

**SAB Draft Report to Assist Meeting Deliberations -- Do not Cite or Quote -- This draft is a work in progress, has not been reviewed or approved by the chartered SAB, and does not represent EPA policy.**

Draft of January 18, 2007

The Honorable Stephen L. Johnson  
Administrator  
U.S. Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

Subject: Science Advisory Board (SAB) Report on the Office of Research and Development's (ORD) Sustainability Research Strategy and the Science and Technology for Sustainability Multiyear Plan

Dear Administrator Johnson:

At the request of the Office of Research and Development (ORD), the SAB recently reviewed ORD's Sustainability Research Strategy (Strategy) and the related Science and Technology for Sustainability Multiyear Plan (Plan).

The SAB's Environmental Engineering Committee, augmented with other SAB members for this advisory, strongly endorses the Agency's proposal to establish a research program on environmental sustainability because such a program will improve the scientific foundation for a sustainable environment. Historically, environmental protection at the Agency has been carried out in single-media regulatory programs. The Committee applauds the Agency's steady movement towards a systems approach that reflects the complexity of the world in which we live and effectively balances environmental protection, economic viability and societal interests.

The Strategy, which emphasizes interdisciplinary approaches to environmental protection, provides an effective road map for the transition of the Agency's Pollution Prevention and New Technologies program to the new Science and Technology for Sustainability program. The Strategy identifies research that will support risk-based environmental protection decisions without compromising society's economic or social development goals.

The Plan, which describes the Agency's proposed sustainability research and technical activities, describes the right focus that points the Agency in the right direction to achieve sustainability. However, more financial support and identification and reallocation of the right resources is needed for all the short and long-term outcomes to be achieved in the five-year time frame specified.

The Committee supports the systems-based approach to environmental decision-making that is central to the sustainability paradigm. Success of this program will require the development of a workforce with training and skills related to sustainability. The Committee encourages the Agency to establish creative human

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1 resource programs that will develop and foster the requisite sustainability expertise  
2 within the Agency's current workforce, and that will effectively target uniquely trained  
3 individuals from outside the Agency.  
4

5 To be effective, a sustainability-centered workforce must be supported by a  
6 management structure that appreciates the value of a systems approach to  
7 environmental issues and has the skills to facilitate its adoption. The Committee  
8 encourages Senior Agency management to re-examine the current lines of authority  
9 and accountability within the Agency hierarchy to identify and remove any structural  
10 impediments that could adversely affect decision-making supported by the sustainability  
11 paradigm.  
12

13 The Plan and Strategy call for the integration of sustainability research  
14 throughout the Agency's research programs. The modest funding of the program limits  
15 what can be achieved during the five-year time period of the Plan. The Committee is  
16 disappointed at the modest level of budgetary support allocated to the Plan. This  
17 limitation suggests that sustainability-focused research programs are not a priority for  
18 the Agency. A substantially higher commitment is needed to have a serious impact on  
19 internal research priorities, managerial buy-in, and program visibility and growth.  
20

21 This research program provides the Agency with an opportunity to promote and  
22 coordinate sustainability-focused research activities across the federal government and  
23 with private sector partners as well. Other government agencies (both national and  
24 international), commercial industry and many non-governmental organizations and  
25 private citizens have already endorsed and adopted environmental sustainability as a  
26 framework for environmental management. The Agency's sustainability research can  
27 provide a scientific foundation for environmental decisions at EPA, in other federal  
28 agencies, and in the private sector.

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Thank you for the opportunity to provide advice on this important and timely topic. The Committee applauds the Agency's leadership in advancing the scientific foundation for environmental sustainability. The Committee would also like to acknowledge its pleasure in working with a very dedicated, knowledgeable and responsive ORD staff. Please feel free to contact us if you have any questions concerning this review.

Sincerely,

Dr. Granger Morgan, Chair  
EPA Science Advisory Board

Dr. Michael J. McFarland, Chair  
Environmental Engineering  
Committee

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## **NOTICE**

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This report has been written as part of the activities of the EPA Science Advisory Board, a public advisory group providing extramural scientific information and advice to the Administrator and other officials of the Environmental Protection Agency. The Board is structured to provide balanced, expert assessment of scientific matters related to the problems facing the Agency. This report has not been reviewed for approval by the Agency and, hence, the contents of this report do not necessarily represent the views and policies of the Environmental Protection Agency, nor of other agencies in the Executive Branch of the Federal government, nor does mention of trade names or commercial products constitute a recommendation for use. Reports of the EPA Science Advisory Board are posted on the EPA website at <http://www.epa.gov/sab>.

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**U.S. Environmental Protection Agency  
Science Advisory Board  
Environmental Engineering Committee Augmented for Sustainability  
Advisory**

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## **1. Executive Summary**

The SAB Environmental Engineering Committee, augmented with other SAB members, was in unanimous agreement that, together, the Strategy and Plan form an excellent first step in the Agency's transition from the historical single media or "stovepipe" approach to environmental protection to a systems approach that continues to focus on and achieve environmental protection. The Strategy, which basically describes a research framework for addressing the technical, social and economic complexity of current and emerging environmental protection issues, constitutes a new paradigm that explicitly embraces the application of life-cycle principles in support of short and long-term risk management decisions.

Accompanying the Strategy is the Agency's sustainability Plan, which describes the specific research and technical activities proposed by the Agency that will support future sustainability-focused environmental decision-making. The Committee fully endorses the Plan as the blueprint for the Agency to achieve both its short and long term sustainability outcomes. However, the Committee also recognizes that ensuring successful sustainability outcomes depends on the Agency's ability to commit sufficient resources to support the development, dissemination and application of new environmental monitoring and assessment technology as well as the design and implementation of suitable sustainability metrics and indicators. The Committee is confident that full implementation of the sustainability Plan will generate vital scientific and technical information that will enable Agency decision-makers to better address both present and emerging environmental issues.

The Committee strongly supports the Agency's decision to establish a sustainability research program to address the multifaceted nature of current and emerging environmental problems. The Committee applauds the Agency's determination to look beyond the media-specific regulatory model to explore a more integrative approach to environmental protection that is cognizant of the economic and social impacts of environmental decision-making. Environmental protection decisions that also support the economic and social well being of future generations is of paramount importance to Agency decision-makers and the Strategy clearly establishes the path for achieving that goal.

Similarly, given the expanding technical and social science based information needed to support sustainability-focused environmental decisions, internal restructuring of the Agency's current programs is required to manage and direct data collection and processing. To this end, the Committee acknowledges that the Strategy provides a clear road map for facilitating the Agency's transition from the Pollution Prevention and New Technology (PPNT) program to the Technology for Sustainable Outcomes program.

Of particular importance to achieving broad Agency adoption of the sustainability paradigm is the creation and deployment of a technical workforce effectively trained in the practical application of environmental sustainability concepts and methods. The

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1 Committee encourages ORD to work with senior Agency management to establish and  
2 reinforce the institutional changes necessary to foster a greater understanding and  
3 appreciation for the economic and societal benefits of sustainability-centered  
4 environmental protection.

5  
6 The Committee strongly supports the Agency's decision to advance environmental  
7 stewardship and collaborative problem solving as a means to achieve measurable,  
8 sustainable outcomes. The Committee applauds the Agency's progression from  
9 pollution control to pollution prevention to sustainability.

10  
11  
12 Because of the Agency's international reputation as a scientifically credible steward of  
13 environmental protection, the Committee strongly encourages the Agency to assume a  
14 more substantive and visible role in conducting and disseminating results of  
15 sustainability research. Other government agencies (both national and international),  
16 commercial industry and a myriad of non-governmental organizations and private  
17 citizens have endorsed environmental sustainability. Moreover, as global recognition of  
18 the economic and societal impacts on environmental decision-making increases, the  
19 interdisciplinary approach to solving environmental issues endorsed by the Strategy and  
20 Plan elevates the Agency's environmental stewardship profile. EPA's scientific  
21 capability can be of great value to the sustainability concepts for environmental  
22 management. By providing a scientific foundation for sustainability approaches, EPA  
23 provides a sound basis for its own sustainability programs and for those of others .

- 24  
25  
26 1. The Committee recommends that the Agency better define those terms  
27 associated with the sustainability strategy and the measurement of sustainability  
28 outcomes.

29  
30 To minimize the confusion and ambiguity for the targeted audience of both the Strategy  
31 and the Plan, the Committee encourages the Agency to define more clearly what is  
32 meant by the term sustainability. Both documents would benefit from explicit  
33 acknowledgement of the competing definitions of sustainability, thereby providing a  
34 context for the Agency's choice among the various definitions of this term and  
35 recognition of alternative views of this contested and often nebulous topic.

- 36  
37 2. The Committee supports application of sustainability principles to address and  
38 resolve specific, multi-faceted environmental problems.

39  
40 The Committee acknowledges that the judicious selection of research projects within  
41 the Plan will help to facilitate the diffusion and adoption of the sustainability paradigm  
42 both within and outside the Agency. To ensure a successful Agency transition from the  
43 traditional media-specific "stove pipe" approach to a more integrated systems approach  
44 to environmental protection requires that the sustainability research activities be  
45 scientifically compelling and have wide national visibility. Moreover, the sustainability  
46 research products should strategically integrate into the Agency's other 16 multi-year

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1 plans and provide the technical focus that guides the sustainability research activities  
2 conducted by other federal agencies.

3  
4 The Agency should be prepared to undertake some “higher risk – higher payoff”  
5 projects, i.e., projects that because of complexity, data requirements, methodological  
6 novelty, and interdisciplinary focus may be difficult to carry out successfully, but would  
7 have a large impact if they are indeed developed successfully. The project portfolio  
8 should also balance targeted Agency needs and geography. The project portfolio  
9 should become the basis for articulating the relationship between projects and products  
10 for the annual performance measures (APM) and annual performance goals (APG)  
11 described in the Plan.

12  
13 3. To encourage broad adoption and implementation of sustainability-based  
14 approaches to environmental protection across the EPA, the Committee strongly  
15 urges the Agency to be creative and strategic in developing its human resources  
16 programs.

17  
18 If the Agency is serious about sustainability, it should have the right skill set to  
19 implement it and have champions positioned throughout the Agency. If the Agency is to  
20 pursue the critical social dimensions of sustainability, it needs to employ individuals with  
21 backgrounds beyond the physical sciences, engineering and economics. Stronger  
22 social science expertise is needed in fields such as anthropology for ethnographic  
23 assessments (how individuals, households and communities think, behave and interact  
24 with products, technologies and natural systems) , psychology (behavioral economics),  
25 and decision theory.

26  
27 4. The Committee encourages the Agency to enhance the diffusion of environmental  
28 sustainability principles and practices within and outside the Agency

29  
30 The Plan correctly points out that, as the value of the ORD sustainability program  
31 becomes recognized, other program directors and offices will understand the value of its  
32 attributes, goals, and metrics, and become active in seeking out collaborative projects.  
33 This research program gives the Agency opportunities to define environmental  
34 sustainability both internally and externally and to promote the use of related research  
35 products.

36  
37 To assume a leadership role in promoting the economic and societal benefits of the  
38 sustainability paradigm, a true systems approach will be needed. This means involving  
39 personnel from many different areas including different Agency program offices,  
40 regional offices and other federal agencies (e.g., Department of Defense, Department of  
41 Energy, Department of Agriculture, etc.), local environmental groups, private industry  
42 and other community stakeholders.

43  
44 ORD could further solidify its leadership role in promoting sustainability-based  
45 environmental decision-making by developing greater capacity in sustainability  
46 research. This could be achieved through a combination of: hiring new personnel with

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1 training in sustainability research, establishing incentives for existing personnel to apply  
2 their technical expertise in support of the sustainability paradigm, pioneering new  
3 models of cooperative research with industry and development of sustainability “think-  
4 tanks” within the Agency.

5  
6 5. Support for sustainability is widespread. Both sound science and senior  
7 management support can further the paradigm..  
8  
9

10 While not universally accepted as the sole approach to environmental protection,  
11 support for sustainability, as both a goal and a means of approaching decisions, is  
12 widespread. The concept and practice of sustainability now permeates the Agency and  
13 many other institutions. Both a strong scientific base and the overt support of EPA  
14 management can promote wider implementation of the sustainability paradigm. These  
15 activities are mutually enhancing as well. Sound science provides a basis for support  
16 by senior management and senior management can advocate for the resources with  
17 which to further strengthen the science base.  
18

19 6. The Committee recommends that the Agency make judicious use of targeted  
20 collaborations with other federal agencies as well as the private sector.  
21

22 The Agency’s research budget for this Plan is small. There are benefits to seeking  
23 opportunities to collaborate with others to leverage funds to meet goals. There is also a  
24 risk that the research program could be diluted by demands for time and resources.  
25 The key is pursuing the right opportunities. If resources allow, the field as a whole  
26 would benefit from the Agency providing overall leadership and focused coordination to  
27 these external entities because none presently exists.  
28

29 The responses to the specific Sustainability Research Strategy Charge Questions are  
30 briefly summarized here.  
31

32 S1. Does the SAB agree with the central premise of the Strategy that sustainability is  
33 all about decision making and that ORD research support should aim to inform and  
34 allow decision makers at all levels of government and in the private sector to choose  
35 courses of action that will lead to achieving sustainable outcomes?  
36

37 The Committee does not agree with the central premise that sustainability is “all about  
38 decision making” and “aiming to inform.” The Sustainability Strategy document is a  
39 careful and thoughtful effort to capture the opportunity to implement an important  
40 paradigm shift across much of the Agency’s jurisdiction.  
41

42 The Strategy will serve as an important companion document to the Plan as the  
43 sustainability paradigm is adopted within the Agency. It will also be important as the  
44 Agency works externally with other Federal agencies and stakeholders across the  
45 nation. Rather than simply focusing on decision-making and the use of sustainability-  
46 based research to inform decision-makers (albeit critically important), the Committee

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1 offers the following expansive view of the programmatic needs of the sustainability  
2 Strategy:

3  
4 1. Agency-sponsored core research focused on sustainability science is  
5 needed.

6  
7 2. Public stakeholders are part of the cultural aspect of responding to and  
8 implementing sustainability at the local level and should be explicitly  
9 acknowledged within the Sustainability Strategy.

10  
11 3. The definition of sustainability may benefit from additional interpretation.  
12 The research portfolio would be more compelling if ORD were more explicit  
13 about the interdependence of the three pillars of sustainability (environment,  
14 social aspects and the economy).

15  
16 4. ORD needs to explicitly promote and integrate a life-cycle approach to  
17 environmental protection decision-making within the Sustainability Strategy that  
18 goes beyond simply generating information and furnishing it to decision makers.  
19 The life-cycle approach would support the need for behavioral change and  
20 outcome measurement over time.

21  
22 S2. Does the strategy make a compelling case for ORD and EPA that Sustainability  
23 Research is a priority for ORD?

24  
25 The Committee agreed with the case made in the Strategy that a systems view is  
26 needed in order to address environmental problems and that a sustainability framework  
27 encompasses a systems approach. Allocation of resources, on the other hand, does not  
28 indicate that Sustainability Research is a priority for ORD. The level of Agency  
29 resources currently allocated to support sustainability research is woefully inadequate  
30 for a meaningful scientific research program. Further, if the resources allocated to the  
31 Sustainability Research Strategy reflect Agency priority setting, then sustainability  
32 research does not currently appear to be a priority within ORD.

33  
34  
35 S3. Does the strategy focus on priority national issues and identify the right research  
36 questions?

37  
38 The Strategy is cross-media. The areas and questions outlined are quite  
39 comprehensive, and expand upon the initial themes. Nevertheless the Committee is  
40 concerned that insufficient attention is devoted to certain issues (such as climate  
41 change research), the interface of social science and economics research with chemical  
42 and /biological research, and the difficulty of developing a meaningful suite of  
43 sustainability metrics.

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1 S4. Does the strategy identify the right implementing steps to address research  
2 questions and achieve sustainable outcomes (Advance technology, develop tools  
3 and approaches, advance systems research and disseminate and apply results.)  
4

5 As the discussion of implementation progresses, the specificity of the Strategy  
6 decreases as does ORD's control over the outcomes. The Strategy should  
7 acknowledge increasing resource demands tied to coordination with multiple entities.  
8 Neither the Strategy nor the Plan specify how the Agency will identify and pursue future  
9 research opportunities, what resources will be used, or how success might be  
10 evaluated. Finally, it is unclear what happens to the Agency's focus on pollution  
11 prevention. Prevention has been an important part of the EPA message for over 15  
12 years and one that resonates with the public, NGO community and industry.  
13

14 S5. Does the strategy adequately and correctly connect to policy and/or decision-  
15 makers inside and outside EPA for achieving desired sustainability outcomes?  
16

17 Policy and decision-making are two different, but related, aspects of the problem.  
18 Decision-making depends on the way policy is implemented and requires that  
19 appropriate incentives (i.e. policy tools) be established. The Strategy focuses on  
20 activities, offices, and regions within EPA, and coordination among these entities.  
21 There is limited discussion of connections to and collaborations with decision-makers  
22 and organizations outside of EPA. The Strategy does connect to EPA decision-makers  
23 by arguing that environmental sustainability research is important and appropriate for  
24 ORD as well as by seeking to negotiate with other EPA program managers and  
25 decision-makers about the content and future of sustainability research at EPA.  
26

27 S6. Does the Strategy enable ORD to prioritize its research investments? Does the  
28 Strategy define an appropriate role for EPA relative to other funding agencies?  
29 Does it sufficiently encourage other Federal agencies and organizations to relate  
30 their sustainability efforts to EPA's so as to promote co-funding and/or  
31 collaboration where appropriate?  
32

33 The Strategy document clearly states that it is up to the individual multi-year plans and  
34 to the National Program Directors to identify their priority sustainability research areas  
35 and presents criteria for setting priorities that are consistent with those found in the  
36 Strategy. Moreover, the Strategy emphasizes that each individual multi-year plan  
37 should develop a balanced research portfolio with a good mix of short-term and long-  
38 term projects, known and emerging issues, projects that are traditionally central to  
39 EPA's mission and others that are more on the boundaries (e.g. agriculture and aquatic  
40 species.  
41

42 The Committee had mixed reactions to this agenda and criteria for setting priorities.  
43 Recognizing both the importance to ORD of establishing a scientifically credible  
44 presence in sustainability-based research and the reality of limited budgetary resources,  
45 the Committee recommends a two-pronged approach that (i) pursues core research on

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1 sustainability and sustainability metrics, and (ii) establishes a small number of  
2 demonstration projects that would give ORD high visibility in the sustainability arena.

3  
4 S7. Does the Strategy outline an adequate roadmap for ORD to implement this  
5 program (P2 transition to Sustainable Technology, coordination among NPD and  
6 across existing multi-year plans, leveraging interagency cooperation, and  
7 defining emerging research areas?)

8  
9 The Strategy lists specific projects and programs with a sustainability emphasis or focus  
10 in other agencies. It also identifies other federal agencies with overlapping interests for  
11 each of the six broad research themes, as well as international partners. Despite these  
12 lists, however, and EPA's acute awareness of other nations' focus and recent advances  
13 on sustainability matters, the discussion and the information offered is too cursory to  
14 allow the Committee to judge whether these other agencies have sufficient incentive to  
15 establish partnerships with EPA and promote co-funding and collaborations.

16  
17 S8. Does the SAB believe that sustainability research is a sufficiently strong concept  
18 for integrating and coordinating across ORD research programs?

19  
20 From a science perspective, sustainability is a strong concept that has value in  
21 integrating and coordinating sustainability-based activities across ORD research  
22 programs. However, there are inherent obstacles and historical impediments to such  
23 change. The SAB recommends the Administrator and senior leadership consider a  
24 variety of approaches to ensuring the success of the implementation of this Strategy  
25 throughout the Agency's research program.

26  
27 The responses to the Multi-Year Plan Charge Questions are briefly summarized here.

28  
29 P1. Does the organization of the new Sustainability Technology Plan provide a clear  
30 logical framework for implementing an element of the overall Sustainability  
31 Strategy? Does the Plan follow appropriately from the Sustainability Research  
32 Strategy? Are the research issues identified in the Plan consistent with the  
33 research questions identified within the Sustainability Research Strategy?

34  
35 The Plan provides a clear and logical framework for implementing an element of the overall  
36 Strategy. Within the context of limited resources, the Plan identifies a set of issues that are  
37 consistent with the Sustainability Research Strategy and current ORD capabilities.  
38 The criteria for project selection should be reviewed to ensure that they are appropriate for  
39 identifying those research activities that will more effectively support the Strategy.

40  
41 The Committee is largely satisfied with the content of the Plan through Chapter 4. The  
42 Committee did engage in extensive discussion about Chapter 5, which presents the  
43 specifics of the planned research program. The Committee's comments are included  
44 later in this document.

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1 P2. For each major research track addressed within the Plan (e.g., Decision Support  
2 Tools, Education, Technologies, Systems, and Metrics/Indicators), do the Annual  
3 Performance Goals (APGs) and Annual Performance Measures (APMs)  
4 represent a logical progression of activities and intended outcomes? Does the  
5 Plan identify the specific issues motivating the research program?  
6

7 Within each major research goal related to metrics, tools and technologies, the  
8 respective annual program goals and measures represent a logical progression of  
9 activities and intended outcomes.  
10

11 However, the long-term goals themselves should be re-ordered. A more logical  
12 progression is:  
13

- 14 1. Develop the appropriate metrics
- 15 2. Develop any decision support tools required for analysis (keep this systems  
16 based if possible and linked to metrics).
- 17 3. Investigate technological options to reach the goal and try to get the technologies  
18 in place (SBIR grants, performance incentives...).
  
- 19

20 Recognizing the budgetary constraints and the desire to achieve high profile measures  
21 of success, the Agency might consider selecting one or two key demonstration projects  
22 that are focused on a real and current sustainability issues. To the extent practicable,  
23 the projects should support sustainability metrics development, development and  
24 application of sustainability decision support tools and sustainability technology  
25 development and demonstration. The actual projects identified should have a major  
26 impact for the municipality, region, or even industry that is affected with the information  
27 gained easily transferred to other entities.  
28

29 P3. Does the Plan lay out a balanced program addressing both short-term and  
30 longer-term research that meets current needs while positioning the Agency to  
31 respond to emerging issues?  
32

33 The Committee is convinced that the most pressing need is for short term successes to  
34 gain further support for the research program. Looking at the longer term, the  
35 Committee is persuaded the program should have the capability to detect emerging  
36 problems and inform the Agency. A prescriptive numerical balance, in dollars, work  
37 years, number of projects, variety of disciplines is not recommended  
38

39 P4. Do the long-term goals address the high-priority science, engineering, and  
40 technology needs of users that will help the Agency meet its strategic goals relating to  
41 sustainability? Do the long-term goals clearly relate to the research tracks within the  
42 Plan framework? Do they provide a picture of what the program is trying to achieve?  
43 Will the proposed research activities lead to progress towards these goals? Are the  
44 goals appropriately linked to long-term environmental outcomes?  
45

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1 Addressing the longer term outputs and outcomes of the program is important because  
2 ORD research has historically been focused on shorter term needs. The Plan explains  
3 clearly the linkages of the annual performance goals to the long-term goals and the  
4 long-term goals to the Strategy. However, it is not clear whether these long-term goals  
5 will significantly advance sustainable approaches to management and address specific  
6 sustainability challenges. The weakest part of the Plan is the integration between the  
7 long-term goals and long-term environmental outcomes. The outcomes, while  
8 measurable, are not scientifically compelling nor are they focused on achieving goals  
9 through the application of sustainability principles. A tenuous link between sustainability  
10 goals and outcomes leaves the Plan vulnerable to claims that ORD is retreating to the  
11 historical single-media “stove pipe” approach to environmental protection.  
12

13 While the development of new, more sustainable technologies is usually best left to the  
14 private sector, the Agency has a critical role to play in certifying and evaluating data and  
15 making it available to the sustainability community. Furthermore, the Agency is  
16 encouraged to engage in research that is specifically focused on developing incentives  
17 for private companies to invest in and adopt new technologies.  
18

19 The Plan alludes to but does not explicitly develop the Agency’s role in conducting  
20 “regular and continuous assessments of environmental trends”. If indeed the Agency  
21 assumes this role, and makes such assessments available to the public, then it will be  
22 performing a valuable service that can enable decision makers at all levels to respond  
23 to both emerging as well as legacy environmental issues.  
24

25 P5. Are the research products supportive of the strategic target as set forth in the  
26 Agency’s Strategic Plan under Objective 5.4?  
27

28 Objective 5.4 of the Agency’s Plan focuses on enhancing society’s capacity for  
29 sustainability through science and research. The long-term goals support this strategic  
30 target by establishing sustainability metrics, creating decision-support tools, and  
31 developing and applying cutting-edge technologies to solve environmental problems.  
32 However, it is unclear who will be leading the proposed efforts, how funding will be  
33 prioritized, or how the research products will be defined. Given the lack of detail, it is  
34 difficult to assess the nature of the products or their significance. With the limited  
35 budget projections, it is unlikely that products will have a large impact on enhancing the  
36 science or decision-support of sustainability.  
37

38 P6. Does the scope of work proposed within the Plan complement research being  
39 supported by other programs inside and outside EPA?  
40

41 The Committee found that the scope of work appeared to complement research inside  
42 the Agency and perhaps outside the Agency. The Committee urges the Agency to  
43 conduct more extensive investigation and documentation of external research related to  
44 the Plan.  
45

46 P7. Are there other potential emerging research areas that the Plan should consider?

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1  
2 The long-term goals are sufficiently broad to cover most emerging issues, however, it is  
3 unclear how the Agency will identify, prioritize, and respond to emerging issues on an  
4 on-going basis. The plan should explicitly address this concern since it has both  
5 resource and coordination implications.  
6

7 P8. Is the level of resources specified by the Plan sufficient to address the research  
8 issues that it identifies, allowing ORD to achieve the intended outcomes of the  
9 research program? Is the Plan's relative allocation of those resources among the  
10 research tracks of the sustainability research program appropriate, based on a  
11 consideration of scientific and programmatic needs?  
12

13 The level of support specified for the Plan is less than one one-thousandth of the  
14 Agency's overall budget and no more than 1% of the S&T budget. In the Committee's  
15 opinion, a substantially higher commitment is needed to have a serious impact on  
16 internal research priorities, managerial buy-in, and program visibility and growth. The  
17 level of support allocated will limit progress and suggests to the Committee that the  
18 Agency does not ascribe a high level of importance to sustainability-based research  
19 activities. In the Committee's opinion, the area of environmental sustainability should  
20 become a main thrust of ORD, with allocation and resources established at a level  
21 commensurate with its importance to current and future Agency decisions.  
22

23 P9. Does the Plan appropriately address findings and recommendations in  
24 evaluations of the program and its components?  
25

26 ORD is clearly interested in working with other parts of the Agency and organizations  
27 outside of the Agency. However, the descriptions of how such collaborations will be  
28 developed and implemented need to be strengthened in the Plan.  
29

30 Overall, the Plan is too vague when it describes proposed results and outcomes that  
31 pertain to sustainability. Planned efforts to quantitatively describe those planned results  
32 and outcomes need to be expanded in light of future external assessments of the  
33 sustainability program.  
34

35 This Committee's review and the upcoming BOSC review should address the concerns  
36 delineated in the PART evaluation. Regarding the integration of the elements of the  
37 P2NT (now sustainability) research program, the Plan provides evidence of substantial  
38 efforts at coordination and integration. The Committee's evaluation of those effects is  
39 described in the responses to other Plan charge questions.  
40

## 2. Responses to Charge Questions Relating to the Strategy

**S1 Does the SAB agree with the central premise of the Strategy that sustainability is all about decision making and that ORD research support should aim to inform and allow decision makers at all levels of government and in the private sector to choose courses of action that will lead to achieving sustainable outcomes?**

The Sustainability Strategy document is a careful and thoughtful effort to capture the opportunity to implement an important paradigm shift across much of the agency's jurisdiction and, along with other Federal partners and stakeholders, the national landscape. The Agency is to be commended for its work here.

The document will serve as an important companion document to the Plan as the sustainability paradigm is adopted internal to the Agency. It will also be important as the Agency works externally with other Federal agencies and stakeholders across the national landscape.

Many of the comments offered here reflect initial thoughts by the Committee that eventually resulted in the seven overarching comments being developed during the Committee meeting (presented in section 4 of this report). Consequently, these comments in response to S1 may be elaborative in nature.

The Committee does not agree with the central premise that sustainability is "all about decision making" and "aiming to inform." Rather, four additional, expansive views are offered:

First, Agency-sponsored core research focusing on sustainability science is needed. By defining sustainability as "all about decision making," the Strategy mixes together scientific questions with assumptions about likely policy directions. Overtly combining sustainability research activities with possible policy decisions weakens and limits the scientific aspects of the Strategy to only those environmental issues that can be addressed in the near term.

Development of decision support tools implies a foundation of knowledge about sustainability. In some areas, there is this foundation: for example, the benefits of energy efficiency are widely acknowledged. But, by not explicitly acknowledging the critical need for conducting research specifically focused on defining the fundamentals of sustainability science, the Strategy may not fully support sustainable outcomes. ORD research support should not just aim to inform decision makers, but should enable the Agency to establish a systematic and transparent process for identifying and prioritizing major environmental concerns that can be effectively addressed through application of sustainability principles. Sustainability research should provide the Agency with the scientific tools to deliver maximum value back to stakeholders in terms of a balance to economic, social and environmental improvements (the three pillars of sustainability).

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1 It is of critical importance that the Strategy be able to distinguish between two related,  
2 yet distinct functions: clarifying sustainability principles, and implementing sustainability  
3 solutions. The strength of ORD research has traditionally been focused on clarifying and  
4 documenting environmental impacts. This role for ORD research is commendable and  
5 should be expanded to include clarifying the Agency's current understanding of  
6 sustainability principles. Implementing sustainability solutions to a recognized  
7 environmental problem will be primarily a policy decision. After policy decisions are  
8 made, ORD research could then appropriately focus on applied research to implement  
9 the policies. For instance, ORD's efforts to "develop a set of appropriate metrics to  
10 gauge society's progress towards sustainability" (ES-page 14) should, in part, be based  
11 on metrics already available (e.g., energy efficiency) and allow greater focus on current  
12 and future policy and regulations. With such existing metrics, then society could  
13 proceed with the task of developing technologies and approaches to achieve these  
14 goals.

15  
16 Second, the public and public stakeholders are clearly part of the cultural aspect of  
17 responding to and implementing sustainability at the local level.

18  
19 Sustainable decision-making will take place at many levels and across both the public  
20 and private sectors, from individuals to neighborhoods, municipalities and regions,  
21 countries and continents, NGOs and private firms, and consumers and producers. Any  
22 plan to inform and support decision-making on such a scale is a large undertaking  
23 involving research on; material and energy flows, information dissemination, economic  
24 incentives and expectations for present and future payback. As such, integration of  
25 social factors into the science that ORD has traditionally employed is an essential  
26 element of the sustainability paradigm. Typically, major legislative actions and federal  
27 policy are needed that respond to public perception of need. The sustainability  
28 paradigm is of such a nature, a radical departure from past ways of perceiving  
29 humankind's relationship to the environment.

30  
31 An important premise in the sustainability paradigm is informed decision making for  
32 change agents (e.g., government) and for the practitioners (e.g., the public). In general,  
33 the difficult component of decision-making is having the needed information. In this  
34 regard, it is important that the Strategy focus on decision-making and identify  
35 "information driven" processes. A sustainability-focused solution to environmental  
36 concerns is effective only if information is coupled with incentives (or disincentives) that  
37 can drive behavioral change (and prevent backsliding to traditional unsustainable  
38 solutions). The Strategy fails to explicitly acknowledge the role of the public and other  
39 stakeholders besides local, state and federal government and the regulated entities.  
40 The public should be apprised of and might well be interested in learning about what  
41 technological advances funded by ORD have been adopted private industry. In addition,  
42 the metrics and indicators developed under the auspices of ORD research program  
43 would serve the interests of the public at large, not just those of government officials  
44 and decision makers.

45

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1 Third, the definition of sustainability may benefit from additional interpretation. The  
2 research portfolio would be more compelling if the interdependence of the three pillars  
3 of sustainability (environment, social aspects and the economy) were clarified.  
4 Currently, economic growth and population change appear to be treated as exogenous  
5 variables that determine the pressure imposed on the environment.

6  
7 Fourth, ORD needs to explicitly promote and integrate a life-cycle approach to  
8 environmental protection decision-making within the Strategy that goes beyond simply  
9 generating information and furnishing it to decision makers. The life-cycle approach  
10 would support the need for behavioral change and outcome measurement over time,  
11 both internal to and external to the Agency.

12  
13 **S2 Does the strategy make a compelling case for ORD and EPA that**  
14 **Sustainability Research is a priority for ORD?**

15  
16 The Committee unanimously agreed a systems-based approach is needed in order to  
17 address environmental problems and that a sustainability framework supports that a  
18 systems methodology. Other points of agreement included concern that the category of  
19 “decision maker” was construed rather narrowly. Committee members argued that the  
20 long-standing problem of “silos”—division of environmental problems into individual  
21 media and/or pollutants—was not sufficiently addressed as a core source of the  
22 problems facing environmental policy and the Agency.

23  
24 Allocation of resources, on the other hand, does not indicate that Sustainability  
25 Research is a priority for ORD. The level of Agency resources currently allocated to  
26 support sustainability research is woefully inadequate for a meaningful scientific  
27 research program. Further, if the resources allocated to the Sustainability Research  
28 Strategy reflect Agency priority setting, then sustainability research does not currently  
29 appear to be a priority within ORD.

30  
31  
32 **S3 Does the strategy focus on priority national issues and identify the right**  
33 **research questions?**

34  
35 The Strategy organizes its priority research questions according to the six critical  
36 research themes in Chapter 4 (Natural Resource Protection, Non-renewable Resource  
37 Conservation, Long Term Chemical and Biological Impacts, Human Built Systems and  
38 Land Use, Economics and Human Behavior, and Information and Decision Making).  
39 These themes, and the questions that are derived from them, have both a generic (i.e.  
40 nothing to distinguish EPA’s role), and EPA-specific focus which, in general,,  
41 emphasizes issues related to human interactions with the environment. To its credit, the  
42 Agency has tried to derive a strategy that is cross-media. The areas and questions  
43 outlined are comprehensive, and expand upon the initial themes. The Committee  
44 encourages the Agency to apply the principles of sustainability in supporting research  
45 activities aimed at addressing high profile environmental concerns e.g., global climate  
46 change, energy production, etc. The Committee strongly endorses the efforts by the

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1 Interagency Sustainable Development Indicators group to develop a suite of  
2 scientifically defensible sustainability metrics.

3  
4 The Committee acknowledges the inherent difficulty in establishing sustainability  
5 metrics that are acceptable to a broad range of public and private stakeholders.  
6 However, successful transition of the Agency from its single-media regulatory focus to a  
7 systems-based approach to environmental decision-making is dependent on the  
8 formulation of scientifically defensible sustainability metrics.

9  
10 Owing to the early advances of the international community in conducting state-of-the-  
11 art research on sustainability, Committee recommends that the Agency critically  
12 examine the practices of the European Union (EU) countries, Japan, and others as a  
13 means of establishing reasonable sustainability benchmarks while developing a  
14 distinctive sustainability research model that is patterned after the Agency's  
15 sustainability paradigm, i.e. collaborative, forward-focused, inclusive, adaptive, and  
16 integrative.

17  
18 **S4 Does the strategy identify the right implementing steps to address**  
19 **research questions and achieve sustainable outcomes (advance**  
20 **technology, develop tools and approaches, advance systems**  
21 **research, and disseminate and apply results)?**

22  
23 The Strategy refers to four implementing steps: (1) transition the current pollution  
24 prevention and new technology research program into a Science and Technology for  
25 Sustainability Research Program, (2) coordinate with 16 other multi-year plans, (3)  
26 collaborate and partner with EPA Program and Regional Offices and other government  
27 organizations, and (4) identify and pursue future research opportunities.

28  
29 As one proceeds from implementing step 1 to 3 a number of things occur:

- 30  
31 1. There is less and less specificity of how this will work in the Strategy.  
32  
33 2. ORD has less and less direct control of the outcomes and this will lead to  
34 measurement problems.  
35  
36 3. There will be increasing resource demands tied to coordination with multiple  
37 entities (important given limited resources).

38  
39 Step 4 (identify and pursue future research opportunities) appears in various forms  
40 throughout the strategy but neither the Strategy nor the Multiyear plan specify how this  
41 will be done, what resources will be used, or how success might be evaluated.

42  
43 Finally, it is not clear what happens to pollution prevention (step 1). Though always  
44 under-resourced, prevention has been an important part of EPA message for over 15  
45 years and one that resonates with the public, NGO community and private industry.

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1 The Plan should make clear how the S&T for Sustainability Research Program views  
2 the concept of “prevention.”  
3  
4

5 **S5 Does the Strategy adequately and correctly connect to policy**  
6 **and/or decision-makers inside and outside the EPA for achieving**  
7 **desired sustainability outcomes?**  
8

9 Policy and decision-making are two different, but related, aspects of the problem. US  
10 environmental policy is, and will most likely remain, risk-based. Whether this is  
11 inconsistent with “sustainability-based” policy will only be known when the outcomes of  
12 research on sustainability become apparent.  
13

14 Decision-making depends on policy, or more precisely the way policy is implemented,  
15 and requires that appropriate incentives (i.e. policy tools) be implemented. It can relate  
16 to long or short-term courses of action, the longer the term the greater the uncertainty in  
17 the outcome. This is why it is important to view sustainability metrics and standards as  
18 evolving, i.e., a moving target whose descriptions are continuously refined as research  
19 results are generated.  
20

21 The Strategy focuses on activities, offices, and regions within EPA, and coordination  
22 among these entities. There is limited discussion of connections to and collaborations  
23 with decision-makers and organizations outside of EPA. The Strategy does connect to  
24 EPA decision-makers by arguing that environmental sustainability research is important  
25 and appropriate for ORD, as well as by seeking to negotiate with other EPA program  
26 managers and decision-makers about the content and future of sustainability research  
27 at EPA.  
28

29 The Strategy does not propose any significant connections to federal policy and/or  
30 decision-makers outside EPA. External collaborations and partnerships are discussed  
31 in a summary manner on pages 70-73. Ongoing programs and relationships are noted,  
32 with some specific examples given. There is more discussion of connections with other  
33 Federal agencies than with regulated bodies (industry), communities, and consumers.  
34 Although the Strategy refers on page 63 to the need for balance between research that  
35 supports decision making within EPA and by other government organizations and  
36 industry, it neglects to mention the role of consumers or non-governmental, non-  
37 regulated parties that may be involved in policy recommendations or decisions, be they  
38 individual life-style decisions or those that affect local or regional communities. There is  
39 little in the Strategy about partnering with academic research or even how EPA might  
40 better leverage information and research generated by the regulated parties  
41 themselves.  
42

43 The general nature of the discussion of external connections is consistent with the tone  
44 of the rest of the Strategy, which examines six broad themes of environmental  
45 sustainability in a general manner. It is not clear, however, how much of an impact the  
46 collaborations and partnerships will actually have in advancing sustainable approaches

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1 to management and protection of the environment. There is no discussion of  
2 connections with specific kinds of decision-makers or policies linked with specific  
3 sustainability challenges. Certainly, specific connections within public and private  
4 sectors will evolve as the program develops, but the Strategy recognizes that this effort  
5 must be (and will be enhanced by) connections with other efforts in EPA and outside  
6 EPA.

7  
8 ORD is clearly interested in connecting to policy and decision makers within and outside  
9 of Agency in the Strategy and Plan. However, as formulated, the Strategy does not  
10 require the identification of specific kinds of decision-makers and policies. Weakness in  
11 this respect probably reflects resource constraints rather than failure of intention and  
12 foresight. If the Strategy was built around specific sustainability challenges, which it is  
13 not, then the need for identifying decision-makers and policies would be more apparent.  
14

15 The Strategy should do more to prepare to discuss research results with policy makers.  
16 After ORD clarifies and strengthens its research strategy, it should develop an active  
17 program to connect to policy makers and decision makers. In this regard, the strategy  
18 could be more explicit in its goal of trying to change behavior through the development  
19 of metrics and tools that might move all parties towards decisions that create  
20 environmental sustainability – that recognize something beyond straight measures of  
21 economic productivity. It's almost too subtle in that regard. At the same time, it is critical  
22 that the Strategy acknowledge that decisions will always be made in the absence of  
23 complete information; development of approaches to decision making that address  
24 uncertainty are essential.  
25

26 The Strategy could also do more to move us away from a waste-centered view of  
27 environmental protection. The Strategy appears to view “sustainability” as following  
28 logically, temporally, and philosophically from the current emphasis on waste  
29 management as a means to healthy environments. It may be more useful to view things  
30 the other way around, regardless of how policy has historically been implemented. The  
31 problem with seeing sustainability as derived from a waste-centered view is that it then  
32 becomes very difficult to refocus our (EPA managers and scientists, the government in  
33 general, and the citizenry) environmental frame of reference. This inevitably leads to  
34 inadequate organizational structures, poor prioritization, and seeking answers to the  
35 wrong questions. Interestingly, this has been recognized in the Agency’s Strategic Plan  
36 under Goal 3 (Land Preservation) in which it is stated “Our ultimate goal is to move the  
37 Nation from a waste-oriented to a life-cycle management way of thinking about  
38 materials”.  
39

40 ORD has an opportunity to provide leadership both internal to the Agency and external  
41 among the federal agency family and other organizations. This can be accomplished by  
42 coordination and leadership in the definition of environmental sustainability and in the  
43 use of related research products which will influence how other federal agencies and  
44 organizations move forward with their sustainability programs.  
45

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1 The scope of environmental sustainability research efforts outside EPA is vast and the  
2 ORD has only skimmed the surface. To take one example, there is no mention of the  
3 scholarly literature on environmental sustainability. There are several key  
4 academic/scientific journals devoted to this topic and, of course, many more that touch  
5 on it. A more deliberate effort at ongoing literature review is warranted in this respect -  
6 to exploit what has been created by others, to stay abreast of developments in the field  
7 and to identify vehicles (e.g., journals) through which ORD research should be  
8 disseminated.

9  
10  
11 **S6 (a) Does the strategy enable ORD to prioritize its research investments?**  
12 **(b) Does the strategy define an appropriate role for EPA relative to other**  
13 **funding agencies? Does it sufficiently encourage other Federal agencies**  
14 **and organizations to relate their sustainability efforts to EPA's so as to**  
15 **promote co-funding and/or collaboration where appropriate?**

16  
17 **S6(a): Does the strategy enable ORD to prioritize its research investments?**

18  
19 The Strategy document identifies five objectives for ORD research (understanding of  
20 systems, development of decision-support tools, development of technologies,  
21 collaborative approaches to decision-making, development of metrics and indicators)  
22 and six broad research areas (“themes”—namely renewable resource systems, non-  
23 renewable resource systems, long-term term chemical and biological impacts, human-  
24 built systems and land use, economics and human behavior, information and decision-  
25 making).

26  
27 Examples of more specific, but still sufficiently broad, research questions are offered for  
28 each of the six research themes. In this document, ORD elected to present criteria that  
29 could be used to set priorities, rather than trying to identify research priorities directly.  
30 Specifically, these criteria are (i) “high impact;” (ii) “true to EPA’s research capabilities;”  
31 (iii) “true to EPA’s role” and mission; (iv) “leverage:” higher priorities on research that  
32 ultimately leads to sustainability on a large scale, with EPA partnering in initial research  
33 or through transfer and diffusion of knowledge, methodologies, and approaches; and (v)  
34 systems context.

35  
36 The Strategy clearly states that it is up to the individual multi-year plans and to the  
37 National Program Directors to identify their priority sustainability research areas.  
38 (Indeed, the Plan document presents criteria for setting priorities—grouped into primary  
39 and secondary criteria—that are consistent with those in the sustainability strategy  
40 document.)

41  
42 Moreover, the Strategy emphasizes that each individual multi-year plan should develop  
43 a balanced research portfolio with a good mix of short-term and long-term projects,  
44 known and emerging issues, projects that are traditionally central to EPA’s mission  
45 (e.g., water) and projects that are at the boundary of EPA’s responsibility but still  
46 important for sustainability (e.g., agriculture and the health of aquatic systems),

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1 research that supports decision-making within EPA (programs and regional offices) and  
2 research that supports decision-making in the industry and in other local, state and  
3 federal organizations.

4  
5 The Committee had mixed reactions regarding the efficacy of this agenda and the  
6 criteria employed for setting research priorities. The Committee determined that, on  
7 the whole, the research portfolio composition was appropriate for ORD. However, in  
8 practice, several Committee members expressed reservations over whether the  
9 compelling science questions and priorities that truly speak to sustainability and its  
10 cross-cutting issues would be addressed as part of ORD's sustainability research  
11 program.

12  
13 Recognizing that the Agency is poised to assume a global leadership role in  
14 sustainability research, the Committee strongly recommends that, in light of ORD's  
15 limited budget, that the following parallel activities be conducted immediately: (i)  
16 conduct core research on sustainability focusing on the development of defensible  
17 sustainability metrics, and (ii) implement a small number of Agency-sponsored  
18 technology demonstration projects that provide ORD with the opportunity to achieve  
19 significant visibility within the sustainability research arena. It is important that these  
20 demonstration projects move away from waste/end-of-pipe approaches to take a  
21 broader, system-based perspective. Examples of such projects might include an  
22 assessment of (i) biofuels policies and options, which are topical and encompass a  
23 broad range of issues and potential impacts on emissions of greenhouse gases,  
24 agriculture, dependence on imports of fossil fuels, etc. and may imply a variety of  
25 economic incentives; (ii) a study of the hypoxic environment in the Gulf of Mexico or the  
26 Chesapeake Bay, and (iii) wastewater practices and infrastructure needs in regions and  
27 cities with accelerated population growth.

28  
29 **S6(b): Does the strategy define an appropriate role for EPA relative to other  
30 funding agencies? Does it sufficiently encourage other Federal agencies and  
31 organizations to relate their sustainability efforts to EPA's so as to promote co-  
32 funding and/or collaboration where appropriate?**

33  
34 The Strategy lists specific projects and programs with a sustainability emphasis or focus  
35 in other agencies. It also identifies other federal agencies with overlapping interests for  
36 each of the six broad research themes, as well as international partners. Despite these  
37 lists, however, and EPA's acute awareness of other nations' focus and recent advances  
38 on sustainability matters, the discussion and the information offered on page 71-73 is  
39 too cursory to allow the Committee to judge whether these other agencies will feel  
40 encouraged to establish partnerships with EPA and promote co-funding and  
41 collaborations.

42  
43 **S7 Does the Strategy outline an adequate roadmap for ORD to implement this  
44 program (P2 transition to Sustainable Technology, coordination among NPD and  
45 across existing multi-year plans, leveraging interagency cooperation, and  
46 defining emerging research areas?)**

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The roadmap for implementation of the program is described in Chapter 6, pp. 61-75, beginning on page 64 and includes four implementing steps: (1) transition the current pollution prevention and new technologies research program into a Science and Technology for Sustainability Research Program; (2) coordinate with other multi-year plans; (3) coordinate and partner with EPA Program and Regional Offices and other government organizations, communities, nonprofit organizations, universities, and industry; and (4) identify and pursue future research opportunities.

The Committee supports ORD’s roadmap for implementation of the Sustainability Research Strategy. Coordination with other multi-year plans is essential to the success of the Sustainability Research Strategy. The implementation of the Sustainability Research Strategy through a number of multi-year plans will begin to provide the Agency with a distributed core of sustainability research in ORD. Coordination with EPA program and regional offices and other government organizations will provide additional needed capacity to carry out the research program.

Implementation of the Strategy is organizationally challenging because it relies on cooperation throughout ORD and EPA. The Strategy is an important step for ORD and for the Agency, and the Committee supports ORD’s initiative. Explicit management support of the Sustainability Research Strategy would be important to ensuring successful implementation.

**S8 Does the SAB believe that sustainability research is a sufficiently strong concept for integrating and coordinating across ORD research programs?**

In the face of exponential economic and population growth, in addition to the threats of a possible oil crisis, global warming, and ozone depletion, it is clear that novel actions must be taken in order to ensure the continued prosperity and progress of our generation and those of the future. New methods must be developed to balance the needs of present and future populations with the real limits of our natural resources. Attempting to remedy ecological damage by “stovepipe” policies represents an incomplete understanding of pollution and the environment. Thus, environmental scientists and decision-makers are presented with a multitude of environmental challenges in developing new models, methods, and technologies to deal with pollution and environmental protection in a holistic, systems-based manner. The philosophy of sustainability has the capacity to provide the answers to these challenges when applied to relevant scientific, social, and economic fields.

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1 Sustainability impacts and is impacted by variety of disciplines, and thus a  
2 multidisciplinary and multimedia approach to managing our environment is required  
3 Building on the definition taken from the well-known Brundtland Report, the ORD draft  
4 document defines sustainability as “meeting basic environmental, economic, and social  
5 needs now and in the future without undermining the natural systems upon which life  
6 depends.” Thus sustainability is conceptualized as a dynamic process, an open-ended  
7 challenge, in which scientists, economists, and lawmakers work together to solve  
8 present problems and anticipate future issues.

9  
10 More precisely, the Strategy identifies “Six Themes of Environmental Sustainability,”  
11 that will underpin the Agency’s approach to sustainability. They are: natural resource  
12 protection, non-renewable resource conservation, long-term chemical and biological  
13 impacts, human-built systems and land use, economics and human behavior, and  
14 information and decision-making. These themes reflect the concept upon which the  
15 Strategy is predicated – that “the nation is most capable of achieving sustainable  
16 environmental outcomes by investigating resources . . . in a systems-based context and  
17 incorporating the influences of economy and human behavior where appropriate.”  
18

19 The report of the 2005 National Academies of Sciences cited in the ORD draft  
20 document identified eight priority sustainability areas in need of government support,  
21 including green chemistry and engineering, energy intensity of clean processing, and  
22 separation sciences, among others. These fields all represent the frontier of  
23 environmentally conscious sciences, as well as representing specific research areas in  
24 which the ORD has a vested interest, and an accordingly strong presence.

25  
26 In addition to intramural research programs, the Strategy proposes ORD involvement  
27 and collaboration with government programs at the federal and state level, and also with  
28 industrial programs. Thus, sustainability effectively helps to coordinate and integrate a  
29 broad range of ORD research programs. However, two main issues are not  
30 emphasized;

31  
32 (1) increasing food (both crop and animal) production and its  
33 consequences to the environment; and

34  
35 (2) multimedia nature of a sustainable strategy.  
36

37 The EPA is the Federal agency most concerned with research designed to protect and  
38 utilize the natural resources of the environment. It is, therefore, appropriate for the  
39 Agency to fund research programs that will serve its mission, and, where possible,  
40 assist the missions of other agencies. The Strategy will create opportunities for co-  
41 funding/coordination between the EPA and other Federal agencies in science,  
42 engineering, economic and social fields, as sustainability comes to the forefront of  
43 research programs in many different disciplines.  
44

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1 While sustainability research can play an important role in integrating and coordinating  
2 across ORD research programs, the exigencies of Agency mandates and to a lesser  
3 extent resource constraints and the "ownership" of key topics by other agencies, means  
4 that the portfolio of ORD research programs is not likely to be completely conducive to  
5 integration in this manner. However, sustainable development must be taken seriously  
6 by the entirety of upper management at the Agency and a critical core of Agency  
7 scientists.  
8

### 3. Responses to Charge Questions Relating to the Plan

**P1 Does the organization of the new Sustainability Technology Plan provide a clear logical framework for implementing an element of the overall Sustainability Strategy?  
Does the Plan follow appropriately from the Sustainability Research Strategy?  
Are the research issues identified in the Plan consistent with the research questions identified within the Sustainability Research Strategy?**

Yes. The Committee agrees that the organization of the new Sustainability Technology Plan provides a clear logical framework for implementing an element of the overall Sustainability Strategy. The Committee recognizes that financial and personnel resources are limited for this program. Within this context, the Plan identifies a set of issues that are consistent with the Sustainability Research Strategy and current ORD capabilities. The criteria for project selection should be reviewed to ensure that they effectively focus research on projects that will contribute more effectively to the Sustainability Research Strategy.

The Committee is largely satisfied with the content of the Plan through Chapter 4. These parts of the Plan discuss the shift to sustainability, the foundation of a sustainability program, creation of a framework for the Plan, and prioritization of the Plan research. The Committee did engage in extensive discussion about Chapter 5, which presents the specifics of the planned research program. The Committee has a number of comments on the specifics of the planned research program. These comments are included later in this document.

**P2 For each major research theme addressed within the Plan (e.g., Sustainability Metrics, Decision Support Tools, and Technologies), do the Annual Performance Goals (APGs) and Annual Performance Measures (APMs) represent a logical progression of activities and intended outcomes? Does the Plan identify the specific issues motivating the research program?**

On the one hand, within each major research goal related to metrics (LTG 1), tools (LTG 2) and technologies (LTG 3), the respective APGs and the APMs do represent a logical progression of activities and intended outcomes. While one could debate the choice of LTGs and related APGs and APMs, for those cited there is a logical progression of events for intended outcomes.

While on the other hand, if one looks at the progression of the three major LTGs, the Plan appears to be chronologically inconsistent. Technology development is identified as a major focus in the short term while development of sustainability metrics is not addressed until 2008-2011. A more logical progression within the context of a overall focused sustainability research project is described as follows:

1. Develop the appropriate metrics

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1       2. Develop any decision support tools required for analysis (keep this systems  
2       based if possible and linked to metrics).

3  
4       3. Investigate technological options to reach the goal and try to get the technologies  
5       in place (SBIR grants, performance incentives...).

6  
7       Again, the goal is to link metrics, with decision support, with technological innovation  
8       within one project that can be completed with available resources. Currently, there is no  
9       clear progression among the 3 LTGs described in the document.

10  
11       **Does the Plan identify the specific issues motivating the research program?**

12  
13       While there does appear to be a logical progression of activities and intended outcomes  
14       presented within each LTG, it is difficult to determine the overarching objective and  
15       specific goals for the research program proposed. While the overall strategy is  
16       appropriate insofar as sustainable outcome measures related to energy, air, water,  
17       materials, land and ecosystems are concerned (see Table 1.1), there is no clear  
18       integration between the research program and how these outcomes will be achieved.  
19       Furthermore, the probability of achieving the intended outcomes is low due to resource  
20       (appropriate personnel and funding) constraints. Realizing such constraints and  
21       wanting to achieve maximum impact for the resources invested, one recommendation is  
22       to select one or two key demonstration projects, focused on a real and current  
23       sustainability issue where the approach can include all the aspects of metrics  
24       development, development and application of decision support tools, and technology  
25       development and demonstration. The actual projects identified should have a major  
26       impact for the municipality, region, or even industry that is the focus of the project, with  
27       the information gained easily transferred to other entities.

28  
29       **P3       Does the Plan lay out a balanced program addressing both short-term  
30       and longer-term research that meets current needs while positioning the Agency  
31       to respond to emerging issues?**

32  
33       The Science and Technology for Sustainability Multi-Year Plan (Plan) builds upon the  
34       framework of the Pollution Prevention and New Technologies (P2NT) Research  
35       Program, created in 2000. Under the P2NT program, much progress has been made in  
36       a variety of fields pertaining to sustainability, such as the development of Environmental  
37       Impact Assessment Models, the Small Business Innovation Research Program, and the  
38       Technology for a Sustainable Environment programs.

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1 The P2NT program was reviewed by the Federal Government's Office of Management  
2 and Budget, and several recommendations were made to improve the program,  
3 including "becoming more focused on the need of Agency client offices, fostering more  
4 collaboration with other researchers (academic, industrial, and government), and  
5 developing an ability to measure and track program results over time." Thus, the Plan  
6 benefits from being created with these recommendations in mind, focusing on  
7 coordinating interdisciplinary programs, setting long- and short-term goals, and  
8 measuring the program's performance in an effective way.

9  
10 The Plan establishes three long-term goals (LTGs), with the overall vision of "providing  
11 support to regional and national sustainability polices and initiatives." First, the Plan  
12 seeks to identify and create scientifically based sustainability metrics, which will allow  
13 scientists a clearer picture of what a healthy, sustainable ecological system looks like.  
14 Next, the Plan calls for the development of decision-support tools that promotes  
15 environmental stewardship and sustainable management practices. Thirdly, the Plan  
16 calls for the development, application, and demonstration of innovative technologies  
17 that solve environmental problems and provide sustainable outcomes.

18  
19 The description of these three long-term goals is sufficiently broad to allow flexibility in  
20 their execution, but specific enough to establish criteria for their measurement. In  
21 addition, the related research program also has several performance measures which  
22 rely upon feedback from the Agency's clients, e.g., individuals, communities,  
23 government and private companies.

24  
25 Furthermore, the ORD has established criteria by which research activities may be  
26 prioritized. The primary criteria are: resource availability, relevance to the Agency's  
27 Mission and Addressing Program Office Needs, and Staying True to ORD's Research  
28 Capabilities. These criteria raise serious questions regarding implementation in that the  
29 draft document reports that the resources allocated to the existing P2NT research  
30 program are modest and, in fact, are expected to decline. With this in mind, are the  
31 long-term goals of the Plan attainable? Will new research programs fail to be funded,  
32 although there may be potential for a highly positive environmental impact? Is the Plan  
33 itself a sustainable program? This question is of the utmost importance as all goals and  
34 plans are predicated upon the availability of adequate resources.

35  
36 The Plan calls for responding to emerging issues, but lays out no strategy for identifying  
37 these issues or organizing a coherent response. ORD needs to be specific about how it  
38 will track emerging issues, prioritize them, and decide how best to address them. This  
39 function will be important in terms of also identifying future partners within the  
40 government, industry and academia. The resource demands for issue tracking are not  
41 extensive, but ORD or other Agency program offices must be responsible for tracking  
42 not just relevant environmental issues but changes in industrial production technologies,  
43 social behavior and economic drivers that may result in new opportunities to achieve  
44 sustainable outcomes.

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1 If this is a more helpful interpretation around the topic of balance, then it might be useful  
2 to weight the balance somewhat in favor of short term research projects that develop  
3 useful products in the next year or two; and slightly less towards long term (i.e. research  
4 projects that develop useful products within five years) so that early successes are  
5 ensured.

6  
7 **P4 Do the long-term goals address the high-priority science, engineering,**  
8 **and technology needs of users that will help the Agency meet its**  
9 **strategic goals relating to sustainability? Do the long-term goals clearly**  
10 **relate to the research tracks within the multi-year plan framework? Do**  
11 **they provide a picture of what the program is trying to achieve? Will the**  
12 **proposed research activities lead to progress toward these goals? Are**  
13 **the goals appropriately linked to long-term environmental outcomes?**

14  
15 **(a) Do the long-term goals address the high-priority science, engineering, and**  
16 **technology needs of users that will help the Agency meet its strategic goals**  
17 **relating to sustainability?**

18  
19 This set of charge questions requests commentary from the SAB on the long term  
20 efficacy of the proposed sustainability research program. Addressing the longer term  
21 outputs and outcomes of the program is important because ORD research has  
22 historically been focused on shorter term needs, often driven by political imperatives  
23 rather than science-based prioritization.

24  
25 Chapter 3 of the Plan explains clearly the linkage of the LTGs to the Sustainability  
26 Research Strategy, which examines six broad themes of environmental sustainability. It  
27 is not clear, however, how much of an impact the general LTGs will actually have in  
28 advancing sustainable approaches to management and addressing specific  
29 sustainability challenges. The LTGs address high-priority science, engineering, and  
30 technology needs mostly indirectly. Moreover, specific sustainability challenges involve  
31 more than just science, engineering, and technology research needs (i.e., the need to  
32 integrate economics, social sciences, architecture, and planning).

33  
34 The Committee encourages the Agency to identify and document its role in facilitating  
35 the development of new, more sustainable technologies (APG 3.2). Although, in the  
36 majority of cases, such development is best left to the private sector, the Agency can  
37 play a unique and major role in highlighting the cross-cutting environmental problems  
38 for which sustainability technology is urgently needed. Moreover, the Agency can  
39 facilitate the interfacing between the federal government and private industry through  
40 the P2 program, certify and evaluate data and making it available to the sustainability  
41 community (consistent with proprietary requirements), verify sustainability technologies,  
42 ensuring that consistent metrics are used by all stakeholders (including various Agency  
43 offices and programs), and conduct research on ways to incentivize companies to invest  
44 in and adopt new technologies.

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1 **(b) Do the long-term goals clearly relate to the research tracks within the multi-**  
2 **year plan framework? Do they provide a picture of what the program is trying to**  
3 **achieve?**

4  
5 In Chapter 5 of the Plan, the planned research described via the APGs is consistent  
6 with the LTGs under which the APGs are listed. The inclusion of particular APGs can  
7 be debated, and other possible APGs could be suggested. The proposed research  
8 activities represented by the APGs will clearly lead to progress, but the likely impact of  
9 this progress in helping to address specific long term sustainability challenges is not  
10 clear.

11  
12 One clear role that the Agency can play to which the Plan alludes but does not explicitly  
13 develop is that of conducting “regular and continuous assessments of environmental  
14 trends”. If indeed the Agency assumes this role, and makes such assessments  
15 available to the public, then it will be performing a valuable service that can enable  
16 decision makers at all levels to respond to emerging issues as well as ongoing ones.

17  
18 **(c) Will the proposed research activities lead to progress toward these goals?**

19  
20 The document has specific deliverables but it is unclear where the research questions  
21 are developed and prioritized. There is little in the Plan about cooperative research with  
22 universities and industry. In the latter case, there needs to be a shift in Agency policy to  
23 move from one of regulation to one more focused on demonstrating the business case  
24 for sustainability. In this regard, having regulations in place to drive certain sustainability  
25 initiatives, once identified, can help but should be done judiciously.

26  
27 The Committee notes that Plan LTG 1 focuses on the development of metrics for  
28 assessing environmental systems, but the Agency fails to follow this same approach for  
29 prioritizing its research. Without such an approach, the sustainability research portfolio  
30 may not reach its maximum long term value.

31  
32 **(d) Are the goals appropriately linked to long-term environmental outcomes?**

33  
34 This area is perhaps the weakest part of the Plan. The outcomes, while measurable, are  
35 not focused on achieving goals through the application of sustainability principles (such  
36 as dematerialization, material substitution, development of alternative energy sources,  
37 process modification, fostering of innovative technologies, organizational change,  
38 supply-chain management, and total cost accounting, to name a few). Without this  
39 aspect, the plan runs the risk of retreating to a focus on single-media, end-of-pipe  
40 treatment.

41  
42 **P5 Are the research products supportive of the strategic target as set**  
43 **forth in the Agency’s Strategic Plan under Objective 5.4?**

44  
45 Objective 5.4 of the Agency’s Plan focuses on enhancing society’s capacity for sustainability  
46 through science and research. More specifically, it states that the Agency will “(C)onduct

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1 leading edge, sound scientific research on pollution prevention, new technology development,  
2 socioeconomic, sustainable systems and decision tools. By 2011, the products of this  
3 research will be independently recognized as providing critical and key evidence in informing  
4 Agency policies and decisions and solving problems for the Agency and its partners and  
5 stakeholders.”

6  
7 The LTGs set forth in the Plan certainly support this strategic target, by establishing  
8 sustainability metrics, creating decision-support tools, and developing and applying cutting-  
9 edge technologies to solve environmental problems. However, it is not clear who will be  
10 leading the proposed efforts, how funding will be prioritized, or how the research products will  
11 be defined. In Section 4.2, a series of research questions is provided that are directed at the  
12 LTGs. Each of these questions are important and complex and in Chapter 5 the planned  
13 research program presents APGs that address these questions. Limited detail is provided in  
14 the Plan with regard to what the research products will be and therefore, it is difficult to assess  
15 the nature of the products or their significance. With the limited budget projections, it is  
16 unlikely that products will have a demonstrable impact on enhancing the science or decision-  
17 support of sustainability.

18  
19 **P6 Does the scope of work proposed within the Plan complement research**  
20 **being supported by other programs inside and outside EPA?**

21  
22 The Committee found that the scope of work appeared to complement research inside  
23 the Agency and perhaps outside the Agency. More extensive investigation and  
24 documentation of external research related to the Plan is urged.

25  
26 **P7 Are there other potential emerging research areas that the Plan should**  
27 **consider?**

28  
29 The LTGs are sufficiently broad to cover most emerging issues, however, it is unclear  
30 how the Agency will identify, prioritize, and respond to emerging issues on an on-going  
31 basis. The plan should reflect this since it has both resource and coordination  
32 implications (for instance, coordination with the 16 other MYPs). What criteria will be  
33 used to define “emerging” issues, how will they be prioritized, and what type of criteria  
34 could be used to evaluate “success” in terms of addressing an emerging sustainable  
35 development challenge (versus an existing one)?

36  
37 What should the balance be between existing and emerging, which is related to the  
38 broader issue of how to allocate resources using a portfolio-of-initiatives approach?

39  
40 **P8 Is the level of resources specified by the Plan sufficient to address the**  
41 **research issues that it identifies, allowing ORD to achieve the intended**  
42 **outcomes of the research program? Is the Plan’s relative allocation of**  
43 **those resources among the research tracks of the sustainability research**  
44 **program appropriate, based on a consideration of scientific and**  
45 **programmatic needs?**

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1 The level of support specified for the Plan is \$2.7 million external and 36.5 internal full-  
2 time equivalents (FTEs). Assuming the 36.5 FTEs translate into something on the order  
3 of \$4 million, this suggests that the Agency is allocating about \$6.7 million to  
4 sustainability research (with the hope that it will increase by 10-20% in the near future).  
5 Even in times of declining budgets, EPA is still a \$7.3 billion agency, meaning that the  
6 sustainability initiative is less than one one-thousandth of the Agency's budget. Even if  
7 the comparison is made only against the S&T budget, the fraction approaches to no  
8 more than 1%. No other multi-year plan is allocated such a miniscule resource base.

9  
10 The Committee is perplexed by such modest levels of support for a program that  
11 promises to re-focus the way the Agency does research and re-evaluate the basis for  
12 the risk-based paradigm. Given the enthusiastic and expansive goals and metrics for  
13 this program, and assurances of "traction" of the sustainability theme within the Agency,  
14 the Committee is, frankly, disappointed that the Agency is unwilling to initiate this  
15 program at a more substantial level. The Plan correctly points out that as the value of  
16 the sustainability program becomes recognized, other program directors and offices will  
17 become more compliant with its attributes, goals, and metrics, and will presumably  
18 become active in seeking out collaborative projects. Even so, in the Committee's  
19 opinion, this initial allocation, even if grown in the short term by 20%, falls far short of  
20 that needed to elevate the sustainability paradigm to a level where it is visible within the  
21 Agency, the federal government, and the nation. In the Committee's opinion, a  
22 substantially higher commitment is needed to have a serious impact on internal  
23 research priorities, managerial buy-in, and program visibility and growth.

24  
25 The level of support allocated will limit progress and suggests that the Agency does not  
26 assign high significance to sustainability-based themes into its research programs. For  
27 example, the priorities for future research activities (Section 5.4 of the Plan) would result  
28 in further narrowing ORD sustainability research into the areas of its existing expertise.  
29 Instead, the Agency could seek to develop new and greater capacity in sustainability  
30 research through a combination of new personnel with training in sustainability research  
31 (directed hires), incentives for existing personnel to explore ways in which their  
32 expertise could be incorporated into the sustainability model (such as focused  
33 sabbaticals for Agency scientists), pioneering new models of cooperative research  
34 (such as partnering with industry and other agencies), and sustainability "think tanks"  
35 within the Agency. In the Committee's opinion, environmental sustainability should  
36 become a main thrust of ORD with allocation of resources assigned to a level  
37 commensurate with its importance for current and future decision-making.

38  
39 **P9 Does the Plan appropriately address findings and recommendations in**  
40 **evaluations of the program and its components?**

41  
42 Discussions between ORD officials and members of the SAB Committee revealed that  
43 this question pertains to the responsiveness of ORD to the feedback from the Program  
44 Assessment Rating Tool (PART) Review of USEPA's Pollution Prevention and New  
45 Technologies Research Program (P2NT).  
46

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1 In addressing the PART Review of the P2NT Program, the Plan briefly expresses  
2 concerns about: 1) becoming more focused on the need of Agency client offices, 2)  
3 fostering more collaboration with other research programs and 3) developing an ability  
4 to measure and track program results over time. Discussions with the Agency indicated  
5 that concerns had emerged during the PART review related to the lack of a timely  
6 review and failure to integrate all parts of the P2NT program.

7  
8 ORD's responses in the Plan to P2NT's PART review was insufficient for the Committee  
9 to provide a comprehensive response as more detailed information about issues  
10 pertaining to the PART review should be included in the Plan.

11  
12 The Plan and feedback from ORD during the June 13-15 meeting indicated ORD is  
13 interested in working with other Agency program offices as well as regional offices and  
14 state agencies. The Committee applauds ORD's commitment to enhancing inter and  
15 intra-Agency interactions on sustainability-related activities but suggests that ORD  
16 provide greater clarification within the Plan regarding the specific steps that will be  
17 followed to achieve meaningful collaboration. In particular, ORD needs to explicitly  
18 describe how it will work with other governmental organizations and achieve  
19 measurable outcomes that will be helpful for future assessments of the sustainability  
20 program.

21  
22 There is also information in the Plan that demonstrates ORD's intent on increasing  
23 collaborative efforts with research programs external to the Agency. More explicit  
24 descriptions of how such collaborations will be developed and implemented need to be  
25 strengthened within the Plan. The issue of developing methods to measure and track  
26 program results is briefly described as part of LTG1 in terms of identifying and creating  
27 scientifically based sustainability metrics. Such efforts aimed at developing techniques  
28 to measure and track sustainability program results should be described in greater  
29 detail. Overall, the Plan is commendable but in many instances is vague particularly  
30 when describing proposed results and outcomes that pertain to sustainability. Planned  
31 efforts to quantitatively describe those planned results and outcomes need to be  
32 expanded in light of future external assessments of the sustainability program.

33  
34 This Committee review and the upcoming BOSC review should address the concerns  
35 delineated in the PART evaluation about timely review. Regarding the integration of the  
36 elements of the P2NT (now sustainability) research program, the Plan provides  
37 evidence of substantial efforts at coordination and integration. The Committee's  
38 evaluation of those effects is described in the responses to other Plan charge questions.

## 4. Additional Advice

### 1. The Committee recommends that the Agency better define those terms associated with the sustainability strategy and the measurement of sustainability outcomes.

The Strategy and the Plan need to define sustainability more clearly and overtly. In this regard, the documents would benefit from explicit acknowledgement of competing definitions of sustainability—thereby providing both context for the Agency’s choice among the various definitions and recognition of alternative views of this contested and often vague topic. Similarly, the Agency should acknowledge the emphasis in its approach on environmental sustainability. (There should also be greater care taken to avoid conflating sustainability and sustainable development.) Clarity about these definitions will help readers better grasp choices made by the Agency and help them locate their own understanding of sustainability relative to the Agency’s deliberations.

In addition, some discussion of the attributes of sustainability (already implicit in the draft documents)—e.g., systems approach, integrative science—making clear where possible if the attributes are unique, necessary or sufficient markers of sustainability, will help the Agency avoid problems where the programs, Plan and other constituencies that it hopes to enlist in sustainability research, deem their existing activities as falling under this rubric without appropriate expansion, amendment or enhancement.

### 2. Picking Projects to Increase Internal and External Integration

The Committee feels that the careful selection of multifaceted research projects within the Plan is helpful to the adoption of the sustainability paradigm both within and outside the Agency. EPA has a prominent leadership mandate in the sustainability arena and its research projects and their products are important for adoption of the paradigm. The projects should have visibility and be nationally compelling. The research products should strategically integrate into the other 16 multi-year plans across the Agency and allow the Agency to guide other Federal agency research on sustainability.

A portfolio of projects should be considered that has balance with respect to factors such as risk, early winners, and geography. The portfolio might include regional projects, projects conducted with CRADAs with industry, projects conducted jointly with other agencies, or projects conducted in cooperation with programs overseas. The Agency has conducted many prior compelling studies and efforts that may be amenable to analysis and produce excellent sustainability science, so some retrospective analysis may be helpful. A portion of the portfolio may be considered high risk with anticipated high rewards. An internal “skunk works” might be considered as it can be strategic and allow certain higher risks projects to be conducted, particularly in emerging areas, to advance important sustainability science products. The portfolio should become the basis for articulating projects and products for the APMs and APGs in the MYP.

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1 Criteria for assembling the portfolio should be developed that include parameters such  
2 as balance, probability of success, and targeted product needs for internal and external  
3 adoption. These criteria should be more detailed than the primary and secondary  
4 criteria presently offered. Criteria for projects of high value but uncertain success may  
5 differ. The depiction of a clear linkage between criteria, project, product, and APMs and  
6 APGs in the Plan would be helpful.

7 Budgetary restrictions limit ORD's options in terms of sustainability technologies to  
8 explore, sustainability projects to fund and participate in, and aspects of sustainability to  
9 study within a project. Yet, to become a presence in the sustainability arena, ORD  
10 should be encouraged to think creatively and "outside the box."

11  
12 For example, given the importance of water resources and water resource  
13 development, especially in the West, why not explore options for reuse/recycle of grey  
14 waters, or collection and reuse of rain water, even if they are not envisioned within the  
15 current regulatory framework and current practice?

16  
17 Likewise, the portfolio of projects to fund or directly participate in might also include,  
18 along with obvious "winners", projects that examine unusual aspects of sustainability or  
19 innovative policy options and their relation to sustainability. The willingness to undertake  
20 such studies and to have a diversified portfolio would, in the Committee's opinion,  
21 enhance the Agency's scientific credibility within the sustainability research field.

22  
23 The same might apply when selecting which aspects of sustainability to examine in  
24 depth within a given project. Consider, for example, biofuels and biofuels policy options.  
25 In addition to studying the implications of biofuels use on greenhouse gas emissions,  
26 the impacts of biofuel crops on agriculture and the environmental consequences of  
27 biofuel crop practices, it might be valuable to examine how such environmental  
28 consequences are linked to social aspects of biofuel use and production. Similar  
29 considerations might apply to a project that studies hypoxia in the Gulf of Mexico,  
30 including implications for upstream agricultural practice and wastewater treatment,  
31 impacts on communities, economic activities and ecosystems at risk. ORD could serve  
32 as a coordinator for such a project. Another type of project where ORD would be an  
33 excellent leader and coordinator might be one focused on wastewater treatment, a real  
34 problem in communities with undersized capacity and high projected growth in  
35 population.

36  
37 The Committee believes that ORD's long-term success in establishing itself as a major  
38 stakeholder in sustainability research activities will depend on its research portfolio,  
39 which should include a mix of projects that are central to EPA's mission (e.g., watershed  
40 protection), projects that reside at the boundaries (e.g., agriculture and the health of  
41 aquatic ecosystems), and projects that specifically address emerging issues. To pursue  
42 them, ORD might consider partnerships with other agencies and/or international  
43 organizations as well as hiring personnel with the appropriate background, as discussed  
44 in overarching theme #3.

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1 **3. The Committee encourages the Agency to become more creative and**  
2 **strategic in developing its human resources programs with the goal of**  
3 **establishing a critical number of champions of the sustainability**  
4 **approach to environmental protection**  
5

6 In an era of constrained resources, it is essential that the Agency be strategic in the  
7 development and deployment of its human capital. It needs to address more explicitly  
8 the human resource implications of working on sustainable development. This involves  
9 combining the right talent with the right management structures, as well as addressing  
10 the issue of where the people are located in the EPA hierarchy. Just integrating  
11 sustainable development and outcomes into the existing ORD structures and programs  
12 may not be the best approach.  
13

14 If it were to achieve the goals of the Strategy and the Plan, there is a need to fill talent  
15 gaps. The Agency needs to acquire the requisite expertise through new hires, or  
16 through redirection of the workforce through transformation of existing skill sets or  
17 efforts of current staff, and through partnering and leveraging other programs in ORD or  
18 the agency as a whole. A sabbatical program to enable current staff to retool would  
19 allow the agency to better employ talented individuals whose current work is no longer  
20 supported. EPA should consider the use of internal transfers for EPA employees, the  
21 Intergovernmental Personnel Act (IPAs) to bring in academics, details for people from  
22 other agencies and fellowships for post-docs such as AAAS Science Fellows. It might  
23 be worth bringing in someone from another country that has worked on developing and  
24 implementing a national sustainability plan. This approach could allow another 6-10  
25 individuals with needed skills and talents to be added to the existing 35 FTEs as well as  
26 better positioning the current 35 FTEs.  
27

28 There are several areas identified for development. There are no in-house experts with  
29 a background in decision theory. If the Agency is to pursue the critical social dimensions  
30 of sustainability, even if its focus were limited to environmental sustainability, it needs to  
31 hire individuals with backgrounds beyond the physical sciences, engineering and  
32 economics. Stronger social science components that go beyond economics are needed.  
33 Such fields and tools include anthropology for ethnographic assessments (how  
34 individuals, households and communities think, behave and interact with products,  
35 technologies and natural systems) and psychology (behavioral economics) among  
36 others.  
37

38 If it were to be a knowledge agency as well as a regulatory one, it needs to devote  
39 some resources to analyses and syntheses of the outcomes of both intra-mural and  
40 extra-mural research as well as of the efforts world wide in this area. There is still more  
41 thinking that is needed around sustainable development and EPA's role as well as the  
42 need to catalyze additional people and resources. A part of this overhauled team should  
43 be isolated in a skunk works-type program (maybe 5-8 people) to do out of the box  
44 strategic thinking on this topic for at least a year without being saddled with  
45 management responsibilities.  
46

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1 **4. The Committee encourages the Agency to enhance the diffusion of**  
2 **sustainability concepts and practices within and outside the Agency (related to**  
3 **strategic human resource development, careful project selection and linkage with**  
4 **other multi-year plans, consideration of sustainability components for internal**  
5 **and external research projects, and securing and exploiting senior management**  
6 **buy-in).**  
7

8 There is a need for, and EPA should provide, leadership both internal to the Agency and  
9 external among the federal agency family and other organizations. The EPA has an  
10 opportunity to coordinate and lead in the definition of environmental sustainability and in  
11 the use of related research products that will influence how other federal agencies and  
12 organizations move forward with their sustainability programs. The Plan correctly points  
13 out that as the value of the EPA ORD sustainability program becomes recognized, other  
14 program directors and offices will become more compliant with its attributes, goals, and  
15 metrics, and will become active in seeking out collaborative projects.  
16

17 To achieve leadership by EPA in promotion of environmental sustainability, there needs  
18 to be a paradigm shift at EPA. The shift needs to be away from the current silos related  
19 to air, water, solid waste, etc and more towards a true systems approach involving  
20 personnel from many different areas, including different offices within EPA, the EPA  
21 regions, other government agencies such as DOD and DOE, community stakeholders  
22 (i.e., general public), and industry.  
23

24 There are many opportunities for EPA ORD to step up to a leadership role, even in the  
25 context of limited resources. ORD could seek to develop new and greater capacity in  
26 sustainability research through a combination of new personnel with training in  
27 sustainability research, incentives for existing personnel to explore ways in which their  
28 expertise could be incorporated into the sustainability model, pioneering new models of  
29 cooperative research within the Agency and with industry, and development of  
30 sustainability “think tank” within the Agency.  
31

32 The development and diffusion of sustainability metrics, tools, and technologies can be  
33 accelerated via the creation of in-house think-tank to consider how to infuse  
34 environmental sustainability approaches and thinking. The think-tank, a group of  
35 perhaps 5-8 people, could develop the messages that can catalyze additional people  
36 and resources. Such a program could become attractive since there are not many  
37 places in government now where out-of-the-box thinking on this topic can take place.  
38 These people should be kept out of the “weeds” to be able to think strategically about  
39 the topic for at least one year. Members of the think-tank group need to be systems  
40 thinkers with diverse backgrounds to focus and be agents of change within EPA.  
41

42 Careful project selection and demonstrated integration with other multi-year plans do  
43 matter. Internal and external interest in ORD sustainability research will be driven at  
44 least partially by successes (or failures) of early projects. The Science and Technology  
45 for Sustainability Plan should have some definitely achievable APGs and APMs for  
46 prioritized themes that will quickly deliver research product “winners.”

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1  
2 The research products should clearly tie into the other 16 multi-year plans. This way,  
3 results of the EPA ORD program in sustainability will be immediately relevant to the  
4 larger EPA, and will encourage more EPA groups to adopt the sustainability paradigm.  
5

6 The ORD should require the applicants for both extramural and internal research  
7 support to state how their proposed research impacts, affects, or enhances  
8 environmental sustainability. Similar to the “broader impacts” component required in all  
9 NSF proposals, a statement about “sustainability relevance” could be a required section  
10 in all proposals received by the Agency.  
11

12 To encourage a systems approach in EPA research, care should be taken to encourage  
13 systems thinking in proposals and to have an extramural review process that rewards  
14 not only good reductionist science but broad systems science that investigates many  
15 variables in one or a few systems.  
16

17 **5. The Committee strongly supports a greater and more explicit endorsement of**  
18 **the sustainability approach by the Agency Administrator as well as other senior**  
19 **Agency management personnel**  
20

21 EPA needs to demonstrate leadership both internal to itself and external among the  
22 federal agency family with respect to sustainability and environmental stewardship. To  
23 that end, within ORD, the position of National Program Manager for Sustainability needs  
24 to be created. Such a position should be expected to lead not only in ORD but in the  
25 Agency as a whole. Management of the overall team if developed as outlined in Section  
26 3 above will require skill and care. The National Program Manager, as well as  
27 leadership of the various programs directed at sustainability should be chosen carefully.  
28 Explicit support from the Administrator of this effort, and of this position is critical. It is  
29 also important that the Agency recognize that the opportunity for leadership across the  
30 federal agencies is now, and that a commitment from the highest levels will be  
31 transformative.  
32

33 **6. The Committee recommends that the Agency establish more effective and**  
34 **substantive collaborations with other federal agencies as well as the private**  
35 **sector.**  
36

37 The Agency and the ORD should be applauded for their recognizing the need to  
38 establish partnerships with sustainability related programs and activities being carried  
39 out by others as summarized in Section 5.2 of the Plan. However, the Committee feels  
40 that this is such an important item that more specific plans and goals in this regard  
41 should be clearly identified related to the specific environmental sustainability projects to  
42 be performed.  
43

44 As environmental sustainability relates to achieving a balance among the three areas of  
45 economic growth and viability, social responsibility and environmental protection,  
46 organizations associated with all three aspects need to be engaged. With much effort

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1 and focus being given to the issue of environmental sustainability by numerous groups  
2 ranging from governmental organizations, the private sector and academia, EPA could  
3 move into the key role of providing overall leadership and coordination among these  
4 different organizations by providing structure and focus as none presently exists.  
5

6 The Committee recommends that the Agency immediately initiate a thorough bench-  
7 marking exercise of different organizations dealing with environmental sustainability,  
8 both within the US and internationally as well as covering all the different stakeholder  
9 groups. This will serve to help bring the Agency personnel quickly up the learning curve  
10 as well as even help to identify some key focus areas that EPA could begin participating  
11 in directly. As a first step, ORD could just determine what is happening within other  
12 Agency program offices and determine what opportunities exists for greater  
13 coordination and resource leveraging. The lessons learned internally by the Agency  
14 could be expanded to other governmental organizations, academia and the private  
15 sector.  
16

17 In conclusion, actively engaging many of the other organizations focused on  
18 environmental sustainability can be the first step in EPA becoming the body that first  
19 brings the different groups to the table, and then provides the coordinating structure that  
20 holds them together to achieve true sustainability. This could also be the first step for  
21 all the other programs within EPA to be focused and coordinated under an overall  
22 environmental sustainability paradigm.  
23  
24