Netherlands Enterprise Agency

Joint calls on Biobased economy with Brazil – an analysis

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It's estimated that, since 2011, the Netherlands has invested about EUR 10 million in joint calls for proposals (public R&D) in the field of Biobased Economy, with Brazilian partners who participate with an equivalent investment. This investment is based on the complementarity of both countries and the huge opportunities expected in the global biobased economy, as also underlined in the country report of the Dutch Advisory council for science, technology and innovation (AWTI) [5]. About two thirds of the projects from these joint calls are coordinated by Wageningen University, Delft University of Technology and Netherlands Institute for Ecology NIOO-KNAW. Analysis of the project themes shows that the project portfolio covers the full range from biomass production to biomass conversion into products, including sustainability and value chain development.

Since 2011 the Netherlands and Brazil frequently launched joint calls for research proposals in the field of Biobased Economy. Over time this generated a considerable R&D portfolio, in which the Netherlands has invested, so far, an estimated EUR 10 million. This article provides an overview of these calls, the collaborations created in these projects and the project themes.

Joint calls for research proposals

On the Dutch side, the driving forces between this (public) R&D portfolio are the Netherlands Organization for Scientific Research NWO and the public-private consortium BE-Basic. Since 2011 both organizations launched the following Biobased Economy calls for proposals:

NL funding	BR funding	Year call	Max. budget (NL + BR)	# projects approved
BE-Basic	FAPESP	2011	US$ 2 mln	4
BE-Basic	FAPESP	2012	US$ 3 mln	2
BE-Basic	FAPESP	2013	US$ 3 mln	4
BE-Basic	FAPESP	2016	US$ 3 mln	4
		Subtotal	**US$ 11 mln**	**14**
NWO	CNPq	2013	€ 1,675 mln + R$ 4mln	6
NWO	FAPESP	2013	€ 2,1 mln + € 1 mln	7
NWO	FAPESP	2017	€ 1,8 mln + R$ equiv.	6
NWO (SIA)	FAPEMIG	2017	€ 125.000 + € 125.000	1
		Subtotal	**€ 9,625 mln**	**20**
		Total	**≈ € 18,5 mln**	**34**

Some observations regarding this overview:

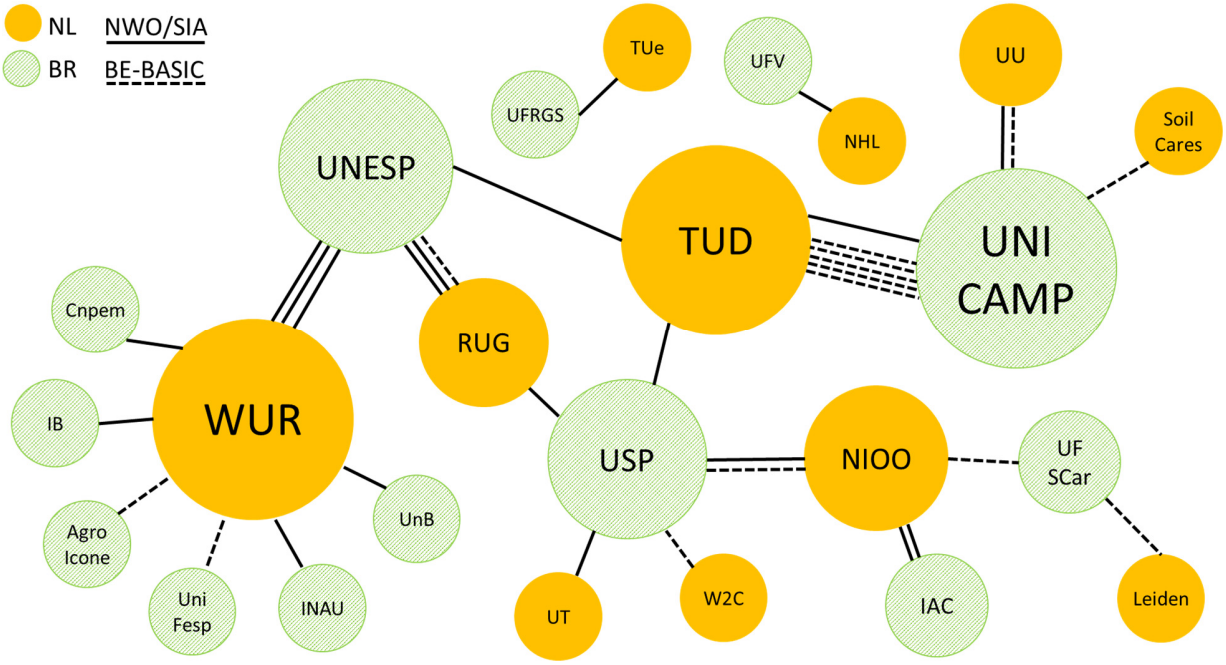
- Six of the eight calls are a collaboration with the São Paulo Science Foundation (FAPESP), one of the main funding bodies for public R&D in Brazil. FAPESP provides funding for researchers in the State of São Paulo, FAPEMIG in the State of the Minas Gerais. The Brazilian National Council for Scientific and Technological Development CNPq provides funding on a national level.
- The current program between Regieorgaan SIA and the Minas Gerais Science Foundation FAPEMIG has a total volume of about EUR 1 million. In 2017, the first topic was launched (biobased water

technology) with one quarter of the budget. It's expected that three more topics will be launched in 2018 with the remainder of the budget (Agrifood chains, Biobased Chemistry and Sustainability).

- The budgets are amounts mentioned in the calls for proposals (maximum available budget). No data was published on actually awarded project budgets or depletion of call budgets.
- The Brazilian partners use a different method to calculate project budgets from what is custom in the Netherlands. An important difference is that all the hours of Brazilian researchers (already paid with public money, so is argued) are seen as an in-kind contribution of the submitting institute(s). Therefore, abovementioned funding bodies aim for a "balanced partnership, not specifically in monetary terms but with equivalent research commitment and efforts from both partners"(as BE-Basic and Regieorgaan Sia put it).

Collaborations

The figure below is a graphical representation of collaborations between parties in aforementioned 34 R&D projects. The figure only shows project coordinators (an overview of all consortium partners is not publically available). Each connecting line in this figure represents one project, with a distinction (in line style) between funding provided by the BE-Basic consortium or by science foundation NWO. The larger the circle, the more projects (the smallest circle represents 1 project, the largest circle 9 projects).



NL: WUR = Wageningen Univ., TUD = Delft Univ. of Technology, NIOO = Netherlands Institute for Ecology (KNAW), RUG = Univ. of Groningen, UU = Utrecht Univ., UT = Twente Univ., TUe = Eindhoven Univ. Of Technology, Soilcares = SoilCares Research, W2C = Waste2Chemicals (currently ChainCraft), Leiden = Leiden Univ., NHL = NHL Hogeschool

BR: UNICAMP = Univ. of Campinas, UNESP = São Paulo State Univ., USP = Univ. of São Paulo, IAC = Agronomics Institute of Campinas, UFSCar = Federal Univ. of São Carlos, UFV = Federal Univ. of Viçosa, UFRGS = Federal Univ. of Rio Grande do Sul, UnB = Univ. of Brasilia, INAU = National Wetland Institute, UniFesp = Federal University of São Paulo, AgroIcone = AgroIcone, IB = Biological Institute, Cnpem = Center of Research in Energy and Materials

Looking at the number of projects, the Dutch top three is as follows: Wageningen University (9 projects, mainly NWO funding), Delft University of Technology (8 projects, mainly BE-Basic funding) and Netherlands Institute for Ecology (5 projects). The Brazilian top three is University of Campinas (9 projects), São Paulo State University (7 projects) and University of São Paulo (6 projects).

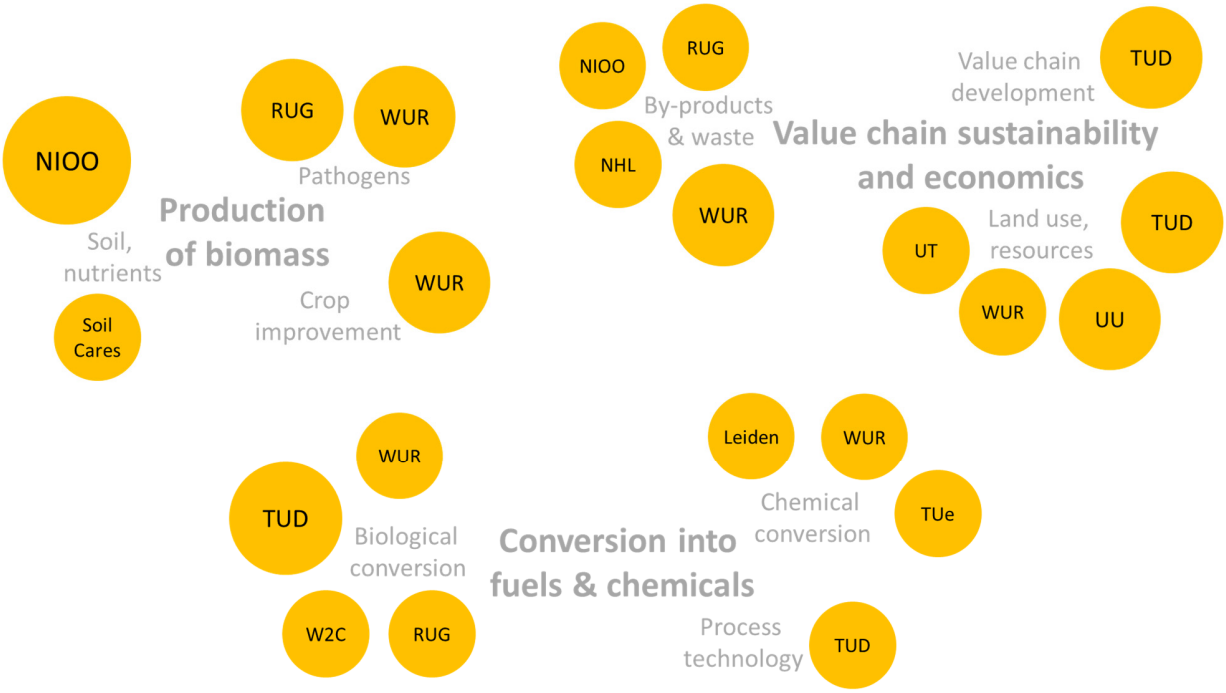
In general, projects are distributed over different departments and different project coordinators. Of the 25 different project coordinators (as identified in the project proposals), 18 persons coordinate 1 project, 6 persons 2 projects and 1 person 4 projects.

Main themes in the collaborations

According to the Hoofdlijnennotitie Biobased Economy of the Dutch government [6] the following concepts apply to the development of new policy:

- The optimization of biomass production and the closing of cycles, e.g. nutrient cycles.
- Stimulating technology development for the conversion of biomass into useful products.
- Sustainability (depletion of soil, biodiversity, effects of land use, etc.).

Based on publically available information, an analysis was made of the themes addressed by the 34 aforementioned projects, resulting in the figure blow. The figure clusters these themes along the three aforementioned essential elements of Biobased Economy: the production of biomass, the conversion of biomass into useful products and sustainability / value chains.



The larger the circle, the more projects; the smallest circle represents 1 project, the largest circle 4 projects.

This is of course a simplified representation of the projects, since the figure does not take into account the fact that some projects involve several themes. However, the figure clearly shows that Dutch R&D parties have a good collaboration on *all* essential elements of Biobased Economy with their counterparts from Brazil (a country with large natural resources and decades of experience and knowledge development in biofuels).

A total of 8 projects focus on **production of sustainable biomass**, targeting the optimization of soil conditions (nutrients, micro-organisms), crop improvement and fighting pathogens in crops, where possible biologically. And 10 projects focus on technology for the **conversion of biomass into fuels and chemicals**, with more emphasis on the biological route (where micro-organisms convert the biomass into products) than on the chemical route. The cluster of **sustainability and value chains** is the largest with 13 projects (also in number of involved parties). The main themes are optimal use of residues (for by-products, energy), reduction or treatment of waste streams, and integrated assessment of value chain sustainability.

The latter theme includes the topic of land use, since land use and mainly changes in land use can have significant impact on e.g. greenhouse gas emissions, soil ecology and also social and economic indicators. Given the importance of up-to-date and accurate data on land use, these projects involve collaborations with earth observation specialists (remote sensing, translating satellite images in information on land use and crops).

More information
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Sources and further reading:
[1] NWO & FAPESP projects: http://www.fapesp.br/en/7372
[2] NWO & CNPq projects: https://www.nwo.nl/en/research-and-results/programmes/Cooperation+Brasil+%28CNPq%29+Biobased+Economy/Projects
[3] BE-Basic & FAPESP projects: http://www.fapesp.br/en/5982
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