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Call for proposals Value from Biomass 2019, Nederlandse Organisatie voor Wetenschappelijk Onderzoek

Efficient and responsible production of chemicals, materials and energy from biomass in a societally relevant context
2019

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

Contents

1 Introduction

1.1 Background

Value from Biomass is a cross-disciplinary and cross-sectoral initiative of the NWO Domain Science and the NWO Domain Social Sciences and Humanities together with participating Top sectors Chemistry, Energy and Top Institute for Knowledge and Innovation Biobased Economy. Within the Top sectors, industry, knowledge institutions and governments are working together on knowledge and innovation, in terms of topics and funding. The agreements on this are recorded in the so-called innovation contracts. This call is funded under the Dutch Knowledge and Innovation Contract 2018-2019 (https://www.nwo.nl/documents/nwo/kennis--en-innovatiecontract-2018-2019).

The NWO call Value from Biomass addresses the transition from an economy that runs on fossil feedstock to an economy that runs on sustainable alternatives. In particular, this call focusses on fundamental research into the conversion of biomass to added value products, with regards for the whole value chain and associated societally relevant aspects. The aim of this call is to fund ground breaking (fundamental) science and to deliver responsible and innovative solutions for biomass conversion in a societally relevant context.

A coherent interdisciplinary approach is required to tackle these large and urgent scientific, economic and societal challenges. NWO therefore wants to bring researchers from exact and natural sciences, humanities and social sciences together with private parties in public- private partnerships (PPP). With these consortia, fundamental, precompetitive research in the area of biomass conversion combined with responsible innovation can be stimulated.

The call invites project proposals from multidisciplinary consortia that address both molecular and technological challenges as well as the societal aspects of the biomass value chain. The NWO

Responsible Innovation (NWO-MVI) approach needs to be included in all proposals (see Section 2). Projects require matching from at least one private party. In selecting the applications, the following criteria will be taken into account: fit to the aim of the call, the quality of the research proposal, the quality of the consortium, and the societal impacts.

1.2 Available budget

The available NWO budget for this call is € 2.790.000,–. This budget is intended for projects with a duration of up to six years that will be realised by knowledge institutions in collaboration with private partners. The private partners will have to contribute at least 30% of the project budget needed. This matching can consist of a contribution in cash, or a combination of cash and in kind. The maximum NWO contribution per project is € 630.000,– (see section 3 of this call).

Only proposals that are assessed as 'very good' or 'excellent' are eligible for a grant. This could imply that the budget available for this call will not be used in its entirety.

1.3 Validity of the call for proposals

This call for proposals is valid until the closing date **June 13, 2019**, 14:00 hours CE(S)T.

2 Aim (scope of the call)

Value from Biomass: Efficient and responsible production of chemicals, materials and energy from biomass in a societally relevant context.

2.1 Introduction

Before the Industrial Revolution, energy was derived from natural resources such as biomass, wind and waterpower. During the course of the Industrial Revolution, limitations in the technology to use these resources led to their replacement by fossil fuels such as coal, oil and gas. As a result of this transition, the energy sector of our current industrialized society is completely dependent on cheap fossil fuels, which consequently play a major role in the global economy.

However, the disadvantages of large scale use of fossil fuels are becoming ever more clear. In 2015, parties to the UNFCCC reached the Paris Agreement, to combat climate change and invest in a sustainable low carbon future. The UN Sustainable Development Goals and the Dutch Climate Agreement of 2018 share this focus. These agreements illustrate the urgency of transitioning from an economy that runs on fossil feedstock to an economy that runs on sustainable alternatives. For the energy sector this includes refocussing towards utilization of energy from the sun, biomass, wind and water. For the chemistry sector, biobased alternatives provide opportunities to obtain organic, carbon-containing starting material in a fossil independent way. And the agriculture and forestry sector, apart from being the prime supplier of food and feed and wood derivatives, will become a supplier of the raw material in these essential transitions.

Such transitions require scientific research and technological innovation in nearly all the sectors of the global economy, from the molecular level all the way to the global scale, with regard for individual people, society, and the environment. Achieving a biobased economy therefore not merely requires scientific and technological innovation, but also societal and cultural adaptation. Therefore, this NWO call addresses these transitions, and focusses on fundamental research into the conversion of biomass to added value products, with regards for the whole value chain and associated societally relevant aspects. The aim of this call is to fund ground breaking (fundamental) science and deliver innovative solutions for biomass conversion in a societally relevant context. The call invites project proposals from multidisciplinary consortia that address both molecular and technological challenges as well as the societal aspects of the biomass value chain. The NWO Responsible Innovation (NWO-MVI) approach that needs to be included in all proposals is described in Chapter 2.4.

2.2 Biomass to value cascade

Transitioning towards a biobased economy impacts our global economy. Exemplary aspects include feedstock production, trade, distribution of wealth and knowledge transfer. Biofuels and biobased chemicals are expected to have a major impact on our economy, and generate a positive net-GDP-effect. In addition, the production, transport and conversion of biomass is labour-intensive. It is therefore expected that a shift towards a biobased economy benefits employment opportunities.

Apart from coming up with technological solutions, aspects such as market integration, consumer behaviour and a novel view on utilizing products from agriculuture and forestry is at least as crucial

for a successful transition. In addition, multiple stakeholders are involved. These may include scientists, industrialists, farmers and non-governmental organisations who might have different interests, values and needs.

The value chain from biomass raw materials to products and their applications can be illustrated by a cascade of general steps as shown in Figure 1. Each step in the value chain brings choices and opportunities, such as:

- Which raw material to use
- Which products and/or applications to focus on
- How to improve product yields and production rates
- How to create value from process residues
- Where geographically should the individual steps in the cascade take place
- How to ensure economic viability of the process and market integration of final products

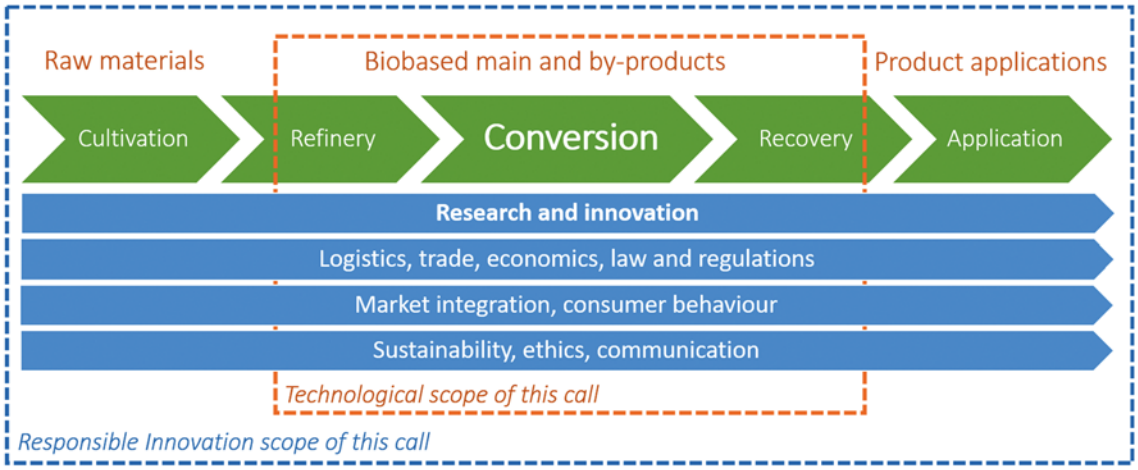


Figure 1. Biomass to value cascade, and scope of this call.

The choices and opportunities within the biomass value chain both have scientific and technological aspects, as well as consequences for responsible innovation. Figure 1 displays both parts of the scope of this call. The technological part of the research projects can be aimed at the refinery, conversion, and recovery of biobased main and by-products. The Responsible Innovation part of the research projects can apply to these topics as well, but might also include relevant issues on the cultivation of raw materials or the application of products. In this call, consortia are requested to combine research on both the scientific and technological aspects of biomass conversion with research into the societal aspects (such as ethical, juridical, sociological, economical, and psychological aspects) of the whole biomass value chain.

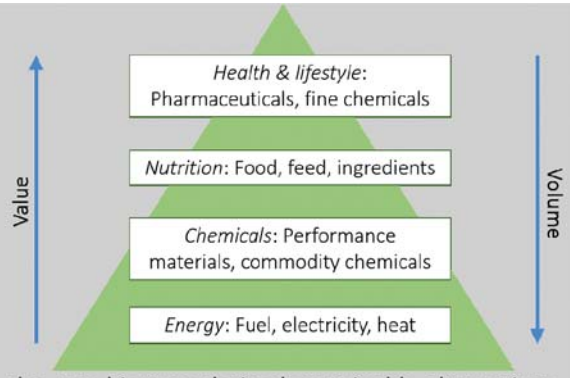
2.3 Biomass conversion

Both industrial biotechnology and chemistry offer tremendous opportunities for transition to a biobased economy, and play a key role in the conversion of biomass based feedstock to bulk chemicals, fuels, fine chemicals, food ingredients and pharmaceuticals. New scientific insights and technological innovations are needed in the fields of microbial, enzymatic, chemo-catalytic and thermo-catalytic conversion of biomass.

Why use biomass?

A range of products can be made from biomass raw materials, with application areas ranging from energy carriers to pharmaceuticals. The pyramid on the right indicates different products, each with its own market price (added value) and market size (volume).

Optimal value utilization can be achieved by converting the most valuable parts of biomass to products with high added value. Applications of remaining components and residues can be sought in lower regions of the pyramid.



Within these different application areas there are also non-biomass derived sustainable alternatives. For instance, energy derived from solar and wind energy can be used to charge electric cars. However, such alternatives do not (yet) exist for aviation, shipping and heavy road transport, making biofuels a sensible sustainable alternative. For the production of carbon based functional materials, biomass is the only sustainable alternative.

Text box 1 Application areas and economic value of biomass derived products.

2.3.1 Biomass conversion focus areas

Proposals have to fit within at least one of the following technological focus areas:

a) *Microbial/enzymatic conversion*: aimed at optimization and/or screening of industrial microorganisms and industrial enzymes towards novel products, utilization of alternative substrates, and improvement of performance at industrially relevant conditions. This includes disciplines such as industrial microbiology, microbial physiology, metabolic engineering, biocatalysis, synthetic and systems biology.
b) *Bioprocess engineering*: aimed at achieving significant cost reduction for conversion processes while ensuring scalability and eco-efficiency, including process intensification, novel cultivation and separation methods and equipment, valorisation of biomass residues, and overall heat and mass integration.
c) *Chemo-catalysis*: aimed at e.g. the stability of catalysts, making use of the chirality of biomass, drop-in building blocks for current petro-chemical installations, and exploring other opportunities within this area.
d) *Thermo-chemical conversion*: obtaining chemicals and/or fuels compatible with current infrastructure, and acquiring robust conversion technologies.
e) *Mechanical and or separation technology*: for separation of valuable molecules from biomass, and allowing for optimal value utilization (see text box 1).

The conversion step in the biomass value cascade is very much dependent on the refinery and recovery steps (see Figure 1). Therefore, in addition to at least one of the focus areas mentioned above, scientific and technological aspects in refinery and recovery may be addressed as well.

2.3.2 Biomass conversion challenges

The aim of this call is to fund ground breaking (fundamental) science and deliver innovative solutions for biomass conversion in a societally relevant context. All scientific and technological opportunities should be explored to accelerate the transition to a biobased economy.

The Responsible Innovation approach that is discussed in paragraph 4 aims to ensure that the innovative solutions are responsible and take the societally relevant context on board in a relevant and productive way. The technological challenges in biomass conversion that applicants can focus on include, but are not limited to:

a) *Biomass recalcitrance*: for example, i) overcoming the general recalcitrance of lignocellulosic biomass, ii) valorisation of all components of biomass (cellulose, lignin, hemicelluloses, proteins, lipids), iii) production of single products rather than mixtures of products, iv) production of bulk and fine chemicals containing non-oxygen hetero-atoms.
b) *Integration of multiple focus areas*: combining microbial, enzymatic, catalytic and/or modelling approaches. For example, combining model based design of chemical/bioprocesses with wetlab testing, or combining catalysts with enzymes or micro-organisms. Such integrated hybrid routes or forms of consolidated bioprocessing, whether in one-pot or cascade mode, can hold considerable advantages.
c) *Sustainable and green reaction media*: ensuring that the solvents used both during fractionation as

well as during chemical catalysis are innocuous and non-toxic. Approaches that integrate the use of alternative solvents with chemo-catalysis or biocatalysis, both for fractionation as well as for product separation should be favoured.

d) *Non-noble metals*: A large number of catalytic solutions to convert biomass (and related products) involve the use of scarcely available metals, which may restrict their future application. The challenge is to develop alternative metal-based catalysts (either homogeneous or heterogeneous catalysis or at the interface of these disciplines) that use a metal that is more abundant, more easily accessible, and is compatible to a large extent with enzymatic catalysts in order to combine chemo-and biobased catalysts to arrive at the desired molecules from biomass. Key performance indicators include the selectivity and stability of the catalysts.
e) *Novel enzymes*: To achieve chemo-enzymatic conversion of bio feedstock into platform chemicals, novel redox enzymes, C-C bond forming enzymes, and enzymes acting on C-N bonds are necessary. In addition, enzymes that are capable of solubilizing polymeric feedstock need to be made available. These enzymes have to be able to work in concert with homogeneous and heterogeneous chemocatalysts (not necessarily in one reactor). Sustainable cofactor recycling is a criteria to consider.
f) *Novel products*: (Novel) platform molecules for the chemical industry or other value added products/materials/fuels, with specific focus on the valorisation of C3+ carbon chains.

2.4 Responsible Innovation (MVI)

In order to bring about responsible innovations that enjoy broad societal consensus and to stimulate better innovations, most prominently technological innovations, NWO has developed the Responsible Innovation approach (NWO-MVI). Responsible innovation research identifies the societal aspects (such as ethical, juridical, sociological, economical, and psychological aspects) of innovations and innovation processes at an early stage so that these can be taken into account in the design process. This approach results in identifying the societal aspects of the proposed innovations, insight into the potential questions and objections they may raise, and specific recommendations for the design process, so that the design can be suitably adapted if necessary. For more information on the Responsible Innovation approach, see also the website http://www.nwo-mvi.nl.

2.4.1 Responsible Innovation focus areas

Consortia need to include the following aspects in their proposal:

a) A proactive creation or design perspective
Societal aspects (such as ethical, juridical, sociological, economical, and psychological aspects) are included in the design process of an innovation from the onset. Identifying aspects that play a role in the process and assessing an innovation's impact on the stakeholders at the earliest possible stage allows these aspects to be taken into account during the design process, which results in societally responsible innovations.
b) Interdisciplinarity
Researchers in the exact & natural sciences and the humanities & social sciences work together on the projects and take a collaborative, interdisciplinary approach to an issue based on their respective fields. This guarantees an integrated approach.
c) Societal relevance and valorisation
During the selection process, all research projects are assessed as to societal relevance and applicability of the results. In addition, each project also has a valorisation panel that may include representatives of businesses, civil society organisations, government bodies and citizens who use the innovations, have to take them into account when formulating policy, or who may (unintentionally) be affected by them. This ensures that stakeholders are closely involved in the research project and that research results are suitable for practical implementation.

2.4.2 Responsible Innovation challenges

In this call, applying consortia are requested to combine research on both the scientific/technological aspects of biomass conversion with research into the societal aspects (such as ethical, juridical, sociological, economical, and psychological aspects) of the whole biomass value chain. Examples of responsible innovation challenges that are relevant to research on biomass conversion include, but are not limited to:

a) Achieving durable collaboration in the value chain, for example:
   – Building trust
   – Developing new roles and responsibilities of stakeholders
b) Fair distribution of profit, for example:
   – Local vs. global scale biomass utilization
c) Ensuring sustainable production and use of materials, for example:
   – Choice of feedstock, catalyst, process parameters, etc.

d) Combining industrial interests and farmers' needs
e) The impact of using 1st, 2nd and 3d generation biomass and/or new conversion technologies on people and planet.
f) (Science) communication, for example:
   – Getting across the sense of urgency of climate change to the general public
   – Mobilize society in adapting towards a circular economy
   – Creating platforms to discuss with stakeholders, include voices that are otherwise not heard
g) Consumer behaviour
h) New business models

The NWO Responsible Innovation programme has granted projects related to the Biobased Economy in earlier calls. The links to a few example projects are listed here:
- Working together towards a biobased economy
- Biofuels: an irresponsible innovation?
- Partnerships for a biobased economy
- Responsible production of biogas in India

3 Guidelines for applicants

3.1 Who can apply

Full, associate and assistant professors and other researchers with a comparable appointment can submit an application if they:
– are employed (i.e. hold a salaried position) at one of the following organisations:
  - Dutch universities;
  - 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
– 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]:
– Proposals require at least one main applicant and one co-applicant who work together. Their expertise must be demonstrably complementary. One applicant must be active in the exact and natural sciences domain, and one applicant must be active in the social sciences and humanities domain, in order to address the multidisciplinary issues involved in this thematic call.
– In every project consortium, at least one company has to participate by means of a (completely) private contribution. In addition to those, other organisations may also take part as co-funders (see Section 3.6).
– Companies and other co-funding parties are not eligible for NWO funding but contribute to the research in cash (and/or in kind, if applicable).
– The in-cash contributions will be dispersed via NWO to the university (or universities) / research institute(s). Immediately upon submission of the proposal, the participating private parties are to confirm their commitment towards NWO by means of a letter of commitment (see Section 3.5). The proposal is to refer to private parties as 'Private participants'.
– No representative of the private party (or private parties) in the consortium (i.e. an individual acting on behalf of a Private participant who is mentioned in the proposal) is to have any (paid or unpaid) academic employment contract in an academic research group that is part of the consortium that is applying for the grant.
– Private parties are to meet the following conditions in order to count as contributing party in an application / project:
  ○ A company must be registered with the Chamber of Commerce (or with a comparable institution abroad if it concerns a foreign company)
  ○ A private party has to be able to contribute in cash
  ○ The in-cash contribution must be of private origin (for example it cannot derive from a grant obtained elsewhere or include other government funds).
– The following conditions hold for smaller / younger companies / start-ups in particular:

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

- The company cannot have been set up simply for the occasion of the project. For that reason, the guideline is that the company should be at least one year old;
- The company must submit its annual accounts upon request;
- None of the academic applicants or the researchers from an applicant's research group who are involved in the project may have an employment contract with the company that is participating in the application concerned; persons whom merely have a consulting role for a start-up will not automatically be excluded, however.

3.2 Project consortium, private and public partners

The project consortium has to be a coordinated combination of expertise and strengths from the exact & natural sciences and the social sciences & humanities (with an appointment at a knowledge institution recognized by NWO, see Section 3.1). The content of the research must fit within the aim and focus areas of this call (see Section 2).

The private partners make a financial contribution of at least 15% of the project costs in cash. The total contribution of private partners equals at least 30%, including in kind contributions. NWO considers a contribution to be private if it is not directly or indirectly paid for by government funding, in accordance with the EU framework for state support.
International private parties can also participate.

The non-university part of Wageningen UR (WUR), the TO2 Federation[2] and RIVM can be members of a consortium as knowledge institutes. However, these organisations are not eligible for funding from NWO. In addition, the non-university part of Wageningen UR (WUR), the TO2 Federation and RIVM, as well as other types of (civil society) organisations that are not eligible for funding from NWO can also participate as an EXTRA co-funder. In this way, they can contribute to the project in cash or in kind and their contribution will count in the calculation of the NWO grant (but it will not count for the PPP allowance, nor will they count towards the minimum required number of private parties within a consortium).
See Section 3.6 for details.

Valorisation panel

All relevant stakeholders involved (including the private partners) are included in a valorisation panel. The collaboration with the panel and how its input is incorporated in the research has to be clearly described and realised in concrete terms.

3.3 What can be applied for

Everything you request (positions, material budget, investments) must be in proportion to the research. Request only what is essential to conduct the research.

3.3.1 Project size

A Value from Biomass project has a minimum size of € 500,000 and a maximum size of € 900,000, including private co-funds[3]. NWO pays 70% of the project costs, the participating companies collectively 30%. The private contribution may be partly in kind (up to 50% of the total matching, see Section 6.2 for the rules on in kind contributions).

Example project sizes (amounts in cash EUR)		
	Minimum	**Maximum**
Project size	**€ 500,000**	**€ 900,000**
Minimum cash cofunding	€ 75,000	€ 135,000
Total (cash + in kind) cofunding*	€ 150,000	€ 270,000
NWO contribution	€ 350,000	€ 630,000

** Cofunding may also completely consist of a total cash contribution of 30%. The private partners make a financial contribution of at least 15% of the project costs in cash.*

[2] The members of the TO2 Federation are TNO, DLO and the GTIs ('Grote Technologische Instituten', i.e. major public technology research institutes): Deltares, the Energy research Centre of the Netherlands (ECN), the Maritime Research Institute Netherlands (MARIN) and the National Aerospace Laboratory of the Netherlands (NLR).

[3] This is excluding the 'PPP allowance' (see section 3.6). When private partners which to co-finance more than 30% of the project costs, the maximum project budget may be exceeded. The maximum NWO contribution to a project is € 630.000,–.

At least one main applicant and one co-applicant have to work together to perform the proposed research. The subsidy must be used for at least two, and up to four temporary scientific positions in combination with material budget and / or non-scientific support. Scientific positions must be divided reasonably and justifiably between cooperating applicants.

3.3.2 Modules

The budget is built up using the NWO-wide standardised building blocks, the so-called modules. These modules are described below. In the proposal budget, applicants choose which combination of modules are needed to answer the research question and how often each module will be deployed. The following modules are available for an application within this round:

Personnel

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. 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.

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).

Module 1b – 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.

Module 1c – Non-scientific personnel

For the appointment of non-scientific personnel, specifically needed for the research project which funding is applied for, a maximum of € 100,000 can be requested with this module. This can concern personnel such as student assistants, programmers, technical assistants, analysts, et cetera. This module can only be applied for in combination with modules 1a and/or 1b. The minimum size of the appointment is 0.5 fte for 12 months. The minimum appointment can be spread over a longer period of time. If the applicants wish to deploy expertise for a shorter period of time, then the material credit can be used for this.

Module 1e – Research leave

In this module, the replacement costs for the main applicant and/or co-applicants can be applied for, so that they can be released from educational, administrative and management tasks. The research leave grant can only be used in combination with and for the purposes of the projects or programmes applied for. For the research leave grant, a maximum size of 5 months per project applies based on 1 fte at the level of the postdoc employee as described in module 1b, with the hourly rates according to the agreement with the Association of Universities in the Netherlands. This budget is intended for the release of the applicants from educational and supervisory tasks so that they can work on the research for which funding has been requested. The employer can use the research leave grant to cover the costs of the replacement for the non-research tasks of the applicant(s) such as education, administrative and management tasks. These tasks must be specified in the proposal.

NB: Remunerations for PhD scholarship students at a Dutch university are not eligible for funding from NWO.

Bench fee

In addition to salary costs, project employees (from module 1a and/or 1b) funded by NWO will receive a one-off individual bench fee (€ 5,000) to encourage his or her scientific career.

Material credit

Module 2 – Material credit

A maximum of € 15,000 per year per full-time scientific position (modules 1a, 1b and/or 1d) 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.);
- costs 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 module 1.

Travel and accommodation costs (for the employees for which a personnel grant was requested in modules 1a and 1b):
- 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).

Internationalisation

Module 5b – 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.

PPP requirements / Co-funding

Module 6d – co-funding

Co-funding matches a percentage of the total project costs, and should consist of at least 30% co-funding, of which at least 15% *in cash* co-funding. The cash co-funding may be complemented with *in kind* contributions.

3.4 When can applications be submitted

The deadline for the submission of proposals is **June 13, 2019, 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.

3.5 Preparing an application

You should write your application in English using the application form provided. NWO kindly requests that you, as the applicant, make five suggestions for foreign referees who we may be able to consult. The list with suggestions for referees may not contain any names of people that the applicant has worked with during the past three years, is currently working with or expects to work with. The suggested referees may not be working in the Netherlands. NWO may decide not to contact the suggested referees.

In addition, the applicant may state the names of three people who may not act as referees. This is not compulsory. You can state the non-referees and suggestions for referees in ISAAC at the same time as you submit your application. For every proposal submitted, NWO assumes that the applicant has informed the host institution and that the university or institute has accepted the funding conditions of this programme.

Components of the application

The application package consists of three parts. The following are to be included in the application package and submitted in ISAAC for all types of partnerships:
1. an application form including the research proposal
2. a letter of commitment from each participating co-funding party
3. a list with five suggested international referees

Templates are available on the website, www.nwo.nl/valuefrombiomass, or via ISAAC (www.isaac.nwo.nl).

3.6 Conditions on granting

The NWO Grant Rules 2017 and the Agreement on the Payment of Costs for Scientific Research apply to all applications. In accordance with the NWO Grant Rules 2017 the maximum duration of a grant is six years and the costs are project specific if there is no funding from other sources.

General terms and conditions

The following applies to all of the types of partnerships mentioned below:
- The NWO Regulation on Granting applies to this call. Projects that have been awarded grants are to start within nine months of the date of the grant decision. NWO can decide to withdraw the grant in the event this condition is not met.
- NWO will charge the following percentage for its project management costs (overhead): 5% of the total cash budget for granted projects. This amount partially covers the organisation and execution of this program's activities. It also covers the organisation of networking events, among other things.
- The project partners (the knowledge institutions and the private and other co-funding parties involved) are to sign a consortium agreement or project agreement with each other and with NWO, in which they agree on a variety of matters including IP and knowledge transfer (see further in Annex 6.1). The project partners are advised to have a draft project agreement ready prior to submitting their proposal. This will help ensure a rapid start for the project once the grant has been awarded. For each of the different types of partnerships, NWO will make a model agreement available upon request.

Co-funding: in-cash and in-kind

The extent of the contribution from NWO depends on the amount of contribution from the participating private parties. NWO pays 70% of the costs of project, not including the PPP allowance. Up to 15% of the in-kind contribution from companies also counts in determining the amount of the contribution from NWO.
Every private party that participates in a proposal contributes in cash – and if required, also in kind – to the project. In calculating the size of the contribution from NWO, the total contribution made jointly by

all participating companies is key. The members of the consortium are to determine among themselves how much each member should contribute.

PPP allowance

The Ministry of Economic Affairs and Climate Policy (EZK) can contribute to the project budget of a public-private partnership project. On the basis of the cash input from companies, a TKI can request a 'PPP allowance' from the Netherlands Enterprise Agency (RVO), which represents EZK. The PPP allowance amounts to a maximum of 30% of the cash contribution from the companies.[4] A TKI will make use of the PPP 'project allowance' (via NWO) which will be added to the budget of the project that 'generates' the allowance. In other words: extra cash input from industry will be advantageous!

The result of a granted PPP allowance is that the projects, after settlement of costs for project management by the NWO office, can usually have more budget than the sum of the NWO contributions and the co-financing. The calculation of the project budget can be made with the help of the tables in the relevant application forms. NWO will facilitate the process of requesting PPP allowance for projects granted within the Value from Biomass programme.

Co-funding by organisations other than companies

Numerous other organisations (both public and private) besides companies have demonstrated their willingness to contribute in cash or in kind to innovative research carried out in the framework of the top sectors. NWO, too, considers the contributions from these civil society organisations important in connection with a broad base of support for innovation. For that reason, such contributions also count when calculating the amount of the contribution from NWO, as long as at least the private partners in each consortium contribute in cash to the project costs and have an immediate need for knowledge and/or innovation. In many cases, however, the in-cash contributions from these other organisations do not count in calculating the PPP project allowance. The table below provides a summary overview of the possibilities.

	Does the in-cash contribution from the organisation count when calculating the amount of the contribution from the following:	
Organisation	**NWO subsidy**	**PPP allowance**
Companies	Yes	Yes
Universities and research institutes	No	No
Universities of applied sciences	No	No
Non-university part of Wageningen UR	Yes	No
TO2 Federation	Yes	No[1]
RIVM	Yes	No
Institutions that do not have the ANBI status	Yes	No
Institutions that do have the ANBI status	Yes	Yes

[1] Unless it can be shown that the contribution has a private origin.

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.

[4] The PPP allowance scheme initiated by the Ministry of Economic Affairs is carried out by the Netherlands Enterprise Agency (RvO). Everything that the present call mentions in that regard is based on the articles as published in the Staatscourant (Government Gazette). In the event of any dispute, the official wording in the Staatscourant is leading. The present call assumes that the scheme will still exist at the moment that a grant is awarded and that the project concerned will meet the conditions of the PPP allowance scheme. The precise amount of the PPP allowance depends in part on the extent to which the amount that the Ministry of Economic Affairs and Climate Policy has budgeted for a given year has been exhausted. If TKIs apply for a larger number of allowances than there is budget for, the percentage of the allowance will decrease proportionally. Other factors are also of importance. In a project proposal that requests a PPP project allowance, the intended use of that allowance must be indicated separately. The project must be executable even without the use of such an allowance.

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.

For more information, see: 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). NWO assumes that researchers will take all necessary actions with respect to the Nagoya Protocol.

3.7 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.

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

4 Assessment procedure

4.1 Procedure

Admissibility

The first step in the assessment procedure is to test whether an application is admissible. On behalf of the NWO Domain Science Board, the NWO Domain Science office will assess the appropriateness and completeness of the proposal. Only those proposals that satisfy the criteria stated in Chapter 3 are admissible and will be taken into consideration.

Referees and rebuttal

As soon as a proposal is declared admissible, NWO will submit this for advice to external referees. These independent advisers are experts in the field of the proposal. For each proposal NWO consults

at least two referees whom will assess each proposal. The referees will assess the proposal against the assessment criteria as detailed in Section 4.2. The referees' reports will be made anonymous and will be sent to the applicant for a written rebuttal.

Assessment committee

An assessment committee will consist of experts within the scope of this call. During a meeting and based on the assessment criteria the committee will reach a single prioritisation of the proposals. The task of the committee is to make their own independent consideration based on the proposal, the referees' reports and the rebuttal. The referees' reports will to a large extent 'guide' the final assessment but will not be blindly accepted by the committee without question. The committee will consider and compare the referees' arguments (also among each other) and examine whether the rebuttal contains a well- formulated response to the critical comments from the referees' reports. Furthermore the committee, unlike the referees, can see the quality of the other proposals and rebuttals submitted. The committee can therefore reach a different assessment from the referees.

Decision taking

With the ranking the assessment committee will advise the NWO Domain Science Board about the quality of the proposals. Based on this advice and the available funding the domain board will take a decision about whether to award or reject the proposals. Policy considerations can also play a role in this, such as diversity or fit within the NWO Domain Science strategy.

Code of Conduct on Conflicts of Interest

The NWO Code of Conduct on Conflicts of Interest (and its successor) 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.

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

Timeline

13 June 2019	Submission deadline full proposals
July-September 2019	Referees are consulted
September 2019	Applicants can submit a rebuttal
November 2019	Selection committee meeting
December 2019	Decision Domain Science Board
December 2019	NWO informs applicant about the decision

4.2 Criteria

Proposals within the *Value from Biomass* call for proposals will be evaluated based on the following assessment criteria:

1. Fit to the aim of the call
   a. Whether the proposal fits within the thematic focus of the call; are both the technological and the responsible innovation scope addressed?
   b. Timeliness, importance and urgency of the proposed project
2. Scientific quality
   a. innovation in research
   b. scientific approach
   c. scientific relevance

d. clarity of focus and objectives
e. feasibility

3. Quality of the consortium
   a. Competence and expertise of the research team/consortium
   b. Synergy, complementarity and added value in the collaboration
   c. Interdisciplinary scientific collaboration
4. Economic and societal impact
   a. Prospects for innovation and/or the application of the results
   b. Contribution to and involvement of the private partner(s) in the project
   c. Composition and role of the valorisation panel
   d. Knowledge transfer and utilization

5 Contact details and other information

5.1 Contact

5.1.1 Specific questions

For questions about the *Value from Biomass* call for proposals please contact:
Dr. ir. T. (Tim) Vos, 070 344 0984, t.vos@nwo.nl

With regards to *Responsible Innovation*, please contact:
Dr. P. (Paulien) Snellen, 070 349 4425, p.snellen@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 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 Intellectual property rights (IP) and knowledge transfer; Project Agreement

In dealing with intellectual property (IP), this call follows NWO policy, which allows the parties involved in a project to make customised 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' will be involved. 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, is particularly important.

The 'Framework for State Aid for Research and Development and Innovation' 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 commercialisation (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 via www.nwo.nl/valuefrombiomass.

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. 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 realise 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:
  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 a company makes a relatively large contribution (i.e. 11% to 30%), for example, 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. If a company makes a limited contribution (10% or less), it will not automatically have any exploitation rights.
  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). Private contributions may also be summed up, to jointly reach a higher percentage category. A prerequisite for this is that the option right is also jointly exercised and that agreements are made about a division of application areas. If an option for (exclusive) use or ownership is exercised, the relevant private partner pays market-based financial compensation.

(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. Finally, the financial contributions that the companies have made to the research that led to the results can be included in the negotiations. The project consortium's secretary is to document the negotiation process and the determination of the normal market compensation.

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.

Project committee

A project committee is set up, in which the project leader (usually the main university applicant), possibly co-project leaders and the co-financiers take part. The project committee discusses the progress of the project on a regular basis. In addition to the project manager, a so-called project manager is appointed from one of the participating companies. The project leader is responsible for the scientific and overall progress of the project, due to his / her role as subsidiary beneficiary, the project manager ensures the valorisation process.

Publication

- In principle, the results are to be public and published in technical/scientific journals for which the consortium members can agree on a publication procedure in a project agreement.
- To ensure the patentability of the results, publications can be delayed for a maximum of nine months. In the event that know-how is to be further developed, the period of secrecy can be extended (this must always be agreed explicitly in writing), with a maximum period of secrecy of five years. In no event may research results remain 'on the shelf'.

Confidentiality of information and secrecy

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 In-kind co-funding

Stipulations

1. Possibility for co-funding parties to participate by means of in-kind contributions:

In programmes financed within the framework of this call, co-funding parties may participate, as indicated in connection with the specific type of partnership, by means of an in-kind contribution. For more information on this, see Section 3. The following stipulations hold in addition to and to the extent that they are not included in the NWO Regulation on Granting.

In-kind contributions/efforts must be
- essential to the project
- included in the NWO-approved budget for the research costs of the project proposal in which the co-funding party participates (see Stipulation 3 for the allowable in-kind contributions) and be within one of the cost categories mentioned in Stipulation 3a through 3c.

2. Commitment

If a co-funding party will participate in the research project with a contribution that is partially in kind as defined above, that party will commit to the NWO project for the in-kind contribution concerned, plus the financial (cash) contribution, by means of a Project Agreement. The pledged financial (cash) contribution will be invoiced by NWO.

3. Allowable in-kind co-funding

In a research project, co-funding parties are allowed to include as in-kind contributions the following costs that are directly attributable to the research project and made by the party concerned (see also Stipulation 1):

a. Hours worked in the framework of the project:
   - Salary costs, assuming an hourly wage calculated on the basis of 1) the annual salary for a full-time position according to the 'wages for income tax' column of the payroll records, incremented by the surcharges owed for social security contributions as required by law and/or stemming from an individual or collective labour agreement, and 2) 1650 productive hours per year. Over and above this amount, an allowance of no more than 50% of these salary costs may be budgeted for other, general costs. The resulting hourly rate to be attributed to the project, including the 50% allowance for general costs just mentioned, may not exceed EUR 125. The inclusion of costs for supervision or for project management will not be accepted.

b. Cost of materials and resources to be used, based on the original purchase prices.

c. The use of equipment, machines and software
   - The costs of the purchase and use of machines and equipment, with the understanding that depreciation costs are allocated to the project, calculated on the basis of the original purchase prices and a depreciation period of no less than five years; the costs of consumables and maintenance during the period of use.
   - The costs of the purchase and use of machines and equipment purchased not solely for the project will only be considered eligible pro rata as project contributions on the basis of the above if there is an accounting for the actual use in hours for each machine or piece of

equipment by means of a comprehensive time-tracking system.

Not permissible as in-kind co-financing:

– Co-financing from the research institute of the (co-) applicant (s) of a project.
– Discounts on commercial rates, among others on materials, devices and services.
– Costs related to overhead, supervision, project management, participation in a project committee, consultancy.

4. Accounting for in-kind contributions

Co-funding parties are to provide NWO with an accounting of their in-kind contributions to NWO in the form of a list of costs contributed, within three months after the completion of the research project towards which the in-kind contribution was provided. The project leader is to submit the application for confirmation of the in-kind contribution simultaneously with the application for finalisation regarding the amount of the grant to be paid out, accompanied by a jointly drafted final report. NWO is entitled to check the statement of costs.

In case a partner's in-kind contribution that is to be accounted for exceeds EUR 125,000, an auditor's statement must be provided; in other cases, a written statement by a proxy – to the effect that the in-kind efforts contributed are in fact attributable to the project – will suffice. If the co-funding party that pledged an in-kind contribution to a research project ultimately fails to deliver part or all of that in-kind contribution or is unable to account for it, this may have consequences for determining the final amount of subsidy granted at the end of the project.