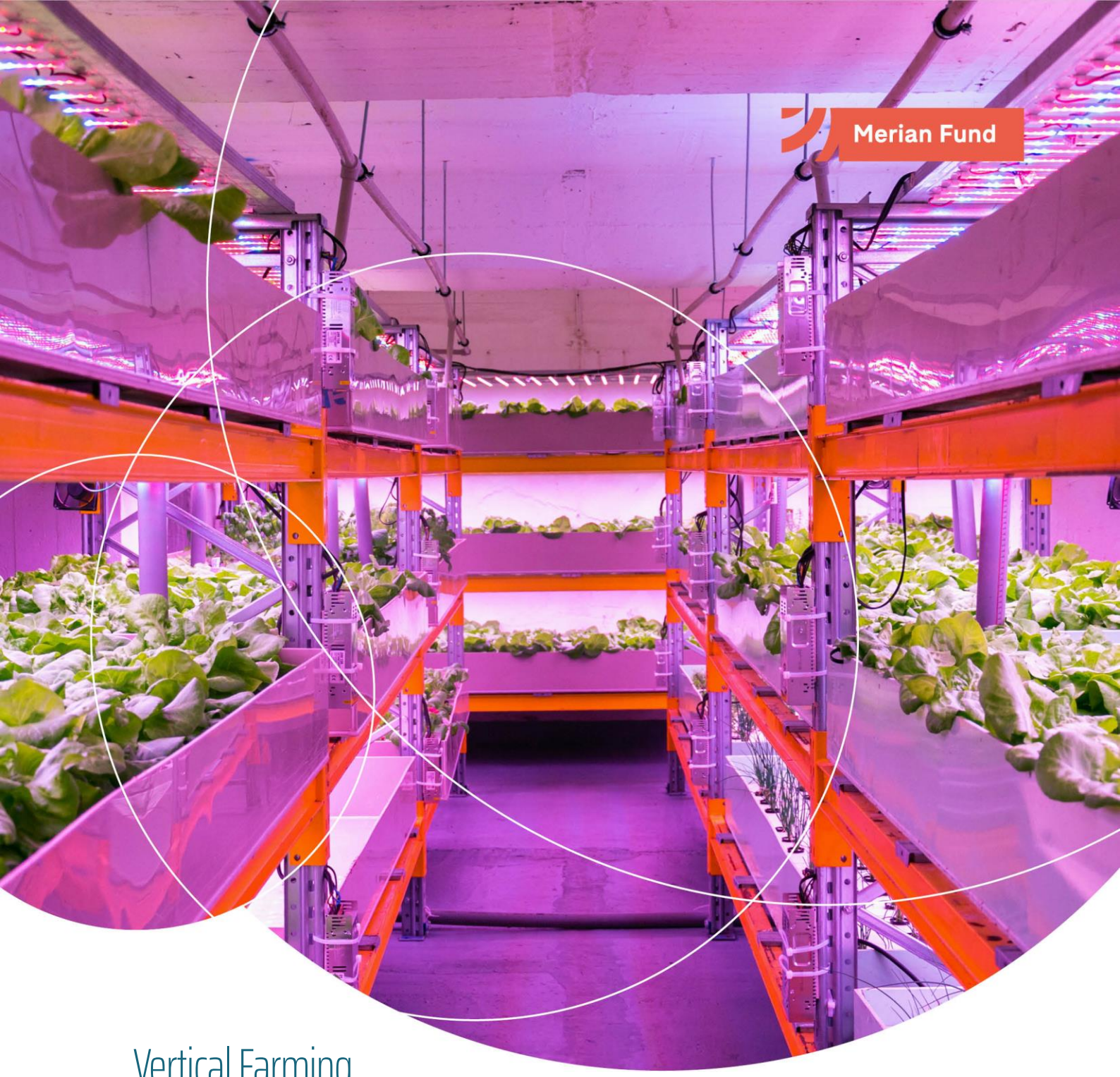


Vertical Farming

Call for Proposals

2020

Contents

1 Introduction

1.1 Background

There is a long history of scientific collaboration between China and The Netherlands. The Dutch Research Council (NWO), through the Merian Fund[1], and the Chinese Academy of Sciences (CAS) aim to further stimulate long-term research collaboration between their two countries by funding joint research, to strengthen the international position and global impact of their research. Funding is provided for interdisciplinary and transdisciplinary consortia of Chinese and Dutch research groups and stakeholder partners, for high quality research that has the potential for high societal and scientific impact. The Cooperation China-The Netherlands (CAS) Programme is one of several instruments in the bilateral research cooperation between China and The Netherlands.

NWO and CAS have agreed on a strategic knowledge and innovation agenda. A call for proposals on a jointly agreed theme based on this agenda is published annually. Funded research should be in alignment with national research agendas, as well as international initiatives such as the UN Sustainable Development Goals, and build bridges between different actors in the knowledge chain, fundamental and applied research, and scientific disciplines. The theme for this year's call is 'Vertical Farming'.

1.2 Available budget

The total budget for this call is M€ 1.4 on the Dutch side, and no more than RMB 9 million on the Chinese side. With the available total budget, NWO and CAS aim to fund up to two projects with a duration of three (on the Chinese side) to four (on the Dutch side) years.

Projects can apply for a maximum of € 700,000 at NWO, and for a maximum of RMB 4.5 million at CAS.

[1] The Merian Fund is part of NWO, and aims to stimulate long-term collaboration with important (emerging) science nations and increase the visibility and profile of Dutch science abroad. The Merian Fund focuses on broad scientific themes of societal importance that require a mission-oriented approach. Programmes in the Merian Fund are aligned with the National Research Agenda (NWA) of The Netherlands. For more information see: https://www.nwo.nl/en/policies/international+collaboration/merian+fund

The NWO Grant Rules 2017 are applicable to the part of the project's budget covered by the grant from NWO. The part of the budget covered by the grant from CAS must follow the CAS grant conditions. Please see section 3 for further details.

1.3 Validity of the call for proposals

This call for proposals is valid until the closing date

- 14 January 2021, 14:00 CET (for the submission of applications to NWO)
- 14 January 2021, 16:00 CST (for the submission of applications to CAS).

PLEASE NOTE: Applications must be submitted to both NWO and CAS.

2 Aim

Many societal challenges are complex and interrelated. To address them requires sustainable collaboration, and flexibility and creativity to achieve sustainable results for effective and impactful solutions. The collaborative research financed by CAS and NWO in this call is intended to work towards scientific knowledge and sustainable, innovative solutions for high scientific and societal impact. At the same time, CAS and NWO aim to stimulate strong, sustainable research collaboration between their two countries. They do this by inviting consortia in which researchers from knowledge institutions from both countries will work with societal partners from public, semi-public and private organisations, in order to increase the societal relevance and impact of their research. The current call focuses Vertical Farming.

2.1 Thematic focus

Within thirty years the world food demand will have increased substantially, due to a dramatic increase in the world's population. Especially urbanized areas will see a rise in the demand for locally produced sustainable, healthy and safe food, because they are often situated far from the conventional food production locations. Vertical farming may provide a solution for this rising demand, because it allows for the production of fresh food within the urbanized regions and can contribute to a more circular food production system.

Vertical farming is a new technology where plants are grown under fully controlled conditions in buildings in many stacked layers without solar light. The use of LED light and the full control of both the aboveground and belowground conditions in combination with the right cultivar, enables growers to produce food with extra added value. This satisfies the demand of consumers for safe, reliable, and tasty food. To further enhance the possibilities for the development of vertical farming systems, the following research topics are important to address:

Reducing the net energy usage and costs

Vertical farming is extremely sustainable with respect to water, fertilizers, pesticides and land use. A key challenge for vertical farming will be to reduce the net energy use and costs. Vertical farming methods currently put high demands on energy usage and subsequently put challenges with respect to sustainability and cost-efficient production. The successful implementation of vertical farming practises on a large scale is highly dependent on the reduction of the energy usage. In order to provide a long long-term alternative for conventional growing practises, both the energy usage as well as the costs must be reduced.

Integrated energy systems in relation to high performance crops and enhanced growth conditions, as well as climate conditions that are energy use efficient are needed to meet this challenge. One of the major opportunities for improving vertical farming practices hence lies in the reduction of energy costs per production unit. There are two main routes through which cost efficiency can be obtained.

The first being a reduction in the energy needs. This can be achieved on the one hand by increasing the yield per energy unit. Uniform growing conditions that are optimized for the growth of the crop in question are hence vital. On the other hand by optimizing the climate system in vertical farms in such a way that it can use and renew its resources with a very low energy usage. The second route is through creating integrated vertical farming systems that create possibilities for circular agriculture and make use of the constructions and possibilities in for example urbanized environments. Circulation of heating and water as integrated part of urban structures, could provide a reduction in energy costs. This calls for the development of smart design guidelines that allow for optimal production with reduced energy needs through multipurpose use of the environment.

Understanding the optimal growth and development conditions for crop species

Growth conditions, such as light, temperature, water, and nutrients, affect the growth, development, and metabolism of plants. In vertical farming systems new combinations of growth conditions can be created that are not possible in conventional production systems, such as fields or greenhouses and that may have never occurred through evolutionary time. This offers opportunities to improve plant growth beyond the borders of natural selection and evolution. In order to determine the optimal growth conditions for plants in vertical farming systems, the underlying physiological processes in plants need to be understood. Therefore, better knowledge about the influence of growth conditions (light, temperature, water, and nutrients etc.) on the regulatory processes of plant growth, development and architecture in vertical farming systems is needed. Because the optimal growth conditions are different for each plant species, a deep understanding of the underlying mechanisms and how these vary between plant species or varieties is key and this research should focus on commercial crop species. A broad ethnical reflection on the perception and consumer acceptance of food produced in vertical farming systems is important in order to optimise possibilities for the marketing of these products.

Because growth conditions can be fully controlled, vertical farming also offers opportunities to grow plants that have an improved quality, such as nutritional value, flavour, and shelf life. For this, a better understanding of the relationship between growth conditions and plants processes and characteristics such as cell structure, carbohydrate and metabolite biosynthesis is required.

Advancing the accuracy and applicability of prediction models

One of the strengths of vertical farming is that crops can be grown under strictly controlled environmental conditions that can be optimized towards various parameters such as yield, flavour water requirement, energy use, profit etc. It is not tractable to identify these optimized strategies for crops in vertical farms purely through experiments. A commonly used approach is to combine experimental work In field and greenhouse crops a solution to this issue was to use with computational models and digital twins that are able to predict crop growth based on estimation of processes like photosynthesis, gas exchange, phenology and others.

Insight is needed into which degree these existing models are applicable to the more diverse conditions that are available in vertical farm scenarios. Improvements in reliability can be made by adapting and/or extending such existing models, or by generating novel models specifically designed for this purpose. Utilization of generated models will be strongest with computational models that focus on commercial crops. .

It is likely that vertical farms will employ modern sensor technologies that are capable of tracking metrics on the status of the plants and farm environment. The accuracy of computational models for vertical farming can be improved by incorporating data from such novel systems and possibly by developing and making use of Artificial Intelligence. By combining novel sensor technology and computational models a control system can be developed. These control systems will allow to control all the growth conditions such that the quantity and quality of the harvested food meets all the specified requirements at the right time. In this way local production in any region of the world can be largely controlled from a control room at a remote distance.

Societal aspects and sustainable implementation of vertical farming systems

Effective and sustainable implementation of vertical farming production systems requires more than just technological solutions. Knowledge about the societal aspects of the intended innovations is also needed, as well as insights in transition dynamics towards large scale implementation vertical

farming systems and their integration in food systems. For example, understanding how vertical farming systems are embedded within an urban context and what kind of institutional adaptations are needed to enable development and upscaling of vertical farming (e.g. of a regulatory, capabilities, or normative/cultural nature, related to changing conventional ways of crop growing, ethics of creating highly engineered crops in sterile growing environments, and data ownership and safety). Insights in what kind of cross-sector interactions, partnerships and investments support the development of vertical farming innovation ecosystems, and the integration of vertical farming in current logistic and energy systems and its interaction with urban and industrial planning. Understanding consumers' acceptance of vertical farming systems is important, and the development of sustainable business models for these farming systems is required (e.g. local and decentralized growing, short chains). Also, insights in impacts on current horticultural systems (as well as their role in this transition) and potentially undesired long term effects of vertical farming are important, and ways to counteract this in the development and scaling process through approaches such as value sensitive design and responsible research and innovation.

2.2 Specific project requirements

2.2.1 Integrated research approach and co-creation

The challenges addressed in this call are interrelated and multi-scalar, and to reach impact require a holistic approach that spans the entire research and innovation chain. The consortia should crosscut scientific disciplinary boundaries (interdisciplinarity) and integrate scientific and practitioners' knowledge in joint research (transdisciplinarity). Research should focus on the entire knowledge chain, from fundamental to applied and practical research. The proposed research itself should be characterised by integrated perspectives. It should evolve in a process of co-creation with different partners: researchers from both countries and societal partners should be actively involved throughout the entire project, in (advising on) defining and conducting the research as well as in communicating the progress and results, in order to jointly produce a mutually valued outcome. Added value may be achieved by integrating and synthesising various sources of knowledge to create new knowledge and by creating sustainability through the development of long-term knowledge relations.

Applications should be based on a thorough review of existing knowledge and should preferably be complementary to existing research initiatives and reinforce these were possible. Project teams are encouraged to use a combination of quantitative and qualitative and quasi-experimental research methods, including operational research, and should include research-into-use approaches.

Projects are also expected to collaborate with the other project awarded in this call, so as to enhance the impact of the call as a whole. As a part of this, projects will be expected to attend joint kick-off and mid-term workshops, as well as a final conference. Projects should budget for this accordingly.

2.2.2 International collaboration

Applications should furthermore be characterised by equal partnership and sustainable collaboration between the Chinese and Dutch partners. This includes inter-institutional cooperation, a balanced contribution to the proposed research, and frequent exchange between the partners, including exchange visits by both senior and junior researchers. Projects must organise a maximum of four research visits (in total) of a minimum of three months each for PhD students and/or post docs, and of minimum three weeks each for senior researchers.

2.2.3 Impact Plan

The research conducted in this call for proposals should have relevance and potential for impact beyond the academic world, such as in societal, technical, economical or cultural realms. This is why, in addition to having a societal or industry partner within the consortium, consortia should consider how relevant stakeholders can be involved in, or benefit from, the design and realisation of the proposed research project.

To further enhance the potential for impact of the proposed research, the application should state how approaches for achieving impact are integrated in the research design and conducted by the consortium in engagement with end users, such as practitioners, policymakers, and industry. To this end, applicants are asked to include an Impact Plan that sets out the potential for impact of the proposed research.

The Impact Plan consists of the following elements:

- *Productive interactions*: Exchanges between researchers and stakeholders in which knowledge is produced and valued that is both scientifically robust and socially relevant. Examples of productive interactions are: formulation of research questions and approaches jointly with potential end-users (co-design), joint execution of research projects and interactive dialogue on research results (co-creation). Interactions can be direct/personal, indirect or financial. The quantity as well as quality of the productive interactions forms an indicator for the potential for societal impact.
- A *Theory of Change* describes how the research process can contribute to societal/economic change, taking into account the context, actors involved and describing the sequence of logically-linked consequential relations. Developing a Theory of Change in a joint effort with research partners as well as stakeholders allows for making explicit which (and whose) problem is being tackled, and how the desired change is perceived to happen through research efforts. Projections on expected change will be based on a myriad of assumptions; documenting these assumptions allows for reflection on whether and how expected pathways to impact remain adequate or need adjustment. A Theory of Change is not fixed, but rather reflected on continuously throughout the research process. For this reason, it is also used as part of the monitoring, evaluation and learning trajectory.
- The *Impact Pathway*, which is part of the Theory of Change, is the visualisation of the change process following from research execution as described in the Theory of Change. It makes explicit how the research activities will lead to results (output) and how exchange of knowledge and the uptake of research output will contribute to desired changes in behaviour, relationships, actions and activities of partners and stakeholders (outcome) that are considered essential to achieving the desired impact.
- A *Strategic Activity Planning* spells out how the proposed productive interactions contribute to achieving outcomes. Outputs do not automatically lead to outcomes, thus strategies are needed of the research consortium to plan and monitor how their efforts will enhance the potential for outcomes. This planning should include specific activities for:
  - *Stakeholder engagement*: Who are the relevant stakeholders to engage with according to context analysis, how are the productive interactions organised and when?;
  - *Communication strategy*: How are engagement dialogues organised and results exchanged and translated, and whose responsibility it is?;
  - *Monitoring, Evaluation and Learning*: How are results of activities monitored and evaluated, such that assumptions can be tested and activities adjusted accordingly and whose responsibility is it?;
  - *Capacity strengthening*: How are required capacities(of consortium partners and stakeholders) strengthened in order to achieve the outcomes, how is this organised and whose responsibility is it?
- A *Risk assessment* entails a description of potential risks for the successful execution of your project and options for handling or mitigating these risks.

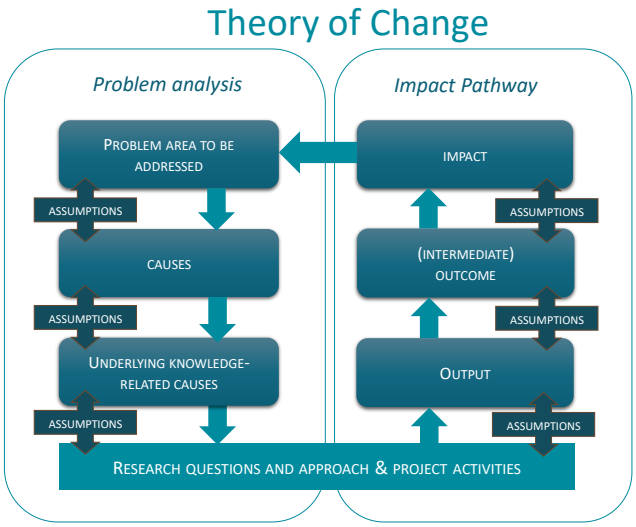
Box 1: Defining Output, outcome and impact

Research outputs relate to the direct and immediate results obtained by a research project or programme.

Research outcomes relate to the changes in behaviour, relationships, actions, or activities of stakeholders as a result of sharing and uptake of research.

Research impact is defined as changes in economic, environmental and social conditions a project or programme is aiming at.

Change is a complex process that depends on a variety of actors and factors of which research is only one. Where research outputs fall under the direct sphere of control of a research project or programme, outcomes belong to their sphere of influence, and impact to their sphere of interest.



3 Guidelines for applicants

3.1 Who can apply

Eligible consortia are composed of researchers based in the Netherlands and in China, with active involvement in the project of a senior Principal Investigator (PI) on both the Dutch and the Chinese side, as well as a Dutch and a Chinese co-applicant. The consortium must also include a partner from a public, semi-public or private practitioner organisation (for-profit or not-for-profit).

Specifically, the Dutch and Chinese sides of the consortium must fulfil the following requirements:

Dutch side of the consortium:

- One Principal Investigator who fulfils the requirements of 3.1.1;
- At least one co-applicant who fulfils the requirements of 3.1.2 and is from a different organisation from the Principal Investigator. Please note: a different faculty or different department is not sufficient;
- A partner from a public, semi-public or private practitioner organisation (for-profit or not-for-profit).

Chinese side of the consortium:

- One Principal Investigator who fulfils the requirements of 3.1.1;
- A co-applicant from a CAS institute or CAS university. If the co-applicant is from the same institute as the Principal Investigator, then he/she must be from a different department.

Together, the consortium members will 1) formulate relevant research questions and approaches; 2) formulate and submit the proposal through the Principal Investigators; 3) conduct the project activities; 4) coordinate knowledge sharing and support the application, dissemination and communication of the project results to a broader group of possible knowledge users that are not a member of the consortium; and 5) take responsibility for the adequate and timely reporting conditions.

Each Principal Investigator and consortium can only submit one proposal.

This call aims at knowledge chain-wide collaboration, to enhance demand articulation, ownership, and the effective uptake of results. For this reason, all consortium partners, as well as relevant stakeholders, are expected to be engaged in all phases of the project execution, from its inception to sharing the (emerging) results. Evidence of such active engagement will be an important element in the assessment of project proposals and may be demonstrated through references to involvement in project preparation, active involvement as a project partner and links between the proposed research project and ongoing projects of NGOs, private enterprises, and/or policy implementation.

A Consortium Agreement to regulate consortium governance, task division, resource management and ownership of results between the collaborating consortium organisations is obligatory (see section 3.5 for details).

3.1.1 Principal Investigators

A proposal should have two Principal Investigators: one based in The Netherlands or at a university established in the Kingdom of The Netherlands, and one based in China. The two Principal

Investigators will serve as the recipients of the grants from their respective funding agencies, NWO and CAS. They will serve as the points of contact for their respective funding agencies and will submit the proposal to both organisations. The Principal Investigators' organisations will take responsibility for the project secretariat, the day-to-day management and all financial affairs of the research project, including the final financial accountability towards their respective funding agencies.

The Dutch Principal Investigator will furthermore serve as point of contact for the NWO call secretariat for the duration of the assessment procedure, and is responsible for ensuring that feedback on the eligibility of the application, reviewer reports, information regarding the rebuttal, and any further information such as the NWO grant award decision communicated regarding the assessment of the proposal is shared with the other consortium members. The Dutch Principal Investigator is also responsible for submission of the application in ISAAC, and for submitting any additional documentation such as the rebuttal on behalf of the consortium. The Chinese Principal Investigator will serve as contact point for CAS for the duration of the assessment procedure, and is responsible for sharing any further information received from CAS, such as the CAS grant award decision, with the consortium.

Dutch Principal Investigator

For scientists based in the Kingdom of The Netherlands, the NWO eligibility criteria apply. Full, associate and assistant professors and other researchers with a comparable appointment can submit an application if:

- they are employed (i.e. hold a salaried position) at one of the following organisations:
  - Universities established in the Kingdom of the Netherlands;
  - University medical centres;
  - NWO and KNAW institutes;
  - TO2 institute[2]
  - the Netherlands Cancer Institute;
  - the Max Planck Institute for Psycholinguistics in Nijmegen;
  - the DUBBLE Beamline at the ESRF in Grenoble;
  - NCB Naturalis;
  - Advanced Research Centre for NanoLithography (ARCNL);
  - Princess Máxima Center.

and also have an appointment period for at least the duration of the application procedure and the entire duration of the research for which the grant is being applied for. Personnel with a zero-hour appointment is excluded from applying. An exemption can be made for researchers on a 'tenure track' contract at one of the institutions above.

Chinese Principal Investigator

For Chinese scientists, CAS requires the Principal Investigator to be affiliated to a CAS institute or CAS university;

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[2] The members of the TO2 Federation are Deltares, ECN, Marin, NLR, TNO and WUR/DLO. See also http://www.to2-federatie.nl (website in Dutch).

AND

have an employment contract for at least the duration of the application procedure and the duration of the research the grant is applied for;

AND

have at least a PhD or an equivalent qualification;

AND

be associate professor or above title.

Please refer to the Chinese call for proposals on the CAS website for more information: http://english.cas.cn/research/

3.1.2 Co-applicants

A co-applicant is a participant in the consortium and receives funding through the Principal Investigator.

Dutch co-applicants

At least one co-applicant must be from a different eligible organisation than the Dutch Principal Investigator (please note: a different faculty or department is *not* sufficient). NWO furthermore requires co-applicants to be one of the following:

- a researcher from one of the institutions listed in 3.1.1, who has an employment contract for at least the duration of the application procedure and the duration of the research the grant is applied for;

  AND

  has at least a PhD or an equivalent qualification.

  Researchers with a 0 hour contract at one of the institutions above cannot be a co-applicant. An exemption can be made for researchers on a 'tenure track' contract at one of the institutions above.

- (in case of a university of applied sciences) an experienced researcher (a professor, assistant professor, or a researcher with a similar appointment) with an appointment at an university of applied sciences funded by the Dutch Ministry of Education, Culture and Science for the duration of the application process and the project (funded in accordance with Article 1.8 of the law on higher education and scientific research).

- (in case of an organisation that is not a university of applied sciences nor listed in

paragraph 3.1.1.) A researcher who has an employment contract for at least the duration of the application procedure and the duration of the research grant applied for, and has a PhD or equivalent, whose organisation meets the following cumulative criteria:
i. is based in The Netherlands;
ii. is a public institute and carries out its research independently;
iii. receives at least 50% public funding;
iv. is not-for-profit other than for the purpose of carrying out further research;
v. its researchers enjoy freedom of publication in international scientific journals.

Please note: these conditions will be assessed by NWO **prior to** submission of the application. To this end, the co-applicant's organisation must submit the following documents by email to cas-nwo@nwo.nl no later than **18 December 2020**:
- a recent extract from the Chamber of Commerce register;
- the deed of incorporation, articles of association or other formal document indicating the public task and the non-profit status;
- the latest available annual accounts accompanied by an auditor's statement.

Chinese co-applicants

CAS requires one co-applicant, who should be affiliated to a CAS institute or CAS university. If the co-applicant is from the same institute as the Principal Investigator, then he/she must be from a different department;

Furthermore, the Chinese co-applicant should:

have an employment contract for at least the duration of the application procedure and the duration of the research the grant is applied for;

AND

have at least a PhD or an equivalent qualification;

AND

be associate professor or above title.

Please refer to the Chinese call for proposals on the CAS website for more information: http://english.cas.cn/research/

3.1.3 Public and/or private collaboration partners

Consortia should contain a public and/or private practitioner collaboration partner. Public and/or private practitioner collaboration partners are partners from the public and/or semi-public sectors and/or industry. They are closely involved with the research and impact plan. Please note that personnel of these organisations are excluded from payment of salaries and research costs from the NWO grant, unless they are hired through the NWO module 2 – work by third parties (see Annex 3.2 What can be applied for). A public and/or private collaboration partner can receive funding from the CAS grant.

All organisations participating in a consortium must be registered as a legal persona.

3.2 What can be applied for

The Principal Investigators and consortia can apply for funds for a project with a maximum duration of three years (on the Chinese side) to four years (on the Dutch side).

This call invites full proposals to be submitted. All consortium members have to be involved in the formulation of the research questions, in the development of the proposal and in the execution of the research project. Each Principal Investigator and consortium can apply for one project only.

Reimbursable costs

Different costs can be reimbursed from the CAS and NWO grants. The application form allows you to specify which organisation you would like to cover a certain cost. You should complete two budgets, one specifying the costs to be covered by the NWO grant and one specifying the costs to be covered by the CAS grant.

Reimbursable costs NWO budget:

For a research proposal in this round, a maximum of € 700,000 can be applied for on the Dutch side. The budget modules (including the maximum amounts) that are available within this call for proposals are stated in the table below. You should only request that which is essential for realising the research.

Budget module	**Maximum amount**
PhD	According to VSNU or NFU rates[3]
Professional Doctorate in engineering (PDEng)	Positions in combination with PhDs and/or postdoc(s), according to VSNU or NFU rates[3]
Postdoc	According to VSNU or NFU rates[3]
Non-scientific staff at (NSS) universities	€ 100.000, according to VSNU or NFU rates[3], in combination with PhDs and/or postdoc(s)
Other scientific staff (OSS) at universities	€100.000, in combination with PhDs and/or postdoc(s)
Research leave	5 months, 1 fte, according to VSNU or NFU rates[3]

[3] For personnel outside the Netherlands, the local rates are reimbursed up to a maximum of the VSNU rates.

Personnel universities of applied sciences and other institutions (such as applied research organisations (TO2) and SMEs)	Rates based on *Handleiding Overheidstarieven 2017* (HOT)
Material costs	€ 15,000 per year per scientific position
Investments (up to € 150.000)	maximum of € 150,000
Investments (€ 150.000 to € 500.000)	greater than or equal to € 150,000 (for data collections, a minimum of €25,000 applies) and less than or equal to € 500,000
Knowledge utilisation	€140,000 (€25,000 per module), up to 20% of grant
Internationalisation	€140,000 (€25,000 per module), up to 20% of grant
Money follows Cooperation	less than 50% of the total budget applied for

Involvement of civilians, so-called 'citizen science', might have an added value to the quality of science. They could offer data and insights that would not be available for science in other set-ups. NWO wants to finance citizen science as well and offers the possibility from 2020 onwards to apply for reimbursement of citizen involvement in research projects via the budget module 'material, project-related goods or services, work by third parties'. This module offers researchers a possibility; this is by no means an obligation. Researchers can decide whether the involvement of citizens is desirable and how the budget is used for this (e.g. reimbursement of expenses for civilians, offering skill training or technical aids for participating citizens).

Explanation for budget modules personnel

Funding for the salary costs of personnel who make a substantial contribution to the research can be applied for. Funding of these salary costs depends on the type of appointment and the organisation where the personnel are or will be appointed.

- For university appointments, the salary costs are funded in accordance with the VSNU salary tables applicable at the moment the grant is awarded (https://www.nwo.nl/en/funding/funding+process+explained/salary+tables).
- For university medical centres, the salary costs are funded in accordance with the NFU salary tables applicable at the moment the grant is awarded (https://www.nwo.nl/en/funding/funding+process+explained/salary+tables).
- For personnel from universities of applied sciences and other institutions, the salary costs are funded on the basis of the collective labour agreement salary scale of the employee concerned, based on the *Handleiding Overheidstarieven 2017*.
- For the Caribbean Netherlands, the Dutch government employs civil servants on Bonaire, Sint Eustatius and Saba under different conditions than in the European part of the Netherlands. (https://www.rijksdienstcn.com/werken-bij-rijksdienst-caribisch-nederland/arbeidsvoorwaarden)

The rates for all budget modules are incorporated in the budget format that accompanies the application form. For the budget modules "PhD", "PDEng" and "Postdoc", a one-off individual bench fee of € 5,000 is added on top of the salary costs. This bench fee is intended to encourage the scientific career of the project employee funded by NWO. Remunerations for PhD students/PhD scholarship students at a Dutch university are not eligible for funding from NWO. The available budget modules are explained below.

PhD (including MD-PhD)

A PhD is appointed for 1.0 fte for a duration of 48 months. The equivalent of 48 full-time months, for example an appointment of 60 months for 0.8 fte is also possible. If a different duration of appointment is considered necessary for the realisation of the proposed research, then as long as this is properly justified, the standard time can be deviated from. However, the duration of appointment must always be at least 48 months.

N.B.: please note that in this Call, you can only apply for funding for a maximum of 48 months from NWO.

Professional Doctorate in Engineering (PDEng)

Funding for the appointment of a PDEng can only be applied for if funding for a PhD or postdoc is also applied for.
The appointment for a PDEng position is a maximum of 1.0 fte for 24 months. The PDEng trainee is employed by the institution applying for funding and can realise activities within the research at an industrial partner for a specified time. If the research proposal is awarded funding, then an agreement must be concluded with the industrial partner(s) concerned. The underlying "Technological Designer Programme" should be described in the funding proposal.

Postdoc

The size of the appointment of a postdoc is at least 6 full-time months and at most 48 full-time months. The size and duration of the appointment is at the applicant's discretion , but the appointment is always for at least 0.5 fte or for a duration of at least 12 months. The product of fte x duration of appointment should always be a minimum of 6 full-time months.
The material budget is available to cover the costs of a more limited appointment of a postdoc.

Non-scientific staff (NSS) at universities

Funding for the appointment of non-scientific personnel necessary for the realisation of the research project can only be applied for if funding for a PhD or postdoc is also applied for. A maximum of € 100,000 can be requested for NSS. This includes personnel such as student assistants, programmers, technical assistants or analysts. Depending on the level of the position, the appropriate salary table for non-scientific staff at MBO, HBO or university level applies.
The size of the appointment is at least 6 full-time months and at most 48 full-time months. The size and duration of the appointment is at the applicant's discretion, but the appointment is always for at least 0.5 fte or for a duration of at least 12 months. The product of fte x duration of appointment should always be a minimum of 6 full-time months.
The material budget is available to cover the costs of a more limited appointment of non-scientific personnel.

Other scientific personnel (OSS) at universities

Budget for other scientific personnel such as AIOS (doctor training to be a specialist), ANIOS (doctor not training to be a specialist), scientific programmers or employees with a master's degree can only be applied for if funding for a PhD or postdoc is also applied for. For this category, a maximum of € 100,000 can be applied for.
The size of the appointment is at least 6 full-time months and most 48 full-time months. The size and duration of the appointment is at the applicant's discretion, but the appointment is always for at least 0.5 fte or for a duration of at least 12 months. The product of fte x duration of appointment should always be a minimum of 6 full-time months.

Research leave for applicants

With this budget module, funding can be requested for the research leave costs of the main and/or co-applicant(s). The employer of the applicant concerned can use this to cover the costs of relinquishing him or her from educational, supervisory, administrative or management tasks (not research tasks). The time that is released through the research leave grant can only be used by the applicant(s) for activities in the context of the project. The proposal must describe which activities in the context of the project the applicant(s) will carry out in the time relinquished.
The maximum amount of research leave that can be applied for is the equivalent of five full-time months. NWO funds the research leave in accordance with the salary tables for a senior scientific employee (scale 11) at the time the grant is awarded (https://www.nwo.nl/en/funding/funding+process+explained/salary+tables).

Personnel universities of applied sciences and other institutions

For the funding of salary costs of personnel employed at a university of applied sciences or other type of institution (such as TO2 or SMEs), the following maximum rates (hours/day) are used in accordance with the *Handleiding Overheidstarieven 2017* (HOT). For the Taskforce for Applied Research (NPRO SIA), the HOT table *kostendekkend* is used, and for the Netherlands Initiative for Education Research (NRO) and other institutions, it is the HOT table *kostenplus*.

Explanation of budget module Material

For each fte scientific position (PhD, postdoc, PDEng) applied for, a maximum of € 15,000 material budget can be applied for per year of the appointment. Material budget for smaller appointments can be applied for on a proportionate basis and will be made available by NWO accordingly[4].
The applicant is responsible for distributing the total amount of material budget across the NWO-funded personnel positions. The material budget that can be applied for is specified according to the three categories below:

Project-related goods/services

- consumables (glassware, chemicals, cryogenic fluids, etc.)
- measurement and calculation time (e.g. access to supercomputer, etc.)
- costs for acquiring or using data collections (e.g. from Statistics Netherlands), for which the total amount may not be more than € 25,000 per proposal
- access to large national and international facilities (e.g. cleanroom, synchrotron, etc.)
- work by third parties (e.g. laboratory analyses, data collection, citizen science)
- personnel costs for the appointment of a post-doc and/or non-scientific personnel for a smaller appointment size than those offered in the personnel budget modules

Travel and accommodation costs for the personal positions applied for

- travel and accommodation costs
- conference attendance (maximum of two per year per scientific position applied for)
- fieldwork
- work visit

[4] Per 0.2 fte scientific employee at a university of applied sciences (junior, medior and senior level, with a minimum appointment of 0.2 fte for a period of 12 months), a maximum of € 15,000 material budget can be applied for each year of the appointment.

Implementation costs

- national symposium/conference/workshop organised within the research project
- costs for Open Access publishing (solely in full gold Open Access journals, registered in the "Directory of Open Access Journals" https://doaj.org/)
- data management costs
- costs involved in applying for licences (e.g. for animal experiments)
- audit costs (only for institutions that are not subject to the education accountants protocol of the Ministry of Education, Culture and Science), maximum € 5,000 per proposal; for projects with a duration of three years or less, a maximum of € 2,500 per proposal applies.

Costs that cannot be applied for are:

- basic facilities within the institution (e.g. laptops, desks, etc.);
- maintenance and insurance costs.

If the maximum amount of € 15,000 per year per full-time scientific position is not sufficient for realising the research, then it may be deviated from if a clear justification is provided in the proposal.

Explanation of budget module Investments (up to € 150,000)

In this budget module, funding can be requested up to a maximum of € 150,000 for investments in equipment, datasets and/or software (e.g. lasers, specialised computers or computer programs).

Explanation of budget module Investments (€150,000 to €500,000)

In this budget module, funding can be applied for project-related investments in scientifically innovative equipment and/or data collections of national and international importance. The costs for these project-related investments should be adequately specified and justified in the proposal. The minimum amount that can be applied for is € 150,000. The maximum amount that can be applied for is € 500,000.

The costs for investments should be adequately specified and motivated in the proposal.

Funding can be requested for:

- costs for investment in scientific equipment;
- costs for investment in datasets;
- personnel costs for the setting up of databases and the initial digitisation of the bibliographical equipment, if these cannot be purchased;
- personnel costs for employees with specific, essential technical expertise needed in order to build or develop an investment.

If funding for personnel costs is applied for, then the need for these personnel costs should be justified. If the applicant does not have this expertise available, then it should be stated that this expertise needs to be procured with these costs. The internal procurement procedures and/or guidelines of the applicant apply.
Funding cannot be requested for:

- costs of infrastructure facilities that can be regarded as part of the usual infrastructure;
- data collections and any associated software and bibliographies that are already available in other ways;
- other personnel costs, including personnel costs required to operate and conduct research with the facility;
- maintenance and use of equipment. The costs for researchers using equipment for a project can be covered via the material budget.

Explanation of budget module Knowledge utilisation

This module can be requested a maximum of 6 times, up to 20% of the grant. A maximum of € 140,000 can therefore be requested under this call as funding for knowledge utilisation activities. The following conditions apply per module:

The aim of this budget module is to facilitate the use of the knowledge that emerges from the research[5]. The budget applied for may not exceed €25,000.
Because knowledge utilisation takes many different forms in different scientific fields, it is up to the applicant to specify the costs required, e.g. costs of producing a teaching package, conducting a feasibility study into potential applications, or filing a patent application.
The budget applied for should be adequately specified in the proposal.

NB: please take into account requirements of knowledge utilisation stated elsewhere in this call for proposals, such as budgeting for kick-off, midterm, and final workshops of your project and participation in the programme's kick-off, midterm, and final workshop, and 2.2.3 Impact Plan.

Explanation of budget module Internationalisation

This module can be requested a maximum of six times, up to 20% of the grant. A maximum of € 140,000 can therefore be requested under this call as funding for internationalisation activities. The following conditions apply per module:

The budget for internationalisation is intended to encourage international collaboration. The budget applied for may not exceed €25,000. The amount requested must be specified. If the maximum amount is not sufficient for realising the research, then it may be deviated from if a clear justification is provided in the proposal.

Funding can be requested for:

- travel and accommodation costs in so far as these concern direct research costs emerging from the international collaboration and additional costs for internationalisation that cannot be covered in another manner, for example from the bench fee;
- travel and accommodation costs for foreign guest researchers;
- costs for organising international workshops/symposia/scientific meetings.

NB: please take into account the requirements for internationalisation stated elsewhere in this call for proposals, such as in 2.2.2 International Collaboration

Explanation of the budget module Money follows Cooperation (MfC)

The module Money follows Cooperation provides the possibility of realising a part of the project at a publicly funded knowledge institution outside of the Netherlands.
The applicant must convincingly argue how the researcher from the foreign knowledge institution will contribute specific expertise to the research project that is not available in the Netherlands at the level necessary for the project.

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[5] In this budget module, the definition for "knowledge transfer" used by the European Commission in the Framework for State Aid for research and development and innovation applies (PbEU, 2014, C198).

This condition does not apply if NWO has concluded a bilateral agreement concerning Money follows Cooperation with the national research council of the country where the foreign knowledge institution is located. On this NWO web page you will find an overview of research councils that signed a bilateral MfC agreement with NWO.

The budget applied for within this module cannot be more than 50% of the total budget applied for .
A co-applicant from the participating foreign knowledge institution should satisfy the conditions set for co-applicants in Section 3.1 of this call for proposals, with the exception of the condition that the co-applicant should be employed in the Kingdom of the Netherlands.

The rates for the personnel costs of researchers at the foreign knowledge institution are calculated on the basis of the correction coefficients table of the Marie Skłodowska-Curie grants (EU, Horizon 2020), based on the Dutch VSNU rates. The table can be can be found on this web page of NWO.

The main applicant receives the grant and is responsible for transferring the amount to the foreign knowledge institution and for providing accountability for the MfC part of the grant. The MfC part will be part of the overall financial accountability of the project.

The exchange rate risk lies with the applicants. Therefore, gains or losses due to the exchange rate are not eligible for funding. The applicant is responsible for:

- The financial accountability for all costs in both euros and the local currency, for which the exchange rate used must be visible;
- a reasonable determination of the size of the exchange rate. If requested by NWO, the applicant must always be able to provide a description of this reasonable determination.

If more than 125,000 Euros is requested within this module, the final financial statement must be accompanied by an auditor's report.

NWO will not issue any funding to co-applicants in countries that fall under national or international sanction legislation and rules. The EU Sanctions Map (www.sanctionsmap.eu) is guiding in this respect.

Reimbursable costs CAS budget:

The maximum duration on the Chinese side is three years. Projects can apply for a maximum of RMB 4.5 million at CAS – each year RMB 1.5 million.

The use and management of CAS project funds shall be carried out in strict accordance with the CAS Fund Management Provisions of all the Academy-level Research Projects. For more information, please see: http://www.bpf.cas.cn/gzzd/2/201801/t20180104_4628940.html

Please refer to the Chinese call for proposals on the CAS website for more information: http://english.cas.cn/research/

3.3 When can applications be submitted

The deadline for the submission of proposals is:

- **14 January 2021, 14:00 hours CET (for submission of the application to NWO)**
- **14 January 2021, 16:00 CST (for submission of the application to CAS)**.

Proposals must be submitted on time to both NWO (via ISAAC) and CAS (via ARP system).

When you submit your application to ISAAC you will also need to enter additional details online, such as the names and institutions or organisations of both Principal Investigators and of your co-applicants and collaboration partners. You should therefore start submitting your application at least five working days before the deadline of this call for proposals.

Applications submitted after the deadline to NWO or CAS will not be taken into consideration.

3.4 Preparing an application

Webinar

A webinar on this call will be held. In this webinar, extra explanation will be provided regarding specific requirements on the Chinese and the Dutch side, the composition of the Sino-Dutch consortium and the impact plan approach, and the call secretariat of CAS and NWO will answer questions. CAS and NWO will announce the date of the webinar in September. It is not mandatory to join the webinar. More information, including the link to join the webinar, will be made available on the NWO website – Cooperation China-The Netherlands (CAS) programme page – and the CAS website in September.

Proposal

Sino-Dutch research teams must prepare a joint research proposal, which will be submitted to NWO by the Dutch Principal Investigator and to CAS by the Chinese Principal Investigator. The Chinese Principal Investigator is also required to submit a Chinese application and a collaborative agreement. Please refer to the Chinese call for proposals on the CAS website for more information.

- Download the application form and Excel budget format from the electronic application system ISAAC or from NWO's website (on the grant page for this programme);
- Complete the application form and Excel budget format, using the guidelines in the application form;
- Save the application form as a pdf file and upload it in ISAAC and ARP system;
- Save the Excel budget format as Excel and upload it as separate document in ISAAC and ARP system.

Proposals should include:

- The application form for full applications;
- A completed budget, using the Excel budget format;
- A letter of commitment from the organisations of the Principal Investigators, co-applicants, and collaboration partner(s), in which the institution or organisation confirms that they agree to the conditions required for the execution of the project. The letter must be signed by the Dean of the faculty or director of the organisation and be printed on the letterhead of the institution or organisation. See the format in Annex 6.1;
- A draft consortium agreement;
- CVs of both Principal Investigators and all co-applicants and representatives of public or private collaboration partners (each max 1 A4 page);
- In case of co-financing: a letter of guarantee from the co-financing organisation confirming the numeric amount that will be provided as co-financing. In case the organisation of a consortium member provides co-financing, this confirmation can be included in the letter of commitment. Letters of guarantee or commitment letters which include co-financing are unconditional and do not contain opt-out clauses.

It is not permitted to include other documents than those requested above. Applicants will be asked to remove any additional documents.

Please note: the Chinese Principal Investigator may need to submit additional information to CAS. Please refer to the Chinese call for proposals on the CAS website for more information.

Eligibility concerns compliance with the conditions set in this call. Formal criteria include all criteria mentioned in Chapter 3 of this call for proposals, including:

- Timely received application via NWO's electronic application system ISAAC and CAS ARP system;
- Application has been submitted by the Dutch Principal Investigator;
- All consortium members meet national eligibility criteria (section 3.1 of the Call for Proposals);
- Specific conditions (as outlined in Section 3 of the Call for Proposals, the annexes, and the notes in the application form) have been applied;
- Completed and signed application form, signed by both Principal Investigators and all co-applicants, and collaboration partners;
- Composition of consortium complies with the requirements;
- Format, length of text, language is as required;
- Budget conditions are met;
- Completed annexes are added.

Please note that the Chinese Principal Investigator may need to submit additional documents to CAS in order to comply with national eligibility requirements. The Chinese Principal Investigator must also submit the application on time to CAS. Please refer to the Chinese call for proposals on the CAS website for more information: http://english.cas.cn/research/

If correction of an application, or the submission of necessary additional information to NWO, is possible, the Dutch Principal Investigator will receive the opportunity to correct their application and/or submit the necessary additional information within five working days. If the Dutch Principal Investigator is unable or unwilling to comply with this request, the application will not be admitted to the assessment procedure.

Please note: applications submitted to CAS cannot be corrected, and, if they do not meet CAS's eligibility criteria, will be declared inadmissible. If an application is declared inadmissible by CAS, it will also be declared inadmissible by NWO and will not be admitted to the assessment procedure.

Applicants will receive written confirmation of receipt within three weeks after the deadline of this Call, stating whether or not the application has been accepted into the assessment procedure. If an application is declared inadmissible by either CAS or NWO, it will not be admitted to the assessment procedure.

3.5 Conditions on granting

The NWO Grant Rules 2017 and the Agreement on the Payment of Costs for Scientific Research apply to all grants provided by NWO. The CAS grant conditions apply to all grants provided by CAS.

Conditions start and duration of project

Duration

The maximum duration of a project is three years on the Chinese side and four years on the Dutch side.

Start
The project should start by January 2022. At least one researcher must be appointed to the project at the time of its start. If the project has not started by January 2022, the NWO-WOTRO Steering Committee, on behalf of NWO, and the Board of CAS can decide to revoke the granting decision.

Start documents
The Dutch Principal Investigator and the Chinese Principal Investigator are responsible for ensuring the necessary documents for the start of the project are submitted to their respective funding agencies, so that the project in its entirety can start on time.

NWO
The project can start if the following documents have been approved by NWO:
- A project notification form with information of project staff;
- A data management plan;
- A consortium agreement, signed by all consortium organisations[6];
- (If relevant) approval of relevant ethics committees;
- (If relevant) receipt by NWO of the first tranche of in-cash co-financing.

CAS
CAS will inform the Chinese Principal Investigator of the necessary steps. The Chinese Principal Investigator must submit all necessary documentation to CAS in time for the project to start by January 2022.

Publications
When publishing the results of the subsidised research, the support by NWO and CAS should be mentioned.

Reporting to NWO and CAS

Annual and Mid-term report
Annually, the project must submit a report to inform NWO and CAS on the overall project progress, experiences and output. The Dutch Principal Investigator will receive instructions and a format for this report in advance.
The projects will also be evaluated at about the mid-term of the projects' running time by self-assessment. This includes a workshop of the project team organised by the consortium and a discussion of the results with stakeholders from outside the project team. Consortia should include this workshop in their budget. The mid-term report will be based on the conclusions of the workshop, including a reflection on and, if required, revision of the impact plan, the underlying assumptions and the indicators. The International Advisory Committee (IAC, see 4.1) created by CAS and NWO will evaluate the progress of the projects based on mid-term reports submitted by the consortia. Interviews or field visits may be organised to evaluate the progress and impact of the projects. The IAC will give recommendations to the projects based on their evaluations.

[6] A format can be found on the funding page for this programme.

The mid-term report of all the projects of a call need to be submitted before the joint mid-term workshop and will be used as input for organising the mid-term workshop.

Final accountability to NWO
A substantive final report should be submitted within three months after the end of the project's runtime, detailing the research done and the achieved results, as well as a reflection on the project's impact plan and its indicators. As part of this, projects will be asked to again complete a self-assessment, and hold a final workshop and a discussion with stakeholders from outside the project team. The final substantive report will again be evaluated by the International Advisory Committee, created by CAS and NWO. The final workshop should again be taken into account in the consortium's budget.

Simultaneously, the Dutch Principal Investigator and the controller/financial manager of the Principal Investigator's institution should submit a signed financial end report, organised according to the budget lines of the approved NWO budget. The report should detail, among others, the effective duration (period) and size (FTE) of the personnel appointed to the project using the module Personnel of the NWO grant, and, if applicable, how eventual replacements were arranged. The realised in-cash and in-kind co-financing should also be accounted for.
If the Dutch Principal Investigator's organisation is not subject to the Education Auditors Protocol of the Dutch Ministry for Education, Culture and Science, an external audit report must also be submitted. NWO reserves the right to conduct an external financial audit.

NWO reserves the right to externally evaluate projects financed under this call. The project ends with the issuing of the grant settlement decision. This decision is taken after approval of the final document(s) by NWO.

For financial accountability to CAS, see the Chinese version of the call for proposals:
http://english.cas.cn/research/

Programmatic coherence

The projects awarded under this call should contribute to (the development of) vertical farming. To this end, Principal Investigators, researchers and other consortium members are expected to contribute to knowledge exchange and knowledge utilisation at a programme level, and to participate in and contribute to the meetings organised for that purpose. This includes a joint kick-off and mid-term workshop with all projects of the call, as well as a final conference. This is in addition to the activities organised by the individual projects for this purpose. Consortia should budget for their participation in these meetings in their application (€ 25,000). Projects are also expected to work with the other project financed in this Call.

International exchange

Projects must facilitate frequent exchange between the partners, including exchange visits by both senior and junior researchers. Projects must organise a maximum of four research visits (in total) of a minimum of three months each for PhD students and/or post docs, and of minimum three weeks each for senior researchers. See also Chapter 2.2.2.

Co-financing

- Co-financing by private and/or public parties is not a requirement for this call, but if available, can take the form of in-kind or in-cash co-financing, with a maximum of 50% of the total project budget;
- It is possible for contributions to be partially in-kind and partially in-cash. The amounts of co-financing specified in the budget should correspond to the amount of co-financing specified in the letter of guarantee or, in case of co-financing by an organisation that is part of the

consortium, in the letter of commitment. Letters of guarantee are unconditional and do not contain opt-out clauses;
- Co-financing provided by a Chinese institution or organisation should preferably be included in the CAS budget, and should be accounted for to CAS. Co-financing provided by other institutions or organisations should preferably be included in the NWO budget, and accounted for to NWO;
- After a research proposal has been awarded funding, NWO will invoice the private or public party that has pledged an in-cash contribution if that in-cash contribution to the NWO budget is equal to or exceeds € 5,000. After the contribution has been received, the money will be awarded to the project. It is the responsibility of the Dutch Principal Investigator to invoice cash co-funding organisations who are contributing less than € 5,000.

Consortium agreement

For research partnerships to be effective, they have to be fair. A consortium agreement should be signed by all consortium partners prior to the start of the awarded project, detailing agreements regarding rights (such as copyright, publications, intellectual property, etc. of products or other developments in the project), knowledge utilisation, as well as affairs such as payments, progress and final reports, and confidentiality. The agreement furthermore details agreements on governance of the consortium (to the extent that it gives sufficient guarantee for effective collaboration), finances, and if applicable, basic knowledge to be contributed, liability, disputes, and information sharing within the consortium. The agreement has to be drafted in a spirit of equity.

The initiative for the concluding of these agreements lies with the Principal Investigators. The agreement will be tested for consistency with the NWO Grant Rules 2017. For intellectual property (IP) rights, the provisions as specified in Chapter 4 of the NWO Grant Rules 2017 are applicable, according to which the IP rights to the results belong to the research institution, whose employee generated the results in question (ownership follows inventorship). For the IP rights of the results of possible co-financing institutions, the percentages shown are applicable, unless an appropriate reflection justifies deviation from this.

Open Access

As signatories to the Berlin Declaration on Open Access to Knowlegde in the Sciences and Humanities (2003), NWO and CAS are committed to making the results of scientific research funded by NWO and CAS freely available in open access on the internet. In doing so, NWO and CAS are implementing the ambitions to make all publicly funded research openly available. All scientific publications of research funded on the basis of this call for proposals should therefore be available in open access immediately (at the time of publication). NWO and CAS accept various routes:
- publication in an full open access journal,
- deposit a version of the article in a repository or
- publication in a hybrid journal covered by one of the agreements between the VSNU and publishers. See www.openaccess.nl.

Any costs for publication in full open access journals can be incurred in the project budget. NWO and CAS do not reimburse costs for publications in hybrid journals[7]. These conditions apply to all forms of scholarly publications arising from grants awarded on the basis of this call for proposals. Also academic monographs, edited volumes, proceedings and book chapters. For more information on the NWO's open access policy, see: www.nwo.nl/openscience .

Data management

The results of scientific research must be replicable, verifiable and falsifiable. In the digital age this means that, in addition to publications, research data must also be freely accessible. As much as possible, NWO and CAS expect that research data resulting from projects funded in this programme will be made publicly available for reuse by other researchers. “As open as possible, as closed as necessary” is the guiding principle in this respect. As a minimum, NWO and CAS require that the data underpinning research papers should be made available at the time of the article’s publication. The costs for doing so are eligible for funding and can be included in the project budget. In the data management section, and in the data management template if the project is awarded funding, researchers explain how they plan to manage the data expected to be generated by the project.

1. Data management section

The data management section is part of the research proposal. Researchers are asked to prospectively consider how they will manage the data the project will generate and plan for which data will be preserved and be made publicly available. Measures will often need to be taken during the production and analysis of the data to make their later storage and dissemination possible. If not all data from the project can be made publicly available, the reasons for not doing so must be explained in the data management section. Due consideration is given to aspects such as privacy, public security, ethical limitations, property rights and commercial interests.

2. Data management plan

After a proposal has been awarded funding, the researcher should elaborate the data management section into a data management plan. In this plan, the researcher describes whether use will be made of existing data, whether new data will collected or generated, and how the data will be made FAIR: Findable, Accessible, Interoperable, Reusable. The data management plan must be completed in consultation with a data steward or equivalent research data management support staff at the home institution of the project leader. The plan should be submitted to NWO via ISAAC as part of the starting documents. NWO will approve the plan as quickly as possible. Approval of the data management plan by NWO is a condition for disbursement of the funding. The plan can be adjusted during the research.

Further information on the NWO data management protocol can be found at www.nwo.nl/datamanagement-en.

[7] A hybrid journal is a scientific journal that is based on subscription income but which offers researchers the possibility to make individual articles Open Access by paying an extra article processing charge. In one issue of a journal you may therefore find both articles that can only be read with a subscription and articles that are freely accessible.

Nagoya Protocol

The Nagoya Protocol became effective on 12 October 2014 and ensures an honest and reasonable distribution of benefits emerging from the use of genetic resources (Access and Benefit Sharing; ABS). Researchers who make use of genetic sources from The Netherlands or abroad for their research should familiarise themselves with the Nagoya Protocol (www.absfocalpoint.nl). NWO and CAS assume that researchers will take all necessary actions with respect to the Nagoya Protocol.

Ethical aspects

Any research proposal that raises ethical issues must be carefully considered in advance. The applicants need to assess what ethical challenges will be met in the proposed research, consider how these will be addressed, and how ethical clearance will be obtained. In The Netherlands, certain research projects require a statement of approval from a recognised (medical) ethics review committee or an animal experiments committee. In addition, some research proposals require a licence under the Population Screening Act (WBO). Similar laws and regulations in China must be adhered to if required and applicable. Applicants must subscribe to and comply with the prevailing codes.

Applicants themselves are responsible for determining whether their research proposal raises possible ethical issues. If so, they are also responsible for obtaining any necessary statement of approval from the appropriate ethics review committees and/or license under the Population Screening Act or similar organisations. A research project can only start when NWO has received a copy of the necessary approving ethical statement and/or Population Screening Act license (if applicable). For complex questions related to ethical issues and in case applicants would question the need for ethical clearance, NWO and CAS reserve the right to consult an external adviser. If after consulting the applicant, NWO and CAS are of the opinion that an ethical assessment is needed for the application, then the applicant is obliged to take the necessary measures for such an assessment. If the applicant fails to obtain the necessary statement of approval from an ethics review committee then the grant shall be immediately withdrawn.

Once the project has started the research must be conducted in an ethically responsible way. The Global Code of Conduct for Research in Resource-Poor Settings can be complementary in this aspect to the Code of Conduct for Research Integrity. If the applicant fails to conduct the research in an ethically responsible way, NWO and CAS shall reserve the right to withdraw the grant immediately.

3.6 Submitting an application

Applications should be submitted to both NWO and CAS, by the Dutch and Chinese Principal Investigators respectively. Applications not submitted to both organisations will not be admitted to the assessment procedure.

Applications submitted after the deadline, or that have not been submitted to both application systems before the deadline, will not be included in the assessment procedure.

Submission to NWO:
The Principal Investigator based in The Netherlands or at a university established in the Kingdom of The Netherlands must submit his/her application via his/her own ISAAC account. Applications not submitted via ISAAC will not be admitted to the assessment procedure.

If the Principal Investigator does not have an ISAAC account yet, then this should be created at least five working days before the application is submitted to ensure that any registration problems can be resolved on time. If the Principal Investigator already has an ISAAC account, then

he/she does not need to create a new account to submit an application.

Please note that you will be asked to submit additional information when submitting your application in ISAAC, such as the organisations of your consortium members. For this reason, we strongly advise that you start submitting your application at least five working days before the deadline. If the organisation of your co-applicant(s) or collaboration partners is not yet registered in ISAAC, you will need to contact the department 'Relatiebeheer'(relatiebeheer@nwo.nl) of NWO in order to add them.

For technical questions please contact the ISAAC helpdesk, see Section 5.1.2..

Submission to CAS:
The Chinese Principal Investigator should submit the application via ARP system. Please see the Chinese version of the Call for Proposals on the CAS website: http://english.cas.cn/research/

4 Assessment procedure

4.1 Procedure

Code for dealing with personal interests (Personal Interest Code)

The assessment and/or decision-taking process for this funding round will be carried out according to the Personal Interest Code. More information concerning the Personal Interest Code can be found on the NWO website. See: https://www.nwo.nl/en/common/subsidies/funding-process-explained/code-for-dealing-with-personal-interests.

Eligibility

After the deadline, the administrative eligibility of the applications is assessed by NWO and CAS, based on the eligibility criteria specified in chapter 3. All applicants and their organisations must fulfil national eligibility rules for research proposals as set by the relevant organisation (see section 3.1, Who can apply).

If correction of the application submitted to NWO is possible and necessary, the Dutch Principal Investigator will be given one opportunity to adjust his or her application. If the application is not corrected within five working days, NWO and CAS will not include the application in the assessment process. Corrected applications will, after approval of eligibility by both NWO and CAS, be included in the assessment procedure.

Please note that applications submitted to CAS cannot be corrected, and if found not to comply with CAS's eligibility conditions will not be eligible.

The remainder of the assessment procedure will subsequently be conducted through the online system of NWO.

Substantive assessment

All eligible applications will be sent to independent, (inter)national reviewers, who will assess the application based on the criteria specified in 4.2.2. Each application will be assessed by a minimum of four reviewers. The reports by the external reviewers will be made available to the Dutch Principal Investigator via ISAAC, who should share them with the Chinese Principal Investigator. The consortium will have five working days to write a response to the reviewers' reports. The response should be submitted by the Dutch Principal Investigator on behalf of the consortium, via his or her ISAAC account.

Assessment and grant advice

NWO and CAS will jointly compose an International Advisory Committee (IAC), with international experts. All applications are assessed in competition by the IAC, according to the criteria specified in paragraph 4.2. The IAC will make a final assessment of the application, based on the application, the reviewer reports, and the response, according to the criteria in section 4.2. The IAC will subsequently rank all applications. The IAC will subsequently present a substantiated advice to the NWO-WOTRO Steering Committee and the Board of CAS regarding which applications are to be awarded.

Decision

The NWO-WOTRO Steering Committee, on behalf of NWO, and the Board of CAS will check the assessment procedure has been carried out in accordance with the call for proposals, and will provisionally decide on the projects to be awarded, based on the advice of the IAC. The decision becomes definitive when the NWO-WOTRO Steering Committee and the Board of CAS have come to the same provisional decision.

Qualification

Based on the IAC's final score, NWO will award a qualification to all proposals, and will make this known to the Dutch Principal Investigator with the decision about whether or not the application has been awarded funding. CAS will communicate the decision to the Chinese Principal Investigator.

Only applications that receive the qualification "excellent" or "very good" will be eligible for funding. For more information about the qualifications please see: www.nwo.nl/en/funding/funding+process+explained/nwo+qualification+system.

Data management

The data management section in the application is not evaluated and therefore not included in the decision about whether to award funding. However, both the reviewers and the IAC can issue advice with respect to the data management section. After a proposal has been awarded funding, the researcher should elaborate the data management section into a data management plan. Applicants can use the advice from the reviewers and the IAC when writing the data management plan.

A project awarded funding can only start after NWO and CAS have approved all starting documents, as stated in section 3.5. It is the responsibility of the Principal Investigators to ensure that these documents are submitted on time to the respective funding agencies so that the project can start within the allowed time frame.

Timeline

December 2020	Webinar
18 December 2020	Deadline for submission of documents for Dutch co-applicants whose organisation is not listed in 3.1.1. to test eligibility
14 January 2021 16:00 CST	Submission deadline full proposals CAS
14 January 2021 14:00 CET	Submission deadline full proposals NWO
January-April 2021	Reviewers are consulted
April-May 2021	Consortia have five working days to submit a rebuttal, via the ISAAC account of the Dutch Principal Investigator
May 2021	IAC meeting
October 2021	Decision NWO-WOTRO Steering Committee and Board of CAS
October 2021	NWO and CAS inform Principal Investigators about the decision
January 2022	Deadline start projects

While NWO and CAS strive to meet the above time frame, NWO and CAS reserve the right to deviate from the indicated dates.

4.2 Criteria

Applications will be assessed according to the following criteria:

I. Quality of the research proposal
II. Quality of the consortium
III. Potential scientific and/or societal breakthrough

The criteria carry equal weight and each count for one-third of the final assessment. The assessment criteria are further operationalised below:

I. Quality of the research proposal
- Alignment with the thematic focus of the call for proposals;
- Scientific importance of the proposed research;
- Complementarity to other research programmes or (inter)national research agendas;
- Innovativeness of the research question and approach;
- Interdisciplinarity and transdisciplinarity; the proposal incorporates the scientific disciplines necessary for addressing the problem, as well as knowledge from outside the scientific community;
- Clarity of problem statement and rigour of research;

- Suitability and feasibility of the approach and methodology;

II. Quality of the consortium
- Quality of the involved research partners;
- Quality of the Sino-Dutch collaboration, including equality in the partnership;
- Potential for long-term knowledge relations;
- Coherence and complementarity of the consortium, including organisation of the research;
- Quality of knowledge co-creation, including attention to and involvement of the complete knowledge chain;

III. Potential scientific and/or societal breakthroughs
- Relevance for society;
- Degree to which the proposal aims for scientific and societal breakthroughs;
- Quality of involvement of wider public/specific target groups;
- Quality of impact plan, including utilisation and valorisation;
- Quality of communication plan for knowledge transfer, including outreach to industry, societal partners, and/or other stakeholders.

5 Contact details

5.1 Contact

5.1.1 Specific questions

For specific questions about Cooperation China-The Netherlands (CAS) and this call for proposals on 'Vertical Farming' please contact:

NWO:
Mr Berry Bonenkamp
+31 (0)70 349 44 16

Miss Maaike Spiekerman
+31 (0)70 349 4094
CAS-nwo@nwo.nl

CAS:
Ms GONG Haihua
+86 (0)10 6859 7396
hhgong@cashq.ac.cn

5.1.2 Technical questions about the electronic application system ISAAC

For technical questions about the use of ISAAC please contact the ISAAC helpdesk. Please read the manual first before consulting the helpdesk. The ISAAC helpdesk can be contacted from Monday to Friday between 10:00 and 17:00 hours CET on +31 (0)20 346 71 79. However, you can also submit your question by e-mail to isaac.helpdesk@nwo.nl. You will then receive an answer within two working days.

6 Annex

Annex 1: Format Letter of Commitment

6.1 Format Letter of Commitment

[Template letter of commitment for consortium organisation]

[The letter should be printed on the stationery of the consortium organisation concerned]

[address main applicant]

Concerns: Letter of Commitment

[Location], [date]

Dear [name principal investigator],

Through this letter, I confirm that [**name consortium organisation**] is available and committed to participate in the proposed project, entitled '[*proposal title*]', which was submitted to the '[*Title of call]*'.

[outline the availability and commitment of the consortium organisation, including the availability and commitment of the individual consortium members, and confirm that the PI and/or co-applicant(s) have a contract for the duration of the assessment process and the research]

[if applicable, indicate the consortium organisation's total contribution in cash, or quantify the in kind contribution. This amount should be the same as indicated in the application form.]

Yours sincerely,

[signed by the Dean of faculty/director of the organisation]

Location: [..] ..... [signature]
Date: [..] [**NAME + POSITION**]

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