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Call for proposals Photosynthesis Public-private collaboration programme on photosynthesis, its genetics and physiology, Nederlandse Organisatie voor Wetenschappelijk Onderzoek

2019

The Hague/Utrecht, April 2019
Netherlands Organisation for Scientific Research

1 Introduction

1.1 Background

The Dutch government designates 'Horticulture and Starting Materials' as one of the nation's 'top sectors'. Meanwhile, NWO has developed initiatives, both national and international, on the subject of 'biobased economy'. Furthermore, the National Science Agenda has resulted in several 'exemplary routes' that are closely linked to the photosynthesis programme: "Circular economy and resource efficiency: sustainable circular impact" and "Sustainable production of safe and healthy food". In the latter, photosynthesis is recognized as a 'game changer'. Finally, the EU has defined one of its Grand Societal Challenges within this field: "Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bioeconomy". The European photosynthesis research community, in which Dutch scientists play a prominent role, is working towards a 'Future and Emerging Technology Flagship' proposal, or similar initiative.

Within 'top sectors', the business community, knowledge institutions and the government pool financial resources and relevant know-how. Together they co-develop new knowledge and achieve innovation. Joint arrangements are laid down in innovation contracts. The Netherlands Knowledge and Innovation Contract 2018-2019 (KIC) provides an overview (in Dutch) of activities to be carried out by, among others, NWO in cooperation with each top sector. A link to this document can be found on page: https://www.nwo.nl/documents/nwo/kennis--en-innovatiecontract-2018-2019.

Research within the photosynthesis programme is pre-competitive, but clearly aimed at knowledge transfer and the applicability of the results for industrial benefits with respect to plant breeding concept development and sustainability.

This research programme entitled "Photosynthesis; Public-private collaboration programme on photosynthesis, its genetics and physiology" is one of the activities lined to the Horticulture and Starting Materials top sector and biobased Economy top consortium for knowledge and innovation (TKI-BBE).

This call incorporates a pilot of the programme "Enabling Technologies Hotels" (see Section 3.3.6), which forms part of NWO's Agriculture and Food and Horticulture and Stock work programme 2018-2019.

This call for proposals has been prepared in consultation with the Horticulture and Starting Materials Top Sector. In this public-private partnership programme, a private-sector contribution is required in cash. Project consortia can choose between a private-sector contribution of either 10 per cent or 20 per cent.

1.2 Available budget

The budget available from NWO for this call is € 1,700,000. Each project requires that private project partners co-finance either 10 per cent or 20 per cent of the total project budget in cash. For more details, please refer to Section 3.3.5.

In addition to the main budget, a further overall budget of up to € 90,000 available for Enabling Technologies Hotels, in connection with a pilot for the ETH-inside initiative. Please refer to Annex 6.3 and Section 3.3.6.

1.3 Validity of the call for proposals

This call for proposals is valid until the closing date for submission of full proposals: Thursday, 19 September **2019**, 14:00 hours CE(S)T.

2 AIM

2.1 Theme: Photosynthesis: physiology and genetics

A revolution in agricultural primary productivity will be required if we are to meet future demands for food and fodder, while transitioning smoothly to a sustainable non-fossil industrial base. To meet food demands alone, crop yields per unit area will need to be at least doubled by 2050 if we are to increase productivity without further diminishing the extent of natural ecosystems. Despite its importance to agriculture, photosynthesis remains the last major crop yield-related trait that has not been subject to systematic modification as a route to crop yield improvement. This lack of attention leaves photosynthesis as an important target for future yield improvement strategies. Past research has focused on understanding the operation and limits to photosynthesis under steady-state conditions, but in nature the environment is in continuous change and photosynthesis needs to be understood as a process that is responding to change. The more rapidly photosynthesis responds to change, the closer it will remain to its optimum state; conversely, the more slowly it responds, the less efficient it will be. Improving photosynthesis therefore depends on not only ameliorating its steady-state function but also its dynamic responses. This call focuses on the dynamic responses of photosynthesis.

Environmental change occurs over many time scales. This call addresses photosynthetic responses in the time range of seconds to days, the time range within which short-term physiological responses and longer-term reorganization of the photosynthetic apparatus take place. The focus will also be primarily on responses of photosynthetic light-use efficiency to fluctuations and changes to irradiance, the limits of such responses, and the genetic basis for variation in them. The species investigated should normally be a higher plant; exceptionally non-higher plant species can be investigated but only if there is a clear connection to the goal of improving our understanding of how higher plants respond to changes in irradiance in the seconds-to-days time range.

One of this call's ambitions is to improve cooperation between the photosynthesis and genetics communities, which is necessary in order to achieve the required improvement in crop plant photosynthesis. With that aim in mind, the project(s) within this call will take the form of coherent research initiatives involving researchers from the plant genetics and the plant physiology/biophysics/biochemistry communities.

2.2 Aiming for impact: coherent consortia through applications preceded by a matchmaking event

The wide variety of subjects that are relevant to photosynthesis, combined with the limited number of well-equipped research groups, make it important to integrate relevant subthemes into (a single) multidisciplinary project(s), prepared and implemented by one or more optimally balanced research consortia. The type of consortium envisaged and the role of the matchmaking event for interested parties are explained further in Section 4.1.

While projects are under way, each main applicant will lead a 'project commission' in which the companies that contribute financially are represented together with public not-for-profit partners and an observer from NWO. The meetings, to be held at least twice a year, will enhance both coherence and knowledge dissemination between public and private partners, between researchers and industrial partners.

3 Guidelines for applicants

3.1 Who can apply

Full, associate and assistant professors and other researchers with comparable appointments can submit applications if they:

– are employed (i.e. hold a salaried position) at one of the following organizations:
  - Universities located in the Kingdom of the Netherlands;
  - University medical centres;
  - NWO and KNAW institutes;
  - the Netherlands Cancer Institute;
  - the Max Planck Institute for Psycholinguistics in Nijmegen;
  - researchers from the DUBBLE Beamline at the ESRF in Grenoble;
  - NCB Naturalis;
  - Advanced Research Centre for NanoLithography (ARCNL);
  - Princess Máxima Center; and
  - Royal Netherlands Meteorological Institute;

  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.

Additional conditions[1]:

A proposal must involve a project consortium, which meets the following criteria:

- The consortium must consist of at least three (co-)applicants, from at least three different disciplines from at least three different Dutch knowledge institutions listed in Section 3.1. The budget requested from NWO must include at least (the equivalent of) one full research position for each of the (co)-applicants.
- On behalf of the consortium as a whole, the main applicant must act as coordinator and contact person to NWO. The main applicant must submit the full proposal and required annexes, and has to submit these documents using his/her own ISAAC-account.
- No single (co-)applicant/knowledge institution may apply for more than 60 per cent of the consortium's total requested project budget.
- The consortium must include at least two private companies that jointly co-finance the project with the required private contribution in cash. Depending on the intensity of the companies' involvement, either 10 per cent or 20 per cent of the total budget is to be provided by private partners. Please note that the two private contribution categories differ in terms of the level of project-derived intellectual property rights that the private partners are entitled to (see Section 3.3.5).
- Public partners may join the consortium. Public partners do not need to contribute (in cash). From the application it must be clear that the participation of the public partners is relevant, e.g. for the research itself or for optimal dissemination of project results.
- The financial commitment made by each private party must be stated in a Letter of Commitment submitted to NWO together with the research proposal via ISAAC.
- If a grant is awarded, all parties must sign a joint Project Agreement. A joint Project Agreement includes (a reference to) the full proposal in its granted form. The Project Agreement will take effect if and when NWO agrees to the document in writing. Projects are granted on the condition that a Project Agreement has taken effect.

3.2 Private and public partners

Definition of a private partner

A private co-financier is an enterprise or other organization or consortium, which undertakes activities in the context of the relevant programme or project, which may objectively be deemed market activities. NWO considers an enterprise to be an organizational entity or person that pursues prolonged involvement in economic intercourse through the deployment of labour and capital and

[1] The word 'applicants' refers to both main applicants and co-applicants.

with a view to generating profit. Hence, an SME is considered to be an enterprise, as is a self-employed professional registered with the Chamber of Commerce. Institutes with 'ANBI' status (*Algemeen Nut Beogende Instelling*, i.e. a state-recognized charitable institution or Public Benefit Organization) may also act as private partners. Private partners from other countries may participate in consortia.

Definition of a public partner

A public co-financier is a knowledge institute or other institute that is neither an NWO-recognized knowledge institute (i.e. an institution that cannot apply at NWO on its own account, e.g. a municipal authority or foundation) nor a private party (e.g. a health care foundation, health care insurer or governmental body that, in the context of its activities within the programme or project, does not act in a governmental capacity), insofar as, in its 'partner' role, it undertakes no activities that may objectively be deemed market activities.

3.3 What can be applied for

The funding that may be sought from NWO is € 1,700,000 per application. Given the requirement for a private contribution of either 10 per cent or 20 per cent (depending on the type of project the consortium chooses to apply for), that implies a total programme budget of at least either € 1,890,000 or € 2,125,000 (excluding any additional funds linked to the ETH-inside option).

The budget covers the cost of the research project that encompasses at least three disciplines and represents a significant and cohesive contribution to solving the challenges described in the aim of this programme (Section 2). That cost consists mainly of personnel costs and material costs, both resulting from the appointment of temporary project staff. In addition to the personnel and materials budgets, 5 per cent of the requested budget will be set aside at NWO for 'communication and knowledge utilization'. The communications budget can be used for workshops with potential users of the knowledge to be generated, and for other utilization, transfer, and communication activities that are specified in the application.

3.3.1 Module Personnel: a: PhD

NB: Remunerations for PhD scholarship students at a Dutch university are not eligible for funding from NWO.
Module 1a) PhD/PDEng/MD PhD

The guideline is that 1 fte PhD for 48 months or 0.8 fte for 60 months can be applied for. If a different duration of appointment is desired for the realisation of the proposed research, then the guidelines may be deviated from as long as this is well justified (e.g. PDEng 2 years or MD PhD longer than 4 years).
The salary costs will be remunerated according to the agreements in the 'Agreement for Funding Scientific Research' made with the Association of Universities in the Netherlands and are based on the collective labour agreement of the Dutch universities.
In addition to salary costs, the project employee funded by NWO will receive a one-off individual bench fee (€ 5,000) to encourage his or her scientific career. The agreement and the maximum amounts for personnel costs can be found at https://www.nwo.nl/approval-of-funding-for-scientific-research-2008 and https://www.nwo.nl/salarytables.

3.3.2 Module Personnel: b: Postdoc

The guideline is that the appointment period of a postdoc can be between 12 and 48 months. The minimum size of the appointment is 0.5 fte for 12 months. This deployment can be spread over a longer or shorter period, for example across the entire duration of the project.
If the applicants wish to deploy expertise for a shorter period of time, then the material credit can be used for this.
The salary costs will be remunerated according to the 'Agreement for Funding Scientific Research' made with the Association of Universities in the Netherlands.

3.3.3 Module Material credit

A maximum of € 15,000 per year per full-time scientific position (modules 1a and/or 1b) can be applied for, specified according to the three categories stated below:

- Project-related goods/services
  - Consumables (glassware, chemicals, cryogenic fluids, etc.);
  - Equipment and/or software (e.g. lasers, specialist computers or computer programs, etc.). For

these small items of equipment and/or software, the amount may not amount to more than € 160,000 per application;
    - Measurement and calculation time (e.g. supercomputer access, etc.);
    - Cost for acquiring or using data collections (e.g. from Statistics Netherlands);
    - Access to large national and international facilities (e.g. cleanrooms, synchrotrons, datasets, etc.);
    - Work by third parties (e.g. laboratory analyses, data collection, etc.);
    - Personnel costs smaller in size than those offered in sections 3.3.1 and 3.3.2 of this call.
- Travel and accommodation costs (for the employees for which a personnel grant was requested in sections 3.3.1 and 3.3.2 of this call)
    - Travel and accommodation costs (national and international);
    - Congress visits (max. 2 per year);
    - Fieldwork;
    - Work visits.
- Implementation costs
    - National symposium/conference/workshop organised by the project;
    - Costs of open access publishing
    - Data management costs;
    - Recruitment costs (incl. advertisement costs);
    - Costs involved in applying for licences (e.g. for animal experiments).

Costs that cannot be applied for are:
- Basic facilities within the institution (e.g. laptops, desks, et cetera);
- 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. The only exception to this is the amount for small equipment (€ 160,000).

3.3.4 Module Internationalisation, b) Money follows cooperation (MfC)

The aim of this module is to encourage international collaboration via the principle of Money follows Cooperation, for which the national research budget is used for cross-border collaboration that offers the possibility to create added value for individual research projects by deploying expertise from abroad which is not available in the Netherlands at the desired level for the project. This concerns expertise from organisations outside of the Netherlands that have a public task and carry out research independently. In the proposal, the applicant must convincingly demonstrate that the expertise concerned is not available in the Netherlands. This will be assessed in the selection process. If the arguments are not sufficiently convincing, then the funds for this module cannot be made available.

Furthermore, the applicant needs to state the amount to be deployed for this module in the budget. In principle, there is no limit to the amount that can be requested.

3.3.5 PPP/Co-funding: total private partner cash contribution of either 10% or 20%

This research programme is a public-private collaboration. Each consortium decides what combination of knowledge institutions and (public and) private partners best fits its aims. The private contribution consists of cash contributions by at least two independent private companies. A consortium needs to choose which of two types of project it wants to apply for: either a project type with a higher private partner involvement or a project type with a lower private partner involvement. Depending on the private partners' financial contribution to the project, one of the following two sets of conditions applies:
- a. The private partners in a project with a lower private involvement jointly contribute at least 10 per cent of the entire project budget in cash.
  In that case, the private partners must not actively co-determine the content of the project. Furthermore, the private partners will have no preferential intellectual property rights (IPRs) to any of the foreground knowledge generated by the project, although internal use by private partners is allowed ('teaching and research exemption'). The partners will also take part in the project commission ('gebruikerscommissie').
- b. The private partners in a project with a higher private involvement jointly contribute at least 20 per cent of the entire project budget in cash.
  In that case, the private partners will have a say in what the project consists of. As well as receiving a teaching and research exemption, the partners have a right of first refusal. That implies that they have a preferential opportunity to acquire IPRs to foreground knowledge generated by the project at the going market price (subject to negotiation). The partners will also take part in the project commission ('gebruikerscommissie').

The implications of project type for intellectual property rights are described in more detail as "Option 2: Right to one's own results" in Annex 6.1.
(N.B. 'Option 2' in Annex 1 is equivalent to 'model ii' described in Section 4.2.4.3 of the *Subsidieregeling 2017, Nederlandse Organisatie voor Wetenschappelijk Onderzoek*. NWO uses Section 4.2.4.4 of the *Subsidieregeling...*) to determine that model ii/Option 2 (Right to one's own results) applies throughout the 'photosynthesis' programme.)

3.3.6 Enabling Technologies Hotels

The photosynthesis programme is part of a pilot for the Enabling Technologies Hotels programme, 'ETH-inside' (see Annex 6.2). Applicants have the option to request extra materials budget, specifically for integrating one or more enabling technologies hotels that are associated with the Dutch Techcentre for Life Sciences (DTL). (Information on DTL can be found on page: https://www.dtls.nl/. Information on DTL's 'Enabling Technologies Hotels' can be found on page: https://www.dtls.nl/technology-hotels/).

The following conditions apply:
- The consortium has the option to include up to three DTL-associated enabling technologies hotel in the proposal;
- The enabling technologies hotel must be associated with the Dutch Techcentre for the Life sciences, DTL;
- The hotel's services must be part of, and preferably well integrated with, the proposed research project;
- The ETH budget is to be used for activities at/with the Technology Hotel exclusively;
- The cooperation must be new: the researchers within the consortium have not used technology from the ETH before on the same research subject;
- The maximum extra materials budget that can be requested amounts to € 30,000 per hotel;
- The 'ETH-inside' initiative is a public-private partnership as well.
- Where an ETH is used, in-kind co-funding of € 3,000 (10 per cent) per ETH is required. The co-funding is generally provided in the form of personnel input to make optimal use of the enabling technologies that the hotel(s) make available to the consortium, in cooperation with the ETH in question.

3.4 When can applications be submitted

The deadline for the submission of full proposals through ISAAC, using the main applicant's ISAAC account is Thursday, 19 September **2019**, 14:00 hours CE(S)T.

When you submit your application to ISAAC, accompanied by one letter of Commitment each, you will also need to enter additional details online. You should therefore start submitting your application at least one day before the deadline of this call for proposals. Applications submitted after the deadline will not be taken into consideration.

3.5 Preparing an application

Matchmaking workshop

In order to provide optimal support for the formation of coherent consortia and the drafting of full proposals, NWO will organize a matchmaking workshop in May 2019. NWO will send out invitations for this event in April. The invitation will be communicated through the digital newsletter of the Domain Science, through stakeholders consulted about this call ('Horticulture and Starting Materials top sector, Knowledge and Innovation 'biobased economy' top consortium, Dutch Techcentre for Life Sciences and Plantum), Twitter (@nwo_science) and BioNieuws.

Although parties are not required to take part in the workshop in order to be eligible as consortium partners, all interested parties are strongly advised to attend.
The matchmaking workshop serves as the kick-off of the process that leads to submission of project proposals before the deadline mentioned in Section 3.4. During the workshop, all experts, 'hotels', companies and other interested parties present can learn what other parties could contribute to a project.

During and after the workshop, participants should proceed as follows:
- Form the most suitable consortia to solve important research problems.
  - Consortia may include transcending disciplines, such as numerical modelling, systems biology and modern (electron microscopy) imaging techniques.
  - If a relevant discipline is not represented at the workshop, participants may contact suitable

research groups, if necessary from abroad (see Section 3.3.4).

- Come to an agreement as to the type of project that best suits the consortium and the project, namely either:
  - the type of project with a lower level of private partner involvement and a private partner cash contribution of 10 per cent, or
  - the type of project with a higher private partner involvement and a private partner contribution of 20 per cent.
- Investigate whether and, if so, which Enabling Technologies Hotels should be included in the consortium to achieve access to relevant high-end equipment and expertise.
- Start co-developing coherent multidisciplinary applications. If the private sector contribution is to be 20 per cent, participating companies are directly involved in drafting the proposed project as co-makers.
- Secure private funding for their proposals, of either 10 per cent or 20 per cent of the requested budget, contributed by at least two independent private sector companies.

Preparing the proposal

- Download the application form from the electronic application system ISAAC or from NWO's website (the grant page for this programme).
- Complete the application form.
- The application should be in English, in a standard font of at least 11 points. Literature references may be in font size 9. References to external documents (other than references to published literature) should be avoided. To guarantee proper processing of your application you should not protect the PDF file in any way.
- Collect a letter of commitment from each private sector partner that will contribute financially if and when a grant is awarded by NWO in respect of the research proposal. Each letter of commitment must state the size of the financial contribution in euros, must be signed and printed on the company' official stationary and must be addressed to NWO. A suitable format for a letter of commitment can be downloaded from the programme's webpage.

3.6 Conditions on granting

The NWO regulation on subsidies (*Subsidieregeling 2017, Nederlandse Organisatie voor Wetenschappelijk Onderzoek*) that took effect in May 2017 applies. A link to the publication (in Dutch) can be found here or on this page: https://www.nwo.nl/documents/nwo/juridisch/nwo-subsidieregeling-1-mei-2017. The most recent Agreement for Funding Scientific Research between NWO and the Association of Universities in the Netherlands, based on the collective labour agreement of the Dutch universities, also applies. Please be aware that, by the time a grant decision is made, an updated version of the Agreement may have come into force, superseding the version in force at the time that the proposal was prepared and submitted. Because the version(s) in force at those times may differ from the version in force when this call is opened, no link to the Agreement is provided in this call for proposals.

The NWO Code of Conduct on Conflicts of Interest applies to all persons and NWO staff involved in the assessment and/or decision-making process. See also: www.nwo.nl/en/documents/nwo/legal/nwo-code-of-conduct-on-conflicts-of-interest.

Rules for public-private partnerships; NWO Framework for Public-Private Partnerships

At the government's request, NWO, KNAW, VSNU, the Association of Universities of Applied Sciences, VNO-NCW and MKB-Nederland have drawn up rules on public-private cooperation in the programming and implementation of fundamental and applied research, and on intellectual property. The document setting out the rules (in Dutch) is available at the following address: https://zoek.officielebekendmakingen.nl/blg-236107.pdf. The current programme entails PPC variant 2 ('specific form').

Annex 6.1 describes the minimum requirements for Project Agreements (also known as 'consortium agreements'). These relate to recording arrangements regarding the consortium's governance, finances, publications, intellectual property, liability and disputes. The NWO principles on intellectual property (IP) and knowledge transfer are set out in the framework document.

Please see sections 3.2 and 3.3.5 for conditions regarding public-private partnerships that apply specifically to this Photosynthesis Research Programme.

Project commencement

If the proposal is successful, the partners are required to fulfil certain conditions before the project can actually start:

1. The project leader must fulfil the data management obligations.
2. The consortium partners must confirm their cash contributions and payment schedules in a letter to NWO.
3. Each of the partners that are to make cash contributions to the project must pay the first instalment to NWO.
4. The consortium partners must draw up a Project Agreement covering matters such as the financial and intellectual property (IP) arrangements. The Project Agreement should be consistent with the application in its approved form, with Annex 6.1, and with all other NWO stipulations made or referred to in this call document. The Project Agreement comes into force only if and when NWO agrees to it in writing.
5. The project leader must enter details of the proposed project appointee(s) into ISAAC and upload the start form to ISAAC.

The consortium partners must satisfy the first condition within three months of the grant award. Conditions 2 to 4 must be satisfied within six months of the grant award. The final condition stated above must be satisfied within nine months of the grant award. If the consortium proves unable to meet the deadlines stated above and NWO does not agree to a further delay, the award will be withdrawn.

Project management

The Photosynthesis Programme has close links with the Horticulture and Starting Materials top sector. NWO will therefore monitor progress on behalf of that top sector.

Open access

All scientific publications resulting from research that is funded by grants derived from this call for proposals are to be immediately (at the time of publication) freely accessible worldwide ('open access'). There are several ways for researchers to publish on an open-access basis. A detailed explanation of open access can be found on www.nwo.nl/openscience-en.

Data management

Responsible data management is part of good research. NWO wants data generated by publicly funded research to become freely and sustainably available for reuse by other researchers wherever possible. Furthermore, NWO wants to raise awareness among researchers about the importance of responsible data management.
Proposals should therefore satisfy NWO's Data Management Protocol. That protocol provides for two stages of Data Management Planning:

1. Data management section

The data management section is part of the research proposal. Researchers should answer four questions about data management within their intended research project. Thus, before starting the research, the researcher is required to think about how the collected data is to be ordered and categorized so that it can be made freely available. Measures will often need to be taken during the production and analysis of the data to make subsequent storage and dissemination possible. Researchers can state what research data they consider to be appropriate for storage and reuse.

2. Data Management Plan

After a proposal has been awarded funding, the researcher should expand upon the data management *section* to produce a Data Management Plan. The Data Management Plan is a detailed statement of the matters outlined in the data management section. In the plan, the researcher describes whether use will be made of existing data or a new data collection and how the data collection will be made FAIR: Findable, Accessible, Interoperable, Reusable. The plan should be submitted to NWO via ISAAC within four months of the proposal being awarded funding. 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 revised during the research.

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

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 familiarize themselves with the Nagoya Protocol (www.absfocalpoint.nl). NWO assumes that researchers will take all action necessary for compliance with the Nagoya Protocol.

3.7 Submitting an application

An application can only be submitted to NWO via the online application system ISAAC. The main applicant must submit his/her application files via his/her own ISAAC account. If the main applicant does not already have an ISAAC account, one should be created at least one day before the application is submitted, to ensure that any registration problems can be resolved on time. If the main applicant already has an NWO-account, then he/she does not need to create a new account to submit an application. Applications not submitted via ISAAC and applications submitted after the deadline stated in Section 3.4 will not be taken into consideration.
To submit, save the completed application form as a PDF file. Save each letter of commitment (for requirements regarding LoCs, refer to Section 3.5) as a separate PDF file. Do not write-protect, or otherwise protect, the application form or any of the other PDF files. Upload the application, accompanied by the LoC PDF files, to ISAAC.

When you upload the application to ISAAC, you will have the opportunity to nominate up to three people who you don't want to act as referees for your proposal. Do not include their names on the application form itself.

For technical questions regarding the submission of applications, please contact the ISAAC helpdesk, see Section 5.1.2.

4 Assessment procedure

4.1 Procedure

General

In accordance with the agreement between NWO and the VSNU, applicants must inform their institution that they will be submitting a project proposal to NWO. The applicant is to give a copy of the proposal to the scientific director or dean of the institution or faculty.
Whenever a proposal is received, NWO will assume that the applicant has already informed the institution and that the university or the institute accepts both the NWO Regulation on Granting and the funding conditions published in this Call for Proposals.

The NWO Regulation on Granting stipulates that all NWO-funded research must be carried out in a manner consistent with nationally and internationally accepted standards of scientific practice, as referred to in the Netherlands Code of Conduct for Scientific Practice of 2012 (VSNU). From October 2018, the Netherlands Code of Conduct for Research Integrity 2018' applies. Links to the Dutch and English versions of this document can be found on this page: https://www.vsnu.nl/wetenschappelijke_integriteit.html.
More information about the NWO policy on scientific integrity can be found at http://www.nwo.nl/en/policies/scientific+integrity+policy.

The NWO Code of Conduct on Conflicts of Interest is applicable to anyone (including NWO staff) who is involved in assessing or making decisions about proposals. See also: http://www.nwo.nl/en/documents/nwo/legal/nwo-code-of-conduct-on-conflicts-of-interest.

NWO will assign every complete proposal a qualification. The qualification will be made known to the applicant when they are informed of the decision as to whether or not their proposed project will be funded. For more information about the NWO qualification system, see: http://www.nwo.nl/en/funding/funding+process+explained/nwo+qualification+system.

Admissibility

The first step in the assessment procedure is to test whether an application is admissible (also known as eligibility check). Only those proposals that satisfy the criteria stated or referred to in Chapter 3 of this brochure are admissible and will be taken into consideration. If a proposal is judged conditionally

admissible, the main applicant is given the opportunity to correct the application (or LoCs), under normal circumstances within 48 hours.
Inadmissible applications and conditionally admissible applications that are not corrected within the permitted time frame are not consider further. Any applicant whose proposal does not satisfy the admissibility criteria will be notified accordingly by letter. The consideration of applications (including, where relevant, the ETH-inside component) is in two stages: 'Review/Response' and 'Ranking and grant recommendations...'.

Review/Response

Each eligible photosynthesis proposal will be sent to independent, international referees for review. The applicant will then have an opportunity to respond in writing ('rebuttal') to the anonymized referees' remarks/advice.

Ranking and grant recommendations

Applications, reviews and responses are evaluated by an assessment committee. The committee discusses and ranks the proposals. The committee considers the referees' input and the applicant's response, and arrives at an independent assessment of the proposal. The committee's role differs from that of the referees insofar as:
– the committee is able to take the applicant's response into consideration; and
– the committee can consider all proposals, referees' reports and applicants' responses, whereas referees normally see only one proposal. Only the committee sees all assessments of all proposals.

Consequently, the committee's conclusion regarding the merit of a proposal may differ from the referees' conclusion. Referees are specifically asked to reflect on the composition of the proposed consortium, the optimal combination of disciplines and technologies, and on the coherence of (the distribution of) tasks within the proposed project. In its advice to the Board, the assessment committee may include a recommendation, based on reviewers' comments, to suggest to have the consortium/project revised, for the sake of optimal performance, prior to funding being granted.

The advice of the assessment committee, consisting of a ranking and grant recommendations, is sent to the Board of the NWO Domain Science (ENW).

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 referees and the committee can issue advice with respect to the data management section. After a proposal has been awarded funding, the researcher should expand upon the data management section to produce a Data Management Plan. An applicant can use the advice from the referees and the committee when writing the Data Management Plan. A project that has been awarded funding can only start once all the conditions have been met, including the condition that NWO has approved the Data Management Plan.

Decision-making

The Board of NWO's Domain Science will consider the assessment committee's ranking and grant recommendations and decide whether a grant (including, where applicable, the ETH-inside component) should be awarded in each case. Grants can be awarded only in respect of applications appraised by NWO as 'Excellent' or 'Very good'. Proposals appraised as 'Good' are not eligible for funding, even when budgetary scope is available.

Procedural steps for photosynthesis proposals
1. Using the ISAAC online application system, the main applicant submits the proposal as a non-protected PDF document, accompanied by a letter of commitment (in PDF format) from each private party that is to contribute financially to the project.
2. NWO checks the admissibility (eligibility) of the proposal, by reference to the criteria listed in Section 3.
3. If there is scope for the correction of an initially inadmissible application, the main applicant will be given the opportunity to correct the application, usually within 48 hours. If the application is not adequately corrected within that time, or if it is not possible to correct the application, NWO will not consider it further.
4. If the proposal is declared admissible, the office of the Domain Science will forward it to at least four international experts ('referees'). The referees will evaluate the proposal by reference to the criteria listed in Section 4.2. The data management section will not be evaluated, as was explained earlier in this section.

5. The applicant will then have an opportunity to respond in writing to the referees' reports. The applicant is not obliged to respond.
6. The assessment committee (either the PPP Committee itself or an advisory committee, also installed by the Board of the NWO Domain Science) will assess the dossiers. Each dossier consists of a proposal and at least four referees' reports and, in most cases, a response from the applicant. The assessment committee gives each proposal an appraisal for each of the evaluation criteria, and an overall appraisal. The committee then ranks the proposals according to their overall appraisals.
7. The assessment committee sends its report, including its appraisals and its ranking of the proposals, to the Board of the NWO Domain Science in the form of a grant recommendation.
8. The Board of the NWO Domain Science decides which projects to fund. The Board is not obliged to allocate the entire available budget, if the number, size and quality of the applications make it inappropriate to do so.
9. Each applicant is sent a letter on behalf of the Board of the NWO Domain Science, informing the applicant of the outcome of the evaluation.

	Indicative Timetable
April 2019	Publication of the call for proposals
April 2019	NWO Publishes the invitation to register for the matchmaking workshop; the form for submitting research proposals can be downloaded from ISAAC and the NWO programme website
May 2019	Matchmaking workshop
19 September 2019	Deadline for submitting full proposals
October-November 2019	Referees consulted
December 2019	Applicants invited to send responses to referees' reports
December 2019	Assessment and grant recommendation
January 2020	Grant decision by Board of the NWO Domain Science
January 2020	NWO informs applicants about decisions
April 2020	Deadline for Data Management Plan
July 2020	Deadline for NWO acceptance of the Project Agreement
July 2020	Commencement form to be received
July 2020	First instalment of private cash contribution to be received by NWO
October 2020	Start of the research project (first appointment)

4.2 Criteria

Since 2009, NWO has pursued a policy of promoting the transfer of knowledge generated with the help of NWO funding. Transfer may be to other scientific disciplines, or to users outside the world of science (industry/society). The knowledge utilization policy is mainly targeted at increasing researchers' awareness of knowledge utilization. NWO therefore asks every researcher applying for funding to answer several questions explaining how knowledge from their project may be utilized. (For example: how will knowledge utilization be realized, and how does the researcher intend to facilitate knowledge utilization?) Provision of an explanation is one of the assessment criteria.

As part of the assessment procedure, the explanatory information (including, where relevant, the ETH-inside component) will be assessed to determine:
- Whether the knowledge utilization and knowledge transfer possibilities described are realistic and complete
- The extent to which the action plan represents the optimal approach for realizing the full knowledge utilization and knowledge transfer potential

Overall assessment criteria

Applications are to be assessed on the basis of the following three criteria:
I. Originality and scientific quality (40 per cent)
II. Coherence of the project and the consortium, and strategic fit (40 per cent)
III. Knowledge utilization: value of the project in economic or social terms (20 per cent).
The data management section does not contribute to the assessment.
NWO makes use an appraisal scale ranging from 1 (Excellent) to 9 (unsatisfactory). A separate score is given for each criterion.

I. **Originality and scientific quality**
   – Originality and innovativeness; potential for excellent, precompetitive scientific contributions;

development of new knowledge and/or concepts, or groundbreaking methods and technologies
- Urgency of the proposed research in terms of scientific support for the call's aims
- Scientific quality of the proposal: objectives, approach and methods, fitness for purpose and feasibility
- Scientific quality of the groups involved: national and international embedding, publications, expertise, multidisciplinary and interdisciplinary collaboration, and access to required equipment and facilities.

II. **Coherency and strategic fit**
- Coherence of the research aims and research questions
- Whether the composition of the consortium optimally reflects and supports the project's research aims
- Whether all (members of each of the) groups contribute equally, or at least substantially, to answering the central research question
- Whether the participating groups interact, and whether the cooperative strategic fit provides added value, as opposed to groups merely working in parallel
- Extent to which the application is consistent with the aim and themes of this call for proposals (see Section 2 and Annex 6.1).

III. **Knowledge utilization and value in economic or societal terms**
- The economic or social value of the proposed research
- Whether the proposal includes a translation step from the theoretical level (model plant, numerical modelling) to the practical/societal level (crops, agronomic efficiency)
- Whether the project includes outreach activities to the general public, explaining the socio-economic rationale of the research project, and whether such activities are coherently integrated throughout the project, rather than merely appended to it
- Whether the project reaches out to other national and international initiatives, thus enhancing its (scientific and socioeconomic) impact

5 Contact details and other information

5.1 Contact

5.1.1 Specific questions

For specific questions about photosynthesis and this call for proposals, please contact the programme manager:
Theo Saat
NWO Domain Science (ENW)
T: +31 70 344 0791
email: photosynthesis@nwo.nl

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 before consulting the helpdesk. The ISAAC helpdesk can be contacted from Monday to Friday between 10:00 and 17:00 hours CE(S)T on +31 20 346 7179. However, you can also submit your question by email to isaac.helpdesk@nwo.nl. Questions submitted by email will be answered within two working days.

5.2 Other information

Background information on Enabling Technologies Hotels can be found on the website of the Dutch Techcentre for Life Sciences (https://www.dtls.nl/technology-hotels/enabling-technologies-hotels-programme/) and in Annex 6.2.

6 Annexes

6.1 Intellectual property rights (IP) and knowledge transfer; Project Agreement

(origin: brochure NWO PPS-fonds EN final, 2018,
adapted to fit the photosynthesis programme)

With regard to intellectual property (IP), the photosynthesis programme follows NWO policy, which allows the parties involved in a project to make bespoke agreements, for example depending on the composition of the consortia and the extent of the (financial) contribution. Such agreements must be in compliance with the EU Support Framework Regulations in order that no prohibited state aid is

involved. The EU state aid schemes offer two options:
1) a general block exemption regulation, which offers, under certain conditions (including its being mentioned on the State Aid website), the possibility of 'authorized aid' and 2) the application of the 'Framework for State Aid for Research and Development and Innovation', which specifies the conditions under which support is not considered to constitute state aid. Within the context of the 'photosynthesis' programme, the second option applies.

The 'Framework for State Aid for Research and Development and Innovation' mentioned under Option 2 above gives two possibilities:
a) making agreements in advance as to how any IP rights to the results are to be allocated, as long as such allocations 'adequately reflect' the efforts, the contributions and the respective interests of the parties involved in the project, or
b) letting the IP rights accrue to the project party that generated the results concerned; in the event that a different project party wishes to obtain exclusive rights with an eye to commercialization (this will ordinarily be a private party), that party will need to pay a normal market compensation for that to the generating party.

Prior to the start of the research project, parties involved in the project will enter into a Project Agreement with each other and with NWO, in which they agree on IP, the transfer of knowledge and a number of other matters (see further below). Entering into a Project Agreement is just one of the conditions for receiving a grant for the project concerned.
Approval from NWO is necessary before a project can start. The *Model Project Agreement* is to be used. This is available upon request and will be sent once a project has been granted.

Project Agreement

The Project Agreement contains agreements about:
– (Private) funding of the project
– Ownership of knowledge and IP rights: background knowledge (input, access and use) and foreground knowledge (right to entitlement, as well as access and use)
– Reporting requirements and the exchange of results
– Publication
– Confidentiality / secrecy
– Settlement of disputes
– Indemnity/liability

Minimum conditions for the Project Agreement

Every Project Agreement must satisfy a number of minimum conditions.

(Private) funding for the project

NWO pledges to provide the grant to the project concerned by means of an allocation to the (university-based) lead applicant or her/his affiliated institution. In the Project Agreement, the participating private party or parties commit to the pledged co-financing to NWO and any in-kind contributions.

Ownership of knowledge and IP rights

Background knowledge: Input of, access to and use of this knowledge
– Prior to the start of the project, parties involved in the project are to check and/or agree with each other on which relevant background knowledge they will provide to help realize the project. During the project, supplemental background knowledge can be contributed.
– Any background knowledge thus contributed will remain the property of the project party who provided it. The knowledge may be used by the receiving project party / parties in connection with the research project. The project party that provides the knowledge will make the necessary background knowledge available, upon a written request to that effect, at no cost to the requesting project party by means of a non-transferable and non-exclusive licence for the duration of the project.
– If one project party wishes to gain access to background knowledge from another project party in order to commercially exploit the results, this project party will, insofar as this is legally possible, be granted a licence by the project party that provides the background knowledge concerned, on market terms.

Foreground knowledge: Ownership of results and intellectual property (IP) rights
– Foreground knowledge (the project results) must be freely accessible to all parties involved in the

project for non-commercial use. To that end, parties involved in the project will grant each other royalty-free licences.
– With regard to both the ownership of and the IP rights to the results, the parties involved in the project are to choose one of the following options.
However, as the Nota Bene in section 3.3.5 explains, within the 'photosynthesis' programme, only 'Option 2' (Right to one's own results) applies.

Option 1: Adequate reflection

The starting point for this first option is that *all* project parties are *entitled* to claim IP rights to the research results. Next, the project parties are to make agreements in the form of a *Project Agreement* that determines which project parties will *in fact* accrue which rights.

It is of importance that the Project Agreement should make it clear that the allocation of IP rights among the parties involved in the project will *adequately reflect their efforts within, contributions to and respective interests in the project*, in order to ensure compliance with legislation regarding state support. In connection with this allocation of IP rights, parties are also to agree on supplementary normal market compensation in the event that the desired allocation does not constitute, or not entirely, an *adequate reflection*, for example if substantial IP rights are allocated to a private party that made only a limited contribution to the project.

Option 2: Rights to one's own results

In this second option, it is the project party (or parties) that generate the research results that is (or are) entitled to claim IP rights to the research results. The percentage categories used by NWO will apply in this case. These categories are based on the principle that the more a company contributes, the more rights it will be allocated.

If the private partners' in cash contributions to a 'Photosynthesis' project total 20%:
If a company (or a group of companies that have indicated on the application form that they want to be regarded as a 'group' in the sense of Community Framework for State aid for Research and Development and Innovation) makes a relatively large contribution (11% to 30%), it will be entitled to a right of option for exclusive commercial use (i.e. the right of first refusal). To make use of this right of option, a normal market compensation will need to be negotiated, from which the company's private contribution to the project may be deducted.

If the private partner in cash contribution to a 'Photosynthesis' project total 10%:
If a company (or a group of companies that have indicated on the application form that they want to be regarded as a 'group' in the sense of Community Framework for State aid for Research and Development and Innovation) makes a limited contribution (10% or less), it will not automatically have any exploitation rights; if the company nevertheless desires a right of first refusal, agreements will need to be made about that (in advance) with NWO.

The percentage categories are as follows:
1. A company that contributes a private contribution amounting to 0% through 10% will have no rights to the results of the research party carrying out the study. Companies are nevertheless allowed to use the results generated during the research for their own internal, non-commercial purposes, however;
2. A company that contributes a private contribution amounting to 11% through 30% will have a right of option for an exclusive right to commercial use of the results of the research party that is carrying out the study, regardless of whether or not those have been patented. It the company exercises this right of option, it will need to pay a normal market compensation for this, minus the amount of its private contribution;
3. For private contributions amounting to 31% through 50%, companies will receive – in addition to the right of option described in the second percentage category – a non-exclusive, royalty-free commercial right of use.

Calculating the percentages of private contributions

The calculation of the percentages is based on the marginal costs (i.e. the NWO contribution + cash/in-kind private contributions). NWO policy also allows for private contributions to be counted together, such that, for example, a small or medium-sized company that contributes a relatively small amount can still fall within the second or third percentage category, albeit together with the other private parties. In such cases it is important that the company in the second category pay a normal market compensation for any right it may want to have, minus the amount of its (in this case: limited) private contribution.

In the specific case of the photosynthesis programme, the private contribution can either amount 10% in cash or 20% in cash. Depending on the level of private in cash contribution choses, 'percentage category 1' or percentage category 2' applies.

(Non) exclusive rights and know-how

When it comes to granting rights to use the research results, there could be
1) already patented results, the rights to which are licensed, or
2) unpatented results, which the project parties agree either
   a) to have patented either
      i) by the party that is entitled to the rights (i.e. the party that generated the results) and which subsequently gives those rights in an exclusive or non-exclusive licence to the interested party, or
      ii) by the interested party (with an explicit mention of the names of the inventors), which thereby obtains the (exclusive) right of ownership of the results, or
   b) not to have patented, in which case additional agreements will need to be made about a compensation and about an extended period of secrecy with regard to the results concerned; in that case there would be a licence on know-how.

Compensation for exclusive rights of use and ownership rights

In negotiating about and determining the normal market compensation for the acquisition of exclusive rights of use and/or ownership, the negotiating parties can opt for one of the following: a market-based approach (market comparison); an income-based approach (what incomes are expected?); or a cost-based approach (what did it cost to achieve the research results?). The parties could also opt to use an assessment by an independent expert. The costs involved in establishing and maintaining patent rights could also play a role in this connection. The project consortium's secretary is to document the negotiation process and the determination of the normal market compensation. Companies can receive a discount on the normal market compensation to be paid amounting to the value of their contribution to the research that led to the results. An absolute deduction will apply in this connection: the entire private contribution can be deducted from the normal market price.

Reporting / exchange of results

The parties involved in the project make agreements with each other about the reporting and exchange of results. This is independent of the reports required by NWO and the Ministry of Economic Affairs and Climate Policy (with respect to PPP allowance) by virtue of their role as research funders.

Publication

(The brochure of the Photosynthesis programme does not make use of section 3.3.4, subsection 1, of the NWO Regulation on subsidies, that took effect in May 2017 (a link to this publication (in Dutch) can also be found on page: https://www.nwo.nl/documents/nwo/juridisch/nwo-subsidieregeling-1-mei-2017).

That the "Subsidieregeling..."went into force, including its section 4.1.1.1, also has consequences regarding publications. Publication of project results has to take place within 9 months after these results were generated and have to be Open Access available right from the time of publication ('NWO regulation on subsidies', section 4.1.1.2).
- Results are to be published in technical/scientific journals as long as the agreed upon publication procedure is followed during the period of secrecy and as long as the agreements made in connection with that procedure are kept, while observing the stipulations of the NWO regulation on subsidies, including the sections referred to in the previous sentences.
- In no event may research results remain 'on the shelf'.

Confidentiality of information and secrecy

- Foreground knowledge is strictly confidential and will only be made public after all parties involved in the project have given express permission to that effect.
- Parties involved in the project promise each other to keep secret any information (including background knowledge) that was provided on the basis of confidentiality and to use it only within the framework of the project.

Procedure for the settlement of disputes

Parties involved in the project are to agree to a scheme for settling disputes. In the event of disputes,

the parties are to make an effort to seek an amicable solution. NWO is to be notified of any dispute that arises and will make a binding decision in cases that are directly connected with the research and the grant.

Indemnity

NWO and the knowledge institution(s) shall be indemnified against claims by any private party that is involved and/or third parties due to damage stemming from the use of research results and/or IP by the latter.

6.2 Dutch Techcentre for the Life Sciences (DTL) & Enabling Technologies Hotels (ETH)

Dutch Techcentre for Life Science (DTL)

The Dutch Techcentre for Life sciences is a foundation through which more than fifty public and private organizations cooperate. As well as universities, the foundation's members include university medical centres, research institutes (e.g. CWI, Naturalis, eScience center, SURF, Dans and RIVM) and a number of companies (including DSM, Baseclear and Elsevier). Together, they aim to strengthen the life sciences research infrastructure in the Netherlands. Amongst other things, DTL is known for acting as the Dutch 'node' within the European ELIXIR initiative, a European data infrastructure serving the life sciences.
DTL's main activities can be clustered into four categories:

- 'Data', with the main focus on promoting FAIR data stewardship (Findable, Accessible, Interoperable & Reusable)
- 'Learning', offering courses on FAIR data stewardship, ELIXIR, bioinformatics, systems biology, genomics, pharmaceutical research and other applications that involve large amounts of data
- 'ELIXIR', courses that help to comply best with ELIXIR standards and make optimal use of the facilities this European infrastructure for the life sciences has to offer
- 'Technologies', which involves a network of DTL-associated enabling technologies hotels. A 'hotel' in fact consists of a group of experts that each contribute expertise on a high-end technology. The joint expertise on, and access to, innovative top technology can also be employed for other research projects and outside the scope of the hotel experts' own scientific disciplines.
  The Enabling Technologies Hotels programme was originally established by ZonMw and (predecessors of) NWO's Science Domain.

Enabling Technologies Hotels (ETH)

At the moment, more than 130 enabling technologies hotels are associated with DTL. The ETH Programme is focused on three Dutch top sectors: Agriculture and Food, Horticulture and Starting Materials and Life Sciences and Health. The ETH Programme is part of the Knowledge and Innovation Contract 2018-2019, (KIC), for each of those three top sectors. In earlier calls, the ETH public-private partnership programme (PPS) has demonstrated the interest in employing knowledge hotels. As a result of three calls between 2013 and 2016, hotels were included in ninety-five research projects. The programme was evaluated in 2016, and some of the recommendations from the evaluation were immediately implemented in the fourth call, in 2017.

The Photosynthesis Programme will be included in the ETH pilots. Such pilots, called "ETH-inside", are part of the ETH activities included in the Knowledge and Innovation Contract 2018-2019. Pilots will demonstrate whether and, if so, how the ETH approach can be integrated into the regular PPS programmes of the three top sectors mentioned in the previous paragraph.

The way in which the option of including one or more DTL-associated enabling technologies hotels is included in the Photosynthesis Programme on a pilot basis, is in line with the ETH approach. The conditions of 'ETH-inside' are therefore, with the exception of the first condition, similar to the conditions within the regular ETH Programme. The conditions for employing one or more DTL-associated enabling technologies hotels are listed in Section 3.3.6 of the programme brochure.