



## Call for Proposals, Sustainable Water Technology

### Partnership Programme NWO-Wetsus on the Impact of Water Research on Energy, Industry, Health, Economy, and Environment (4th round)

#### Science

2020 4th round

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## 1 Introduction

### 1.1 Background

The Dutch government designates 'Water & Maritime' as one of the nation's 'Top Sectors'. Within the Top Sectors, the business community, knowledge institutions, and government pool together finances and know-how in order to co-develop knowledge and achieve innovation. Joint arrangements are laid down in Knowledge and Innovation Contracts. These contracts provide an overview of activities to be carried out by, among others, NWO in cooperation with each Top Sector. The NWO-Wetsus Partnership Programme "Sustainable Water Technology: Impact of Water Research on Energy, Industry, Health, Economy and Environment" is one of the activities in connection with the Top sector 'Water & Maritime'.

NWO and 'Wetsus, European centre of excellence for sustainable water technology', have set up this joint Partnership Programme to stimulate effective collaboration and interaction between academia and industry regarding sustainable water technology for society. Each project within this call will be operated by a consortium consisting of both a knowledge institution and one or more industrial partners, not limited to members of Wetsus. Industrial commitment and hands-on participation provide this initiative with a firm foundation into the private sector. This partnership programme benefits society in at least 5 ways:

- By strengthening national and multinational enterprises based in the Netherlands;
- By stimulating Dutch research groups active in sustainable water technology;
- By providing training and excellent research facilities to researchers and their academic-, private-, and other partners;
- By incorporating researchers into a Europe-wide network of specialists, representing a wide array of areas of expertise in which to exchange ideas;
- By exemplifying Wetsus' role as central roundabout and national 'hub' through which both member organisations and non-member organisations may establish wider cooperation within the international water technology community.

NWO and Wetsus have decided to join forces to address societal and scientific issues spanning all the themes of the Wetsus community. Many of society's challenges in this field are of a multidisciplinary nature. The scope of each Partnership programme call is limited to a subset of themes. The themes



addressed in this fourth call are presented in section 2 (“Aim”). Within each of the subjects included in section 2, multidisciplinary approaches are encouraged, also if this involves crossing boundaries between listed subjects and beyond.

The NWO-Wetsus Partnership Programme “Sustainable water technology: Impact of Water Research on Energy, Industry, Health, Economy and Environment” has links to two of the National Science Agenda’s ‘exemplary routes’: ‘Kwaliteit van de omgeving: de waarden van natuur, landschap, bodem, klimaat, water en milieu’ and the ‘Blauwe route’.

This call for proposals was prepared in consultation with the Top Sector Water & Maritime.

Research within the NWO-Wetsus Partnership Programme is precompetitive in nature. General emphasis lies on detailed analysis of (managing) complex, industrial, scientific and/or societal aspects of freshwater- and wastewater cycles and processes, relevant for sustainable water technology. This research programme aims to generate accurate solutions to enhance sustainable water management and technology. The methods of choice and the disciplines involved will vary from theme to theme.

Provided (co-)applicants meet the general NWO criteria presented in section 3.1, participation in the call is equally open to knowledge institutions and (as co-financiers) industrial partners that are members of Wetsus, or willing to become members in case their project proposal is granted.

Research activities must take place at the Leeuwarden research laboratory of Wetsus. This working side-by-side will facilitate interdisciplinary exchange of information about research approaches and ideas, among participants from different universities and institutes, connecting different Wetsus- and Partnership Programme initiatives, and stakeholders in different Wetsus-based projects. This unique collaboration brings synergy and new creativity in order to create new sustainable water treatment technology.

In exceptional cases field work and other activities that cannot be performed at Wetsus’ lab may be carried out at the appropriate location, if in accordance with the granted research proposal. If activities are planned at other locations than Leeuwarden or the location described in the granted proposal, both the programme director of Wetsus and the programme manager at NWO have to grant their prior permission.

### **1.2 Available budget**

The maximum NWO budget available for this call within the Partnership programme is € 500,000.

In this Public Private-partnership, NWO’s grant must be matched by a financial (‘in cash’) contribution provided by consortium partners, including private sector companies.

Except for NWO’s contribution which helps to cover direct personnel costs and private partners’ contributions to Wetsus, all remaining costs of a knowledge institution have to be covered from the employing knowledge institution’s own budget.

The NWO grant will neither exceed € 250,000 nor will it exceed the financial contribution Wetsus declares to have received from the private and other contributing partners for the project. At least 61.2% of the matching contributions to Wetsus must come from private sector partners. Value added tax (BTW) or other taxes do not qualify as partner contributions.

### **1.3 Deadline for submission of (pre-) proposals**

The deadline for the submission of preproposals is April 16, 2020, 14:00 hours CE(S)T. This call for proposals is valid until the closing date June 25, 2020, 14:00 hours CE(S)T.

## **2 Aim**

The programme aims to explore new knowledge fields for sustainable water treatment technology.

The world needs new solutions to growing and emerging problems in availability and quality of water for domestic, agricultural- and industrial use and for nature. The focus must not only be on the efficacy of these solutions but on their sustainability as well, e.g. by requiring less energy, reusing valuable resources (minerals and metals, energy) and reducing greenhouse gas emissions. Existing engineering approaches alone will not be able to provide solutions for these challenges that our society faces now and in the future. Development of new water process technology is necessary to develop new concepts to treat and reuse waste water and to produce clean water from alternative



sources like saline water, impaired water or humid air to minimize the use of precious groundwater.

Within the programme, knowledge institutes and private companies, sometimes in cooperation with societal organisations, collaborate actively in pre-competitive research and development of new concepts for innovative water treatment technologies and for breakthrough improvements of current technologies. These developments can flourish best in an atmosphere where scientific knowledge and conceptual understanding are fostered in concordance with a thorough understanding of societal needs. It is therefore the philosophy of the programme that breakthrough practical developments can only come in tandem with the aim to enhance the scientific understanding in the relevant fields.

The technical results generated are expected to be of strong and immediate interest to all contributing industrial partners. After or during know-how development, the technology providers in the consortium can develop scalable technologies for prototyping and demonstration, ultimately resulting in market introduction. The end-users in the consortium can integrate the technologies in their treatment schemes, and thus companies introduce the programme's results into society.

### **Focus**

Focus of this call is "New processes and process monitoring techniques for enhanced value and quality generation for water and recovered products."

To be eligible for funding, applications must (at least) cover one of the following four subjects:

1. Source Separated Sanitation
2. Genomics based water quality monitoring
3. Resource Recovery
4. Sulfur

For more information on each subject, please see annexe 6.1. Since call subjects coincide with a number of the 'Wetusus Themes', please look on the Wetusus website (<https://www.wetusus.nl/research>) for additional information.

Projects must be based on challenging concepts for technologies and must include scientific study of basics and concepts, with experimental verification of hypotheses leading to the generation of new research results and new technologies. In addition, proposals include a description of the potential impact of expected results on technology development and societal and commercial relevance. For each of the subjects listed above not more than one project proposal will be granted.

### **Scientific disciplines**

The disciplines needed to execute the partnership program include – amongst others -:

- (Bio)Process technology;
- Environmental biotechnology;
- (Applied) Microbiology;
- Microbial ecology;
- Genomics;
- Genome informatics;
- Molecular biology;
- Protein chemistry;
- Analytical chemistry;
- Membrane technology;
- Chemical kinetics;
- (Bio)Electrochemistry;
- Spectroscopy, and
- Microscopy.

## **3 Guidelines for applicants**

### **3.1 Who can apply**

Full, associate and assistant professors and other researchers<sup>1</sup> 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;

<sup>1</sup> In this Call for Proposals, "researchers" refers to both women and men.



- NWO and KNAW institutes;
  - 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;
  - 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:

- Per call, a researcher may act as an applicant<sup>2</sup> of up to two different applications, provided (s)he acts as principal applicant not more than once per call;
- The project employee funded by NWO will be employed by a knowledge institution mentioned above that is part of the project consortium. The staff will be stationed at the Wetsus lab in Leeuwarden.

#### Project consortium

Each proposal involves a project consortium consisting of:

- one or more knowledge institutions that employ the researcher(s) appointed to the granted project;
- one or more private sector partners, contributing financially in the consortium represented by Wetsus;
- Wetsus.

and, optionally:

- one or more partners from outside the private sector, not including knowledge institutions, like water boards, drinking water enterprises, governmental entities, or societal organisations, contributing financially, in the consortium represented by Wetsus;
- one or more partners from outside the private sector, not including knowledge institutions, like Water Boards, drinking water enterprises, governmental entities or societal organisations, not contributing financially in the consortium represented by Wetsus.

### 3.2 What can be applied for

For a research proposal in this round, a maximum of € 250,000.- can be applied for. 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 or	1 position, according to VSNU or NFU rates <sup>1</sup>
Postdoc	1 position, according to VSNU or NFU rates <sup>1</sup>
Material costs	€ 15,000 per year per scientific position
Money follows Cooperation	less than 50% of the total budget applied for

<sup>1</sup> For personnel outside the Netherlands, the local rates are reimbursed up to a maximum of the VSNU rates.

#### Explanation of budget modules for 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 ([www.nwo.nl/salary-tables](http://www.nwo.nl/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 ([www.nwo.nl/salary-tables](http://www.nwo.nl/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*.

<sup>2</sup> The word 'applicant' refers to both main applicant and co-applicant.



- 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” 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.

### **Postdoc**

The size of the appointment of a postdoc is at least 24 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 48 months. The product of fte x duration of appointment should always be a minimum of 24 full-time months. The material budget is available to cover the costs of a more limited appointment of a postdoc.

### **Explanation of budget module Material**

For each fte scientific position (PhD, postdoc) 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<sup>3</sup>. 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, etc.)
- 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

#### **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.

<sup>3</sup> 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.



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.

Wetsus is responsible for gathering information on how NWO's contribution to cover direct material costs was spent by the organisation where the project takes place, to enable the applicant to prepare its final report on the NWO contribution for NWO.

### 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.

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.

The budget applied for within this module cannot be more than 50% of the total budget applied for. A researcher from the foreign 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 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 exchange rate risk lies with the applicant. 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.

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](http://www.sanctionsmap.eu)) is guiding in this respect.

### Example of cost breakdown for a typical project under this call

As an example, the below table provides an indication of how the breakdown of integral costs for a typical PhD project may look like.

Description	Amount	Funded by	Receiver
Module Personnel	€ 237,000	NWO	Knowledge institution
Module Material Credit	€ 13,000	NWO	Knowledge institution, transferred to Wetsus
Indirect cost Wetsus laboratory & organisation ('matching'); remaining direct costs materials	€ 250,000	Contributing partners, (mainly) from private sector	Wetsus
Indirect cost at knowledge institution ('matching') P.M.		Knowledge institution	Knowledge institution

### 3.3 When can applications be submitted

The deadline for the submission of preproposals is **April 16, 2020**, 14:00 hours CE(S)T.

The deadline for the submission of proposals is **June 25, 2020**, 14:00 hours CE(S)T.

When you submit your application to ISAAC 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.

### 3.4 Preparing an application

Preparing a preliminary research proposal or full research proposal involves the following steps:

- Download the appropriate obligatory application form from the electronic application system ISAAC or from NWO's website (on the grant page for this programme);
- Contact the appropriate Wetsus theme coordinator (via [jan.post@wetsus.nl](mailto:jan.post@wetsus.nl)) about your idea for a preliminary research plan in order to:
  - check with Wetsus whether this idea fits this call. Prospective applicants who, according to Wetsus, do not comply with the intended scope of this call are strongly discouraged to apply;



- obtain information useful in writing the 'motivation with regard to criterion B' (see section 4.2). (Wetsus will advise the evaluation panel about each preliminary research plan's quality regarding criterion B);
- besides looking for suitable partners within your own network, the Wetsus network may prove helpful in finding (industrial) contributing partners. In exceptional cases, and in agreement with Wetsus, (private sector members of) a Wetsus Theme Group may agree to contribute financially;
- Involve Wetsus for demonstrating the required level of (intended/committed) financial support from private sector contributing partners and in some cases and to some extent: contributing partners from outside the private sector (public, governmental, societal);
- The appropriate obligatory application form (either for a 'preliminary research plan' or for a 'full research proposal') has to be filled out in full, in accordance with the instructions included in the application form and this call's brochure, including the non-exhaustive list below:
  - Using a standard font of at least 11 points to fill out the form (literature references may be in font size 9);
  - Not including references to external documents other than literature references;
  - If an item indicates that a maximum number of words is to be observed, include your word count to demonstrate that the requirement is met;
- Complete the application form;
- Save the application form as a pdf file and upload it in ISAAC.

If, during the process of preparing an application questions arise, do not hesitate to contact the programme manager at NWO.

#### **Preliminary research proposal**

- The application form includes a 'data paragraph' which has to be filled out in full, but isn't included in the evaluation of the preliminary research proposal;
- With regard to the 'description of the proposed research', the preliminary research proposal consists of 2 sections:
  - Section a, the 'scientific description';
  - Section b, the 'motivation with regard to criterion B'.
- Both section a and b of the 'description of the proposed research' may not exceed 750 words each (approximately 1 page), not including references, publications and the literature list; the word count includes footnotes, figure captions and tables.

#### **Full research proposals**

- The application form includes a 'data paragraph' which has to be filled out in full, but isn't included in the evaluation of the full research plan;
- With regard to the 'description of the proposed research', the full research proposal has only 1 section. The 'scientific description', including the 'motivation with regard to criterion B', may not exceed 3600 words (approximately 4 pages), not including references, publications and the literature list; the word count does include footnotes, figure captions and tables). The updated version of the former 'motivation with regard to criterion B' may either be fully integrated into the section's text or may still be recognisable as a sub-section.

### **3.5 Conditions on granting**

The NWO Grant Rules 2017 and the Agreement on the Payment of Costs for Scientific Research apply to all applications.

#### **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 Open Access. A detailed explanation regarding Open Access can be found on [www.nwo.nl/openscience-en](http://www.nwo.nl/openscience-en).

#### **Data management**

Responsible data management is part of good research. NWO wants research data that emerge from publicly funded research to become freely and sustainably available, as much as possible, for reuse by other researchers. Furthermore NWO wants to raise awareness among researchers about the importance of responsible data management. Proposals should therefore satisfy the data management protocol of NWO. This protocol consists of two steps:



## 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. Therefore before the research starts the researcher will be asked to think about how the data collected must be ordered and categorised 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 their later storage and dissemination possible. Researchers can state which research data they consider to be relevant for storage and reuse.

## 2. Data management plan

After a proposal has been awarded funding the researcher should elaborate the data management section into a data management plan. The data management plan is a concrete elaboration of 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 a maximum of 4 months after the proposal has been 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 adjusted during the research.

Further information about the data management protocol of NWO can be found at [www.nwo.nl/datamanagement](http://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 familiarise themselves with the Nagoya Protocol ([www.absfocalpoint.nl](http://www.absfocalpoint.nl)). NWO assumes that researchers will take all necessary actions with respect to the Nagoya Protocol.

## NWO Policy on Intellectual Property

With regard to intellectual property, Model 1, Option 1 (the so-called "appropriate reflection") as laid down in section 4.2.4.3 (i) of the NWO Grant Rules 2017 applies. In the 'consortium agreement' (see Annex 6.2) the project partners assign the IPRs in a way that appropriately reflects their respective tasks, contributions and interests, in accordance with rules and legislation regarding competition and state aid. The early assignment of IPR among consortium partners in a consortium agreement is expected to enhance utilisation of the generated knowledge.

## Rules regarding public-private partnerships

The obligatory consortium agreement (annexe 6.2) reflects the NWO rules regarding cooperation between public and private partners. In 2013, on request of the government, NWO, KNAW, TO2, VSNU, Vereniging Hogescholen, VNO-NCW and MKB Nederland have formulated rules, in Dutch, for public-private partnerships in the programming and conduction of fundamental and applied research and for intellectual property. According to these 'game rules', this programme is 'PPS-version 3 (intensive form)'. The 'game rules' are implemented in this brochure and will be observed throughout the programme.

## NWO-Wetsus cooperation

NWO and Wetsus have agreed that the selected research projects will take place at the lab facilities of Wetsus in Leeuwarden. Each project is managed by its co-ordinator, but the overall Wetsus laboratory organisation is managed by Wetsus.

Within this Partnership Programme, Wetsus participants who have signed bilateral agreements with Wetsus, and applicants/partners who are not participating in Wetsus have equal opportunities to obtain a NWO grant.

For granted projects, the obligatory consortium agreement results in equal rules for all parties involved and safeguarding that NWO's standards and general conditions are met.

## Start of the project

If the proposal is successful and granted, the partners are required to fulfil certain conditions before payments by NWO to the project can begin. Starting conditions that are part of the granting letter will include at least:

- a 'data management plan' which has to be presented to NWO by the consortium partners within 4 months after the proposal was granted. This plan should be in accordance with the NWO policy on





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- data management, and meet the FAIR standard (Findable, Accessible, Interoperable, Reusable);
  - A reconfirmation to NWO of the financial commitment of private sector contributing partners by Wetsus on behalf of these partners;
  - Obtaining NWO's acceptance on the signed obligatory 'consortium agreement', within 6 months after the proposal was granted;
  - Information on the research scientist appointed to the project has been uploaded in ISAAC, always preceded by submitting a 'starting form' in ISAAC.

Grant applications are awarded on condition that the partners will set out the arrangements concerning matters such as confidentiality and intellectual property rights in a consortium agreement. An awarded project cannot be started until NWO has approved the consortium agreement (see annex 6.2). A standard consortium agreement will be made available via the website for this call.

### **3.6 Submitting an application**

An application can only be submitted to NWO via the online application system ISAAC. Applications not submitted via ISAAC will not be taken into consideration.

A principal applicant must submit his/her application via his/her own ISAAC account. If the principal applicant does not have an ISAAC account yet, then this 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 principal applicant already has an NWO-account, then he/she does not need to create a new account to submit an application.

An application consists of at least 2 pdf-files: one pdf-file with the filled out application form and a pdf-file containing Wetsus' confirmation of the contributing parties commitment. You should not combine application and letters into a single pdf-file. None of the pdf-files must be protected against writing or editing.

When you submit your application to ISAAC 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.

By submitting a preliminary research plan or full research proposal, the main applicant officially declares that all the consortium partners involved in the project have read, and agree with, all the conditions that apply to this NWO-Wetsus partnership programme.

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

It is permitted to mention the names of three persons who may not act as external references for your application (non-referees). These may be researchers or representatives of private and public parties. The names of these non-referees can be entered directly by the applicant into the ISAAC application system.

## **4 Assessment procedure**

### **4.1 Procedure**

As a first step in the assessment procedure NWO will test whether an application is admissible. Only those proposals that satisfy the criteria stated in Chapter 3 are admissible and will be taken into consideration.

NWO will not process an application (preliminary research plans and/or full research proposals) in cases where one or more of the following apply:

- The application was not completed correctly (for instance: not using the obligatory form for this call, exceeding a set maximum of words, exceeding the set maximum budget, is protected against writing or editing, or not written in the English language, not including (private sector) Wetsus' confirmation of the contributing parties commitment, lacking a 'motivation with regard to criterion B', or without a complete 'Data management paragraph');
- The principal applicant does not qualify according to section 3.1;
- The application was not submitted using ISAAC, not before the set deadline, or not using the main applicant's own ISAAC account;
- The scientific content of a full proposal is not in line with the pre-proposal on other grounds than the panel's feedback.

In cases where it is possible to correct the application, the applicant can resubmit a modified



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application within 48 hours. If the application is not corrected adequately, the insufficiently corrected preliminary research plan/full research application will not enter the evaluation procedure.

### **Preliminary research plans**

Preliminary research plans will be evaluated by the evaluation/assessment panel. The panel consists of three independent members appointed by NWO. Each panel member has the skills and knowledge to assess the preliminary research plans and subsequent full research proposals. A NWO staff member will act as secretary to the panel. The evaluation panel evaluates eligible preliminary research plans using both evaluation criteria described in section 4.2. An analysis by Wetsus for each research plan whether it fits into one of the subjects as listed in section 2 is taken into account by the evaluation panel as a non-binding advice. The panel may provide feedback regarding the data management paragraph of the preliminary research plan, but won't take this section into account when evaluating the preliminary research plan.

The assessment committee will write a recommendation to the Board of the NWO Domain Science nominating up to six preliminary research plans the panel considers at least 'very good' with regard to both evaluation criterion A and evaluation criterion B. Subsequently the board decides on which applicants receive an invitation to submit a full research proposal. Wetsus will be asked for input on each preliminary proposal's fit within the themes listed in section 2.

Although full research proposals have to be in line with their preliminary research plan, it is allowed, and recommended, to implement any feedback on the preliminary research plan that is provided by the evaluation panel. Applicants receiving an invitation to submit a full research proposal, may also react to the panel's feedback on the preliminary research plan through the full research proposal's rebuttal.

### **Full research proposals**

For each eligible full research proposal NWO will obtain a minimum of two, preferably three, analyses by internationally renowned scientific reviewers with a background in a relevant scientific discipline. The applicants will receive the review reports and have the opportunity to submit a rebuttal. The rebuttal may include a reaction to earlier feedback by the panel regarding the preliminary research plan.

Full research proposals (except for the data management paragraph), the analyses by reviewers, and the rebuttals by applicants are evaluated by the evaluation/ assessment panel according to the evaluation criteria described in section 4.2.

### **Granting decision**

The assessment committee will present its funding recommendation, including the ranking list, to the Board of the NWO Domain Science which then takes the decision. The board has the right not to use the entire NWO budget available, depending on the number and quality of the applications.

### **Code of Conduct on Conflicts of Interest**

The NWO Code for Dealing with Personal Interests applies to all persons and NWO staff involved in the assessment and/or decision-making process. See also: <https://www.nwo.nl/en/common/subsidies/funding-process-explained/code-for-dealing-with-personal-interests>.

### **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 elaborate the data management section into a data management plan. Applicants can use the advice from the referees and the committee when writing the data management plan. A project awarded funding can only start after NWO has approved the consortium agreement.

### **Qualification**

NWO will award a qualification to all full proposals and will make this known to the researcher with the decision about whether or not the application has been awarded funding. Regardless of their position on the ranking list, only proposals rated at least 'very good' both on



criterion A and criterion B, will be recommended for funding by the evaluation panel. For each of the subjects listed in section 2 the panel will recommend not more than one proposal for funding. This will be determined by the total score on criterion A and B.

For more information about the qualifications please see [www.nwo.nl/en/funding/funding+process+explained/nwo+qualification+system](http://www.nwo.nl/en/funding/funding+process+explained/nwo+qualification+system).

### Tentative schedule

January 2020	Publication call for proposals
Thursday 16 April 2020 14:00:00 hours CE(S)T	Deadline for submitting preliminary research plans
Before 21 May 2020	Selected applicants receive an invitation on behalf of the Board of the NWO Domain Science to submit a full research proposal
Thursday 25 June 2020 14:00:00 hours CE(S)T	Deadline for submitting full research proposals
July-October 2020	Consultation referees
October 2020	Obtaining rebuttals from applicants, responding to recommendations from referees and to earlier feedback by the panel
November 2020	Meeting of the evaluation panel, advice sent to NWO
December 2020	Board of the NWO Domain Science decides on granting or rejecting applications
May/June 2021	Indicative starting date for granted projects

### 4.2 Criteria

Applications are to be assessed on the basis of the following criteria:

A. Originality and scientific quality

B. Value in economic or societal terms and strategic fit.

The data management paragraph is not included in the evaluation. Criterion 'A' and Criterion 'B' are of equal weight in the assessment procedure and prioritisation. NWO makes use of scores on a scale from 1 (excellent) to 9 (unsatisfactory). A separate score is provided for each criterion.

A. **Originality and scientific quality**

- Originality and innovative nature, potential for excellent, precompetitive scientific contributions; development of new knowledge and/or concepts, or ground breaking methods and technologies;
- Scientific quality of proposal: objectives, approach and methods, fitness for purpose and feasibility;
- Scientific quality of the group: national and international embedding, publications, expertise, multidisciplinary and interdisciplinary collaboration, and access to required equipment and facilities.

B. **Value in economic or societal terms and strategic fit**

- Urgency of the proposed research in terms of the scientific reinforcement of the themes described in the call for proposals;
- The added value and potential for practical application of the envisaged research results in economic and/or social terms;
- Extent to which the application is within the aim and themes of this call for proposals (see section 2 and Annexe 6.1).

## 5 Contact details

### 5.1 Contact

#### 5.1.1 Specific questions

For specific questions about Sustainable Water Technology and this call for proposals please contact:

Drs. Erik van Aert (programme manager) NWO Domain Science

T: 070-3440 638

Email: [watertechnologywetsus@nwo.nl](mailto:watertechnologywetsus@nwo.nl)

For consulting Wetsus about a research plan's fit with this call's research subjects, about suitable industrial partners, about the Wetsus organisation and facilities, or other Wetsus-related questions:

Dr Jan Post (Wetsus programme manager) T: 058-2843 000

Email: [jan.post@wetsus.nl](mailto:jan.post@wetsus.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 first 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 (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 Annexe(s)**

### **6.1 Call themes and topics**

This call's focus encompasses four research subjects which will be briefly introduced in this annexe.

#### **Source Separated Sanitation**

The source-separated sanitation theme aims at minimizing drinking water use, maximizing resource recovery from wastewater, and the production of clean water that can be safely reused in the natural water cycle. Within the theme, so far, technological concepts have been developed for source-separated sanitation, and the fate of antimicrobial resistance and micro-pollutants has been studied.

Our research has shown that the presence of antibiotic resistance in water bodies is largely due to discharges of wastewater treatment plants and not as commonly assumed from agriculture.

Within our theme, we focus on studying the processes which could reduce emissions of both micropollutants and antimicrobial resistance. Advanced oxidation and tight membrane filtration are currently applied for micropollutant removal and might potentially be effective in removing antimicrobial resistance. The theme is looking for proposals that address the removal of antimicrobial resistance and micropollutants in one single process. An important issue to consider is the potential regrowth of AMR after treatment and the possible toxicity of micropollutant degradation products. Concentrated wastewater streams from source-separated sanitation or hospitals can be ideal case studies to test the boundaries of post-treatment technologies.

As currently, large investments are made in municipal wastewater treatment plants to remove micropollutants, technologies that also can be used at municipal plants are preferred.

#### **Genomics based water quality monitoring**

Drinking water is produced according to very high standards for chemical and biological quality. For the control of this quality, frequent measurement of a wide variety of chemical parameters (>200) and a limited number of microbiological parameters is required (<10). The focus of this theme is to use genomics-based tools to measure and monitor the quality of (drinking) water instead of traditional culturing techniques. The metabolic response of microorganisms and small eukaryotes to their environment provides information about the microbiological as well as the chemical quality of water. Methods based on this response (measured through gene expression) aid in the development of sensors for sensitive and cheap detection of (genotoxic) micropollutants or for generating a fingerprint profile of the microbial and chemical status of the water in the system. Projects should focus on the extension of these technologies for increased knowledge of biostability, presence, and toxicity of micropollutants. A further challenge in the theme is to design strategies for smarter monitoring of water in drinking water or industrial networks to maximize the chance of finding quality flaws while minimizing measuring efforts.

#### **Resource Recovery**

Within this theme, new technologies for the harvesting of energy and resources from wastewater are developed. These technologies are based on electrochemical systems where the oxidation and reduction reaction takes place on separate electrodes. In case microorganisms interact with such an electrode, electricity or hydrogen can be produced efficiently from wastewater in one step since the microorganisms recover the energy available in waste through an oxidation reaction to produce electrons. Through the production of an electrical current, also charged compounds like, e.g., ammonium, can be separated through a membrane from urine or other ammonium rich streams. Due to pH changes related to the oxidation and reduction reactions taking place at the electrodes, a local high or low pH can be created, which can be used for precipitation, like phosphate from municipal waste. Currently, all these technologies aim at the production of relatively low-value products as electricity and low-grade fertilizers.

In this call, technologies are looked for that focus on the production of more valuable compounds while still having a significant impact on the recovery of resources. The emphasis should be on integrated technologies that both make a significant impact on the recovery of resources and the production of a valuable compound.



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## Sulfur

In the transition of fossil fuel to renewable energy, sulfur will become a scarce resource. Currently, the worldwide market supply of sulfur stems from the recovery of sulfur from oil and gas extraction. The sulfur theme focuses on integrated processes for removal of H<sub>2</sub>S from sour (bio)gas streams and conversion into reusable elemental sulfur using a community of chemolithotrophic sulfide oxidizing bacteria. The biologically produced elemental sulfur is recovered in a crystalline form and has hydrophilic properties. These are distinctively different from those of chemically produced sulfur and much better suitable for reuse, e.g. agricultural purposes.

A challenge in biological sulfur conversion is the unwanted production of sulfate instead of sulfur. Recently, it has been found that sulfide oxidizing bacteria have a charge shuttling capacity, where they can (i) remove sulfide under anaerobic conditions and (ii) can reduce oxygen under sulfide free conditions. This shuttling capacity is stimulated when sulfide oxidizing bacteria are grown under alternating conditions, i.e., “anaerobic-sulfide rich” and “aerobic- sulfide free.” This capacity has the potential to optimize the recovery efficiency of elemental sulfur.

Project proposals should develop new schemes for the operation of the biological sulfur process. These schemes should be scalable and controllable. For this reason, a combined experimental and modeling approach is required. On the one hand, process modeling should give a basis for scale-up and control, while on the other hand experimental work should give proof of concepts while serving for validation of the models.

### **6.2 NWO-Wetsus Programme Compulsatory consortium agreement**

Annexe 6.2 is available as a separate document from NWO's website, choosing the 'documenten' tab on ISAAC's grant page for this programme.