

ANNUAL REPORT 2017

DEPARTMENT OF ENERGY
AND PROCESS ENGINEERING



ANNUAL REPORT 2017 - DEPARTMENT OF ENERGY AND PROCESS ENGINEERING



LOOKING BACK
AT 2017

THE ENERGY
LANDSCAPE

CONTENTS

02

04

CAPTURING
100.000 FRAMES
PER SECOND

06

FOR HE'S A JOLLY
GOOD ONSAGER
FELLOW

08

RECRUITING FROM
TOP SHELF

10

SUPERSMART
AND SUPERCOOL...

12

EPTRAINING 2017 –
LOTS OF TRAINING
AND FUN!

14

THE CLIMATE
MINISTER CAME
VISITING

16

RESEARCHING ON
INDOOR CLIMATE

18

SOME EPT
MOMENTS FROM
2017

22

FESTIVE HAT
TRICK ON
12 JUNE!

24

WE'RE ALL
ABOUT THE
LABS...

26

OFFICIAL OPENING
OF HYDROCEN

27

NUMBERS
2017

28

Content by:
Vibeke Ann Pettersen (editor)
Angela McLean (IndEcol)

Photos credited separately

Design and graphic production:
NTNU Grafisk senter v/Maiken Skogstad

Printing:
Skipnes Kommunikasjon

Contact:
[NTNU, Department of Energy and
Process Engineering.](#)
Kolbjørn Hejes vei 1B, 7491 Trondheim



HAPPY MOMENT:

"I was so happy and proud of EPT when I received the news that EPT was on the NTNU top for publication points in 2017," says Head of Department Terese Løvås. Here flanked by the former Head of Department Olav Bolland, who became our Dean in 2017, and our Rector Gunnar Bovim.

Foto: Vibeke Ann Pettersen/NTNU

LOOKING BACK AT

2017

In 2017 the Department of Energy and Process Engineering (EPT) at NTNU continued to pursue its vision to deliver the core tasks for our organization at the highest level: education, research, innovation and dissemination! All at a time of change and reorganization at NTNU.

2017 has been the year of big celebrations. We have celebrated 100 years for the Water Power Laboratory, 15 years as Department of Energy and Process Engineering, opening of the "new" Thermal Energy lab and the European CCS Laboratory Infrastructure ECCSEL, hosted by EPT.

2017 has also been the year for getting the momentum up in the 5 Centres for Renewable Energy (FME) that we are involved in over a period of 8 years, one of them we are hosting – HydroCen.

Our employees have succeeded in securing funding from both national and international funding bodies. As well as welcoming celebrity visitors such as the Minister for Climate and Environment, one of our professors has been given the responsibility to be the lead author of a special report for the Intergovernmental Panel on Climate Change (IPCC).

At the same time 31 students completed their Bachelor thesis and 114 students completed their Master thesis at EPT this year. We wish them the best of luck in their continued path towards a career in industry, public sector or perhaps even a PhD!

Just to mention a few of all the highlights throughout the year! Overall, we can look back at a year of extremely high activity and productivity – we were even #1 for publication points at the entire NTNU!

This level of success has come through hard work from all of us. I cannot emphasize enough that this is an achievement that everyone at EPT has contributed to!

Finally, but not least, I want to welcome all our new employees at EPT. In 2017 our organization expanded with an entire group as a result of the university merger: The Renewable Energy group at Kalvskinnet – we are looking forward to integrating them at the Thermal Energy lab! We have also recruited excellent new staff, from PhDs to Professors.

I have only had the pleasure to head this department for a few months in 2017, from 1st of August. However, I hope that this annual report brings back good memories of some proud moments in 2017 – and I look forward to continuing on this path in 2018 with EPT.

I would like to thank all our employees and partners for their continuous effort to achieve and making EPT one of the most successful Departments at NTNU.

THE ENERGY LANDSCAPE

The Energy Landscape spans the entire scope of energy research and competence building conducted at SINTEF Energy and the Department of Energy and Process Engineering.



Illustration: SINTEF/NTNU/Oxygen

CAPTURING 100.000 FRAMES PER SECOND!

At this unbelievable speed, this new, self-made optical wonder machine is making PhD Candidate Karl Oskar Bjørgen and Postdoc David Emberson able to see and measure emissions of soot and NOX (mono-nitrogen oxides) from different bio fuels.

“It can even go faster,” the researchers say. In comparison, a normal video consists of 24 frames (pictures) per second.

This optical engine, as it is called, was finished at the end of 2017, and the two researchers designed most of it themselves during approximately 18 months. They have been perfecting the set up for accurate results.

ADVANCED AND ACCURATE SOOT MEASURING

“It is equipped with two cameras, and that was Karl’s idea,” says David.

With this new device, they can validate simulations. The glass used in the optical part is made of Quarts and is exceptionally strong.

TESTING BIO FUELS FOR THE FUTURE

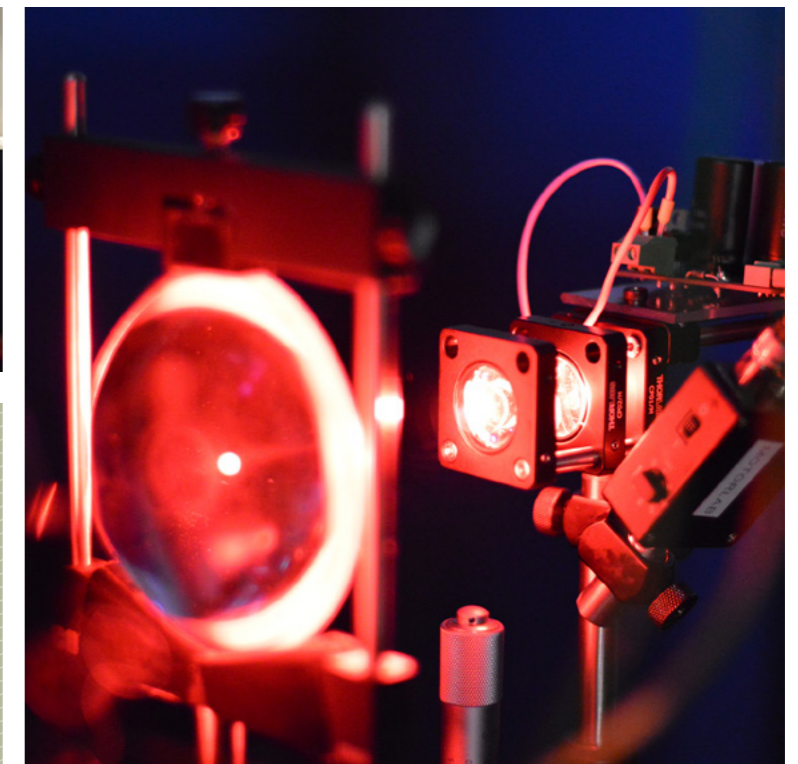
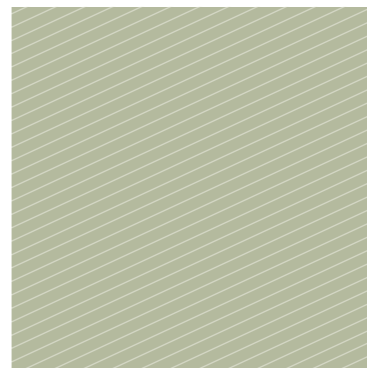
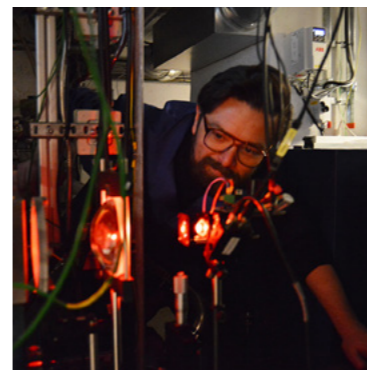
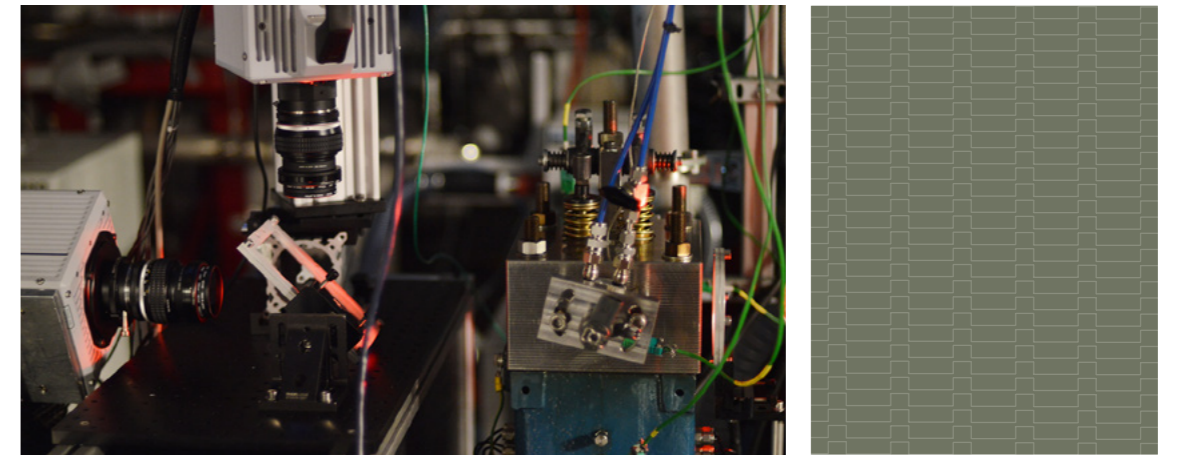
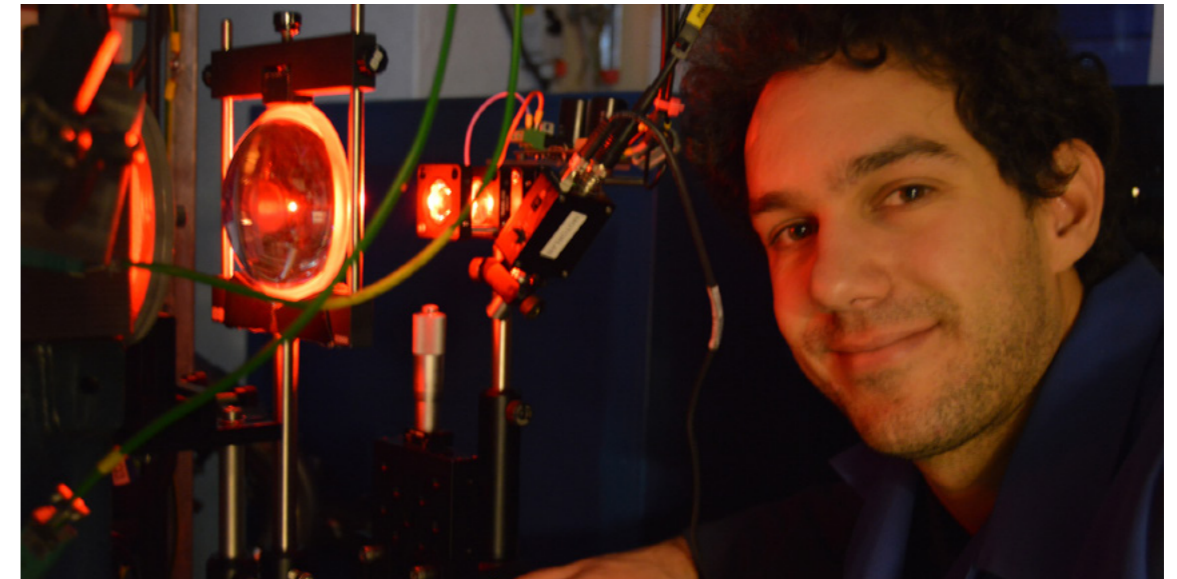
They are looking into a lot of new bio fuels for the future to see how much soot and other emissions they spread. Due to health issues it is important to examine if they are safe and within the laws and regulations. Wood chips – made into a liquid form – is one of them, and they are collaborating with producers.

Karl Oskar is working on his PhD thesis, which will be related to a topic using this new optical engine.

UV LIGHT CHANGES THE FUEL

David is also currently cooperating with SINTEF on a project called Smart Fuels:

“UV light actually changes the fuel, and we have been experimenting in the lab to find out more about this phenomenon. I’m writing the paper now.”



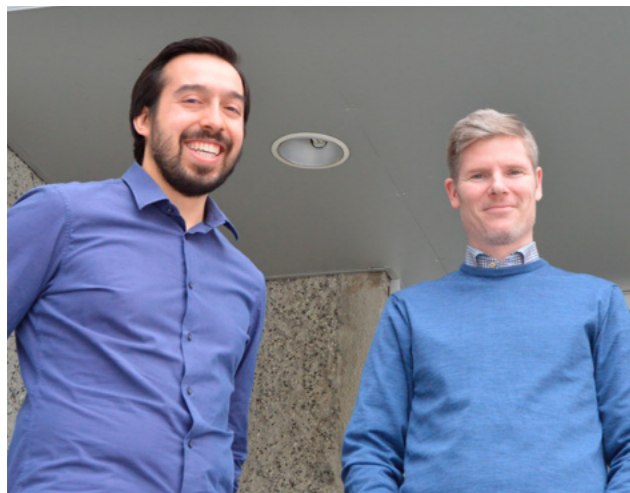
Photos by: Karl Oskar Bjørgen and Vibeke Ann Pettersen/NTNU

FOR HE'S A JOLLY GOOD

ONSAGER

FELLOW!

"Jason Hearst is one of the two new Onsager Fellows we were awarded with in 2017," says James Dawson.



The new Onsager Fellow, Jason Hearst (to the left) and James Dawson outside the Fluid mechanics lab at campus Gløshaugen, NTNU in Trondheim.

EPT is recruiting top international researchers! Jason Hearst and Jonas Moeck were both awarded Onsager Fellowships last year.

"We were so lucky to be awarded these strategic positions. The grants from Horizon 2020 gives us recourses to improve on both research and education. We are very happy about our new top notch colleagues," says Professor Dawson.

AN EXCITED CANADIAN FELLOW

Jason Hearst came to NTNU in July 2017. He completed his PhD at the University of Toronto in 2015.

"I was so excited to come, because the resources and people, the whole environment, here at NTNU is really

good to be in! The infrastructure, including the large wind tunnel, is very impressive and I am excited to be part of this group," says Hearst.

As a Canadian, he feels at home here in Trondheim. The climate is much like it is in Toronto.

"I have been skiing 2-3 times a week this winter, and that's great. The country is nice and clean, and the people are polite."

CARBON CAPTURE AND REAL LIFE TURBULENCE

Jason is involved in a few projects, including a NFR CLIMIT project recently awarded to a collaboration between himself and SINTEF, and an external project with Stat Oil and Global Maritime. His research focuses on the turbulent motion of fluids and their effect on everyday life. He is also pursuing research interests in wind energy and carbon capture. His first PhD student has arrived, and he is also working with master students on propellers and wind turbines.

LARS ONSAGER IN SHORT

Lars Onsager (1903-1976) was a Norwegian-American chemist and physicist. Onsager was born in Oslo. He held a Ch.E. degree (1925) from NTH (Norwegian Institute of Technology, later NTNU Norwegian University of Science and Technology). Onsager migrated to the USA in 1928, and became an American citizen in 1945. Onsager was a J. Willard Gibbs Professor at Yale University.

He was awarded the Nobel Prize in Chemistry in 1968. However, it is little known that Onsager also produced several ground breaking papers on the theory of turbulence and held a lifelong interest in the area.

[Read about Onsager Lecture and Professorship](#)

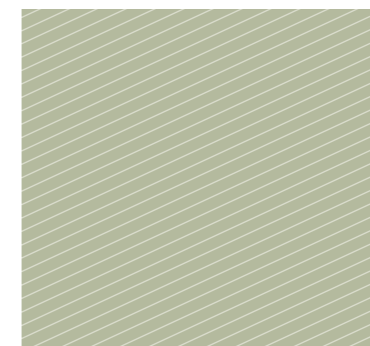
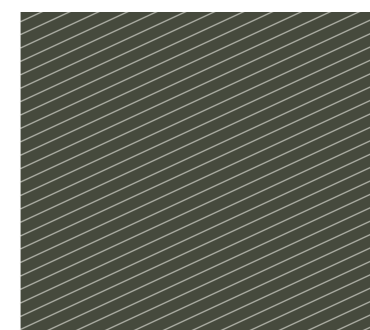


INTERNATIONAL CHAIR

At the very end of 2017, Professor Luca Brandt came to NTNU and EPT as an International Chair for Fluid mechanics. He is a Professor at KTH in Stockholm, where he has been since 1998, and is an ERC consolidator fellow. "I'm impressed by the environment here – there's good labs that complement my numerical simulations of multiphase flows". Brandt also mentions combustions, turbulence, evaporation of droplets and biofuels.

"I think we are more on the fundamental side at KTH, and we don't have such good experimental facilities. My impression is also that you are closer to the industry here, especially with the cooperation with SINTEF."

Luca Brandt comes to NTNU a few days at a time, and the Italian enjoys staying in Trondheim.



Photos by: Vibeke Ann Pettersen/NTNU

RECRUITING FROM TOP SHELF

“Every time I pass his office I think to myself how lucky and grateful I am to have him here.”

This strong statement comes from Professor Odne Stokke Burheim. He is talking about one of our new Professors from 2017, Bruno G. Pollet.



PROFESSORS OF RENEWABLE ENERGY: Odne S. Burheim and Bruno G. Pollet in the lab, which will be moved to Gløshaugen in summer 2018.

The NTNU Rector has told us how to recruit: Excellent academics in their mid-forties. Bruno is at international star-level, and I’m so proud of getting him here,” Odne says.

They first met around 2010 at a hydrogen and fuel cell conference in Vancouver, and again a couple of years later in Toronto. Bruno had then gone to work and live in South Africa, where they later collaborated together

and published some ground-breaking research papers through an informal collaboration.

RISING STAR IN THE FIELD

“Odne was well known as a rising star in our field and network, and we have the same outlook on life and work. It’s not luxury or money that drives us. We want to make a better world. I was very happy to be employed by NTNU and come to Trondheim,” says Professor Pollet.

He was born and raised in France, and has traveled around to different universities in the world. In the UK: Oxford, Birmingham, Liverpool, Coventry and Aberdeen. Among other countries, Spain and South Africa.

“He even had his own fuel cell factory in South Africa,” Odne brags while his new colleague has left the room for a second.

He is also very pleased with the other members of the team, and they are looking forward to co-locating with the rest of the department at campus Gløshaugen.

KNOCKED ON THE EPT DOOR

Because of the merger between NTNU and the University colleges in Trondheim, Gjøvik and Ålesund, the group at campus Kalvskinnnet from former HiST became part of NTNU, and is relocating during summer 2018.

“We are really looking forward to getting settled in at “Varmeteknisk” (Thermal lab building) at Gløshaugen. We wanted to be a part of Department of Energy and Process Engineering (EPT). Mainly because there are some strong links to - for example energy storage, and we took an active part in the process. The department was very welcoming, and we are now eager to collaborate more and closer with our colleagues at EPT.

ENERSENSE

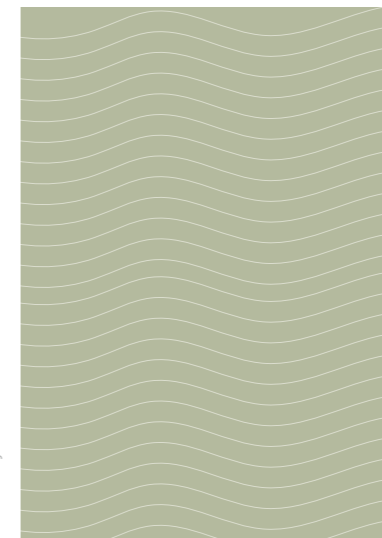
Is a strategic research area with focus on the nexus of energy efficiency, energy storage and sensor technologies, including automation. ENERSENSE is a collaboration between several NTNU departments and faculties.

See more: ntnu.edu/enersense



ENERSENSE GROUP: Winter workshop in Åre December 2017 for sharing research ideas and planning the future direction of applied renewable energy and sensor research. Photo: ENERSENSE

SAMPLES: Water electrolyser and fuel cell electrodes made by Pollet and Burheim



Photos by: Vibeke Ann Pettersen/NTNU

S U P E R S M A R T A N D S U P E R C O O L . . .

Professor Armin Hafner is referring to the full size test lab, or refrigeration facility, called SuperSmart rack.

The really smart part is saving around 30 percent of the energy spent in a supermarket!

"The reason for this large saving is that the heat from the refrigeration process is applied to heat for the building and water instead of going to the crowd. It's really important to use the energy efficiently!" says Armin. We all know that there is heat coming from the back of our fridges at home, so this is the same principle.

ENVIRONMENT FRIENDLY

The environment and the climate benefits a lot from the energy savings, and the systems will keep improving with more research and testing in the future. Energy efficient refrigeration systems with natural working fluids is the main goal. "This lab is unique in Norway, because it's so flexible. We can even simulate that we are located in Saudi Arabia or anywhere," says Armin.



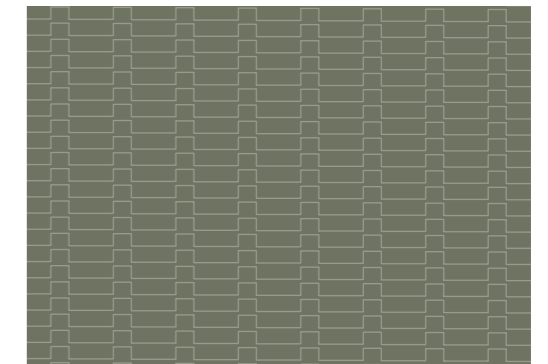
KEEPING SUPERCOOL: "We are testing efficient ways of keeping the groceries refrigerated in the shops. The Super Smart rack in the background is very advanced and unique in Norway." Photo by: Vibeke Ann Pettersen/NTNU



OPENING:

The Supersmart Rack was officially opened on 17 November 2017. From the left: Head of Department, Terese Løvås, Managing director in Advansor, Kim Christensen and Professor Armin Hafner (EPT). *Photo: Maren Agdestein/NTNU*

Read more in this [blog by Professor Armin Hafner](#) (in Norwegian)



COOPERATION WITH SUPERMARKETS

"Most Supermarkets have installed doors to their display cabinets again, after some years where most of them have been open. This is also an important and easy way to save energy."

Armin and his colleagues are doing a lot of testing on the most efficient ways to keep the groceries cold and do this in the most energy efficiency way.

"We can't do these kind of intensive experiments in the shops because it would be very expensive if something goes wrong - and all the foods go to waste. That's why it's a good idea to test everything here before implementing it in the supermarkets. We can simulate fully any store, like from Kiwi or REMA 1000, here. We run specific cases for them, and this cooperation also gives them higher competence in this field, when they will order new equipment," he says. The NTNU researchers also have beneficial cooperation with SINTEF in this lab.

STUDENTS ARE DOING EXPERIMENTS

This lab is also used by students who are working on their masters or PhD thesis. As we are speaking, two of the PhD candidates are working intensely in two different corners of the enormous rack.



The SuperSmart includes very advanced measuring equipment, which was very expensive. "We need this to analyze all the data from all the experiments, says Professor Hafner.

WHERE THE MAGIC HAPPENS: Professor Hafner under all the wires and cables explaining the refrigeration processes they are testing. Photo by: Vibeke Ann Pettersen/NTNU

EPT TRAINING 2017

- LOTS OF TRAINING AND FUN!

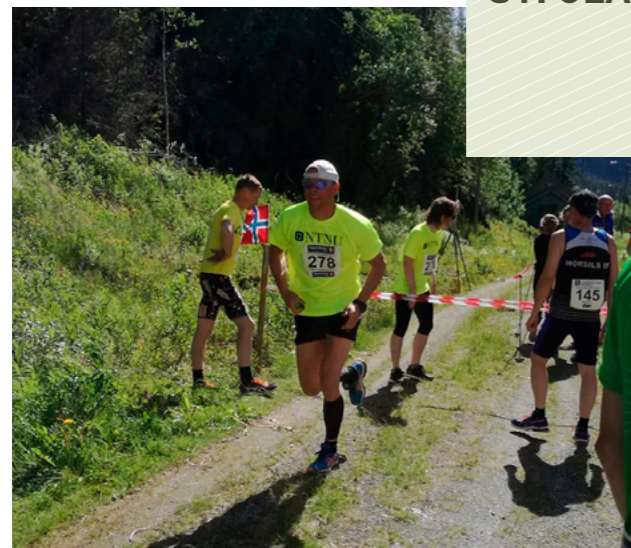
EPT training is great for meeting up and having fun with colleagues. While training and being healthy! In the winter we have ski trainings, which are very popular. Running sessions, St. Olavsloppet and Kayak courses

keep us active in the summer. All year round we have strength training in EPT Gym.

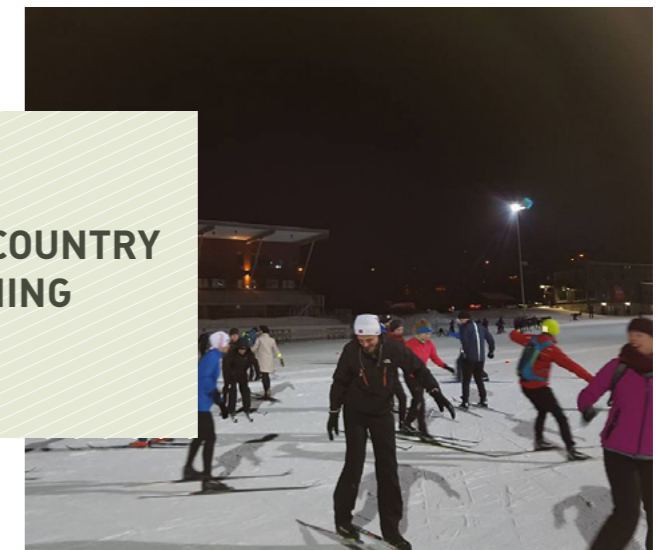
*Photos by EPT members:
Erik, Niranjan, Shareq and Rubén.*



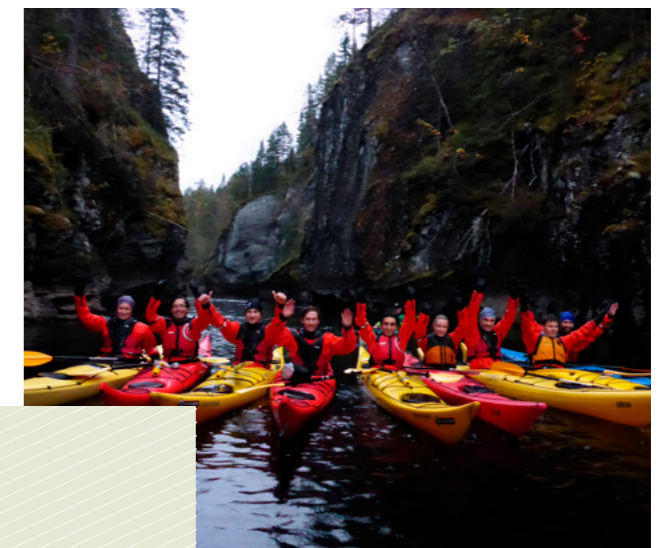
ST. OLAVSLOPPET



CROSS COUNTRY
SKIING



KAYAK COURSE



THE CLIMATE MINISTER

CAME VISITING

As part of his NTNU visit in October, the Climate and Environment Minister, Vidar Helgesen, came to visit us at IndEcol. He met with researchers and heard about the wide range of work being done here to address issues in sustainability.

"This was an opportunity for us not only to highlight the work our group is doing, but also to have a conversation with the person responsible for policy decisions about the direction Norway will take in environmental sustainability" said Professor Anders Hammer Strømman.

"It's not every day you get an audience with a current governmental Minister" said Anders, "so we wanted to make an impact with our research. I think we raised important issues and gave him several things to reflect on".



CHERUBINI AUTHOR OF UN CLIMATE

REPORT



THE FUTURE OF OUR PLANET

In particular, Chapter 6 will address the interlinkages between these factors.

"Francesco's expertise in this area of research is well-recognised, hence his selection as a Lead Author for this Chapter" says Anders. "Our ability to contribute to work at this level highlights the high-caliber research competence that we have and signifies the relevance of what we do".

For his part, Francesco feels "privileged and excited to be involved. The work of the IPCC has huge implications for the future of our planet, and this report will be an important contribution towards a more sustainable future".

Professor Francesco Cherubini was selected as a Lead Author on Chapter 6 of the IPCC's (Intergovernmental Panel on Climate Change) Special Report on Climate Change and Land.

"This is great for Francesco and great for the group as a whole," says Professor Strømman, noting also that "these high-level projects help promote our standing in our field, and provide opportunities for other collaborations as well".

Chapter 6 of this IPCC special report is on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems, and is due to be finalized in September 2019.

NTNU Sustainability 

IndEcol is proud to be the host of NTNU's strategic Research Area, SUSTAINABILITY, led by Professor Helge Brattebø. Helge was a founding member of the Industrial Ecology Programme at NTNU, and brings his broad experience to this important strategic research area.

[NTNU SUSTAINABILITY](#)

RESEARCHING ON INDOOR CLIMATE

– ALSO FOR NTNU CAMPUSES

They are experts on energy and indoor climate, and are searching for ways to achieve the most comfortable and safe environment for us all inside houses. While saving energy, of course!



NEW LIVING LAB: The building in the background contains a test cell lab. Our researchers were the first to use this advanced lab in 2017. From the left: Laurent Georges, Vojislav Novakovic, Natasa Nord, Hans Martin Mathisen and Guangyu Cao. Photo: Vibeke Ann Pettersen/NTNU

Some of our researchers who are working on indoor climate and energy in buildings are cooperating with the NTNU campus development project. Their knowledge is important for creating energy efficient and comfortable buildings for NTNU campuses. Our number of employees in this field is growing – in 2017 we recruited more PhD Candidates than ever before.



ON THE INSIDE: Natasa and Eberhard Schmidt, from the company Wasserkabel, are placing and testing water capillary mats that can be used for heating, cooling, and dehumidification.



EXTRA SIZE: Laurent and PhD student Maria Justo-Alonso are sitting beside the huge radiator in the Living lab. Photos: Lars O. Nord and Maren Agdestein/NTNU

MAIN RESEARCH AND EDUCATION AREAS

ENERGY SUPPLY AND USE IN BUILDINGS

- District heating and cooling systems
- Energy performance of buildings
- Heating and cooling systems for low energy, passive houses and zero emission buildings
- Energy flexible systems for heating and cooling

OPTIMAL CONTROL, OPERATION AND MAINTENANCE OF HVAC:

- Lifetime commissioning of indoor environment and energy efficiency in buildings
- Interactive modelling and simulation

INDOOR CLIMATE, THERMAL COMFORT AND HEALTH

- Indoor environment in low energy buildings, passive houses and zero emission buildings
- Thermal comfort and occupational health

VENTILATION TECHNOLOGIES

- Demand controlled ventilation, mechanical and natural ventilation
- New concepts for ventilation and air conditioning of buildings
- Highly efficient building services for zero emission buildings

POPULAR CO₂ HEAT PUMP: Natasa and Vojislav are looking at some data from the CO₂ heat pump, which is currently very popular among undergraduate students in the course Thermodynamics 1. Photo: Vibeke Ann Pettersen/NTNU



STUDIES - PROGRAMMES

- Master's Degree Programme, 5 years
(MSc/Siv.ing.)

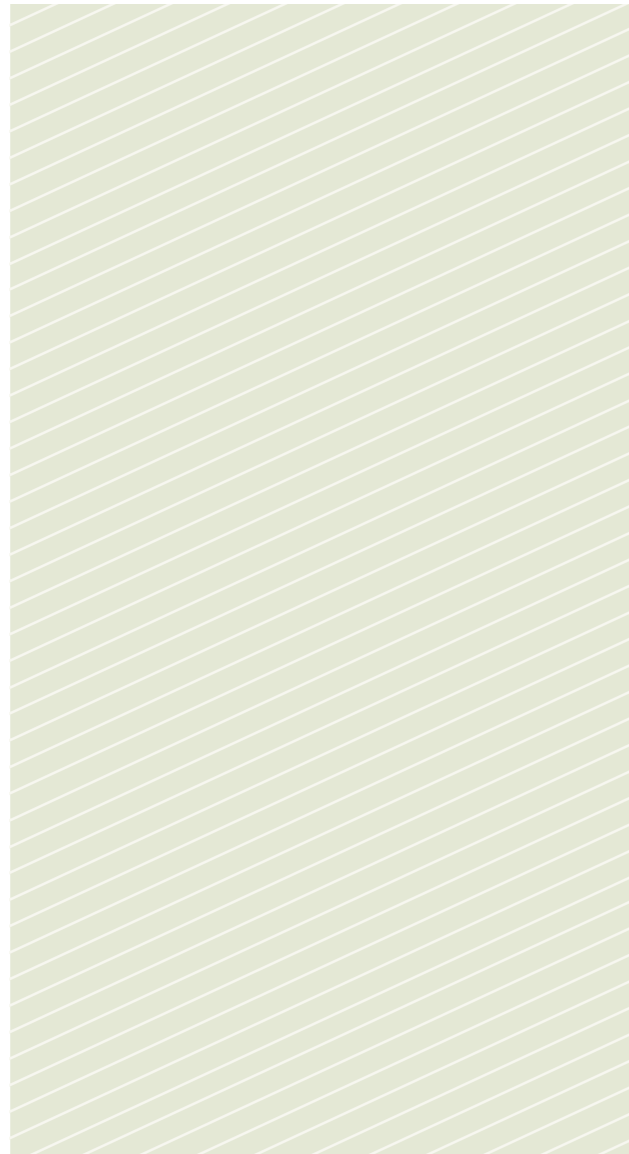
- Energy and Environmental Engineering
- Mechanical Engineering

- Master's Degree Programme, 2 years
(MSc)

- Mechanical Engineering
(2-year PuP)
- Energy Use and Energy Planning
(2-year Energi og miljø)
- Industrial Ecology
- Natural Gas Technology
- Sustainable Energy
(in collaboration with Jiao Tong, Shanghai)
- Hydropower Development
(IBM is host)

- Bachelor's degree programme, 3 years
(BSc)

- Renewable energy/Fornybar Energi
(coordination with the bachelor at Gjøvik and Ålesund)



HIGHLIGHTS RESEARCH PROJECTS IN

2017

In total

72

APPLICATIONS TO RCN
IN 2017
(2016:54)

21

H2020 APPLICATIONS
IN 2017
(29 IN 2016)

2

FRINATEK
APPLICATION
GRANTED

5

EU PROJECTS
GOT APPROVED
IN 2017

18

RCN-APPLICATIONS
GOT APPROVED IN 2017
(2016:16)

SOME EPT MOMENTS FROM 2017



NTNU'S OUTSTANDING ACADEMIC FELLOWS PROGRAMME

ACADEMIC STARS: Fellows in the Outstanding Academic Fellows Programme 2017-2021 (Stjerneprogrammet) with the Rector Gunnar Bovim and 2017 Pro-Rector of Research, Kari Melby. Three researchers from EPT are among them: Natasa Nord, Simen Andreas Å. Ellingsen and Nicholas Worth (not present on this photo). Carlos Dorao from EPT was in the first programme (2014-2018).

Photo: Thor Nielsen/NTNU.

Fellows in the [Outstanding Academic Fellows Programme 2017-2021](#)



THEN WE TOOK BERLIN ...

OUT AND ABOUT:

The department went to Berlin in May 2017. Here is most of the EPT Administration, plus a few academic staff, gathered in front of the Reichstag building in Berlin.

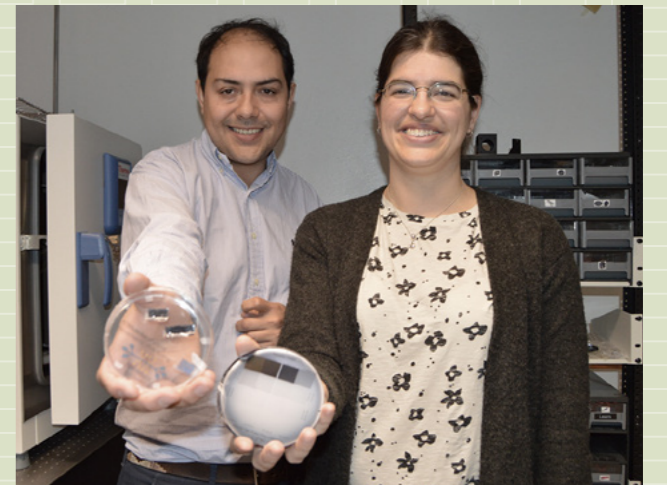
SUPER COUPLE: MARIA & CARLOS

TINY THINGS:

These super-researchers and professors, Maria Fernandino and Carlos A. Dorao are married and they belong to EPT. Both received FRINATEK grants in 2017. They are both involved in NANO research, and are studying aspects of heat transfer and cooling.

"We are looking at condensation and evaporation, and how the bubbles and droplets are responding to different surfaces," the couple explain.

Results from their research may be used for advanced cooling of electronics, like mobiles and computers in the future. *Photo: Vibeke Ann Pettersen/NTNU*



SCIENCE FRIDAY

As part of the science festival "Forskingsdagene" NTNU invited four experts with extensive knowledge of research, innovation, technology, business development, history, energy, hydropower, sea ice, ultrasound and environment issues to Byscenen.

Two of our people contributed on stage: Hege Brende and Terese Løvås. Knut Vilhelm Høyland and Svein-Erik Måsøy also participated.

Photos: Maren Agdestein/NTNU



FESTIVE HAT TRICK ON 12 JUNE!

Three celebrations in one 12 June 2017: The 100-year jubilee of the Waterpower laboratory, the opening of the rebuilt Thermal Energy laboratories (Varmeteknisk) and the inauguration of ECCSEL ERIC.



HEAD START: EPT employees celebrated a few days earlier.
Photo: Julie Gløppe Solem/NTNU



JUBILEE: Hege Brende talking to celebrity guests in the lab.
Photo: Julie Gløppe Solem/NTNU



HEAD START2: EPT employees celebrated a few days earlier.
Photo: Julie Gløppe Solem/NTNU



PHOTO SESSION: Wolfgang Burtscher, Deputy Director-General of the European Commission's Directorate-General for Research & Innovation, Ingvil Smines Tybring-Gjedde, State Secretary in the Ministry of Petroleum and Energy were photographed in front of the new energy lab illustration.

AN ENERGETIC 100 YEAR OLD

Literally full of energy! When the Norwegian Institute of Technology, NTH, was created in 1910, one of its primary goals was to educate the nation's future scientists and engineers. NTH addressed the issue of Norway's hydropower development needs with what Norwegian historians and authors Thomas Brandt and Ola Nordal called a three-sided "hydropower triangle". Read much more in Gemini research magazine. The Waterpower laboratory was built in 1917. This photo of the facade towards the north was taken a year later.

Photo: NTNU/unknown

[Read much more in Gemini Research Magazine](#)
[Also available in Norwegian Gemini](#)



ECCSEL ERIC INAUGURATION:
(From the left) Wolfgang Burtscher, Deputy Director-General of the European Commission's Directorate-General for Research & Innovation, Ingvil Smines Tybring-Gjedde, State Secretary in the Ministry of Petroleum and Energy, Sverre Quale, ECCSEL project director.
Photo: Thor Nielsen/NTNU



COORDINATING ENERGY RESEARCH FOR A LOW CARBON EUROPE

ABOUT ECCSEL ERIC:

- The European Carbon Dioxide Capture and Storage Laboratory Infrastructure (ECCSEL) was established in June 2017 as a permanent pan-European distributed research infrastructure, ERIC (European Research Infrastructure Consortium).
- Within the initial 5 European founding Member countries (France, Italy, the Netherlands, UK and Norway (Operations Centre)), 15 service providers offer open access to more than 54 world class research facilities across Europe.
- ECCSEL is expected to grow both in terms of member countries and heavy investments in upgraded and new facilities. The headquarter; the ECCSEL Operations Centre is located at in Trondheim, Norway.

See more about the [foundation of ECCSEL ERIC](#)

WE'RE ALL ABOUT THE LABS...

Our many labs and all the infrastructure are crucial to our education and research. 2017 was a year full of lab events: The 100 year celebration of the Waterpower lab and the opening of the new Thermal Energy lab (Varmeteknisk).



TURBINE COMPETITION: Students were competing with their self-made turbines. This group is testing their turbine inside the big wind tunnel lab. Photo: Thea Karlsen Løken



STARMUS MAGIC: Visitors during the Starmus festival could see - and taste - ice cream made with nitrogen. Reidar Tellebon is making the magic ice cream. Photo: Mathias Backsæther/NTNU



TOWER: On 1 July 2016 a tower was lifted through the roof of the thermal engineering laboratories (Varmeteknisk), which measures from floor to top about 20 meters. It was raised in two parts; first an internal staircase and then an outside tower with stairs. The tower provides an extension of the multi-phase flow laboratory. Photo: Jørgen Hjelmøy, Ufo2 AS



PROUD: Lab Manager Morten Grønli made a speech at the preopening of the Thermal labs in June. Photo: Julie Gløppe Solem/NTNU

OFFICIAL OPENING OF HYDROCEN



HydroCen (Norwegian Research Centre for Hydropower technology) was inaugurated on 30 January 2017 by the Minister of Petroleum and Energy, Terje Søviknes. Over 200 persons attended the opening ceremony which Rector Gunnar Bovim hosted on behalf of NTNU.

In conjunction [HydroCen](#) executed technical seminars with more than 80 experts from industry partners gathered.

HydroCen is a Centre for Environment-friendly Energy Research (FME). The FME scheme is established by the Norwegian Research Council.

The main objective of HydroCen is to enable the Norwegian hydropower sector to meet complex challenges and exploit new opportunities through innovative technological solutions.

Main research partners are NTNU (host), SINTEF Energy and NINA (Norwegian Institute for nature research). HydroCen also has many other partners.

See more: ntnu.edu/hydrocen



RIBBON CUTTING: A proud centre leader Hege Brende with the Minister of Petroleum and Energy, Terje Søviknes and chair Ivar Arne Børset. Photo: Øyvind Buljo/NTNU

THE REAL THING

This massive Pelton water wheel standing outside the Waterpower lab has actually been in use at Aura powerplant near Sunndalsøra.

Photo: Vibeke Ann Pettersen/NTNU



DELIVERED THESES IN 2017

	No. of delivered master's theses 2017
Energy and Environmental Engineering – 5 years	30
Mechanical Engineering – 5 years	23
Exchange students	21
Natural Gas Technology – 2 years	9
Energy Use and Energy Planning – 2 years	7
Industrial Ecology – 2 years	12
Mechanical Engineering – 2 years	8
Engineering and ICT – 5 years	1
Innovative sustainable Energy Engineering – 2 years	3
Master's theses in total in 2017	114
	No. of delivered bachelor's theses 2017
Bachelor in Renewable Energy	31

PHDS COMPLETED IN 2017

Name	Group	Supervisor
Petrova, Inna	IP	Trygve Eikevik
Jin, Zhequan	IP	Trygve Eikevik
Sandberg, Nina H	IndEcol	Helge Bratlebø
Krüger, Jonas	TE	Terese Løvås
Ager Wick Ellingsen, Linda	IndEcol	Ander H Strømman
Tokbolat, Serik	UiT Narvik/EKB	Rejnish K Calay
Gogstad, P Joachim	STR	Ole Gunnar Dahlhaug
Eskerud Smith, Ivar	IP	Ole Jørgen Nydal
Li, Yan	STR	Simen Ellingsen
Ibrahim, Mohamed	TE	Ivar Ståle Ertesvåg
Hertzfelder Hansen, Thomas	STR	Per Åge Krogstad
Park, Keunsoo	STR	Maria Fernandino
Gibon, Tomas	IndEcol	Edgar Hertwich
Prebeg, Marin	STR	Bernhard Müller
Hamilton, Helen Ann	IndEcol	Daniel Beat Mueller
Sveen, Svein-Erik	UiT Narvik	Bjørn Reidar Sørensen