PRESS RELEASE

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NRF INVITES PROPOSALS FOR RESEARCH PROJECTS IN SUSTAINABLE URBAN SYSTEMS

- *Second scenario-based grant call seeks research proposals to address the challenges posed by high density urban living environments*

1. The increasing number of mega-cities[1] globally in the 21st century will impose tremendous strains on infrastructures and systems that sustain the functions and economic growth of countries. The scarcity of vital resources and the mounting pressure to maintain continual progress in productivity present opportunities for new technologies to be developed that could shape the way mega-cities operate and thrive. Technologies that can support carbon-neutral infrastructure projects, energy-positive buildings and sustainable construction (using recycled materials) will be in great demand. Singapore faces the challenge of a growing population within a limited land area. Therefore, it needs to develop and adopt technologies that can sustain a world-class high quality standard of living.

2. In light of these challenges, the National Research Foundation (NRF) will launch a Scenario-based Competitive Research Programme (CRP) grant call on "Sustainable Urban Systems" (see **ANNEX A** for more details). The Scenario-based CRP grant call develops a specific future setting to highlight major societal challenges faced by Singapore. The inaugural Scenario-based CRP launched in May 2008 was on "Ageing". Out of the 47 proposals received by the NRF, 4 awards were made on the recommendation of the NRF's International Evaluation Panel in January this year.

3. The CRP Funding Scheme provides funding of up to S$10 million per programme over three to five years. It aims to identify future strategic research areas for Singapore by supporting excellent research ideas involving multiple disciplines that are carried out at a programme level (see **ANNEX B** for more details).

4. Applicants are invited to submit a *White Paper* of up to five pages describing their research proposal and objectives as well as expected outcomes by **22 May 2009**. NRF will be assisted by a Local Evaluation Panel (LEP) and an International Evaluation Panel (IEP) to shortlist promising White Papers to be developed into *Full Proposals*, which would then be put through an international peer review process. NRF's International Evaluation Panel (IEP), chaired by Dr Rita Colwell, former Director, National Science Foundation, USA will recommend outstanding proposals to NRF for funding support. Proposals will be evaluated on research excellence, manpower development potential, economic impact and industry relevance.

[1] A megacity is usually defined as a metropolitan area with a total population in excess of 10 million people. Source: "How Big Can Cities Get?" New Scientist Magazine, 17 June 2006, pg 41

5. Submission of White Papers must be made at NRF's Research Portal – the Research, Innovation and Technology Administration system or RITA at https://rita.nrf.gov.sg.

The National Research Foundation (NRF)

The National Research Foundation (NRF), set up on 1 January 2006, is a department under the Prime Minister's Office.

The NRF sets the national direction for research and development (R&D) by developing policies, plans and strategies for research, innovation and enterprise, funds strategic initiatives, builds up R&D capabilities and capacities through nurturing our own and attracting foreign talent, and coordinates the research agenda of different agencies to transform Singapore into a knowledge-intensive, innovative and entrepreneurial economy. It provides secretariat support to the Research, Innovation and Enterprise Council (RIEC), chaired by the Prime Minister. A five-year budget of S$5 billion has been allocated to the NRF in 2006 to achieve this mission.

The NRF aims to:

- Transform Singapore into a vibrant R&D hub that contributes towards a knowledge-intensive, innovative and entrepreneurial economy; and
- Make Singapore a talent magnet for scientific and innovation excellence.

For more information, please visit www.nrf.gov.sg.

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ANNEX A

SINGAPORE IN 2020

A UN Population Fund report ("State of World Population 2007: Unleashing the Potential of Urban Growth") projected the development of at least 22 major urban centres with over 10 million people each around the world, that will house about 5% of the world's population by 2015. Over 80% of the world's urban population would live in the developing world.

Fast-forward to 2020…

In order to accommodate a growing population within a limited land area, Singapore has to increase the development and adoption of technologies in order to sustain a world-class, high quality standard of living for all.

Policy planners have to consider and balance many complex factors when planning for a resource-constrained, land-scarce Singapore. These include maintaining Singapore's economic dynamism, protecting environmental quality and biodiversity, while providing a safe, healthy and comfortable living environment which is conducive for building cohesive communities.

In mega-cities all over the world, high-rise buildings increasingly dominate the urban landscape as overall urban density increases to near breaking point. There will be a huge demand for critical resources such as food and water, to meet the needs of a fast growing population. Concerns on infectious diseases and other heath issues are high on the agenda of the city councils. In a carbon-constrained environment, greater energy efficiency is of increasing importance. Infrastructure investments are expected to surge as public agencies seek to ensure that facilities such as roads and housing are able to meet the escalating demand. Maintaining a clean and reliable water supply, clean air and a healthy balance of greenery with large urban built-up areas are also major challenges. At the same time, the threat of climate change demands innovative mitigation and adaptation measures.

This situation is not unique to Singapore. Asia is home to the fastest growing urban populations in the world. For cities in the region, such rapid urbanisation brings with it complex challenges in areas such as the sustainability of resources, security and risk management.

New technologies can be developed to provide solutions to these urban challenges. A review of existing systems can bring about new processes to improve efficiency and efficacy. Nevertheless, the opportunities caused by such urban challenges are tremendous and technological solutions to these problems would be highly sought after.

Below are some examples of technologies for the highly urbanized society in 2020:

- ***Efficient transportation system***
    - Transition to renewable energy powered transportation and environmentally friendly vehicles. Demand activated public transportation system, laser guided driver aids or personalised automated vehicles for point-to-point transportation.
    - Public transit systems which offer unparalleled convenience and accessibility.

- New design of intelligent expressways.
- Traffic control systems that could accommodate huge traffic volumes and contain features that could mitigate the deleterious consequences of accidents or heavy traffic build-up.
- Ultra high efficiency fuel for automobiles through novel ways of fuel processing or through genetically modifying fuel yielding crops.
- Technologies to minimize consumption of and reliance on non-renewable fuel resources.

- ***Sustainable renewable and alternative energy sources***
  - Generation of clean energy within Singapore's urban landscape.
  - Portability of devices requiring power.
  - Improving energy efficiency and the life span of batteries
  - Alternative approaches to harness energy for power transmission, telecommunication and electronic devices.

- ***Infrastructure and utilities***
  - Technology to reduce the impact of major utilities on neighbouring uses in a built-up urban environment,
  - Reduction of land needed for such utilities.

- ***Pollution issues***
  - Innovative environmental-friendly measures to reduce air pollution problems such as eco-efficient technology to eliminate green house gases and particulate matter.
  - New technologies to minimise noise and other nuisances in a dense urban environment.

- ***Communications***
  - Enhanced telecommunication network or data storage to support the masses.
  - Technologies to improve communication with better interfaces such as holography.
  - Display technologies and devices that are flexible and could be mounted on walls to minimize space.

- ***Food***
  - Alternative food sources to reduce Singapore's reliance on imported food and to detect contamination in food.
  - Synthetic biology applied to food production to improve the yield as well as the quality of food products.

- ***Waste management***
  - Technologies for waste with no universally accepted disposal methods.
  - Efficient waste-to-energy technologies that are scalable, with zero or low remaining residual which can be reused without further processing.
  - Low environmental footprint systems for waste disposal (i.e. low emissions, utilities consumption and land requirement), near to cost parity with landfill costs and which could be sited in close proximity with human activity.
  - Technologies to increase recycling yield and the value of recycled products.

- ***Urban greenery and urban ecology***

- Research to maintain Singapore's reputation as a garden city, such as the applications of greenery in urban settings for the well-being of city-dwellers.

- ***Security***
  - Technologies that provide ultra-fast verification of personal identity such as biometric security systems.
  - Technologies enabling the efficient purchase of goods and services.
  - Home security systems for the detection of intruders.

- ***Social studies***
  - Urbanization and mental health.
  - Problems of high density urban living, such as depression and anxiety, particularly among low income residents.
  - Innovative ways to build community spirit in a high-density living environment.

- ***Building materials and design***
  - Advanced materials that have high strength-to-weight ratio that would enable higher structures to be securely built with superior environmental performance.
  - Building designs that deliver quality of living and greater degree of community interactions in highly built-up areas.

- ***Public health***
  - Advance monitoring technologies to detect and eradicate vectors and rodents that create health hazards
  - Prediction and simulation of carriers of diseases to prevent outbreak of pandemic diseases in highly populated areas

- ***Low cost advanced technologies for the masses***
  - Disruptive innovations that could enable advanced technologies to be made available to the general population.

- ***Weather-proofing cities***
  - Urban climate observations and modelling and urban heat index
  - Solutions to mitigate the warming trend occurring in urban areas due to climate change and increased urbanisation.

This scenario-based CRP scheme aims to draw out research projects relevant to a highly urbanized, densely populated city such as Singapore. Such projects are expected to be multi-disciplinary in nature, and have a strong science base. The intent is for Singapore to become a world-class originator of innovative technologies, products and devices.

Principal Investigators are invited to identify a key urban challenge which Singapore will face in the future and propose a R&D programme to address this challenge. Proposals submitted should have high potential impact, if successfully developed. Incremental improvements of existing know-how and technologies are unlikely to be supported.

ANNEX B

NRF's Competitive Research Programme Funding Scheme

The National Research Foundation's Competitive Research Programme (CRP) Funding Scheme complements the existing Strategic Research Programmes that have been identified top-down, by funding a broad base of research ideas, through a competitive bottom-up approach. This will help to identify new potential strategic research areas in which Singapore can invest to develop core capabilities for new industries of the future.

The CRP Funding Scheme will support R&D programmes, each comprising multiple related projects under a unifying theme. Each award is for a maximum of S$10 million per programme, over three to five years. There are expected to be two rounds of grant calls each year.

While the CRP Funding Scheme is open to all areas of science and technology, preference will be given to areas that fall outside of existing NRF Strategic Research Programmes, such as the Biomedical Sciences Translational and Clinical Research (BMS TCR), Environmental and Water Technologies (EWT) and Interactive and Digital Media (IDM).

Open to both public and private sector participants, the CRP Funding Scheme aims to encourage collaboration and partnerships between academia and industry. By funding at the programme level, a more coordinated and integrated support of high-impact inter-disciplinary research is possible as a larger budget can be allocated to fund a number of related projects to address a given problem.

The CRP Funding Scheme involves two types of calls: General and Scenario-based calls.

Overview of General and Scenario-based CRP

General CRP

The General CRP allows the Principal Investigators (PIs) to surface any new area of research with potential economic and societal benefits for Singapore through a bottom-up approach. Calls for the General CRP will be held annually. Each proposal should be submitted by a Lead PI, who is expected to be actively involved in the overall management of the programme and who will be accountable for the research and its deliverables.

CRP proposals are expected to have the following:

i. High quality cutting-edge science;
ii. High likelihood of building up research infrastructure and capabilities in Singapore;
iii. Competent team consisting of members with credible track records;
iv. Excellent execution of individual projects within the supported programme; and
v. High potential to generate economic and societal benefits to Singapore by creating new industries or advancing existing industries.

Scenario-based CRP

The Scenario-based approach to identifying research programmes complements the General CRP scheme. The Scenario-based CRP aims to support R&D programmes that are use-inspired and able to produce technical breakthroughs to address big challenges and opportunities for Singapore.

In each Scenario-based call, NRF will articulate a future scenario that offers a major challenge or opportunity for Singapore. The research community will be invited to submit proposals for research programmes that will address key scientific and technological challenges presented by the given scenario.

In addition to the basic criteria for General CRP proposals, Scenario-based CRP proposals will also be evaluated on the following:

i. Extent to which the proposed R&D programme address the challenges or opportunities posed by the given scenario;
ii. Relevance and importance of the proposed R&D programme in terms of the economic, technological, social and environmental impact on Singapore; and
iii. Quality of the proposed R&D programme, compared to similar international efforts elsewhere.

Eligibility

Principal Investigators from all Singapore-based institutions of higher learning (IHLs), public sector agencies and research institutions, not-for-profit hospitals and research laboratories as well as companies and company-affiliated research laboratories, are eligible to apply. Support for private sector organisations which are based in Singapore would be provided on a co-funding basis.

Only research conducted in Singapore may be funded under the CRP.

R&D proposals already funded by other Singapore agencies would not be considered under the CRP.

Evaluation of Proposals

Both the General CRP and Scenario-based CRP involve a two-stage proposal submission process. Proposals submitted will be evaluated and shortlisted by a Local Evaluation Panel in the first stage. Shortlisted submissions will be asked to be developed into full proposals and sent for international peer review. The final evaluation and selection of

projects to be awarded will be made by NRF on the recommendation of the CRP International Evaluation Panel (IEP).

Applications

Calls for both the General CRP and the Scenario-based CRP are publicised on NRF's Research, Innovation and Technology Administration (RITA) system. Interested applicants may find out more about the specific CRP calls that are open and submit their applications through the system.

For more information, please visit https://rita.nrf.gov.sg.