

INTRODUCTION TO THE JOHANNES LINNEBORN PRIZE AND THE 2018 WINNER LAUDATION

Wim P.M. van Swaaij
Chairman of the Nomination Committee

The Johannes Linneborn Prize was established in 1994 on behalf of the European Commission by Dr. Wolfgang Palz to honor a European individual for an exceptional life-time contribution to the field of sustainable energy from biomass. In exceptional cases the award can be granted to a non-European. It is not a reward for scientific excellence only, but also technical and managerial merits are appreciated. This prestigious award was connected to the name of Johannes Linneborn, a German biomass pioneer and businessman, a manufacturer of more than 500,000 Imbert small-scale wood gasifiers used to fuel cars, when fossil liquid fuels were scarce. His ideal was a world in which mankind lives in harmony with nature with optimal exploiting of biomass for energy and materials.

From a long list of excellent candidates, the Prize Committee selected as winner of the Linneborn Prize 2018:

Douglas C. Elliott

Laboratory Fellow

Chemical & Biological Process Development Group

Battelle, Pacific Northwest Division

Pacific Northwest National Laboratory

Richland, Washington USA

The prize is awarded to Mr. Elliott for his consistent excellence for over 41 years in pioneering research and management of implementation of renewable energy, with a strong focus on hydrothermal, pyrolysis and catalytic conversion processes of biomass for energy and products. He shows exceptional results in catalysis and process development for hydrothermal processes, thus opening routes for efficient utilization of wet biomass and waste streams. With innovative catalysis he also improved fast pyrolysis and its product qualities.

He provided inspiring and effective contributions and leadership in large national and international co-operation projects and programs in these areas.

Douglas C. Elliott obtained his B.S. Chemistry with Departmental Honors at the Montana State University in 1974 and a M.B.A. Operations and System Analysis at the University of Washington in 1980. He kept on upgrading his professional knowledge during his whole career with courses like: Strategy of Experimentation (1975), Chemical Engineering for Chemists (1983) and Practical Pilot Plants (1991). From the beginning of his career Elliott has been employed by the Battelle system at the Pacific Northwest National Laboratory (PNNL). This laboratory operates under contract by Battelle Memorial Institute doing much work for the Department of Energy (DOE) but also for private partners or even foreign governments.

Starting as young Scientist, he became Research Scientist, Staff Scientist and from 2009 Laboratory Fellow Pacific Northwest National Laboratory. Today he works for this organization on a part-time basis.

In his position as PNNL employee, Elliott was able to carry out biomass research and development in the whole range from fundamentals, process developments, product

applications, techno-economic evaluation of processes towards applications to specific feedstock's. He was especially active in thermo-chemical biomass conversion, performing fundamental studies on reaction networks and research aiming at the creation of catalysts active under hydrothermal conditions (520-640K, 40-220 bar). This opened new robust routes to processes producing methane from wet biomass and waste by developing stable catalyst carriers (like certain forms of zirconia) and stable active materials (like ruthenium). He also developed catalysts for hydrogenation and de-oxygenation of fast pyrolysis oils and tested them in representative process development studies.

Moreover, in the early part of his career, he was already active in hydrothermal liquefaction of biomass in the pioneering years after the oil crisis in the seventies of the former century. Here he managed the supporting bench scale experiments batch and continuously operated, for the well-known Albany facility, a pioneering hydrothermal liquefaction plant.

The list of biomass processes on which Elliott had important and well documented contributions is long: Hydrothermal liquefaction and catalytic hydrogenation of the products, catalytic hydrothermal gasification, fast pyrolysis and catalytic upgrading of the products. These latter operations ranged from 'simple' stabilization of the oil to deep hydrogenation and de-oxygenation towards blending components for petroleum products and chemicals. Also on the application side Elliott was active: for example in process studies on hydrothermal conversion addressing conversions of feedstock's such as algae and algae waste streams after oil extraction, municipal wastewater treatment sludge, agricultural and bio-refinery residues and many more.

These investigations led of course to PNNL reports of high quality, but Elliott also authored or co-authored over 80 peer reviewed articles in various scientific and technical journals, book chapters etc. This included several authoritative reviews and overviews. He also delivered numerous contributions and lectures on conferences including our own series of conferences.

Douglas Elliott is highly inventive and is listed as inventor or co-inventor on 22 US patents with numerous foreign filings.

He operates in a broad global network of well-known biomass scientists and many of his colleagues are eager to include him or follow him in international cooperative studies like the successful Round Robin on Fast Pyrolysis, and the one on viscosity and aging of Fast Pyrolysis oil and various other important biomass related studies of international groups of scientists leading to reports and or publications.

Douglas Elliott was and is very active in the International Energy Agency Bioenergy tasks as the representative for the U.S. and moreover currently as Task Leader of Task 34 on Pyrolysis.

The excellent contributions of Douglas Elliott did not go unnoticed and he received several awards and tokens of recognition such as:

- Special award for Excellence in Technology Transfer, Federal Laboratory Consortium. (2015)
- Named a Battelle Distinguished Inventor. (2004)
- Presidential Green Chemistry Challenge Award, Economic Conversion of Cellulosic Biomass to Chemicals, Environmental Protection Agency. (1999)
- 2 PNNL Outstanding performance Awards for Program development and Project Management (1999)
- R&D 100 Award, Petroleum Sludge Treatment, Research & Development Magazine. (1991)
- R&D 100 Award, TEES Biomass Gasification System, Research & Development Magazine. (1989)
- Special Award for Excellence in Technology Transfer, Federal Laboratory Consortium (1989)

Mr. Douglas Elliott, in your career you made a really great contribution to the science and technology of biomass conversion to useful, renewable and sustainable energy carriers and chemicals. Moreover, your power and leadership in international collaboration in your personal and friendly style is highly appreciated and we hope that you will continue your works for many years to come.

We are certain that the whole biomass community in Europe, the U. S. and the entire world will join the Linneborn committee in their warmest congratulation on this prestigious Award.