Symposium 2021
G.T.D. Bernoulli

The Future of Fuels

Program - speaker abstracts & biography

Bernoulli
Gronings Technologen Dispuut

THE FUTURE OF FUELS

Annual Bernoulli Symposium

May 6th 2021

€ Members: Free
Guests: €2,50.-

10:30-17:00

Online

Free Lunch included

Sign up: gtdbernoulli.nl/events

Speakers:
Dr. Remko Detz
Dr. Arvind Gangoli Rao
Prof. dr. ir. Jeroen van Oijen
Prof. dr. ir. Wiebren de Jong
Dr. Leon Laubscher from Nexio Projects

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Program

The program of this years symposium will look as followed:

10:30-10:45	Opening chairman committee & chairman of the day
10:45-11:45	Dr. Remko Detz
11:45-12:45	Dr. Arvind Gangoli Rao
12:45-13:15	Lunch
13:15-14:15	Prof. dr. ir. Jeroen van Oijen
14:15-15:15	Prof. dr. ir. Wiebren de Jong
14:15-15:30	Coffee break
15:30-16:30	Panel Discussion
16:30-17:00	Closure and summary

From the chairman of G.T.D. Bernoulli

Bart de Wijk
Chairman G.T.D. Bernoulli

Dear participant,

It is an honour to welcome you to the 2021 edition of G.T.D. Bernoulli Symposium! This year's edition marks the 5th installment of a grand tradition. Like previous years, this symposium will discuss another hot topic in the field of science and engineering. It will also be a bit different: with our regular venues closed due to the global pandemic, the creative minds of this year's symposium committee have found a way to bring the symposium to you!

Speakers from both industry and academia will discuss their views on this symposium's topic: Fuels of the Future. Alternatives for fossil fuels are in an ever growing demand for climatic but also socio-economic reasons. Besides global temperatures rising and criticism on international dependence on crude oil production increasing, world oil reserves will inevitably dwindle. All these reasons make the field of fuel technology ripe for innovation, but what will future fuels look like? And how can they be stored? These questions and more are bound to be answered in this year's G. T. D. Bernoulli symposium: The Future of Fuels!

I want to thank the incredibly motivated symposium committee on their tremendous job of realising this symposium in these unconventional times. May today's speakers educate and inspire you, all in the comfort of your own home!

From the chairman

Simon Hobbenschot

Chairman symposiumcommittee

Dear participant,

It gives me great pleasure to welcome you to the 5th symposium of G.T.D. Bernoulli. Firstly I would like to thank all the people that helped making this event happen and especially the committee that invested so much work to make the best online symposium possible: Saad Khan, Suzanne Reinink and Hidde Barkmeijer. The theme of this year is 'The Future of Fuels', where subjects ranging from academia to policy, industry and future prospects will be covered.

During today's symposium, four lectures have been planned, in which experts will be sharing experiences and research in their respective areas. Afterwards, a panel discussion is going to be held where there will be room for discussion.

The goal of this years theme 'The Future of Fuels', is to broaden your knowledge about the broad range of areas involved in making the current use of fuels more sustainable for the next generations. This will be done by covering many areas, such as policies, technical innovations, infrastructure, and applications, all of which have received global interest and are highly stimulating. During the day we planned strategic breaks so you can have further opportunities to talk to our guest speakers. Do not hesitate to ask questions at the end of the presentations, I assure you the speakers will appreciate your participation. Please enjoy your day full of knowledge.

Simon Hobbenschot

The committee

On Thursday, May 6th of 2021, the 5th edition of the G.T.D. Bernoulli symposium is taking place. We, the symposium committee have been working hard to make this day as succesful as possible since our installment back in November. After selecting a very relevant subject, we managed to find some very interesting speakers who will help us understand more about the possibilities and struggles regarding the current and possible future state of fuels.
After the previously wonderful symposiums organized by our association G.T.D. Bernoulli, we wish to add another succesful edition to the list.

We hope you will enjoy this edition of the symposium!

Simon Hobbenschot	Chairman
Saad Khan	Secretary
Suzanne Reinink	Treasurer
Hidde Barkmeijer	Acquisition

Chairman of the day

Dr. Patrizio Raffa

Professor in Chemical Product Engineering
at the University of Groningen

Patrizio Raffa obtained both MSc degree and PhD in Chemistry from the University of Pisa (Italy), in 2004 and 2009 respectively. After an internship CNRS Lyon (France), he returned to Pisa where he developed his post-doctoral research on polymeric materials for industrial applications from 2009 to 2011, first at CNR-INFM Polylab and then at the University of Pisa, in the group of Prof. F. Ciardelli. In 2011 he joined the research group of Prof. F. Picchioni at the University of Groningen as post-doc, working mainly on polymeric surfactants for enhanced oil recovery and thermally reversible polymeric materials. As of January 2017, he is Assistant Professor on Polymeric Products in the same group.

His current research aims at developing new multifunctional polymeric materials of interest for industrial applications, with a focus on enhanced oil recovery, coatings, emulsifiers, and self-healing materials, but his interests can easily go in other directions any day. He also recently started investigating the use of biobased monomers and polymers in industrially relevant materials. He is author of more than 40 papers in ISI journals, and one book on EOR, and he is lecturer for the course Interfacial Engineering for the MSc in Chemical Engineering.

Abstracts

Remko Detz
University of Amsterdam & TNO

Paris Agreement Goals

To reach the goals of the Paris Agreement, the use of fossil fuels should be avoided to limit a further increase of greenhouse gas concentrations in the Earth's atmosphere. As the need for energy remains, fossil fuels should be replaced with sustainable alternatives. Conversion of renewable energy into hydrogen or carbon-based fuels may provide such an alternative. Today, our energy system is mainly linear: from fossil fuels to CO_2 emissions. Ideally, we should implement a sustainable, circular fuel and carbon economy. In this presentation the options to achieve such a circular economy are explained, also addressing the related costs and regulation.

Remko Detz is scientist at the Energy Transition department of TNO (Netherlands). He is an expert on the research topic renewable fuels and chemicals. His interest ranges from technology development starting from the early research phase to technological innovation and the analysis of fully integrated systems within society. These analyses are supported by techno-economic studies and energy system modelling. He is also guest scientist at the University of Amsterdam (UvA) and mainly involved in projects related to hydrogen (carriers), power-to-x, CO_2 utilization, and solar fuels.

Before he obtained a position at ECN in 2017 and later TNO in 2018, he worked on research for sustainable catalysis at the company InCatT (2009-2012), and at the UvA (2012-2017). He finished his MSc Chemistry at the UvA in 2004 and received his PhD in 2009 also at UvA in the field of Organic Chemistry, Synthesis, and Catalysis. He is (co-) author of several peer-reviewed articles in leading international scientific journals and contributor to many reports.

Arvind Gangoli Rao
Technische Universiteit Delft

Energy Transition in Aviation

This presentation will discus the main challenges for aviation in the future and the various options for energy transition in aviation and their associated pros and cons. The talk will cover several examples of research carried at TU Delft along with Airbus and other partners.

Dr. Arvind Gangoli Rao, is as an Associate Professor in the Faculty of Aerospace Engineering at TU Delft and heading the group on Sustainable Aircraft Propulsion. Dr. Gangoli Rao is a specialist in aircraft propulsion and has worked on a variety of problems related to gas turbine combustion, turbine cooling and engine architectures. Dr. Gangoli Rao has authored around 70 publications. Dr. Gangoli Rao has been involved in several other EU projects and was also the coordinator of the EC
funded AHEAD project (http://www.ahead-euproject.eu/). Currently he is leading the APPU project (https://www.tudelft.nl/lr/appu) which deals with the use of LH 2 for the next generation of airbus single aisle aircraft. He is a member of the ACARE (Advisory Committee for Research and innovation in Europe) working group on Energy and Environment and board member of the International Society of Air Breathing Engines (ISABE).

Dr. Gangoli Rao obtained his masters and PhD from Indian institute of Technology, Bombay, India. After his PhD he worked at Technion: Israel Institute of Technology as a post-doctoral researcher for around 3 years. He then joined the faculty of Aerospace Engineering at TU Delft in end of 2008.

Jeroen van Oijen
Eindhoven University of Technology

Combustion of Future Fuels: New types, and opportunities

In this presentation, Jeroen will discuss combustion of future fuels: opportunities, challenges and research. More specifically I want to highlight research at TU/e on hydrogen combustion, metal combustion, and advanced power cycles.

Jeroen van Oijen is Full Professor in the Power & Flow group at the department of Mechanical Engineering of the Eindhoven University of Technology (TU/e). He is a specialist in theoretical and numerical modelling of combustion. His expertise is largely in the field of engines and energy converters and his teaching focuses on mechanical engineering, chemically reacting flows, modelling combustion and transport phenomena in engineering flows. Jeroen van Oijen employs advanced numerical models to unravel the fundamental processes in reacting flows and uses this knowledge to develop computationally efficient models for large-scale simulations of real industrial devices. His group aims to develop new models for the design of devices employing new combustion concepts and future sustainable fuels.

Jeroen van Oijen received his MSc in Applied Physics from TU/e in 1996. His thesis concerned the numerical simulation of the advection of passive tracers in two-dimensional flows. Following this, Jeroen became a PhD student at TU/e. He began working as postdoctoral researcher on the numerical simulation of turbulent flames using advanced flamelet models. Jeroen is known for developing the Flamelet-Generated Manifold (FGM) method, a scientific breakthrough in the field of combustionmodelling. In 2003 he was a visiting scientist in the group of Prof. Peters, the Institute für Technische Mechanik at RWTH Aachen. He has been visiting professor at Stanford University, CA, in 2010, and at the University of California Berkeley, CA, in 2014. Jeroen is Fellow of The Combustion Institute and has co-authored over 100 journal papers. He was chairman of the Dutch Association for Flame Research and coordinator of several national and international research projects on development of reduced models for turbulent combustion and emissions. His models are used for the design of clean and efficient engines, boilers, furnaces and gas turbine combustors.

Wiebren de Jong
Technische Universiteit Delft

Production of base chemicals and fuels based on CO_2 capture and utilization in conjunction with hydrogen production

The world currently faces an energy transition from the utilization of fossil fuels to renewables. Wind and solar energy are intermittent energy sources for electricity production, so demand and supply often do not match in time and geographically. Therefore, energy storage in chemicals like hydrogen, hydrocarbons is needed; not only for seasonal storage for electricity generation but also to replace fossil fuels in many sectors. In this presentation an overview will be given of energy conversion pathways and current research in the context of e-Refinery.

Wiebren de Jong currently is full professor of Large-Scale Energy storage at Delft University of Technology (Department Process & Energy, faculty 3mE). In this area he investigates different novel process concepts to store electricity in fuels and bulk chemicals with an emphasis on modeling, model validation experiments and scale-up of these processes and integration with biomass conversion. He investigates conversion and storage processes including (biogenous) CO_2 utilization together with hydrogen.

He studied chemical engineering at Twente University and subsequently followed a PDEng in process technology (design) at the same university incollaboration with RU Groningen. After a post-graduate period at Stuttgart University (Germany), he started a PhD study in the field of biomass gasification at Delft University of Technology, followed by an assistant and associate professorship there in the Energy Technology section (3mE) in the field of biomass to syngas conversion and biorefinery. In 2016 he became honorary professor at Groningen University in the area of thermo-chemical biorefineries. Also, in the same year he became full professor at Delft University of Technology.

Leon Laubscher

Nexio Projects

A perspective on climate change

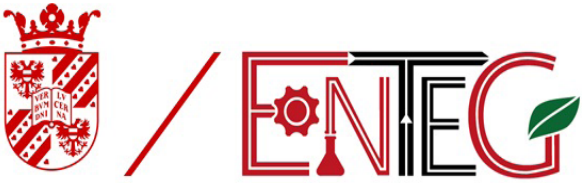
Leon Laubscher will be introducing some interesting perspectives and relevant questions during the panel discussion at the end of the symposium.

Leon Laubscher is a climate change specialist working at Nexio Projects, a sustainability consulting firm located in Rotterdam and with offices in France and Asia. Nexio Projects is a one stop shop for corporate sustainability with teams that specialise in reporting, ESG ratings, strategy development and climate change. Nexio Projects is the only accredited global partner of EcoVadis, one of the world's most reliable and comprehensive sustainability assessment tools. At Nexio Projects Leon leads the Climate Change Team.

With a background in engineering and a sustainability-focused MBA from The Rotterdam School of Management, he combines a practical systems-thinking approach with the challenges that the corporate world faces to develop meaningful and impactful climate change strategies for companies. The projects that the Climate Change team leads includes carbon footprinting on an organisational, service or product level, developing emissions reduction roadmaps, and designing climate change strategies that ensures that companies are not only managing and reducing their emissions, but also mitigating the risks that climate change presents. Leon's experience cuts across all industries and he has worked with clients in the transport, packaging, manufacturing and wholesaling industries, to name a few. Before joining Nexio Projects two and a half years ago he worked in corporate energy-efficiency and renewable energy for several years, providing a solid foundation of hands-on technical knowledge of what it takes for organisations to improve efficiency and decarbonize their operations. He has hosted several workshops and webinars on climate change topics, ranging from how companies can start measuring their carbon footprints to climate change-related risks and opportunities and how companies should assess and manage these.

Partners

G.T.D Bernoulli wants to thank our partners below



Notes

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