中央研究院109年度「永續科學研究計畫」

計畫徵求說明

壹、目標：

人類社會的永續力(the Sustainability of Human Society)是目前各界極為關心的議題。其包含的範圍非常廣泛，對國家社會的發展亦具深遠的影響。而其中許多待解決的問題，需要透過自然科學與人文社會科學進行跨域整合，尋求最佳實質解決問題的方法，並且找到實現的合適方式。本計畫為因應全球永續發展趨勢，並配合國家永續發展政策而設立之任務導向研究計畫。計畫考量重點在於研究完成後，應有明確的研究成果實際受惠者(the stakeholders)，且期許對全球永續發展、我國永續政策推動，具有實質的應用價值並能與國際接軌，計畫因此強調須於近程、中程皆有明確之里程碑。

貳、計畫類型：

為加強跨域合作成果之具體表現，本計畫徵求型態以整合型計畫提出申請。研究計畫以3年為期，每件計畫至少包含3件分支計畫，最多以不超過6件為原則。計畫總主持人負責該項整合型計畫行政及學術層面之領導暨協調。本永續科學研究計畫之徵求須著重於：

一、計畫應包含不同領域研究學者參與，且應進行整合以期成果相輔相成。

二、各分支計畫間及其與總計畫之間，應具備共同的整體性主軸與整合性議題，使計畫具備「整合型計畫」之實質意義。

三、為促成跨領域合作與可實際應用的研究成果展現，計畫總主持人具領導、整合各分支研究之能力。

參、計畫申請作業

一、申請人資格

(一)計畫總主持人需為本院專任助研究員(含)以上之專任人員；本院合聘之研究人員，得擔任計畫總主持人，但須有本院專任研究人員擔任共同總主持人。

(二)分支計畫主持人其現職需相當於助研究員(含)以上人員。

(三)分支計畫主持人須至少三分之一為本院研究人員。

(四)計畫內容如與其他獲補助執行中或申請中之計畫(含院內、外計畫)相關聯者，請務必揭露並敘明。

(五)現獲前瞻計畫補助之研究人員，如欲申請永續科學研究計畫，請依該計畫相關申請資格限制辦理。

二、計畫審查與核定

(一)109 年度永續計畫審查作業分為：初、複審及預算決審三階段。

(二)經核定通過之永續計畫總主持人及分支計畫主持人須簽署「中央研究院永續科學研究計畫執行同意書」。

(三)核定通過之研究計畫，涉及生物材料及基因重組相關實驗者，應檢附核准之生物實驗安全審核同意書；涉及動物實驗者，應檢附核准之實驗動物使用同意書；涉及以人為研究對象者，應檢附核准之人類研究倫理審核同意書。

(四)永續計畫執行期間，每年應提交執行進度報告由永續科學中心及學術諮詢總會進行評審，第一年執行進度報告評審結果將作為第三年經費核給之重要依據。計畫執行期間須配合參與永續科學中心定期舉辦之研究報告研討會及成果發表會；計畫執行期滿後需提送含具體成果(deliverables)之執行成果報告書。成果發表及報告評審結果，將作為日後申請院方計畫審查之參考。

(五)依據「中央研究院學術研究倫理教育課程實施要點」，執行以本院預算支應之研究計畫者，參與計畫人員每 3 年應接受至少 1 小時之學術倫理教育課程訓練，至遲應於開始參與研究計畫之日起 6 個月內完成；研究計畫執行期間短於 6 個月者，應於計畫執行期限內完成。

(六)計畫主持人如涉有違反學術倫理之情事者，本院得依「中央研究院各

級倫理委員會設置及作業要點」處理之。

(七)因永續計畫所產生之研究成果，發表時應註明來自本院經費；其管理與運用，依中央研究院科學技術研究發展成果歸屬及運用辦法之規定辦理。

三、109 年度「永續科學研究計畫」推動時程

- 108 年 5 月 15 日　　計畫徵求說明會
- 108 年 5 月下旬　　公告永續計畫徵求
- 108 年 7 月下旬　　計畫書截止收件
- 108 年 8-10 月　　計畫書審查(含申請人答辯)
- 108 年 11 月上旬　　計畫決審暨核定

肆、109 年推動重點：

本院自 102 年起即陸續規劃推動永續研究，希望將基礎科學接軌應用科學，並且再進一步透過社會科學探討於人類社會實現時的合適方式，藉此將永續科學的研究，用來解決人類永續發展上所面臨的困難，當然也鼓勵兼顧解決我國特有的永續發展困境。109 年度永續研究徵求主題將涵蓋三個面向，說明如下：

主題一：永續能源開發與相關長短期社會實踐問題的探討

人類社會發展因為太過依賴化石燃料能源已經造成地球環境的改變，這個持續的改變不但對人類社會造成了負面的影響，且長此以往估計甚至會對人類生存產生威脅。在減碳的全球共識下，其他低碳排能源的強化利用成為可能解決現今能源困境的途徑之一，然而近年來部分再生能源的開發與佈建，仍因各種阻力而進展有限。因此如何找到更合適的新能源，或是找到合宜的方式來使用既有的能源，是永續科學研究中主要的研究議題。這議題須要基礎科學研究上的突破，也須要工程實做各種條件的最佳化，更須要探討社會實踐時的合理方案。在這主題下所相關議題，均歡迎本院同仁組成跨領域整合團隊進行研究。109 年度優先考量下列子題：

(1) 可靠低成本且環境友善的創能與儲能技術開發

(2) 再生能源推動時的困境與解決方案探索

主題二：環境變遷下之健康議題

人類因地球表面近期的物理化學條件可以支撐我們生存需求，所以經由生物演化過程而在地球上出現，人類生存最關心的議題當然是健康，而健康與否又受制於是否有合適生存的環境條件，近代人類蓬勃的經濟活動雖然造就了更佳的生存條件，不過過度的開發利用也造成環境條件明顯改變，因此也常帶來對健康的負面影響，這個影響甚至可以大到威脅人類的生存，特別是近年人類已經明顯感受到全球暖化這個大環境的轉變，再一次提醒了我們要及早注意可能衍生的健康問題。環境中和健康相關的因子很多，舉凡水圈大氣圈中不同的物理化學條件改變都可以對健康造成負面的影響，因此我們不但要對環境中的複雜物理化學系統有深入的研究，也要對這些變化對健康所造成的影響路徑有明確的認知，才能防範於未然且有效的降低威脅健康的風險。109 年度優先考量下列子題：

(1) 環境條件變化與其相關健康威脅研究

(2) 環境因子改變所造成特定疾病的致病病理探討

主題三：環境友善多元效益之永續農業生物科技

全球人口成長使糧食需求增加，加上人類快速經濟發展不但造成大量碳排放，且全球暖化並致極端氣候發生頻率增加，另外，也新增許多環境的汙染來源，使得農業風險顯著增大，因此糧食安全成為永續科學的重要議題。農業科技發展常以地區為區塊，農業社會整體行為之調控相對困難，當環境變遷之衝擊造成農業壓力時，需有農業科技、社經管理各層面的整合調適，甚至需要國際互助，以降低糧食供需失衡造成之社會震盪。農業部門本身對環境汙染及溫室效應氣體的排放有一定佔比，因此有必要發展低汙染、低/負碳排、低耗能、高水保潛能等等的環境友善農業技術，但往往環境友善技術有偏高成本低效率的顧慮，因此如何從技術面改善而能達到效益多元，並易於廣域施作，甚至加入社經政策面的協作，可使得高成本低效率的負面效應降低，是永續農業現今發展的主要趨勢。109 年度優先考量下列子題：

(1) 跨領域環境友善農業技術

(2) 多元效益與精準農業技術

2020 Sustainability Science Research Program, Academia Sinica
Proposal Submission Instructions

I. Objective

The sustainability of human society is one of the most challenging issues that humanity facing today. It involves a wide range of fields and subjects that have major impacts on our society, and is recognized that only through cross-disciplinary research integrating the relevant physical sciences and humanity / social sciences can we hope to develop practical solutions and the right solutions for problems to realize sustainable development. The Sustainability Science Research Program (the SSRP), Academia Sinica (AS) calls for proposals to meet the challenge mentioned above and to fit in concert with global and national sustainable development policy via mission-oriented research. Furthermore, the proposals should define stakeholders, focus on applicability, connect to the international community, and identify the short-term as well as mid-term milestones.

II. Research Project Types

To strengthen cross-disciplinary cooperation and practical applications of research results, integrated research projects are solicited. Each integrated research project is allowed to have three to six subprojects. The term of each project is constrained to three years. The project director shall be responsible for coordinating all administrative and academic matters of the subprojects. The solicitation of the sustainability science research project emphasizes the following:

1. The project shall include researchers in different disciplines, and the research results shall be complementary to one another.
2. All subprojects shall be “integrated” into the main theme of the integrated research project.
3. The project director shall be capable to lead and coordinate the subprojects, to ensure cross-disciplinary cooperation, and practically apply the research results.

III. Application

1. Eligibility
   (1) A project director must be a full-time employee of Academia Sinica (AS) at the level of Assistant Research Fellow or above. A faculty member jointly appointed by AS may serve as a project director together with a full-time AS employee serving as the co-director for the main project.
   (2) A subproject PI must currently be at the level of Assistant Research Fellow or above.
   (3) At least one third of subproject PIs must be AS researchers.
   (4) It is required to disclose the information of any current or pending projects are partially connected or similar to applied proposal, within or outside AS.
   (5) Current awardees of the Career Development Award (CDA) shall strictly follow the guidelines of CDA if they wish to apply for the SSRP.

2. Review Procedures
   (1) The review procedures of the Program consist of three rounds: professional full-proposal review, panel review, and final budget-decision review.
   (2) The PIs of both main project and subproject of approved projects shall sign the "Project Execution Agreement, Sustainability Science Research Program, Academia Sinica."
   (3) Approved projects involving biological materials, genetically engineered materials, animal experimentation and human subjects may not be allowed to execute the project until letters of consent from relevant AS committees are obtained.
   (4) During project implementation, the annual progress report will be reviewed by the Sustainable Science Center (SSC) and the Central Academic Advisory Committee, and the review results will serve as an important basis for the third year funding. During project implementation, the research groups are required to join seminars and result presentations organized by the SSC. Upon project completion, an accomplishment report with deliverables needs to be submitted. The report review and result presentation will be used as a reference for future applications to AS-funded programs.
   (5) According to the "Implementation of Research Ethics Education at Academia Sinica," all personnel who directly perform any AS-funded research activity should receive at least one hour of academic-ethics training every three years. Such training must be completed within six months from the project inception. If the project is awarded to last less than six months, the aforementioned training must be completed within the duration of the project.
   (6) Should a project PI or project director be involved in academic ethics violations, his or her case will be investigated according to the "Guidelines for the Establishment and Operation of Ethics Committees at All Levels, Academia Sinica."
   (7) Any research achievements supported by the SSRP, AS shall be indicated in the proper acknowledgement form when published, and be managed in accordance with the "Academia Sinica's Scientific and Technological Research and Development Achievements and Application Methods".

3. Schedule of the 2020 Program
   - May 15, 2019 Information Session
   - Late May, 2019 Calls for Proposals
   - Late July, 2019 Proposal Submission Deadline
   - Aug-Oct. 2019 Professional and Panel Review (Including Applicant's Defense)
   - Early Nov 2019 Announcement of Awarded Projects and Budgets

IV. 2020 Research Focus Areas

Academia Sinica has been planning and promoting sustainability science research since 2013 in the hope of integrating basic science and applied science, and probing into the apt measures for such realization in human society through social sciences. In order to solve the dilemmas faced by mankind and our country, the main themes of the 2020 Sustainability Science Research Program will cover the following three aspects.

Theme 1: Investigation on Sustainable Energy Development and Its Related Long/Short-term Problems for Societal Implementation

The earth environment has been substantially changed since the economic development of human society heavily relied on fossil fuel energy. This enduring change has not only caused negative impacts on human society, but also threatened human survival in the visible future which has been scientifically presented in recent years. Having the consensus on the carbon-dioxide excess, we believe that the exploit of low-carbon energy sources holds the key to solve the current energy dilemma. However, the development and construction of low-carbon emission or renewable energy sources, has encountered various resistances. Hence developing suitable energy sources and finding ways to utilize existing energy are important topics in studies within sustainability sciences. The goals of this call are to make breakthroughs in basic scientific research, to optimize various conditions for engineering practice, and to explore reasonable solutions in societal implementation. Scientists in Academia Sinica who are interested in working towards above goals are encouraged to form cross-disciplinary and integrated teams and to submit proposals to this call. Priority of Year 2020 will be given to:

(1) To develop reliable, low-cost, and environment-friendly energy and energy storage technology;

(2) To explore the solutions of the dilemmas when promoting renewable energy.

Theme 2: Health Influences under the Environmental Changes

Health is eternally a concern for human survival and closely dependent on physical and chemical conditions of the Earth environment that has become suitable to support modern bio-activities after a long history of the Earth evolution. The vigorous economic activities of modern humans have created excellent living styles; however, excessive development and utilization have after all caused significant changes in physical and chemical conditions of the environment. It has been confirmed that a variety of negative impacts on human health have been generated, among which some impacts may seriously threaten human survival. The phenomenon of global warming is one of the examples that will lead to a series of condition changes in atmospheric and hydrological systems. To effectively prevent the negative impacts and reduce the risks to human health, this call is looking for proposals on the complex physical and chemical systems driving in the Earth environment as well as on the explicit pathways among these systems to affect our health. Priority of Year 2020 will be given to:

(1) Environmental condition changes and their associated health threats;

(2) The pathology of specific diseases caused by environmental condition changes.

Theme 3: Sustainable Agricultural Biotechnology of Environmentally Friendly also Multi-beneficial

Agricultural risks have been raised not only because global population growth significantly increased food demand, but also the rapid economic development increased environmental pollution and the frequency of extreme weather events under climatic trend of global warming. Food security has become one of the most concerned issues in sustainable development and the adaption of agricultural social behavior is inevitable under severe environmental stress. Since agricultural management and its related science and technology often have regional constraints, the adaption of overarching agricultural behavior is relatively tough. International mutual-aid systems are sometimes needed to avoid societal chaos due to imbalances in regional food supply and demand. Although agricultural sector itself is one of the major sources in environmental pollution and providing greenhouse gases, environmental-friendly agricultural technologies leading to low pollution, low/negative carbon emissions, low energy consumption, but high water retention potential can help relieve above environmental impacts. Therefore, there is a great need for transdisciplinary integration of agricultural technology and social behavior management under the increasing trend of agricultural risk in visible future. This call encourages proposals to work on agricultural technology with multiple benefits and related management plan with social and economic strategy to effectively promote the technology. Priority of Year 2020 will be given to:

(1) Transdisciplinary and environmentally friendly agricultural technology;

(2) Precision agricultural technology for multi-benefits.