutions & Outreach Programs (GSOP)

Introduction.

We are seeking US funding to start-up and execute GSOP in all Countries of the World. Once funding is secured, a US Global Support Center is required to resource and support GSOP in all Countries. The Center will also provide coordination necessary to enable all Countries to succeed and together achieve overall Global success. The US Global Support Center must be fully staffed and ready to function at the *beginning* of the Country Start-Up Year. Thus, the Center itself must be setup during the year prior to Country Start-Up Year.

To commence US Global Support Center setup, the Funding Authority will need to approve an Executive Director (ED) and Chief Executive Officer (CEO) of the Center. The Funding Authority must also approve the Directors of the Global Administration Support Team, the Global Recruitment and Visibility Support Team and the Global Operations Support Team, which together comprise the US Global Support Center. The CEO and three team Directors must be vested with authorities to receive and distribute GSOP Global funding and to oversee GSOP activities in each Country. The Funding Authority must provide funding to setup the US Global Support Center followed by funding for the Country Start-Up Year. The Funding Authority must then provide Global funding for each year of GSOP Years 1-3.

The following schematic in Figure 10 shows the structure of the US Global Support Center.

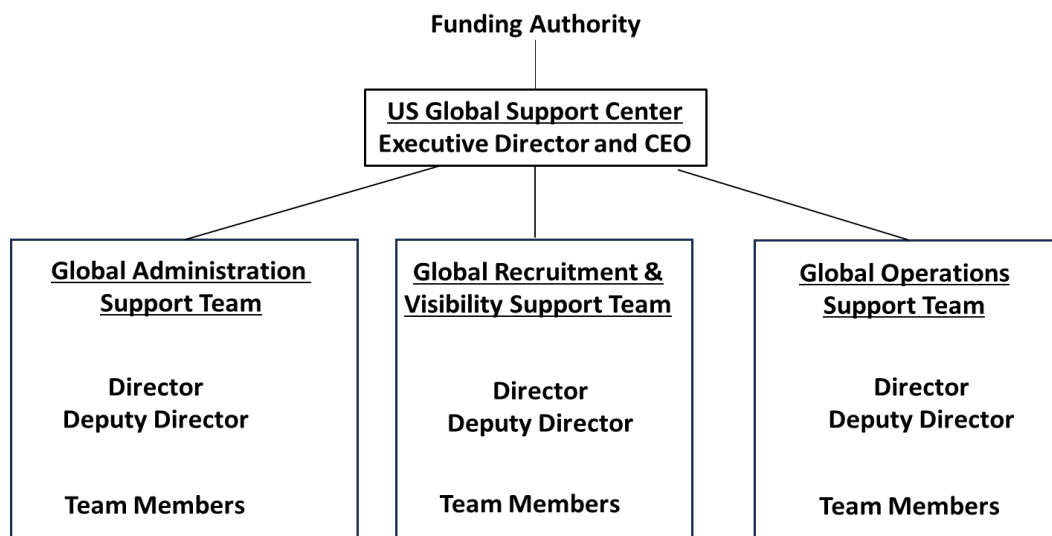


Figure 10. US Global Support Center organization and teams.

Tasks, staffing, and costs will now be presented for each element within the US Global Support Center.

1. Executive Director and CEO (ED/CEO) of US Global Support Center.

a. ED/CEO Tasks

Set-Up of US Global Support Center, ED/CEO Tasks:

1. Interact with the Funding Authority to establish the US Global Support Center and set up yearly funding.
2. Provide quarterly updates to the Funding Authority on all aspects of US Global Support Center set-up. The three team Directors will assist in preparing and presenting the updates as requested by the CEO.
3. Provide oversight and support to the three team Directors in accomplishing their respective tasks.

Country Start-Up Year, ED/CEO Tasks:

1. Interface with the Funding Authority to coordinate needed Country Start-Up Year funding.
2. Provide quarterly updates to the Funding Authority on all aspects of the Country Start-Up Year. The three team Directors will assist in preparing and presenting the updates as requested by the CEO.
3. Provide oversight and support to the three team Directors in accomplishing their respective tasks.
4. Interface with the Global Technical Advisory Committee (G-TAC) to obtain their independent advice.

GSOP Years 1-3, ED/CEO Tasks:

1. Interface with the Funding Authority to coordinate GSOP yearly funding.
2. Provide quarterly updates to the Funding Authority on all aspects of the US Global Support Center, and Global progress in executing GSOP worldwide. The three team Directors will assist in preparing and presenting the updates as requested by the CEO.
3. Provide oversight and support to the three team Directors in accomplishing their respective tasks.
4. Interface with the Global Technical Advisory Committee (G-TAC) to obtain their independent advice.

b. ED/CEO Costs/Year for Country Start-Up Year and GSOP Years 1-3.

Position	Salary K USD	Salary + 40% Ovhd., K USD	# Positions	Labor Cost, K USD
1 ED/CEO	129	180.6	1	180.6

2. Global Administration Support Team.

a. Global Administration Support Team Tasks.

Set-Up of US Global Support Center, Global Administration Support Dir/Dep Tasks:

1. Interface with the CEO and Funding Authority as needed to answer questions and review Global Administration Support progress.
2. Review applications for the Deputy Director of the Global Administration Support Team, interview and select a candidate.
3. Recommend to the Director of Global Recruitment and Visibility Team, a location for the US Global Support Center and the US GSOP co-located teams.
4. Oversee all Global Administration Support functions, monitor progress, and assist as needed.

Set-Up of US Global Support Center, Global Administration Support Team Tasks:

1. Review applications for the for Global Administration Support Team personnel, then interview, select, and hire applicants after approved by the Global Administration Support Director. Interface with applicants to answer questions. Applications will be provided by the Global Recruitment and Visibility Support Team.
2. Hire the candidates approved by the Global Recruitment and Visibility Team and Operations Team Directors for their respective teams.
3. Interface with the CEO and Funding Authority as needed to answer questions and review Global Administration Support progress.
4. Search for and recommend to the Global Administration Director a location for the US Global Support Center and the US GSOP co-located teams totaling 201 personnel.
5. Develop Country guidelines, procedures and periodic reporting requirements for handling GSOP funds and staffing.

Country Start-Up Year, Global Administration Support Dir/Dep Tasks:

1. Interface with the CEO and Funding Authority as needed to answer questions and review Global and Country Administration Support progress.

2. Oversee all Global Administration Support functions, monitor progress, and assist as needed.

Country Start-Up Year. Global Administration Support Team Tasks:

1. Handle all administration, personnel, financial, and legal support functions of the US Global Support Center.
2. Implement Country guidelines, procedures and periodic reporting requirements on handling GSOP funds and staffing.
3. The Global Administration Support Team will interview, select and hire each Country's Director and Deputy Director of Country Administration Support. The Team will directly fund the Country's Director and Deputy Director until they have established their Country GSOP non-profit organization, after which they will receive GSOP funding into their non-profit.
4. Assure and approve that GSOP non-profit organizations are established in accordance with the Country's legal requirements. If an existing non-profit is used to handle GSOP administration tasks, assure that the existing non-profit is operating in accordance with the Country's legal requirements and that Country Operations Teams will be sufficiently independent of control from the existing non-profit. Coordinate with the Global Operations Support Team regarding sufficient independence of Country Operations Teams.
5. Once the Country Administration Support Director and Deputy Director have established their GSOP non-profit organization in their Country, the Global Administration Support Team will provide Country Start-Up Year funding to fully staff and support the Country Administration Support Team and the Country Operations Start-Up Year Team.
6. Create and maintain a database of GSOP staff for the US Global Support Center and for GSOP in each Country. The database should include a roster of staff by Country, and a copy of each hired participant's employment application.
7. Conduct audits as needed on Country Administration Support Team functions to resolve uncertainties regarding proper use and reporting of GSOP funds and personnel.
8. After recruitment and selection by the Global Recruitment and Visibility Team, hire one engineer from each of the 6 world regions to serve as a Regional Liaison within the US Global Support Center

GSOP Years 1-3, Global Administration Support Dir/Dep Tasks:

1. Continue to interface with the CEO and Funding Authority as needed to answer questions and review Global and Country Administration Support progress.
2. Oversee all Global Administration Support functions, monitor progress, and assist as needed.

GSOP Years 1-3, Global Administration Support Team Tasks:

1. Continue to handle all administration, personnel, financial, and legal support functions of the US Global Support Center. Continue Country Start-Up Year tasks as required.
2. Continue to implement Country guidelines, procedures and periodic reporting requirements on handling GSOP funds and staffing.
3. Continue to provide office space for the US Global Support Center and co-located US GSOP staff.
4. As required, review applications provided by the Global Recruitment and Visibility Support Team for positions in the Global Administration Support Team. Interview, select, and hire candidates approved by the Global Administration Support Team Director.
5. As required, directly fund each Country Director and Deputy Director of Country Administration Support until they have established their Country GSOP non-profit organization and receive funding from the Global Administration Support Team into their non-profit.
6. Provide ongoing funding to each Country GSOP non-profit organization to fund their Country Operations and Country Administration Support costs within their approved GSOP funding level.
7. Continue to maintain a Database of GSOP staff for the US Global Support Center and for GSOP in each Country. The database should include a roster of staff by Country, and a copy of each hired participant's employment application.
8. Continue to conduct audits as needed on Country Administration Support functions to resolve uncertainties regarding proper use and reporting of GSOP funds and personnel.
9. Continue to assure that Country GSOP non-profit organizations are operating in accordance with the Country's legal requirements. If an existing non-profit is used to handle Country administration tasks, assure that the existing non-profit is operating in accordance with the Country's legal requirements and that Country Operations Teams are sufficiently independent of control from the existing non-profit. Coordinate with the Global Operations Support Team regarding sufficient independence of Country Operations Teams.

b. Global Administration Support Team Staffing for Country Start-Up Year and GSOP Years 1-3.

Director and Deputy Director:
2 Engineers, MBA

Team Staff:
12 Administrators/Bachelor/MBA Degrees (2 Administrators/Region)
6 Comptrollers/Analysts (1 Comptroller/Region)
12 Accountants (2 Accountants/Region)

2 Lawyers
 1 IT Specialist
 4 Administration Assistants for US Global Support Center*
Total including Dir/Dep + Team Staff: 39

c. Global Administration Support Costs/Year for Country Start-Up Year and GSOP Years 1-3.

Position	Salary K USD	Salary + 40% Ovhd., K USD	# Positions	Labor Cost, K USD
Engineers, MBA	129	180.6	2	361.2
Administrators/Bachelor	70.0	98.0	12	1176.0
Comptrollers/Analysts	82.0	114.8	6	688.8
Accountants	82.0	114.8	12	1377.6
Lawyers	129	180.6	2	361.2
IT Specialist	129	180.6	1	180.6
Administration Assistants*	40.0	56.0	<u>4</u>	<u>224.0</u>
			Total: 39	Total: 4369.4

* Administration Assistant assignments: One Administration Assistants for the Executive Director/CEO, and one Administration Assistants for each of the three team Dir/Dep.

Contract Support Costs/Year for Country Start-Up Year and GSOP Years 1-3.

(The Global Administration Support Team will contract and pay for this support.)

Support Type	Cost K USD
Legal	200
Website	50
Advertising for staffing positions	200
Office space Rental for US Global Support Center and US GSOP collocated staff	600
Staff relocation expenses (79 people x 5K USD/person)	395
	Subtotal: 1445
Miscellaneous (10% of 1440K USD/yr)	<u>144</u>
Total: 1589	

Note: Costs for the setting up the US Global Support Center as well as total US Global Support Center Costs are summarized at the end of this Plan.

3. Global Recruitment and Visibility Support Team.

a. Global Recruitment and Visibility Support Team Tasks.

Set-Up of US Global Support Center, Global Recruitment and Visibility Support Dir/Dep Tasks:

1. Interface with the CEO and Funding Authority as needed to answer questions and review Global Recruitment and Visibility Support progress.
2. Review applications for the Deputy Director of the Global Recruitment and Visibility Support Team, interview and select a candidate.
3. Recommend to the CEO a location for the US Global Support Center and the US GSOP co-located team in coordination with the Directors of Global Administration Support and Global Operations Support.
4. Oversee all Global Recruitment and Visibility Support functions, monitor progress, and assist as needed.

Set-Up of US Global Support Center, Global Recruitment and Visibility Support Team Tasks:

1. Recruit candidates within the US for the Global Administration Support Deputy Director and Team, Global Recruitment and Visibility Support Deputy Director and Team, and Global Operations Support Deputy Director and Team. Provide candidate applications to the respective Teams for selection.
2. Prepare GSOP job application forms and guidance on minimum competency levels for recruiting and selecting candidates for GSOP employment worldwide. These forms and guidance will be prepared in consultation with the other two US Global Support Center Team Directors.
3. Review applications for the Global Recruitment and Visibility Support Team personnel, and interview, select, and request Global Administration Support hire the approved applicants. Interface with applicants to answer questions.
4. Search for and recommend to the Global Recruitment and Visibility Support Director a location for the US Global Support Center and the US GSOP co-located teams totaling 201 personnel.

Country Start-Up Year, Global Recruitment and Visibility Support Dir/Dep Tasks:

1. Interface with CEO and Funding Authority as needed to answer questions and review Global and Country Recruitment and Visibility Support progress.

2. Oversee all Global Recruitment and Visibility Support functions, monitor progress, and assist as needed.

Country Start-Up Year, Global Recruitment and Visibility Support Team Tasks:

1. The Team will initiate establishing GSOP in each Country by advertising GSOP job positions for engineers, economists, social/political experts, subject matter experts, and Global Administration Support Directors and Deputies.

2. Recruit candidates for each Country's Administration Support Director and Deputy Director, and provide applications to the Global Administration Support Team for selection and hiring (Approximately 300 positions).

3. Recruit candidates for each Country's Operations Start-Up Year Team, and provide applications to the Global Operations Support Team for selection (Approximately 700 positions). The Country's Administration Support Team will then hire the selected candidates.

4. Recruit and select in consultation with the other Directors, one engineer from each of the 6 world regions to serve as a Regional Liaison. They will be hosted and colocated with the Global Recruitment and Visibility Support Team and serve the entire US Global Support Center.

5. To help with recruitment, interact with professional societies of engineers, economists, and social/political experts within each Country to inform them of the GSOP and ask them to let their members know of GSOP employment opportunities.

6. Establish and maintain Global GSOP visibility activities to keep the public, government officials, corporate leaders, and GSOP sponsors informed of global GSOP progress. The team will engage with policymakers at the international level and with institutions now working on global warming and climate solutions, e.g., IPCC, UNFCCC, COP meeting leadership, Project Drawdown, Deep Decarbonization Pathways Project, IEA. Present briefings and attend international conferences to inform and maintain GSOP visibility.

7. Prepare and distribute Global GSOP Public Progress Reports to periodically inform the public, government officials, and GSOP sponsors of progress. Note: all internal reports and communications with Country Operations will be handled by the Global Operations Support Team.

8. Establish and maintain a Global GSOP Public Website and social media to host GSOP news and Global GSOP Public Progress Reports in order to gain ongoing visibility.

9. Prepare and maintain a database of GSOP Global Progress Reports and Global visibility interfaces.

10. Recruit and select in consultation with the three Team Directors and the CEO, a Global Technical Advisory Committee (G-TAC) of senior technical experts and advisors for independent peer review, guidance and assistance.

11. Establish interaction with the Global Recruitment and Visibility Sub-Team within in each Country Administration Support Team regarding recruitment and visibility activities, and information exchange.

GSOP Years 1-3, Global Recruitment and Visibility Dir/Dep Tasks:

1. Continue to interface with the CEO and Funding Authority as needed to answer questions and review Global and Country Recruitment and Visibility Support progress.
2. Oversee all Global Recruitment and Visibility Support Team functions, monitor progress, and assist as needed.

GSOP Years 1-3, Global Recruitment and Visibility Support Team Tasks:

1. As needed, continue to recruit US candidates for the three Global Support teams. Provide candidate applications to the respective support teams for selection.
2. As needed, continue to recruit candidates for Country Administration Support Director and Deputy Director and provide applications to the Global Administration Support Team for selection and hire.
3. As needed, continue to recruit candidates for Country Operations Start-Up Year Teams and provide applications to the Global Operations Support Team for selection.
4. To help with recruitment, continue to interact with professional societies of engineers, economists, and social/political experts within each Country to inform them of the GSOP and ask them to let their members know of GSOP employment opportunities.
5. Continue to maintain Global GSOP visibility activities to keep the public, government officials, corporate leaders, and GSOP sponsors informed of global GSOP progress. The team will engage with policymakers at the international level and with institutions now working on global warming and climate solutions, e.g., IPCC, UNFCCC, COP meeting leadership, Project Drawdown, Deep Decarbonization Pathways Project, IEA. Present briefings and attend international conferences to inform and maintain GSOP visibility.
6. Continue to maintain a Global Technical Advisory Committee (G-TAC) of senior technical experts and advisors for independent GSOP Global peer review, guidance and assistance. Meet quarterly with G-TAC members and provide Global updates.
7. Continue to prepare and distribute Global GSOP Public Progress Reports to periodically inform the public, government officials, and GSOP sponsors of progress. Note: all internal reports and communications with Country Operations will be handled by the Global Operations Support Team.
8. Continue to maintain a database of GSOP-Global Progress Reports and Global visibility interfaces.

9. Continue to maintain a Global GSOP Public Website and social media to host GSOP news and Global GSOP Public Progress Reports in order to gain ongoing visibility.
10. Continue to host one engineer from each of the 6 world regions to serve as a Regional Liaison within the US Global Support Center.
11. Continue interactions with the Recruitment and Visibility Sub-Team within in each Country Administration Support Team regarding recruitment and visibility activities, and for information exchange.

b. Global Recruitment and Visibility Support Team Staffing for Country Start-Up Year and GSOP Years 1-3.

Director and Deputy Director:
2 Engineers

Team Staff:
8 Engineers
1 Economist
1 Social/Political Expert
1 IT Specialist
6 International Engineers
1 reserve position

Total including Dir/Dep + Team Staff: 20

c. Global Recruitment and Visibility Support Costs/Year for Country Start-Up Year and GSOP Years 1-3.

Position	Salary K USD	Salary + 40% Ovhd., K USD	# Positions	Labor Cost, K USD
Engineers	129	180.6	2	361.2
Engineers	129	180.6	8	1444.8
Economist	129	180.6	1	180.6
Social/Political Experts	129	180.6	1	180.6
IT Specialists	129	180.6	1	180.6
International Engineers	129	180.6	6	1083.6
Reserve Position	129	180.6	<u>1</u>	<u>180.6</u>
			Total: 20	Total: 3612.0

Note: Costs for the setting up the US Global Support Center as well as total US Global Support Center Costs are summarized at the end of this Plan.

4. Global Operations Support Team.

a. Global Operations Support Tasks.

Set Up of US Global Support Center, Global Operations Support Dir/Dep Tasks:

1. Interface with the CEO and Funding Authority as needed to answer questions and review Global Operations Support progress.
2. Review applications for the Deputy Director of Global Operations Support Team, interview and select a candidate for hiring by the Global Administration Support Team.
3. Recommend to the Director of Global Recruitment and Visibility Support a location for the US Global Support Center and the US GSOP co-located team.
4. Train US Global Support Center staff on Wicked-Problem Approach, GSOP, and Scaling using the Facilitator Training Course.
5. Oversee all Global Operations Support functions, monitor progress, and assist as needed.

Set Up of US Global Support Center, Global Operations Support Team Tasks:

1. Review applications for the Global Operations Support Team, and interview and select applicants after approval by the Global Operations Support Director. Interface with applicants to answer questions. Candidates will then be hired by the Global Administration Support Team. Applications will be provided by the Global Recruitment and Visibility Support Team.
2. Interface with the CEO and Funding Authority as needed to answer questions and review Global Operations Support progress in the US Global Support Center.
3. Search for and recommend to the Global Operations Support Director a location for the US Global Support Center and the US GSOP co-located teams totaling 201 personnel.
4. Take and practice giving the Wicked-Problem Approach Problem Facilitator Training Course to prepare for giving the course during the Country Start-Up Year.

Country Start-Up Year, Global Operations Support Dir/Dep Tasks:

1. Interface with the CEO and Funding Authority to answer questions and review Global Operations Support progress and Country Operations progress.
2. Review IT Specialist applications, interview and make selection. Assign task of planning an Internal GSOP Global Report Platform with the intention that he or she will join the US GSOP Standardization and Information Technology Team at the end of the Country Start-Up Year.

3. Oversee all Operations Support functions, monitor progress, and assist as needed.

Country Start-Up Year, Global Operations Support Team Tasks:

1. Review applications provided by the Global Recruitment and Visibility Support Team for each Country Operations Start-Up Year Team. Interview applicants and make selections for hire. The Global Administration Support Team will then authorize the Country's Director of Administration Support to hire the candidates for their Country Operations Start-Up Year Team. With Global Operations Support Team approval at the end of the start-up year, Country Operations Start-Up Year Team members will continue as Problem Facilitators (leaders) within their Country Operations Teams commencing in Year 1.
2. Train the Country Operations Start-Up Year Teams on the Wicked-Problem Approach. The course consists of six 2-hour sessions, one session per week, plus one session on scaling funds and staff to Country funding levels. The 2-hour sessions include a one-hour lecture, with question-and-answer breaks, followed by a one-hour class-exercise to develop plans to solve a wicked problem of their choice. Start-up team members will then serve as Wicked-Problem Approach Problem Facilitator Training instructors within their Countries as additional Problem Facilitators and full-time staff are hired.
3. Request each Country Operations Start-Up Year Team to scale the US Baseline Program and Execution Plans to their Country's level of funding and priorities. The Global Operations Support Team will train and assist each Country Operations Start-Up Year Team through the scaling process. The Global Operations Support Team will review, mentor and approve each Country's scaled GSOP Program and Execution Plans, which include a Country Problem Diagram, Country Operations Personnel Plan, Country Administration Support and Country Start-Up Year Plans, and Country Cost Plan. A Country will not receive funding to begin GSOP Year 1 Operations activities until their execution plans are approved by the Global Operations Support Team.
4. As the Country Operations Start-Up Year Teams review and select candidates to serve as project level Problem Facilitators for the 3 People's Projects and the Outreach Program, the Global Operations Support Team will review the application and concur in the selection before the candidate is hired by the Country Administration Support Team.
5. Start planning an Internal GSOP Global Report Platform. The IT person performing this work will transition to the US GSOP at the end of the start-up year.
6. Review public release documents prepared by the Global Administration Support Team before release to assure consistency with Country Operations results.
7. Prepare periodic internal news letters to inform all Country Operations Teams of status and progress. Provide the news letters to Global Recruitment and Visibility Team for use in their public reporting.

GSOP Years 1-3, Global Operations Support Dir/Dep Tasks:

1. Continue to interface with the CEO and Funding Authority as needed to answer questions and review Global Operations Support progress and Country Operations progress.
2. Oversee all Global Operations Support functions, monitor progress, and assist as needed.

GSOP Years 1-3, Global Operations Support Team Tasks:

1. Continue to provide Global Operations Support to the Country GSOP in each Region.
2. Serve as points of contact with each of the Country Operations Teams (Primarily the Project level Problem Facilitators).
3. Monitor Country Operation Team's results as posted on the Internal GSOP Global Report Platform.
4. Provide help, advice and guidance to each Country Operational Team as needed.
5. As additional Countries begin their Country Start-Up Year, continue to review applications provided by the Global Recruitment and Visibility Support Team for the Country Operations Start-Up Year Team members. Interview applicants and make selections for hire by Country Administration Support Teams. With Global Operations Support Team approval, Country Operational Start-Up Year Team members will continue on as Problem Facilitators within their Country Operations Teams.
6. Train new Country Operations Start-Up Year Teams on the Wicked-Problem Approach and GSOP. The course consists of six 2-hour sessions, one session per week plus one session on scaling funds and staff to Country funding levels. The 2-hour sessions include a one-hour lecture, with question-and-answer breaks, followed by a one-hour team-exercise to develop plans to solve a wicked problem of their choice. Start-up team members will then serve as Wicked-Problem Approach Problem Facilitator Training Course instructors within their Countries as additional Problem-Facilitators (leaders) and full-time staff are hired.
7. Continue to request the Country Operations Start-Up Year Teams to scale the US GSOP Baseline execution plans to their Country's level of funding and priorities. The Global Operations Support Team will train and assist each Country Operations Start-Up Year Team to scale the US GSOP Baseline plans. The Support Team will review, mentor and approve each Country's scaled GSOP Program Plans, which include a Country Problem Diagram, Country Operations Personnel Plan, Country Administration Support and Country Start-Up Year Plans, and Country Cost Plan. A Country will not receive funding to begin year 1 operations activities until their Country Program and Execution Plans are approved by the Global Operations Support Team.
8. Review public release documents prepared by the Global Administration Support Team before release to assure consistency with Country Operations results.

9. Continue to prepare periodic internal news letters to inform all Country Operations Teams of status and progress. Provide the news letters to Global Recruitment and Visibility Support Team for use in their public reporting.

10. As the Country Operations Teams review and select candidates for project level Problem Facilitators for the 3 People's Projects and the Outreach Program, the Global Operations Support Team will review the application and concur in the selection before the candidate is hired by the Country Administration Support Team.

b. Global Operations Support Team Staffing for Country Start-Up Year and GSOP Years 1-3.

Director and Deputy Director

2 Engineers

Team Staff:

12 engineers (2 Engineers/Regions for 6 Regions)

2 economists

2 social/political experts

1 Information Technology (IT) Specialist*

Total: including Dir/Dep + Team Staff: 19

c. Global Operations Support Team Costs/Year for Country Start-Up Year and GSOP Years 1-3.

Position	Salary K USD	Salary + 40% Ovhd., K USD	# Positions	Labor Cost, K USD
Engineers, Dir., Dep. Dir.	129	180.6	2	361.2
Engineers	129	180.6	12	2167.2
Economists	129	180.6	2	361.2
Social/Political Experts	129	180.6	2	361.2
IT Specialist*	129	180.6	<u>1</u>	<u>180.6</u>
			Total: 19	Total: 3431.4

* US GSOP will provide and maintain an Internal GSOP Global Report Platform for use by GSOP participants in all Counties. Their internal GSOP reports, along with internal Regional and Global results, will be placed on this platform for free accessibility by all GSOP participants. To have this platform available early in year 1 of GSOP Years 1-3, US Global Support Center will hire one IT Specialist during the Country Start-Up Year. This Specialist will move to the US GSOP program at the end of the start-up year. A reserve position for one additional staff is included in the Global Operations Support Team for the GSOP Years 1-3.

Note: Costs for the setting up the US Global Support Center as well as total US Global Support Center Costs are summarized at the end of this Plan.

5. US Global Support Center Total Staffing and Cost for GSOP Years 1-3 and Country Start-Up Year

a. Total Staffing for US Global Support Center:

Executive Director and CEO:	1
Global Administration Support Team:	39
Global Recruitment and Visibility Support Team:	20
Global Operations Support Team:	<u>19</u>
Total:	79

b. Total Cost for US Global Support Center/Year.

Executive Director and CEO	180.6 K USD
Global Administration Support Team	4,369.4 K USD
Contract Support	1,589.0 K USD
Global Recruitment and Visibility Support Team	3,612.0 K USD
Global Operations Support Team	<u>3,431.4 K USD</u>
Sub-Total:	11,918.2 K USD

Total US Global Support Center Cost/Year: 13,182.4 K USD

c. Cost/yr. for US Global Support Center for GSOP Years 1-3 with 5% contingency:
 $13,182.4 \text{ K USD} * 1.05 = 13,841.5 \text{ K USD}$

Total cost for US Global Support Center for GSOP Years 1-3 with 5% contingency:
 $13,841.5 \text{ K USD} * 3 = 41,524.6 \text{ K USD} = 41.525 \text{ M USD}$

d. Cost for US Global Support Center during the Country Start-Up Year with 10% contingency: $13,182.4 \text{ K USD} * 1.1 = 14,500.6 \text{ K USD} = 14.501 \text{ M USD}$

e. Total Cost for GSOP Years 1-3 and for US Global Support Center during Country Start-Up Year: $41,524.6 \text{ K USD} + 14,500.6 \text{ K USD} = 56,025.2 \text{ K USD} = 56.025 \text{ M USD}$

6. Set-Up of US Global Support Center.

The US Global Support Center is designed, staffed and resourced to initiate GSOP in all Countries around the world during the Country Start-Up Year. To accomplish this work, the US Global Support Center must be staffed and prepared at the very beginning of the Country Start-Up Year. Thus, the Support Center must be set-up the year prior to the Country Start-Up Year.

The staffing and costs to set-up the US Global Support Center will be the same as during the Country Start-Up year = $14,500.6 \text{ K USD} = 14.501 \text{ M USD}$



SECTION 7

Global Schedule and Cost Summary

Global Solutions & Outreach Programs (GSOP)

Introduction.

This Section presents the overall GSOP schedule as well as yearly schedules. It ends with a yearly summary of Global GSOP costs. The key GSOP goal is reaching integrated Country, Regional and Global Action Plans to successfully overcome global warming. Reality dictates that the problem can only be solved at the scale of Earth. Practicality requires that the Action Plans be economically supportable and socially/politically acceptable by humanity. Reaching these goals requires intense collaboration among all Country Operations Teams to pool brain power and to reach practical, integrated solutions. The schedules presented here aim to reach these ends.

The GSOP will require three execution years to complete (GSOP Years 1-3). Starting-up GSOP in all Countries in the same time-frame will require two preparatory years. An overall GSOP schedule is presented first followed by separate schedules for the two preparatory years. Schedules for each of the GSOP execution Years 1-3 then follow.

1. Overall GSOP Schedule.

The overall schedule is shown below in Figure 11.

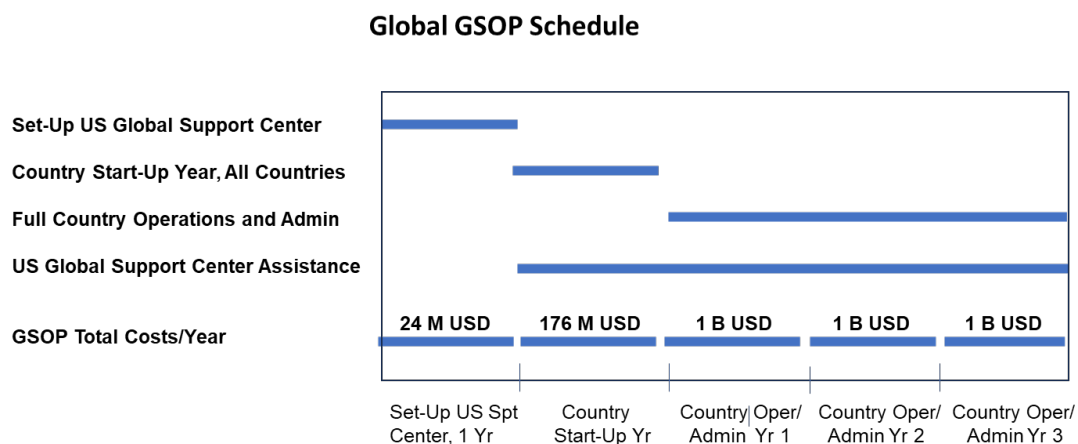


Figure 11. Schematic of overall GSOP global schedule including the two preparatory years and GSOP Years 1-3. Total GSOP Costs for each year are also included in millions (M) and billions (B) of US dollars (USD).

The first task is to set-up the US Global Support Center. The Center will provide GSOP funding and other support to the Country Operations and Administration Support Teams.. It is responsible for starting-up GSOP in all Countries during the Country Start-Up Year. To meet this requirement, the US Global Support Center must be set-up, fully staffed and prepared when the Country Start-Up Year begins.

The Country Start-Up Year will allow each Country to establish and staff their Country Administration Support Teams before GSOP Year 1 begins. Each Country will also staff a small Country Operations Start-Up Year Team to receive training on the Wicked-Problem Approach and to scale their GSOP plans based on their Country funding level. “Country Operations” refers to accomplishing the GSOP tasks by the associated Country Operations Teams. Country Administration Support Teams will assist Country Operations Teams by handling all the administration support tasks and leaving the Country Operations Teams to solve the global-warming problem.

Execution of the GSOP in all Countries will begin by staffing the Country Operations Teams and commencing full GSOP work in GSOP Year 1. Country Operations with Country Administration Support will continue through GSOP Years 2 and 3. The US Global Support Center will continue to provide funding and support to the Country Operations and Administration Support Teams throughout GSOP Years 1-3.

2. Set-Up of US Global Support Center.

Key tasks in setting up the US Global Support Center are shown below in Figure 12.

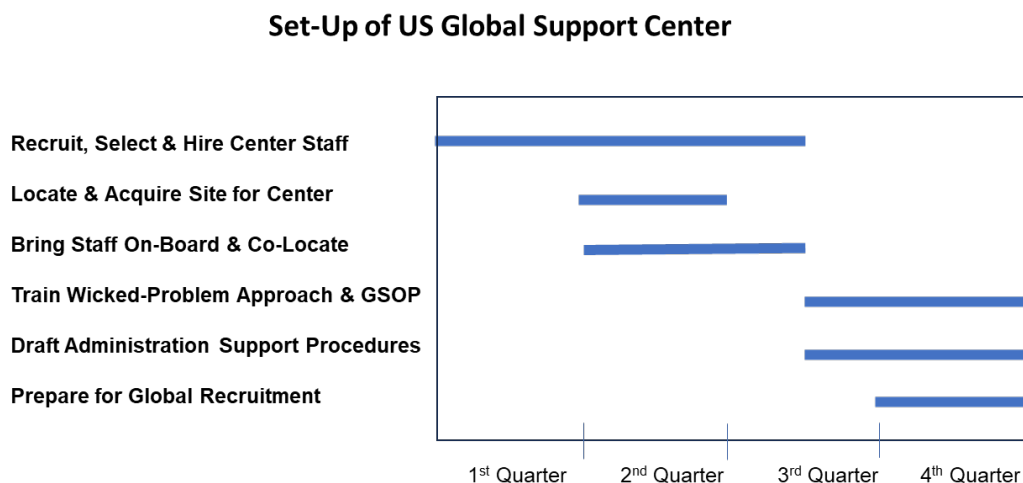


Figure 12. Schematic of US Global Support Center setup and tasks.

The tasks and timing will allow the US Global Support Center be ready to begin Global recruitment of Country GSOP staff at the very onset of the Country Start-Up Year. Center Directors and Deputies and team members will be brought onboard as quickly as possible.

3. Country Start-Up Year.

Figure 13 below presents the Country Start-Up Year schedule and key tasks that must be accomplished by the US Global Support Center, and by the Country Administration Support and Country Operations Start-Up Year Teams.

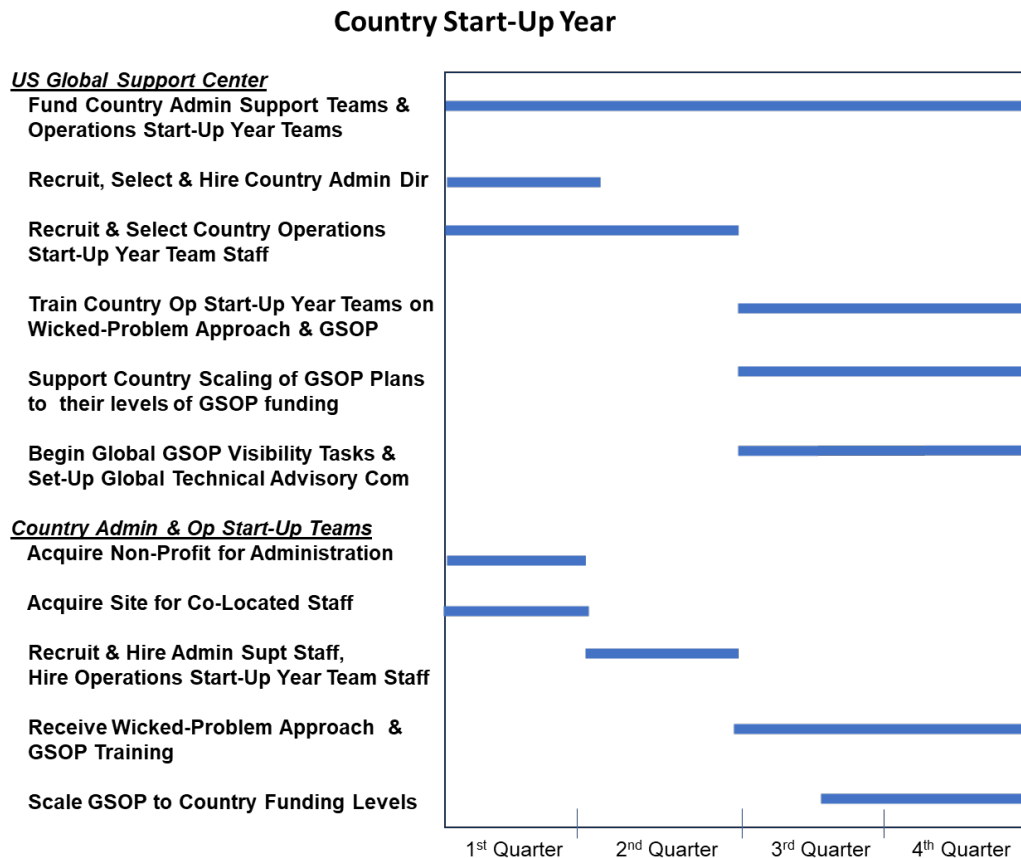


Figure 13. Schematic of Country Start-Up Year schedule and tasks.

The goal of the Country Start-Up Year is to ready all Countries to begin executing their GSOP the following year (GSOP Year 1). In this way, all GSOP participants will be on the same learning curve and international collaboration can begin from the start. Tasks may be completed sooner than indicated by the above schedule.

4. Global GSOP Execution, All Countries.

Separate schedules for executing GSOP in all Countries during GSOP Years 1-3 are shown below in Figures 14, 15 and 16, respectively. GSOP execution requires two components working closely together. The first component, Country Operations, accomplishes the GSOP in accordance with each Country's Problem Diagram, Personnel and Cost Plans. The second, Country Administration Support, enables Country Operations to begin in GSOP Year 1 and carry through GSOP Years 1-3.

A schematic for GSOP Year 1 schedules and tasks is shown below in Figure 14.

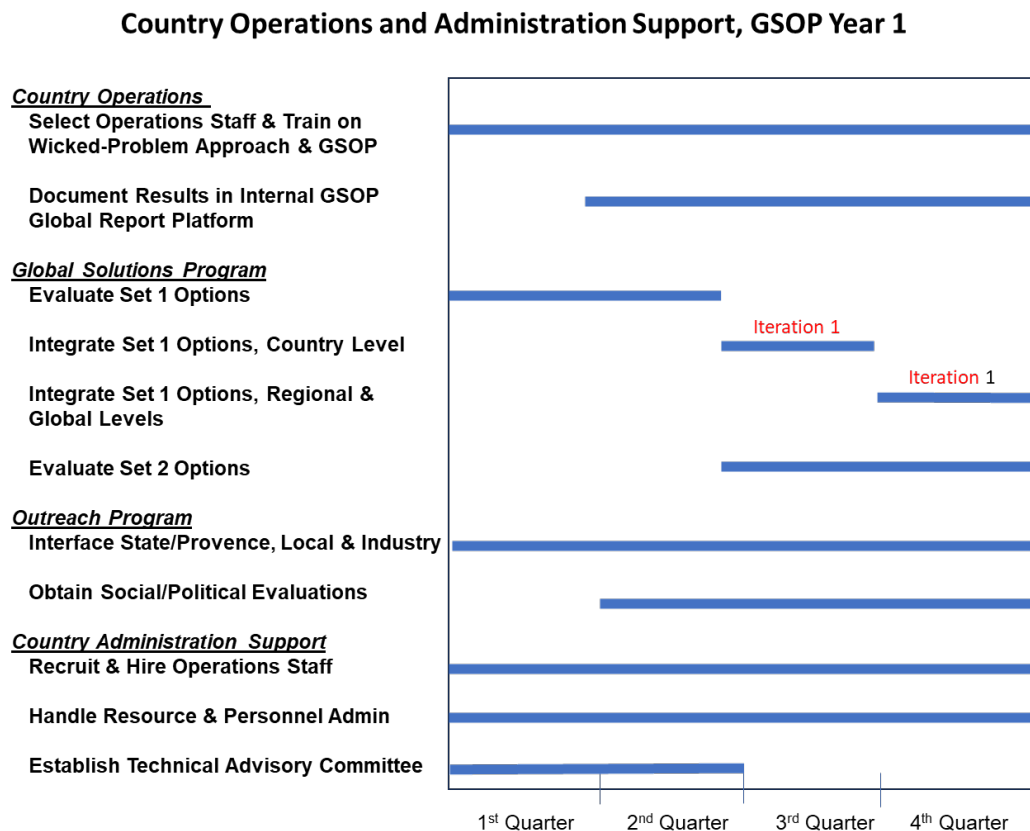


Figure 14. Schematic of GSOP execution showing schedules and tasks during GSOP year 1.

The Country Global Solutions portion of the GSOP is comprised of the three People’s Projects that are executed in parallel on the same schedules. It is here that options to meet GSOP goals are evaluated technically, economically and socially/politically, and then integrated into systems at Country, Regional, and Global levels. All efforts focus on meeting the GSOP goals to: 1) Halt the net release of CO₂. (2) Adapt to unavoidable climate-change impacts. (3) Stabilize the Earth’s energy balance to halt global warming. (4) Adjust the Earth’s energy balance to return to prior conditions. and (5) Address Ocean acidification and other problems. The final systems must be technically effective and achievable, economically supportable, and social/politically acceptable. These systems are then documented in Country, Regional and Global Action Plans, which also address implementing actions.

Because of the complexity of the global warming problem and the number of options to evaluate, an iterative approach is required as indicated in the yearly GSOP schedules. The Wicked-Problem Approach is based on an iterative process. We have found that grasping and integrating the components of wicked problems takes time and can best be handled by repetition. During GSOP execution, climate-solution options will be evaluated and integrated a total of five times to arrive at the best solutions that are technically feasible and effective, economically supportable and socially/politically acceptable.

The Country Operation Teams will choose which options they will evaluate during the first 6 months of GSOP Year 1. We refer to these as “Set 1 Options.” Please refer to Figure 14. The “Set 2 Options” are the ones they will evaluate during the second 6 months of Year 1. The Country

Personnel Plan (US Baseline) provides sufficient staffing so that one evaluation team can evaluate 1 option each 6 months. Integration teams will integrate options every 3 months. This approach is reflected in the following schedules.

Each Country Outreach Program runs in parallel to the Country Global Solutions Program. It provides two-way communication between State, Province, local and industry groups and the Global Solutions Program. GSOP results are shared and good ideas are exchanged. Social/Political evaluations of options and integrated systems will be obtained directly from the people by the Outreach teams.

The US Global Support Center will continue to resource and support GSOP in each Country throughout their 3-year programs.

A schedule for GSOP Year 2 showing schedules and tasks is shown below in Figure 15.

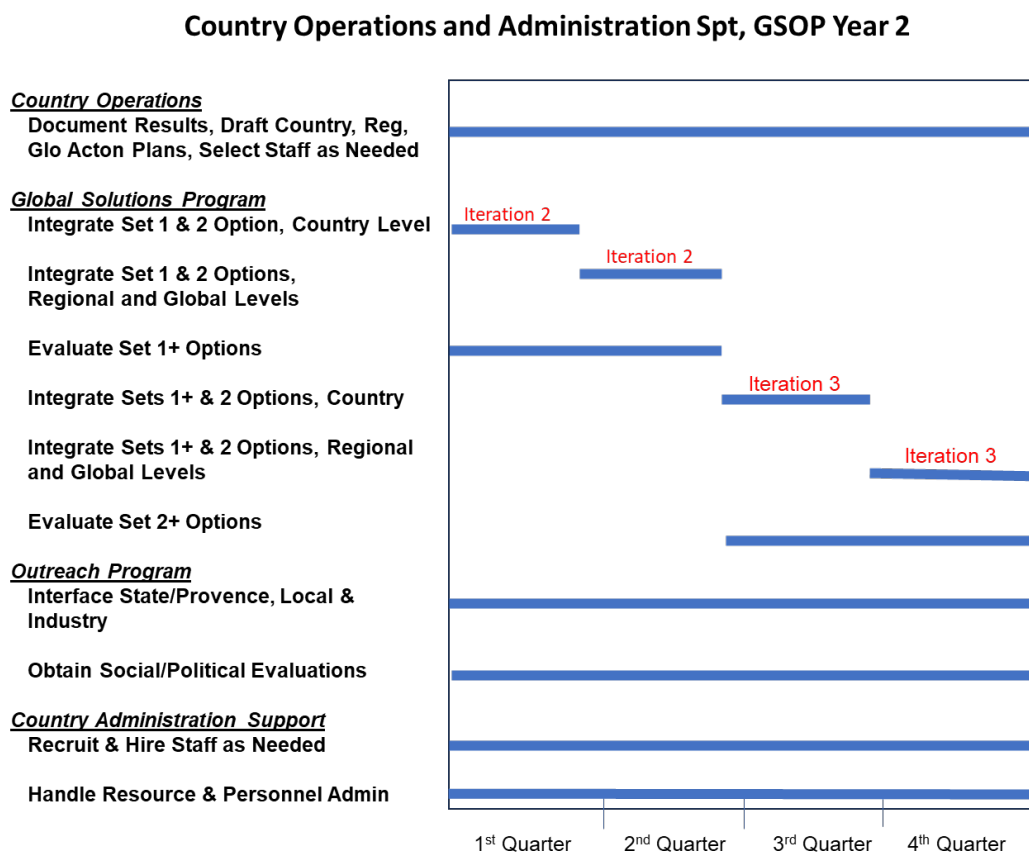


Figure15. Schematic of GSOP execution showing schedules and tasks during GSOP year 2.

Evaluation and integration of options continue. “Set 1+ Options” includes the Set 1 options evaluated in Year 1 plus additional options that are identified for evaluation. Set 1+ evaluations repeat the Set 1 evaluations and provide time to review and refine the initial evaluations of the Set 1 options. The same applies to the integration of Set 1+ options. In this way, results will be firmed up and expanded throughout GSOP Years 1-3. Initial GSOP Country, Regional, and Global Acton Plans will be drafted during Year 2.

A schedule for GSOP Year 3 showing schedules and tasks is shown below in Figure 16.

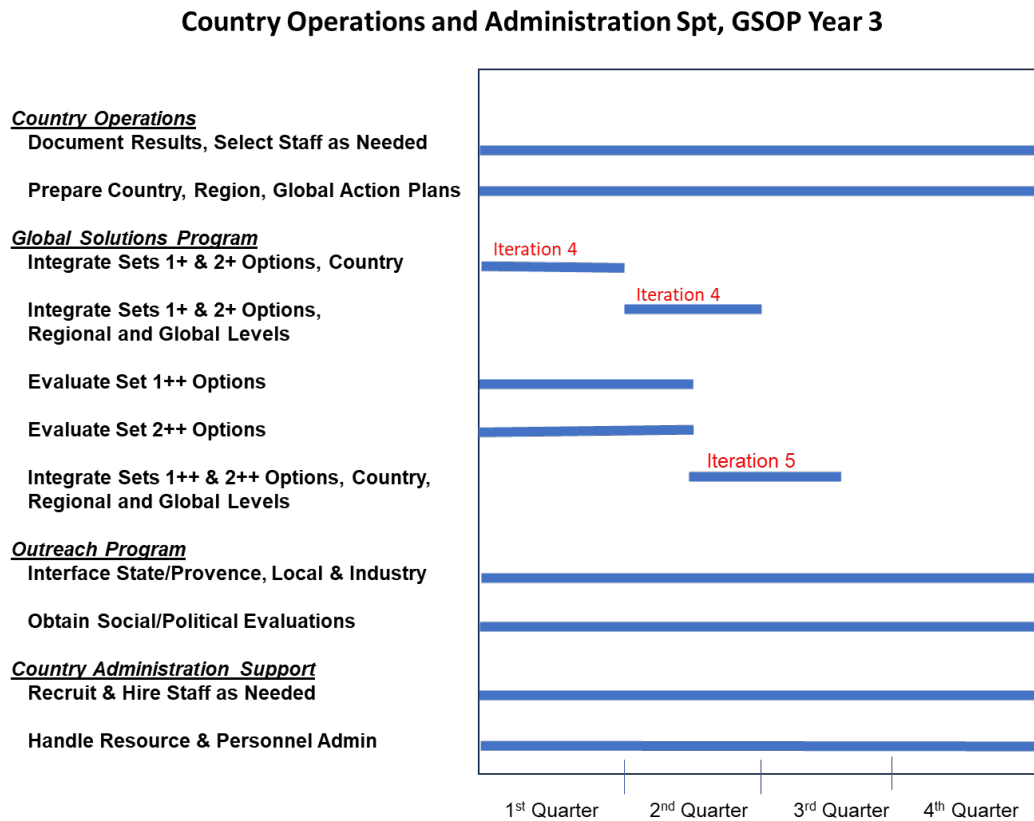


Figure 16. Schematic of GSOP execution showing schedules and tasks during GSOP year 3.

GSOP Year 3 is the rap-up year where all of the evaluations and integrations are brought together into the final GSOP Country, Regional, and Global Action Plans as shown. “Set 1++ Options” include the Set 1+ options with additional options added in Year 3. “Set 2++ Options” include the Set 2+ options with additional options added in Year 3.

5. US Global Support Center, Years 1, 2, and 3

Ongoing US Global Support Center tasks are shown below in Figure 17. The Center will continue to provide central GSOP Global funding, visibility and Country Operations support and coordination throughout GSOP Years 1-3.

US Global Support Center, GSOP Years 1-3

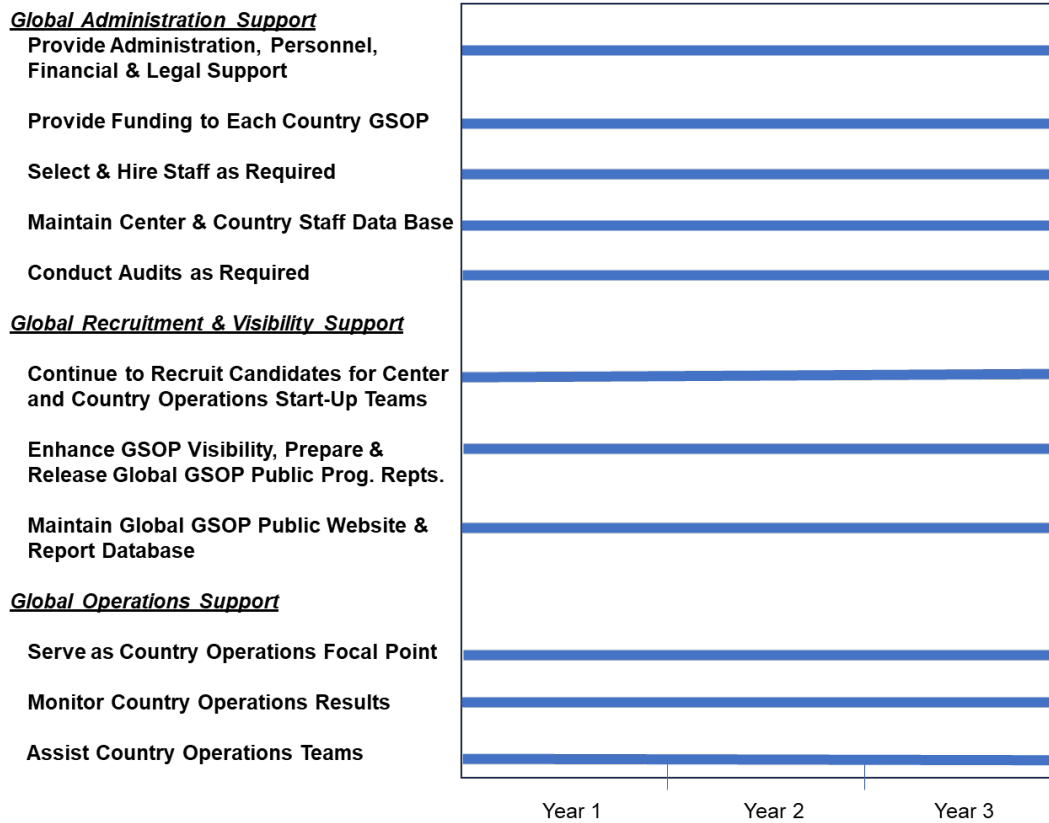


Figure 17. Schematic of schedule and tasks for the US Global Support Center throughout GSOP Years 1, 2 and 3.

6. Yearly Summary of Global GSOP Costs.

The following summary of global GSOP costs corresponds to the Section 5. Global Cost Plan. All costs are in millions of US dollars (M USD) with rounded estimates in billions of US dollars (B USD). The total Global cost of the GSOP is 3.2 B USD

Two Preliminary Years

Costs, M USD

First year: Set-up of US Global Support Center	24
Second year: Country Start-Up Year in all Countries	141
Second year: US Global Support Center Assistance	35
Second year total:	176
Total two preliminary years:	200 (0.2 B USD)

GSOP Years 1-3 Execution**Costs, M USD**

Year 1: Country Operations and Admin Support in all Countries	985
Year 1: US Global Support Center Assistance	<u>14</u>
Year 1: Total	999 (1 B USD)
Year 2: Country Operations and Admin Support in all Countries	985
Year 2: US Global Support Center Assistance	<u>14</u>
Year 2: Total	999 (1 B USD)
Year 3: Country Operations and Admin Support in all Countries	985
Year 3: US Global Support Center Assistance	<u>14</u>
Year 3: Total	999 (1 B USD)
Total GSOP Years 1-3 Execution, M USD:	<u>2,997 (3 B USD)</u>
Total Global GSOP Cost, M USD: (2 Preliminary Years, 200 M USD, + GSOP Years 1-3 Execution, 2997 M USD)	3,197 M USD (3.2 B USD)



SECTION 8

Concluding Remarks

Global Solutions & Outreach Programs (GSOP)

Introduction.

As we mentioned in the Prologue, the GSOP applies the Wicked-Problem Approach to solving the wicked problems of global warming. A six-session Wicked-Problem Approach Problem Facilitator Training Course and Student Handbook will be given to Problem Facilitators in each Country's GSOP at the onset of their programs. While avoiding training details, we will explain how key factors of the Wicked-Problem Approach are embedded within the GSOP Program and Execution Plans.

Wicked-Problem Approach Key Factors.

The key factors of the Wicked-Problem Approach are shown below in Figure 18. We will discuss each one in turn.

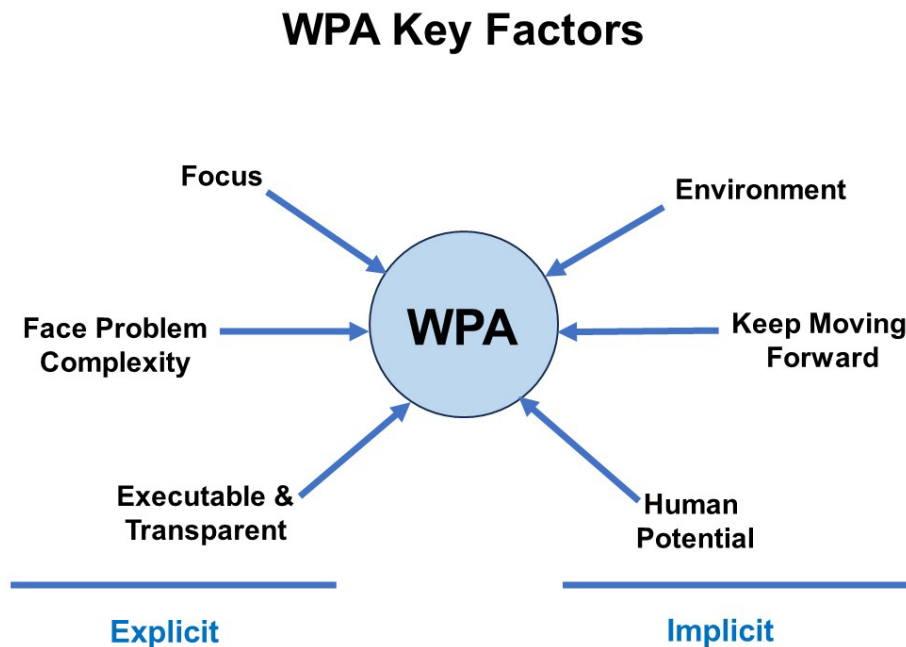


Figure 18. The six key factors of the Wicked-Problem Approach embedded into the GSOP.

Stepping back, we know that people need a common focus in order to all pull together and reach difficult end objectives. Wicked problems are complex and hard. Their complexity must be faced rather than ignored. Still, people must be able to perform the needed tasks to make progress. So, the tasks must be executable, and also transparent so people are not confused. We describe these factors as being “explicit” because they can be achieved with specific actions.

Other key factors are “implicit” in that they relate to human feelings and reactions. For example, people work best when they are highly motivated. Creating a supportive environment can help motivate people, but the people themselves must *feel* motivated. You cannot direct people to be motivated. Moving forward is needed for progress, but it also encourages and motivates people. You can organize tasks to help keep things moving forward, but it is the people who actually move things forward. The most important and most implicit factor is taping the full human potential. This is the overarching purpose of the Wicked-Problem Approach. The other implicit and explicit factors contribute to taping the full human potential.

Here is how the six key Wicked-Problem Approach factors are implemented in the GSOP. We will start with the three explicit factors.

Explicit Factors:

Focus. Focus is crucial if people are to work together and achieve common goals.

1. Problem Diagrams contain explicit Project Goals and End-State Goals to provide a common focus. While the goals are specific for each wicked problem, they must require solutions that are technically feasible and effective, cost affordable, and socially/politically acceptable in order to be implemented and actually solve the wicked problem. In other words, solutions must be effective and practical with adequate being OK.
2. Within the Country Problem Diagram, Problem Elements and Solution Work Units are divided into technical, economic and social/political factors. This standardized structure used by all participants contributes to the common focus.
3. Lastly, by starting GSOP in all Countries at the same time and proceeding on the same schedule, everyone is on the same learning curve. Sharing and integration of results, and focus are all enhanced. International collaboration between GSOP in all Countries can begin immediately.

Face Problem Complexity. We must face the complexity of wicked problems if they are to be solved.

1. In the Problem Diagram, we explicitly divide the problem into technical, economic and social/political Problem Elements and corresponding Solution Work Units: These key parts of wicked problems are then explicitly addressed, not ignored.
2. We let the problem drive the solution by first identifying the Problem Elements of the global warming problem and then by selecting Solution Work Units needed to address each Problem Element. In this way, participants face problem complexity head on.

Executable and Transparent. Solution Work Units must be executable *by the participants* if they are to be of any value.

1. Therefore, the personnel assigned to each Solution Work Unit must have the skills needed to perform that work unit. In the GSOP, engineers will evaluate and integrate options, economists will make economic analyses, and social/political experts will gather and analyze public opinions. They will have the requisite skills for their tasks. Other subject-matter experts will be hired as needed.
2. To achieve common understanding, Solution Work Units must also be transparent by being clearly and simply written. We minimize technical jargon within GSOP plans to gain transparency.

Implicit Factors:

Environment. Now, let's turn to the three implicit factors starting with the problem-solving environment. An ideal environment encourages, motivates and assists:

1. Relying on bottoms-up problem-solving supports this environment. Problem Facilitators don't direct, but rather they lead and assist. They rely on participants self-discipline and commitment to accomplish the needed tasks. All participants are treated equally and paid equally around the globe.
2. A learning environment stimulates creativity and motivates people. Starting all GSOP efforts together places everyone on the same learning curve and initiates learning from the start. Evaluating all options on technical, economic and social/political aspects will require learning.
3. People work best when they are free to focus on facts and truth, not opinions. Problem Facilitators will encourage truth-based problem solving.
4. Problem Facilitators are trained to be sensitive and open to good ideas from any participant at any time. Valuing the input of all participants is a motivator. And, as we have seen first-hand, good ideas can be key to actually solving a wicked problem.

Keep Moving Forward. Participants are encouraged and motivated by a sense of forward progress and accomplishment – they must keep moving forward.

1. To do so requires working through confusing periods. Confusing periods must be expected, given wicked problem's tangled mess of factors. Some have described the Wicked-Problem Approach as "controlled chaos." Starting GSOP in all Countries together may add to the initial chaos. From our experience, people will work through and form a cohesive effort. Problem Facilitators are trained to expect confusing periods and to encourage everyone to "keep pulling on their oars." Over time the fog will clear.
2. Relying on an iterative approach and continuous learning allows for partial success the first time through, and further success on subsequent iterations. Iterations are built into the GSOP execution schedule and tasks.
3. We already mentioned the necessity of having executable Solution Work Units to allow for forward progress.

Human Potential. When we talk about tapping the full human potential, what do we mean? Human potential certainly includes human creativity, rational analysis, and hard thinking. But it also includes all the vague and varied abilities that individuals apply to difficult tasks.

As you may have observed, the Wicked-Problem Approach is not a “methodology” where you work through a defined series of steps, or engineering calculations, and out pops the answer. Rather, it is an “approach” to focus both small and large groups of people on common goals and provide them with opportunity to apply their full human potential. Here are key factors that are built into the GSOP to achieve this end:

1. Bottoms-up problem solving so everyone can contribute and feels empowered.
2. Create a learning environment to provide needed knowledge, breakdown barriers, and catalyze creativity.
3. Be sensitive to good ideas so each person is heard and acknowledged.
4. Treat all participants as equals with equal pay around the world to motivate and to attract the best and brightest to this most complex problem.

Bottom line: While the Wicked-Problem Approach provides focus and environment, it is application of the human potential that solves wicked problems. Problem Facilitators will be trained to keep this principle in mind and to observe the results.

Looking Ahead.

GSOP participants, you are embarking on a great adventure: Mounting a frontal attack on the most complex and threatening strategic problem humanity has ever faced. No one has the answers, and there is no comparable effort. You will lead the way!

As a result, you will become:

- a. A crucial resource providing a common understanding of:
 - The global warming problem and its effects.
 - Integrated solutions for each Country, Region and for the World – solutions that are technically feasible and effective on Earth’s terms, and economically supportable and social/politically acceptable on human terms.
 - The actions needed to implement the solutions at Country, Region and Global levels.
- b. A vital capability to help implement the solutions with a shared sense of urgency and responsibility to act.

With these unique understandings and vital capabilities, you, the 2,800 full-time and 22,200 part-time engineers, economists, social/political experts, and subject-matter experts from all Countries will become a force for change!

The doors will be open – even to lead the world!

APPENDIX A

Acronyms and Definitions

Acronyms:

B USD: Billions of US dollars.

CO₂: Carbon dioxide.

Deg C: Temperature in degrees centigrade.

ED/CEO: Executive Director/Chief Executive Officer.

FT: Full-time personnel including Problem Facilitators.

GDP: Gross domestic product.

GSOP: Global Solutions and Outreach Programs.

G-TAC: Global Technical Advisory Committee attached to the US Global Support Center.

K USD: Thousands of US dollars.

M USD: Millions of US dollars.

PF: Problem Facilitators who lead and coordinate Country Operations Teams working to execute the GSOP. They provide leadership and assistance, and encourage a bottoms-up work environment.

PPM: Parts per million.

PT: Part-time personnel who nominally work 4 hours a week, 1/10 of a normal 40-hour work week.

R&D: Research and Development.

SME: Subject-Matter Experts in any needed discipline working to execute the GSOP.

C-TAC: Country Technical Advisory Committee providing independent advice and assistance within each Country GSOP.

Definitions

Country Action Plans: Each Country's best, practical, integrated systems of climate solutions resulting from their GSOP for years 2050, 2975 and 2100.

Country Administration Support Team: A team that supports and enables the Country Operations Teams to execute the GSOP. The Country Administration Support Team functions throughout the Country Start-Up Year and GSOP Years 1-3. It is comprised of the following two sub-team:

Personnel, Finances and Legalities Sub-Team: The sub-team will handle all administration, personnel, financial and legal support functions.

Recruitment and Visibility Sub-Team: The sub-team will recruit all personnel for the Country GSOP and provides in-Country public visibility of Country GSOP progress.

Country GSOP Public Progress Reports: Reports to periodically inform their Country's public, government officials, and GSOP sponsors of progress.

Country GSOP Public Website: A public website established and maintained by each Country by their Administration Support, Recruitment and Visibility Sub-Team to share Country GSOP progress.

Country Operations and Country Operations Teams: The efforts and teams required to execute the GSOP in each Country by performing the Solution Work Units in their Country Problem Diagram.

Country Operations Start-Up Year Team: A small team established and functioning during the Country Start-Up Year to prepare for full Country Operations the following year in GSOP Year 1.

Country Problem Diagram: A document used by each Country to plan and execute their GSOP. The document includes: project and end-state goals; technical, economic and social/political elements of the global warming problem; and solution work units, analogous to a statement of work, to overcome the problem elements.

Country Start-Up Year: The year prior to GSOP Year 1 during which the Country Administration Support Teams and the Country Operations Start-Up Year Teams are established and functioning in all Countries.

Country Teams: Teams that work together within their Country to execute the Solution Work Units in their Country Problem Diagram.

End-State Goals: CSOP goals that will eventually be accomplished as a result of achieving the Project Goals.

First-Order Integration Problems: Integration problems among climate-solution options that do not work together.

Global Action Plans: Capstone Global plans that integrate Regional Action Plans for years 2050, 2975 and 2100.

Global Administration Support Team: A team within the US Global Support Center that provides all administration and funding support to GSOP in each Country.

Global Cost Plan: An EXCEL spreadsheet that shows detailed GSOP cost and personnel estimates for each Country, Region, and Globally.

Global GSOP Public Progress Reports: Reports to periodically inform the public, government officials and GSOP sponsors of progress. The reports will be prepared and distributed by the US Global Support Center.

Global GSOP Public Website: A website to host GSOP news and Global GSOP Public Progress Reports in order to gain ongoing visibility. The website will be prepared and maintained by the US Global Support Center.

Global Operations Support Team: A team within in the US Global Support Center that trains, mentors and selects Country Operations Start-Up Year Team staff. The team continues to oversee and mentor all Country Operations throughout GSOP Years 1-3.

Global Recruitment and Visibility Support Team: A team within the US Global Support Center that recruits US Global Support Center personnel, Country Administration Support Directors, and Country Operations Start-Up Year Team staff, and provides public visibility to GSOP Global results throughout GSOP Years 1-3.

Global Teams: International teams comprised of People's Project 1 personnel that integrate Regional Action Plans at the Global level. Also, international teams comprised of People's Projects 2 and 3 personnel that evaluate solution options to meet their Project's objectives. Global Team members will remain within their Country and collaborate Globally through the Internet.

GSOP Coordinating Committee: A Country Team of project-level Problem Facilitators from the three People's Projects and the Outreach Program who provide overall coordination, leadership, and assistance to Country Operations Teams.

GSOP Years 1-3: The three years required to execute the GSOP in all Countries.

Internal GSOP Global Report Platform: A platform for internal reporting and sharing of GSOP progress and results among all Countries. The Platform will be established and maintained by the US GSOP, People's Project 1.

Problem Elements: Problem descriptions that break the global warming problem into technical, economic and social/political areas.

Problem Facilitators: Country Operations personnel who lead and coordinate teams and work, provide leadership, assistant, and encourage a bottoms-up work environment.

Project Goals: Objectives to be accomplished for each of the three People's Projects and for the Outreach Program during GSOP Years 1-3.

Project Organization Teams: Country Teams of project level Problem Facilitators for each of the three People's Projects and the Outreach Program who together provide overall GSOP coordination, leadership, and assistance for their project and program teams.

Regional Action Plans: Capstone Regional plans that integrate Country Action Plans at the Regional level for years 2050, 2075 and 2100.

Regional Teams: International teams comprised of People's Project 1 personnel that integrate Country Action Plans at the Regional level. Regional Team members will remain within their Country and collaborate Regionally through the Internet.

Second-Order Integration Problems: Integration problems between climate solution systems and other Country sectors.

Solution Work Units: Analogous to a statement of work, the Solution Work Units are the efforts needed execute the Country Problem Diagram and achieve the goals of the three People's Projects and the Outreach Program. Sometimes the term is shortened to "Work Units."

Third-Order Integration Issues: The impacts of climate solution system on various Country sectors.

US Baseline Plans: Initial plans for US People's Projects 1, 2 and 3, and for the Outreach Program. The US Baseline Plans are presented here in Sections 1, 2, 3, and 4. They will be scaled and modified by each Country to reflect their funding level and local conditions.

US Global Support Center: A US organization that will resource and support GSOP in all Countries.

Wicked-Problem Approach: The approach used within the GSOP for solving the wicked problem of global warming.

Wicked-Problem Approach Problem Facilitator Training Course: The six-session training course used to train Problem Facilitators and other full-time staff on the Wicked-Problem Approach and the GSOP.