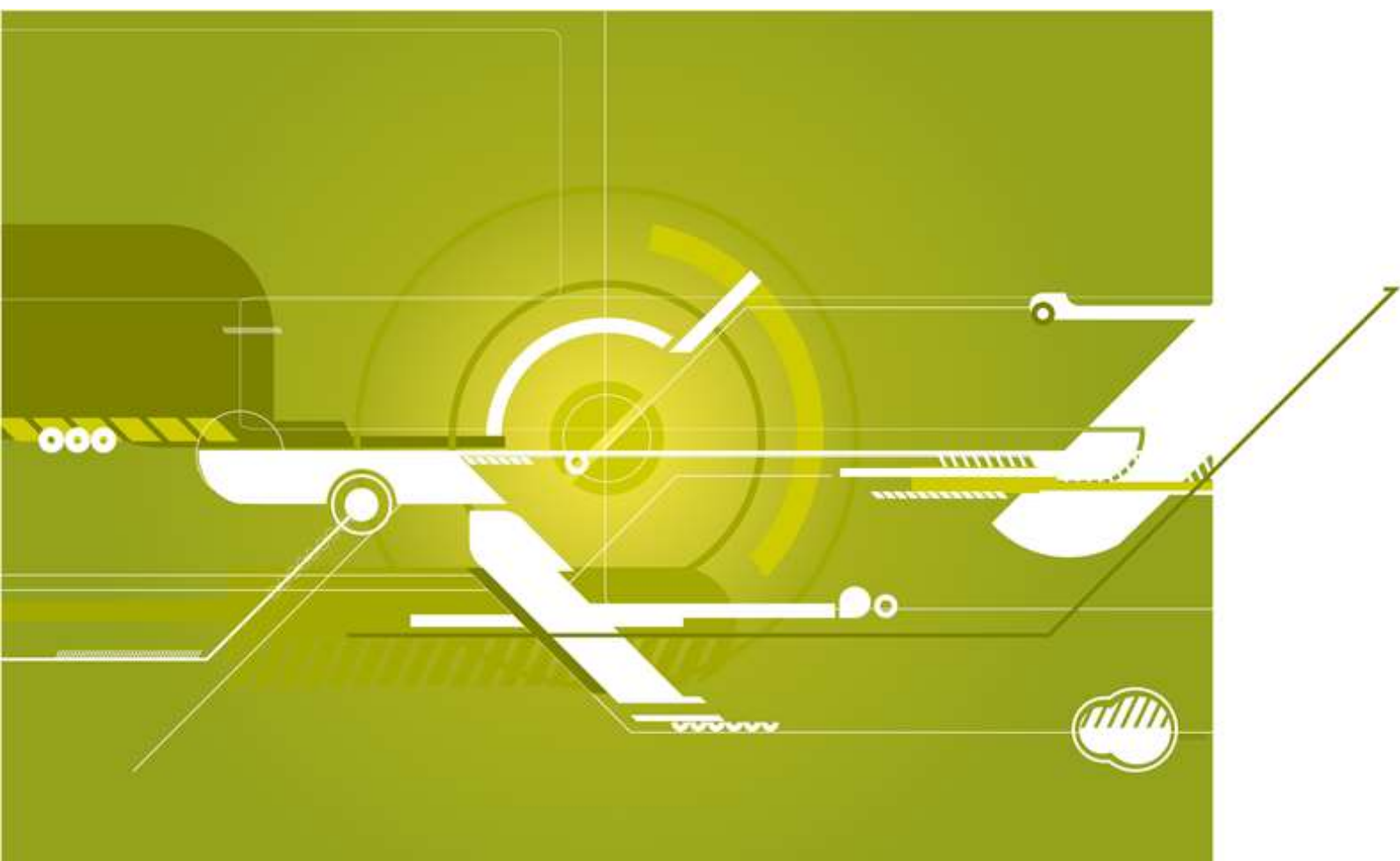





# ANNUAL REPORT 2016

THE SWEDISH KNOWLEDGE CENTRE  
FOR RENEWABLE TRANSPORTATION FUELS



## ABOUT F3

The networking organisation f3

-  provides a broad, scientifically based and trustworthy source of knowledge for industry, governments and public authorities in their strategic planning of short-term actions to reach long-term visions
-  carries through system oriented research related to the entire renewable fuels value chain, both in the shape of syntheses of current research, and as supplementing studies
-  acts as a national platform stimulating interaction between large and relevant R&I programs, towards Horizon 2020 and for other international collaborative processes.

f3 partners include Sweden's most active universities and research institutes within the field, as well as a broad range of industry companies with high relevance. f3 has no political agenda and does not conduct lobbying activities for specific fuels or systems, nor for the f3 partners' respective areas of interest.



### Funding agencies



*All f3 partners, representing academia, research institutes, industry and authorities. Linköping University was a member from 2012-2016.*



Street traffic. Photo: Ingrid Nyström, f3.

## INTRODUCTION

2016 was a very busy year for the networking organisation f3 (fossil free fuels). Many projects that started early in the current second phase (2014-2017) have finished and delivered results in f3 reports as well as scientific publications. For several more projects, deliveries are expected early 2017.

Two calls for projects in the collaborative research program “Renewable transportation fuels and systems” ([Förnybara drivmedel och system](#)) were carried out in 2016, resulting in the initializing of eight new projects (see below). The program is financed by f3 and the Swedish Energy Agency.

The research carried out within f3 includes both syntheses of current research on production and use of renewable transportation fuels, and supplementing system oriented research related to different parts of the entire renewable fuels value chain. Project [outcomes](#) provide guidance to policy makers, government, industry and other organisations facing decisions regarding renewable fuels, whether about policy objectives and instruments to achieve established goals, or investments in R&D, infrastructure and production.

## PUBLISHED REPORTS

Results and reports from f3 projects are accessible from the f3 website. Below is a list of the reports that were published in 2016.

Title* (report no)	Authors	Participating organisations
<i>The method's influence on climate impact assessment of biofuels and other uses of forest biomass</i> ( <a href="#">f3 2015:10</a> )	Sandin G, Peñaloza D, Røyne F, Svanström M & Staffas L.	SP, Chalmers, IVL
<i>How can forest-derived methane complement biogas from anaerobic digestion in the Swedish transport sector?</i> ( <a href="#">f3 2015:11</a> )	Lönnqvist T, Grönkvist S & Sandberg T.	KTH
<i>Nedlagd åkermark för biomassaproduktion – kartläggning och potentialuppskattning</i> ( <a href="#">f3 2016:01</a> , interim report in Swedish from the ongoing project "BeWhere – Stake holder analysis of biofuel production in Sweden").	Olofsson, J & Börjesson, P.	Lund University
<i>Flexibility in ethanol-based lignocellulose bio-refineries: A knowledge synthesis</i> ( <a href="#">f3 2016:02</a> )	Fornell R, Willquist K, Alriksson B & Kalmendal R.	SP, SP Processum
<i>Methane as vehicle fuel – A well-to-wheel analysis (MetDriv)</i> ( <a href="#">f3 2016:06</a> ).	Börjesson P, Lantz M, Andersson J, Björnsson L, Fredriksson Möller B, Fröberg M, Hanarp P, Hulteberg C, Iverfeldt E, Lundgren J, Røj A, Svensson H & Zinn E.	Lund University, Bio4Energy/LTU, E.on, Scania, Volvo, Göteborg Energi
<i>Implications of EU regulations on Swedish bio-fuel stimulus</i> ( <a href="#">f3 2016:07</a> )	Karltorp K & Gosens J.	SP
<i>Reviewing the environmental implications of increased biofuel consumption in Sweden</i> ( <a href="#">f3 2016:08</a> )	Martin M, Larsson M, Oliveira F & Rydberg T.	IVL
<i>Systemic constraints and drivers for production of forest-derived transport biofuels in Sweden.</i> Part A: Report ( <a href="#">f3 2016:09a</a> ) Part B: Case studies ( <a href="#">f3 2016:09b</a> )	Peck P, Grönkvist S, Hansson J, Lönnqvist T & Voytenko Y.	Lund University, KTH, IVL
<i>Analysis of P2G/P2L systems in Piteå/Norr-botten for combined production of liquid and gaseous biofuels</i> ( <a href="#">f3 2016:10</a> )	Jannasch A-K, Molinder R, Marklund M & Hermansson S.	SP
<i>Biofuels and ecosystem services</i> ( <a href="#">f3 2016:14 – Executive summary</a> )	Hansen K, Hansson J, Maia de Souza D, Russo Lopes G.	IVL, SLU, Stockholm University

\* Report title may differ from the original project title.

## OTHER PUBLICATIONS

In 2013, f3 produced an extensive report on assignment from the Swedish government investigation concerning a future fossil free transport sector called *Utredningen om FossilFri Fordonstrafik* (FFF-utredningen). The complete investigation was published under the name *Fossilfrihet på väg* (literally Fossil-free on its way).

During the spring of 2016, a short overview of current knowledge within the field was produced based on the 2013 publication, with relevant data updates:







Printed copies of the overview. Photo: Emmi Voogand, f3.

### *Sustainable transportation biofuels today and in the future – Summary* ([f3 2016:03-04](#))

The publication, available in both Swedish and English, includes the potential and sustainability for biomass use, and the production of sustainable biofuels in a well-to-tank (WTT) perspective. Authors have been Pål Börjesson (Lund University), Joakim Lundgren (Luleå University of Technology/Bio4Energy), Serina Ahlgren, (SLU Swedish University of Agricultural Sciences) and Ingrid Nyström (CIT Industriell Energi/f3).

## POSTPONED PUBLICATIONS

For the below listed projects, publication of f3-reports have been postponed due to scientific peer review processes. Accepted articles are, as a rule, linked by f3 via the project sites.

-  *Optimization of biofuel supply chains based on liquefaction technologies* (participating organisations: Bio4Energy/LTU, Chalmers/SP, Utrecht University)
-  *Integrated assessment of vehicle fuels with Lifecycle Sustainability Assessment – Tested for two petrol and two biofuel value chains* (Participating organisations: KTH, IVL & Lund University)
-  *The role of electrofuels: A cost-effective solution for future transport?* (Participating organisations: Chalmers & IVL).
-  *Techno-economic analysis of biomethane production with novel upgrading technology* (Participating organisations: Bio4Energy/LTU, SP & Faculty of Engineering/Lund University).













New projects in sight. Photo: Hans Thoursie, freeimages.com.







## INITIATED RESEARCH PROJECTS 2016

The collaborative research program “Renewable transportation fuels and systems” is run jointly by f3 and the Swedish Energy Agency. The following projects were initiated last year:

-  [An innovation policy framework and policy options for the development of biorefineries](#)  
Participants: Chalmers, Bio4Energy/LTU, IVL, Göteborg Energi, Preem & Perstorp.
-  [Long-term sustainability evaluation of fossil free fuels production concepts](#)  
Participants: Chalmers, Bio4Energy/LTU & Lund University.
-  [Determination of potential improvements in bio-oil production \(ImprOil\)](#)  
Participants: Innventia, Chalmers, Preem & ÅF Industry.
-  [Prospects for renewable marine fuels](#)  
Participants: IVL & Chalmers.
-  [Techno-economics of long and short term technology pathways for renewable transportation fuel production](#)  
Participants: Bio4Energy/LTU, Innventia & Preem.
-  [Sustainable transportation fuels – a techno-economic WtW analysis](#)  
Participants: Chalmers, Sweco & Göteborg Energi.
-  [Marine feedstock based biofuels and ecosystem services](#)  
Participants: IVL & SP.
-  [Knowledge synthesis on new value chains by thermochemical conversion of digestate for increased biofuel production in Sweden](#)  
Participants: SP, Lund University & Reference group with representatives from academy and industry.

## SMALL F3 PROJECTS

Shorter projects with a smaller economic scope are carried out within the f3 partner network with funding from f3 partners only. In this category, the following projects were initiated during 2016:

-  Bio-SNG production by means of biomass gasification combined with MCEC technique  
Project lead by KTH and carried out in participation with Bio4Energy/LTU.
-  Optimization of biofuel supply chains based on liquefaction technologies  
Project lead by Bio4Energy/LTU and carried out in participation with Chalmers/SP and Utrecht University.
-  Implications of EU regulation on Swedish biofuel stimulus  
Project lead and carried out by SP. The report is available (see Published reports above).
-  A comparative analysis of P2G/P2L-systems for the combined production of liquid and gaseous biofuels.  
Project lead and carried out by SP. The report is available (see Published reports above).
-  Gasification-based biofuels – GHG emissions and profitability analysis based on general and sector specific policy instruments.  
Project lead by IVL and carried out in particitaion with Chalmers.
-  Electrofuels from biological processes – A knowledge synthesis  
Project lead and carried out by SP.

## FACT SHEETS

Fact sheets have proven to be one of the most sought for pieces of information on the f3 website. In 2016 the fact sheets on [HEFA/HVO](#) and [biogas](#) were updated and several more were scheduled.

## SEMINARS

The f3 office organised two major external seminars and one program conference in 2016.

### **Full speed towards a fossil free transport sector? – Perspectives on gasification based biofuels and the role of pilot and demonstration plants.**

f3 and SFC, The Swedish Centre for Biomass Gasification, co-arranged this seminar in February which attracted approximately 120 participants. Three sessions and two study visits to to Preem Göteborg (production of renewable diesel and gasoline based on tall oil and other residues) and Göteborg Energi's GoBiGas plant (gasification of forest residues for production of biogas) were organised.



*Joakim Lundgren, director of SFC and representative of Bio4Energy in f3, introduced SFC, its focus and activities. Photo: Alan Sherrard, Bioenergy International.*

## Förnybara sjöfartsbränslen i tanken? Möjligheter, utmaningar och praktiska erfarenheter.

*(Renewable fuels for the maritime sector – possibilities, challenges and practical experiences)*

This seminar was held in October as a co-arrangement with Lighthouse, the Swedish Maritime Competence Centre. It attracted approximately 80 participants from a wide range of stakeholders and included two sessions. During the first, research-oriented session, three ongoing projects with different aspects on the area were presented: Policy and decision support, electrofuels, and produc-



Johanna Mossberg, director of f3, and Åsa Burman, director of Lighthouse, welcome the seminar participants. Photo: Emmi Voogand, f3.

tion of biomethane and methanol through gasification. In the second session of the seminar, three marine sector actors shared their practical experiences from use of different renewable transportation fuels, as well as their views on the future.

The seminar was live-streamed and recorded for [online](#) access (in Swedish).

## Programkonferens samverkansprogrammet Förnybara drivmedel och system.

*(Program conference for the collaborative research program Renewable transportation fuels and systems)*

In connection to the 2016 general assembly in f3, held in February in Gothenburg, the centre members were presented with all currently ongoing projects within the [collaborative research program](#) that is run and financed by f3 and the Swedish Energy Agency from 2014 to 2017. The conference was a co-arrangement by f3 and the Swedish Energy Agency.

In addition to the external seminars and the program conference, f3 partner representatives gathered in Södertälje (host: Scania), Gothenburg (host: Volvo) and Norrköping (hosts: Linköping University and Lantmännen Agroetanol) for discussions on past and future projects and assignments.

A number of workshops connected to specific projects also took place during 2016, carried out by project leaders and participants. Presentations were held in both national and international meetings, seminars and conferences.

## THE ROLE OF f3 AS SWEDISH ADVOCACY PLATFORM TOWARDS HORIZON 2020

Developing a sustainable transportation sector is a vital societal challenge for the EU and for Horizon 2020. The f3 centre is, since summer 2014, an appointed Swedish advocacy platform for renewable transportation fuels in relation to Horizon 2020. In 2016, the assignment was pro-longed, meaning that the project will run until July 2018.

Also, from 2016, Ingrid Nyström, senior advisor for f3, was appointed as member of the ETIP Bioenergy Steering Committee (Formerly EBTP, European Biofuels Technology Platform). This



gives f3 the opportunity to actively influence the agenda from a stakeholder group perspective, and also to receive important insights in the work process of ETIP Bioenergy, the EU Commission and a range of European stakeholders.

In April, f3 arranged a seminar in Brussels together with the advocacy platforms SusFor and Forum for Transport Innovation. The title was "Innovation in Forest, Fuel, Freight" and the seminar attracted close to 40 participants who engaged in discussions about challenges of sustainable transportation and forestry and about R&I actions needed to utilize their potentials.

During the fall of 2016, the Commission has been preparing the post-2020 research strategy for bioenergy and renewable fuels as part of the development of a new SET plan. The advocacy platform contributed actively to this process, e.g. through input to the ETIP Bioenergy Input Paper to Action 8 in the integrated SET-plan, which concerns the strengthening of market take-up of renewable fuels needed for sustainable transport solutions, and bioenergy cost reductions aspects. Further, f3 has prepared for future actions by collecting and compiling input from its partners concerning prioritized R&I actions and topics for the Horizon 2020 2018-20 Work Programmes.

All in all, the collective work as advocacy platform gives the f3 working group the potential to make an impact on EU R&I developments, by extending and strengthening its network and by proactively compiling material that allows for fast and short notice responses on different actions, submission of comments etc.

## WEBSITE, NEWSLETTERS AND SOCIAL MEDIA

Almost 40 news pieces were published on the f3 website in 2016, covering projects, results, seminars, etc. The website had about 7 600 visitors, which is an increase by 17% compared to 2015. The fact sheets, especially the ones on HVO (Hydrotreated Vegetable Oil) and FAME (Fatty acid methyl esters), proved to be the most popular pieces of information. Also information on ongoing and finished projects generated quite a lot of interest.

While the website is in English, the f3 newsletter features the news in Swedish (with links to information in English). In 2016, it had approximately 400 subscribers who received four regular newsletters and one short reminder for a seminar registration deadline.

The f3 Centre [Twitter account](#), mainly with tweets in Swedish, was also used by the f3 office to share news stories from the f3 website in social media, which has enhanced the possibility for dissemination of research results and related information from the f3 network. In December 2016, the f3 Centre Twitter account had over 90 followers.

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