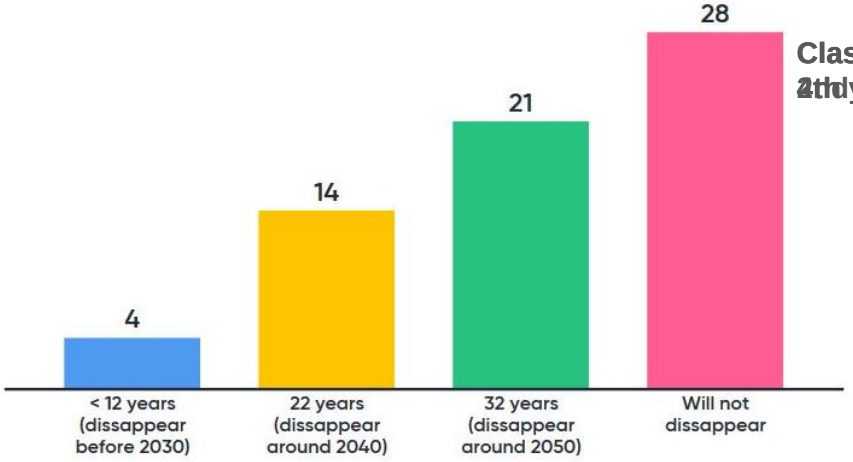
WORK ON SUSTAINABLE ENGINES

LUCIEN KOOPMANS

How many years will the IC Engine survive as part of the powertrain in new vehicles?



Class of 2019
4th year automotive students

Mentimeter

67

BUSINESS NEWS DECEMBER 4, 2018 / 9:56 PM / A YEAR AGO

Volkswagen says last generation of combustion engines to be launched in 2026

2 MIN READ

FILE PHOTO: A car with the Volkswagen VW logo badge is seen on display at the North American International Auto Show in Detroit, Michigan, U.S., January 16, 2018. REUTERS/Jonathan Ernst/File Photo

WOLFSBURG, Germany (Reuters) - Volkswagen's (VOWG_p.DE) strategy chief said on Tuesday the German carmaker's core brand will develop its final generation of vehicles using combustion engine technology in 2026.

Mercedes want to abandon combustion engines by 2039

Date created : 13/05/2019 - 19:04

The end of the Mercedes combustion engine is two decades away dpa/AFP

REGULATIONS

TAILPIPE


PROBLEM SOLVED

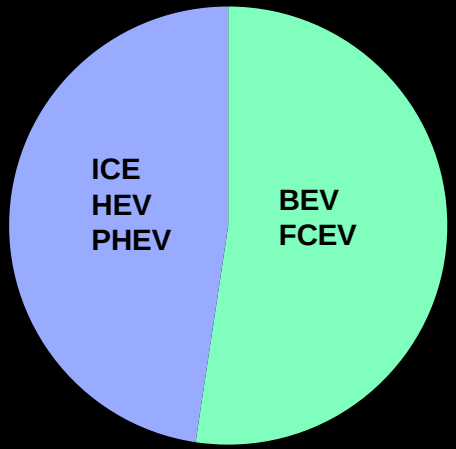
BATTERY ELECTRIC VEHICLES

VW e-Golf

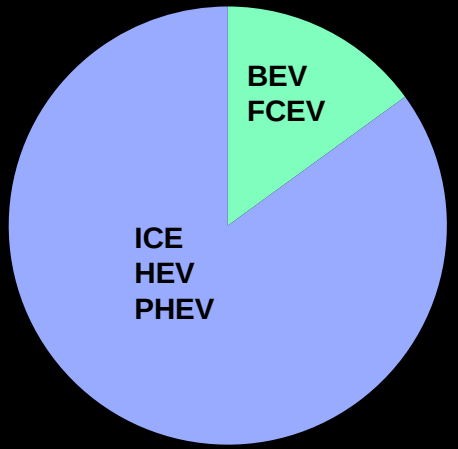
Jaguar I-Pace

FORECAST 2050

LIGHT DUTY



HEAVY DUTY



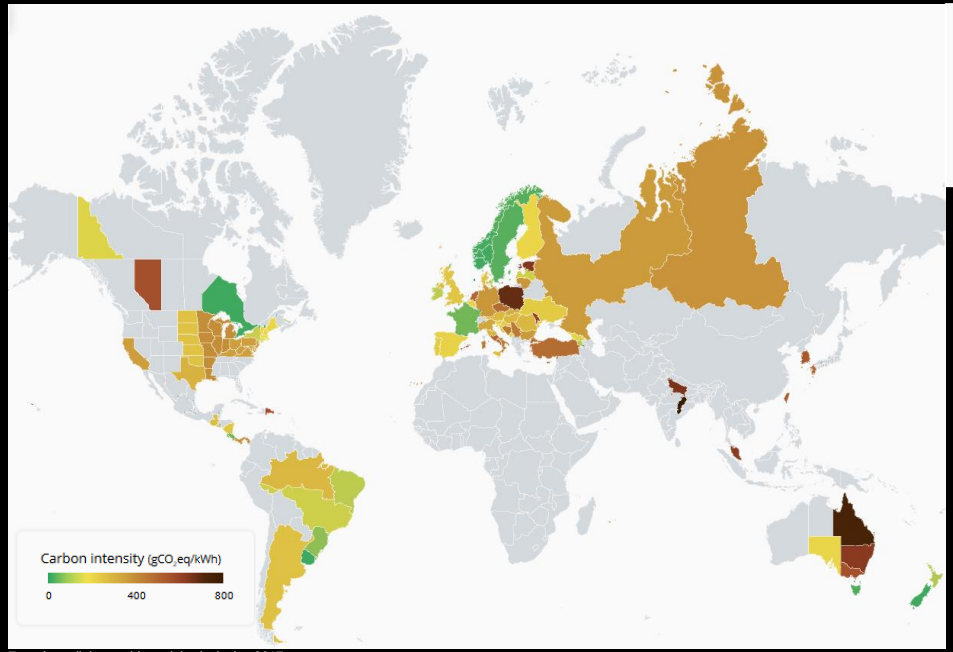
Estimation based on multiple sources

2°C target


Nations Unies
Conférence sur les Changements Climatiques 2015
Paris, France


SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

ENERGY CARRIER



Diesel:	**285 gCO2/kWh**
Gasoline:	**327 gCO2/kWh**
Vehicle gas:	**68 gCO2/kWh**
HVO100:	**11 gCO2/kWh**

Passenger cars:
VW e-Golf: 17,3 kWh/100km
Sweden 10 gCO2/km
Germany 69 gCO2/km
Poland 121 gCO2/km

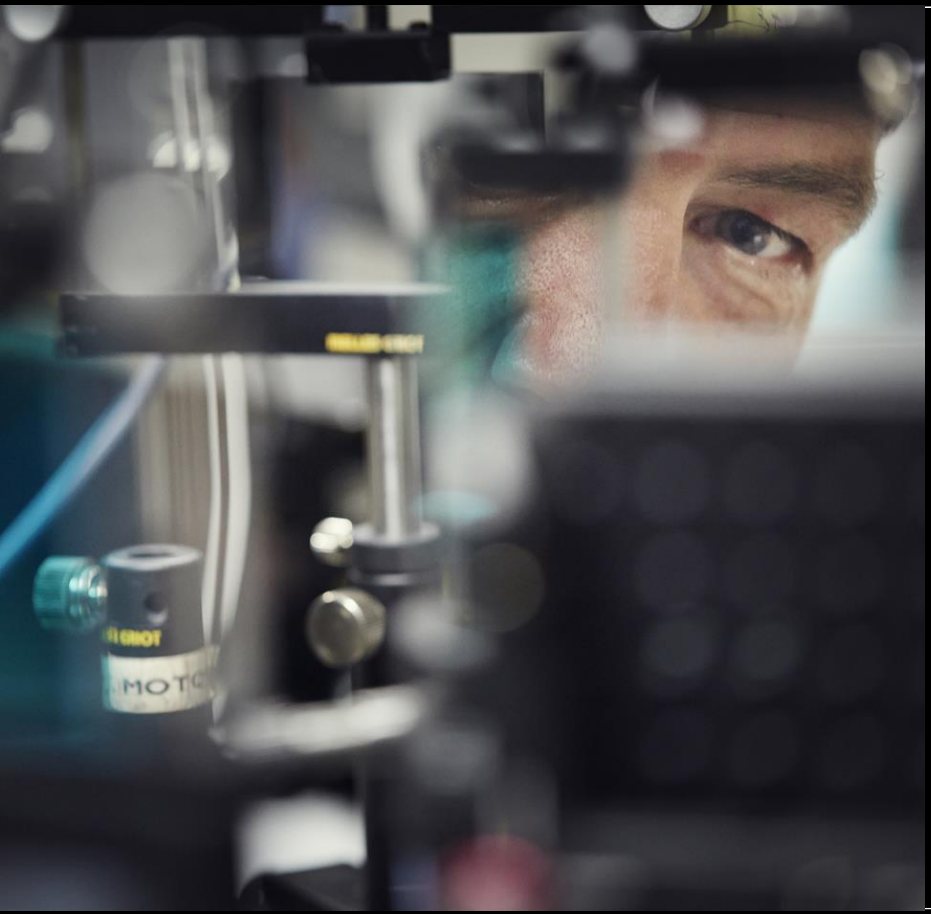
Jaguar I-Pace: 27,6 kWh/100km
Sweden 17 gCO2/km
Germany 110 gCO2/km
Poland 193 gCO2/km

VW Golf 1.6 TDI SCR: 5 l/100km
Diesel 127 gCO2/km
HVO100 15 gCO2/km

Jaguar F-Pace 20d: 6,6 l/100km
Diesel 168 gCO2/km
HVO100 20 gCO2/km

Golf 1.5 TGI Blue Motion: 3,9 kg/100km
CNG 107 gCO2/km
Vehicle gas 35 gCO2/km

Energimyndigheten drivmedelredovisning 2017
https://spbi.se/uppslagsverk/fakta/berakningsfaktorer/energiinnehall-densitet-och-koldioxidemission/
https://www.electricitymap.org/?page=map&solar=false&remote=true&wind=false
https://www.adac.de/rund-ums-fahrzeug/tests/elektromobilitaet/stromverbrauch-elektroautos-adac-test/

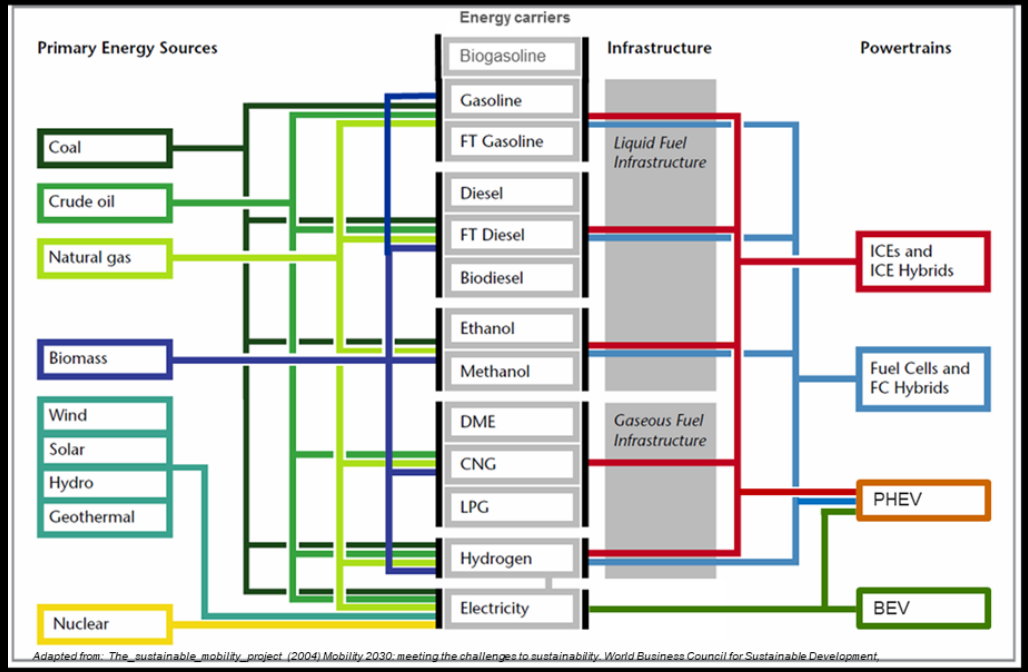


FOCUS AREAS

Engines and propulsion systems
Combustion and sprays

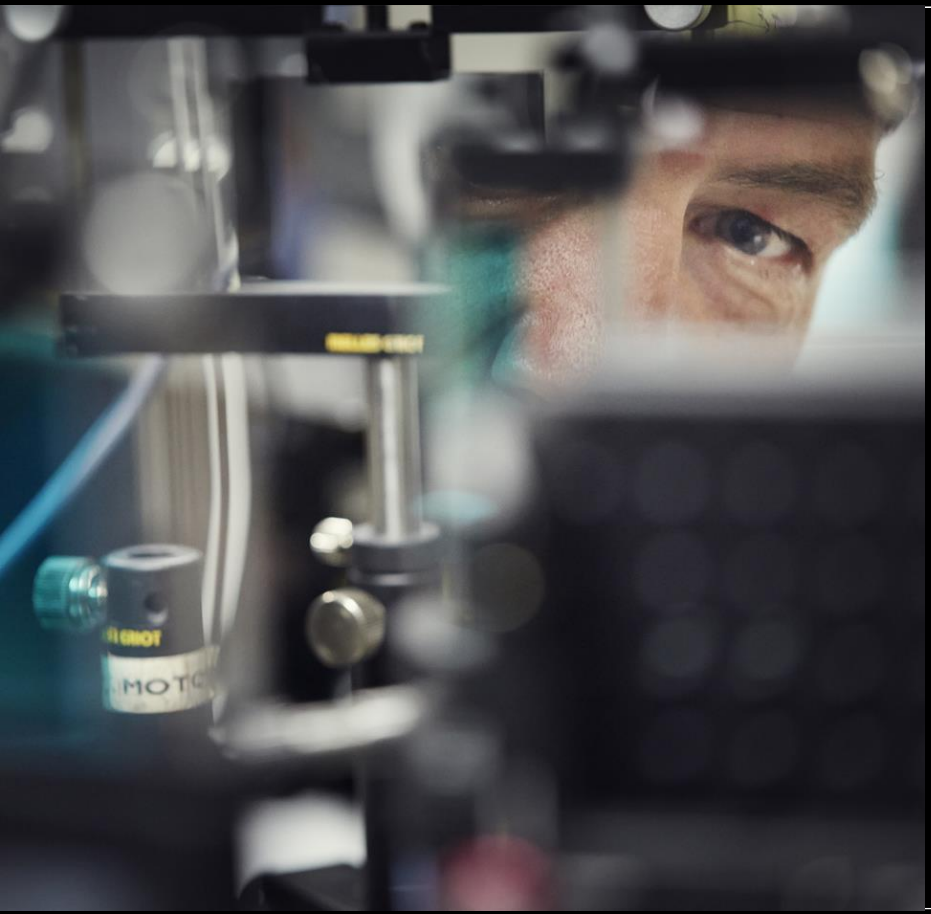
- **Renewable fuels**

RENEWABLE FUELS



Adapted from: The_sustainable_mobility_project (2004) Mobility 2030: meeting the challenges to sustainability. World Business Council for Sustainable Development.

How do renewable fuels impact on emissions and efficiency and what is the best renewable fuel for existing and future engines?

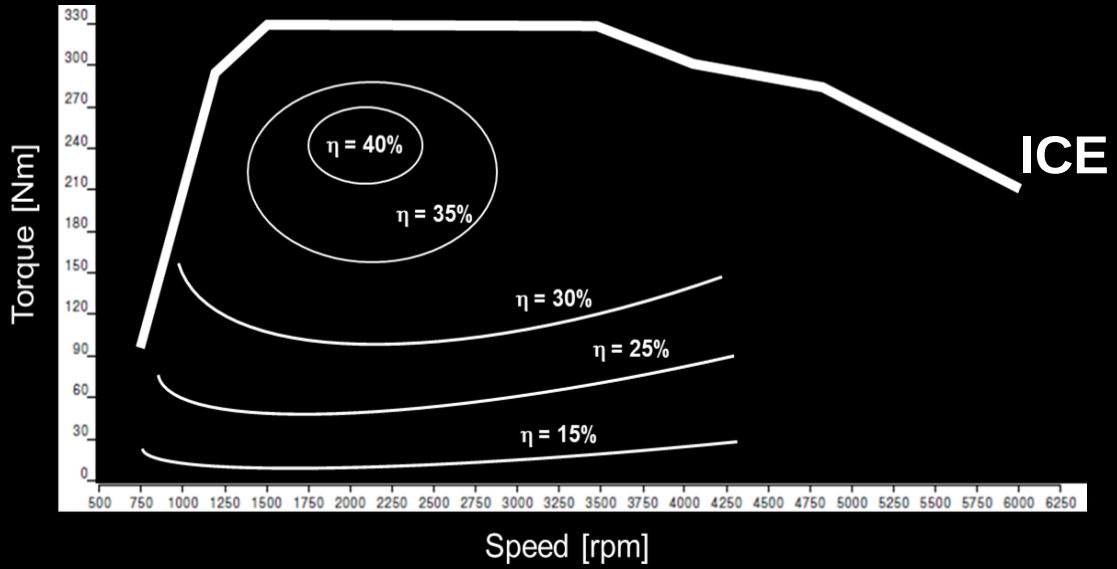


FOCUS AREAS

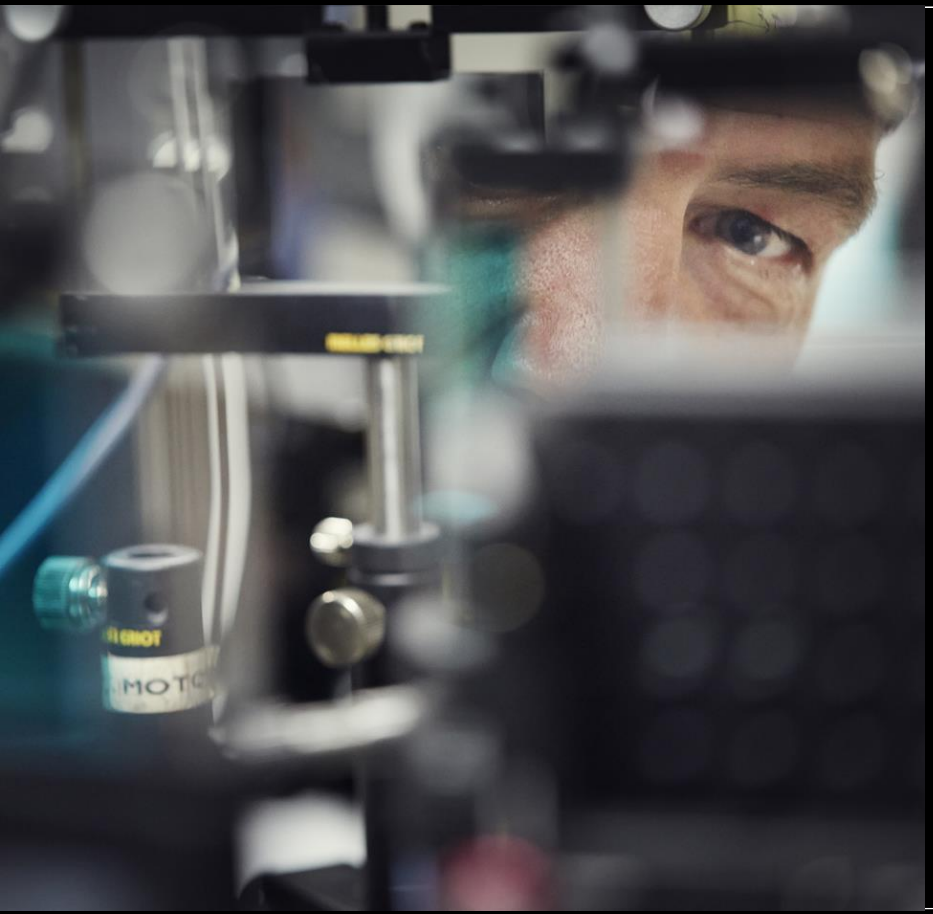
Engines and propulsion systems
Combustion and sprays

- Renewable fuels
- **Energy conversion**

ENERGY CONVERSION



How can we improve the efficiency of the combustion engine in the operating regions?

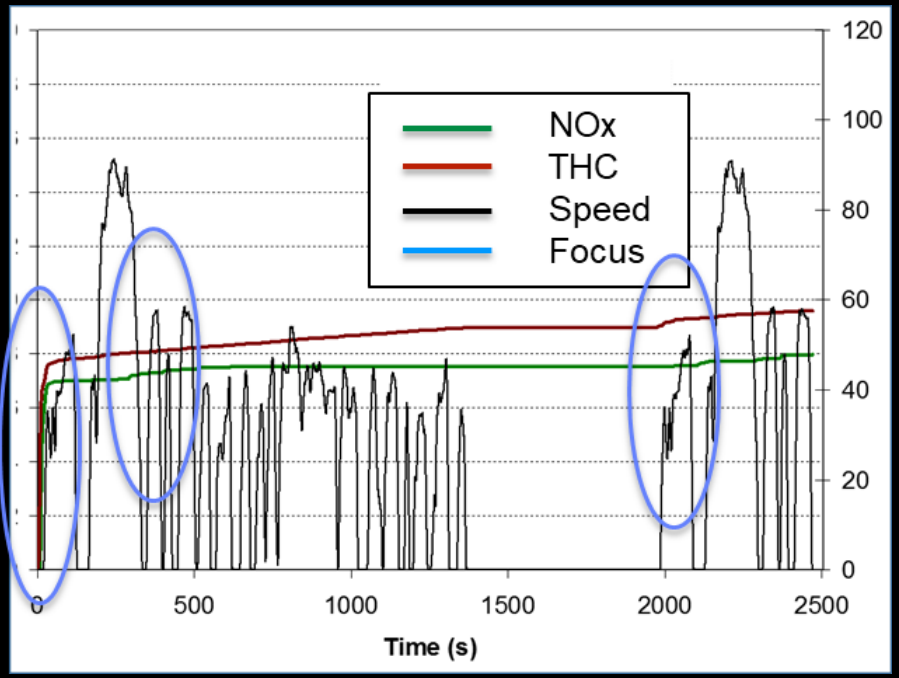


FOCUS AREAS

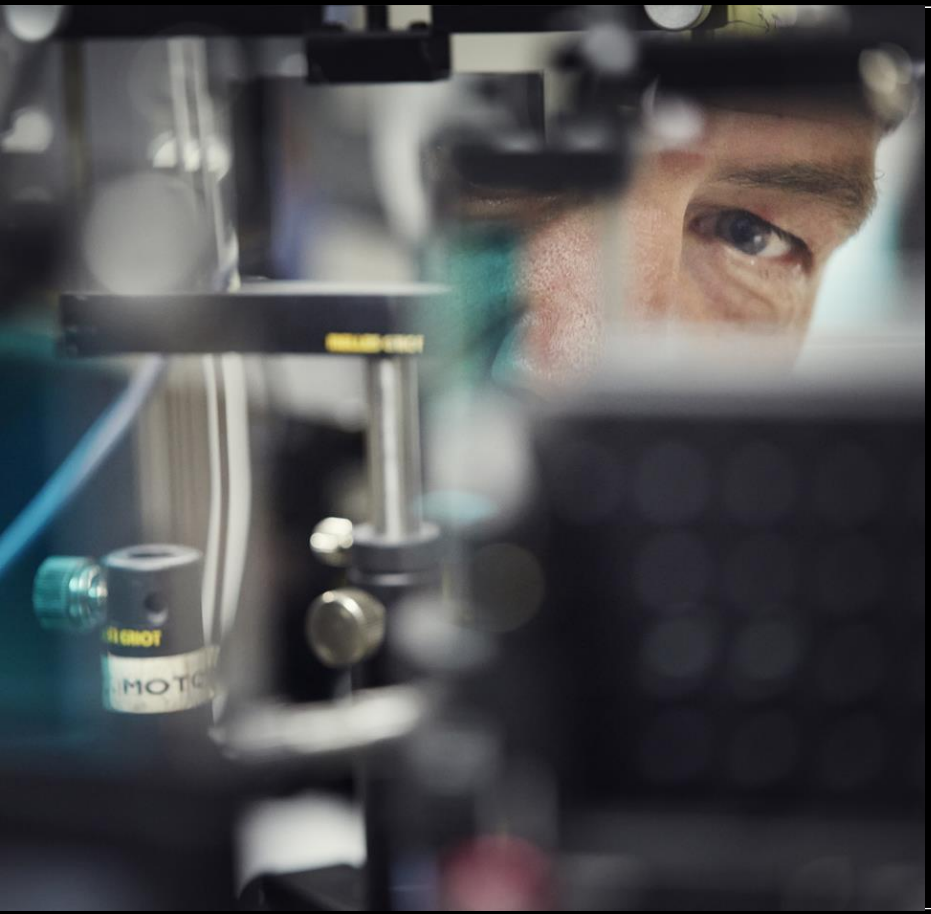
Engines and propulsion systems
Combustion and sprays

- Renewable fuels
- Energy conversion
- **Emissions**

EMISSIONS



How can emissions become zero?



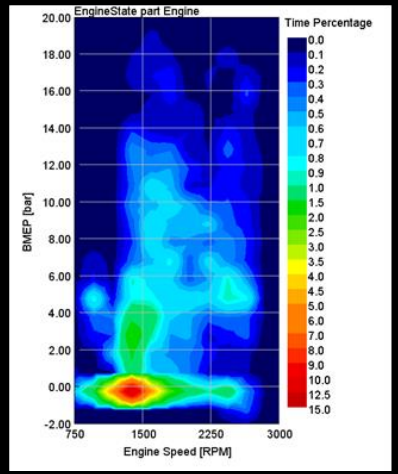
FOCUS AREAS

Engines and propulsion systems
Combustion and sprays

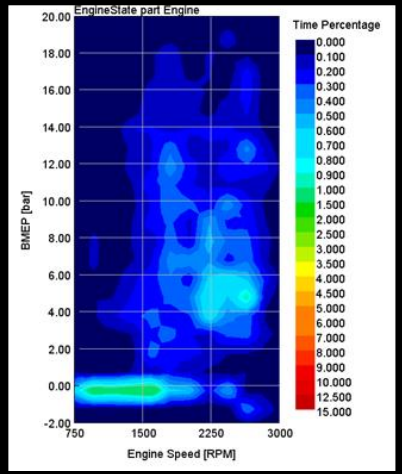
- Renewable fuels
- Energy conversion
- Emissions
- **Electrification**

ELECTRIFICATION

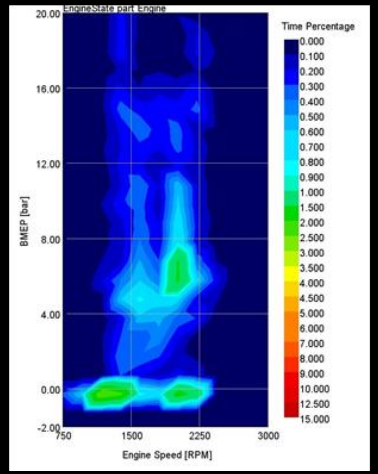
Micro Hybrid



Mild Hybrid

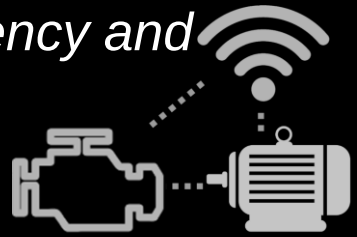


Full Hybrid



How can electrification and combustion benefit from each other in the system?

How can we achieve best efficiency and emissions real-time?



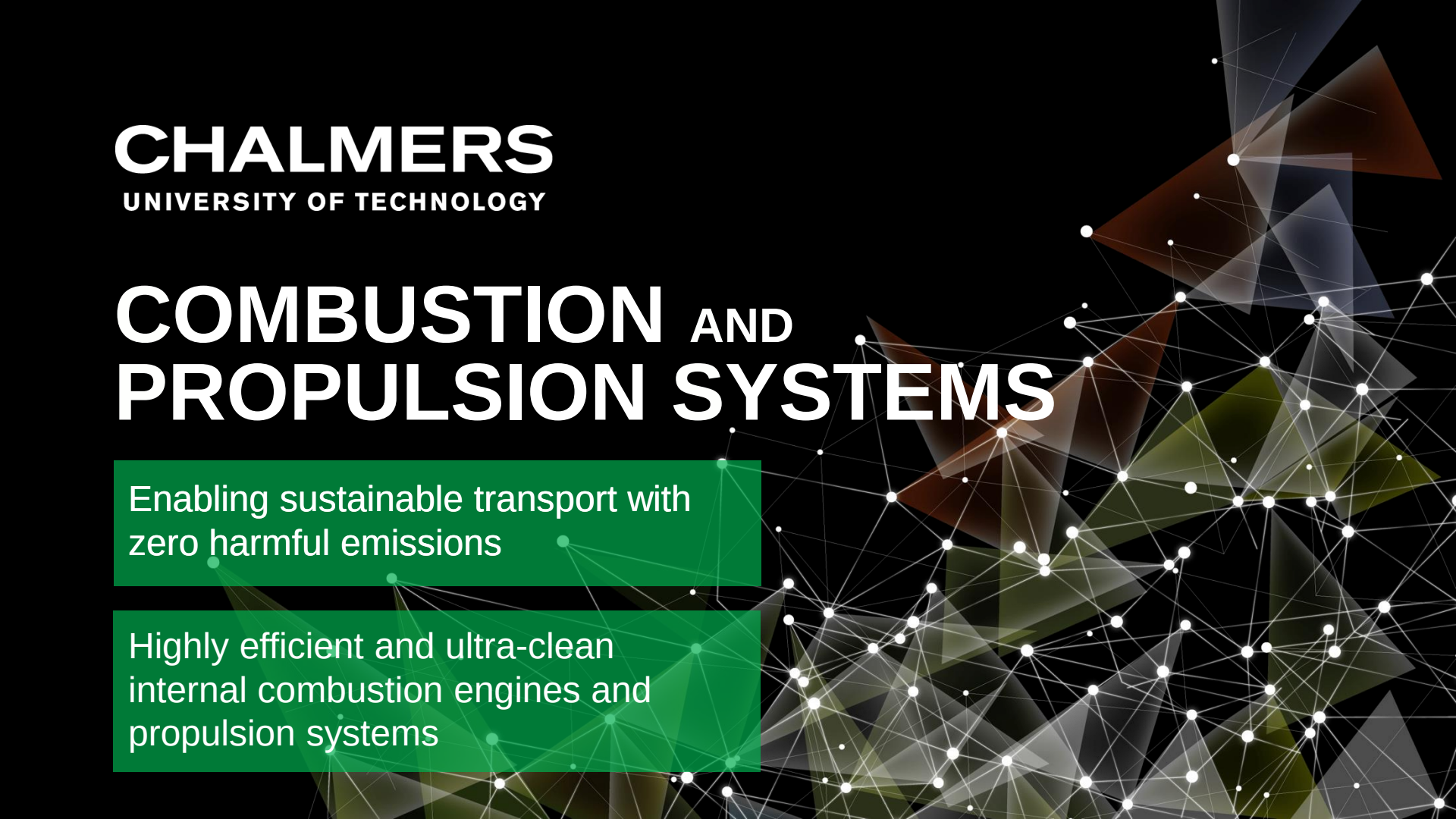
Mindaugas Melaika &
Sarp Mamikoglu

CHALMERS
UNIVERSITY OF TECHNOLOGY

COMBUSTION AND PROPULSION SYSTEMS

Enabling sustainable transport with zero harmful emissions

Highly efficient and ultra-clean internal combustion engines and propulsion systems

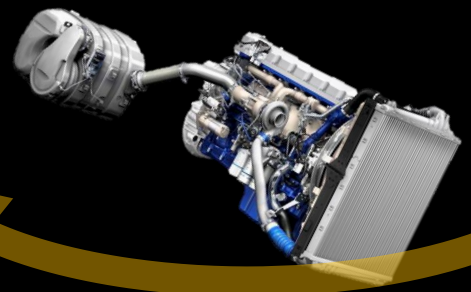


METHODOLOGY

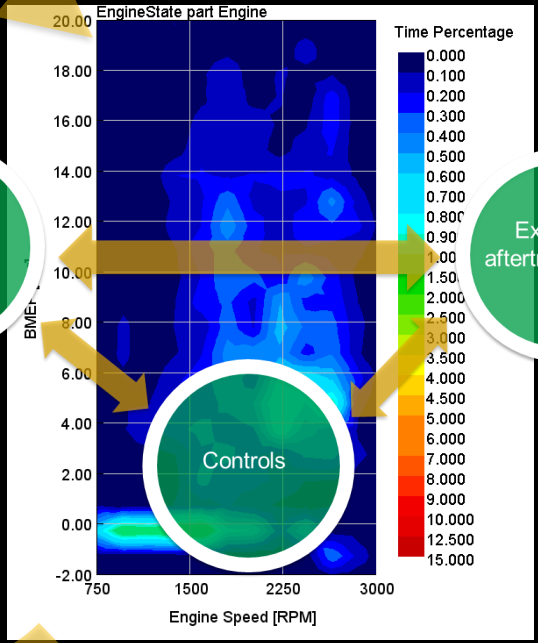
Studies in Spray chamber

Measurements in metal/optical engine

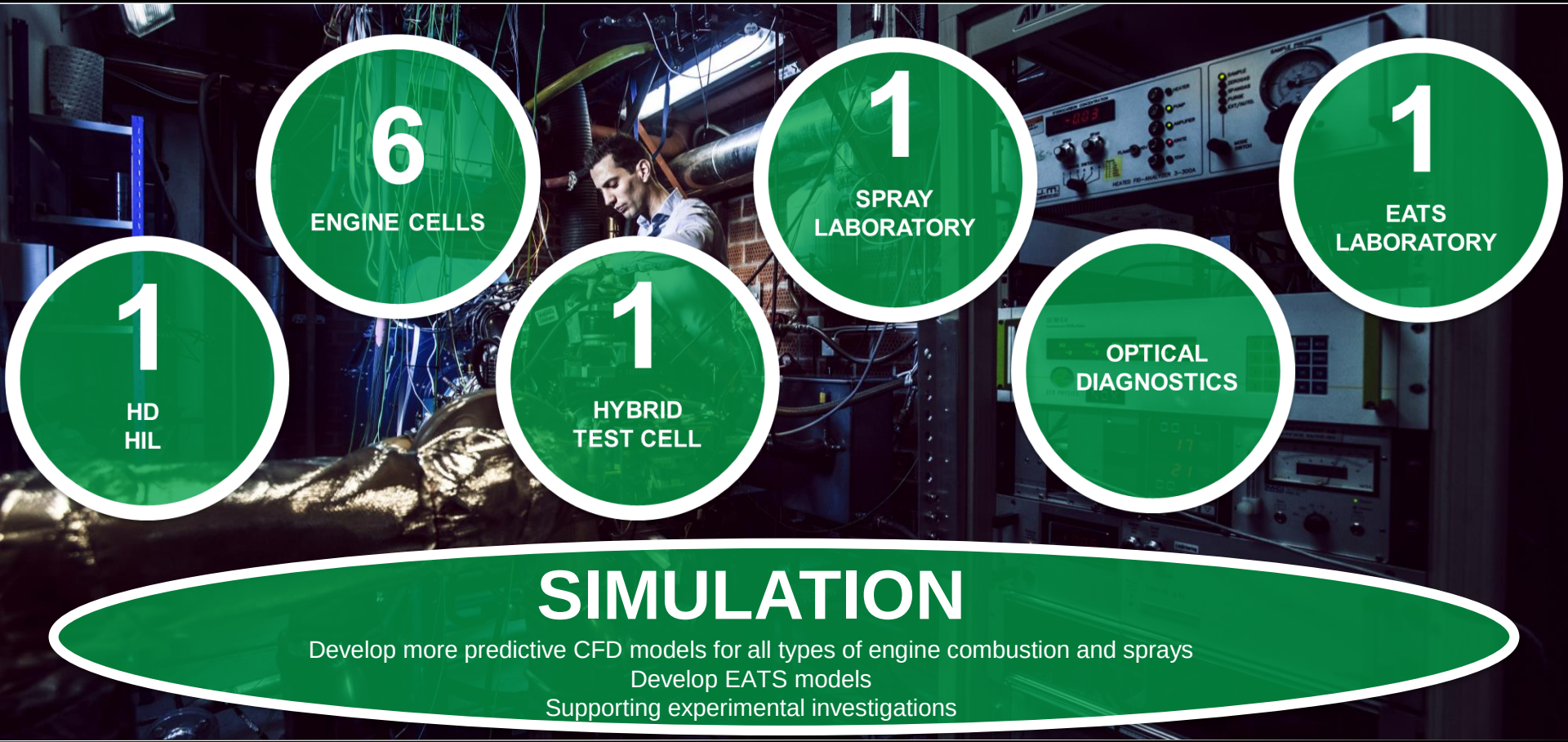
CFD Simulations



Combustion



Exhaust aftertreatment



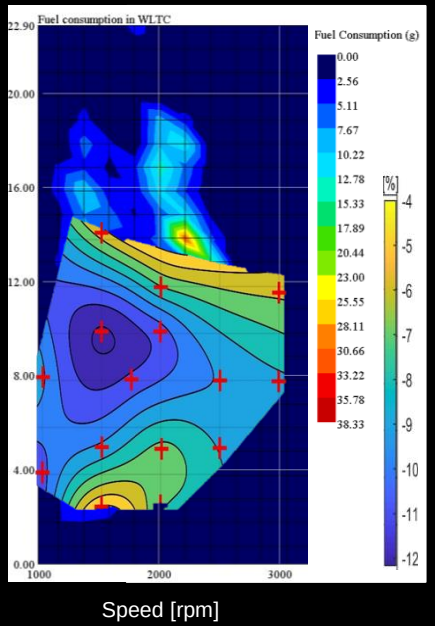
SIMULATION

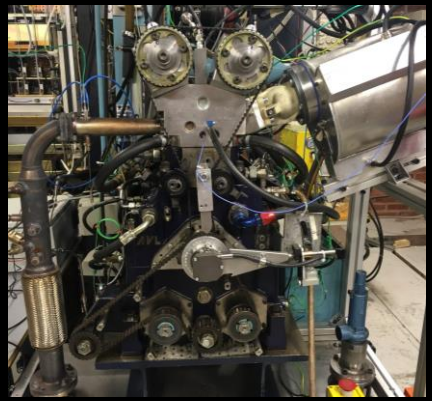
Develop more predictive CFD models for all types of engine combustion and sprays
Develop EATS models
Supporting experimental investigations

SUSTAINABLE ENGINE WORK HIGHLIGHTS

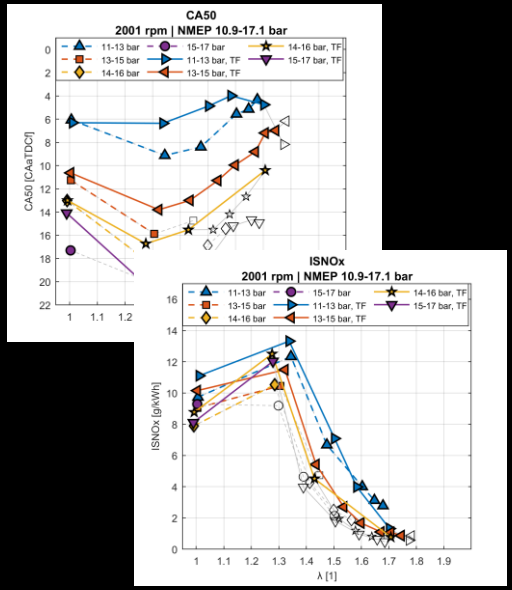
HOMOGEOUS LEAN COMBUSTION

Gasoline





Investigating the operating boundaries using single cylinder testing



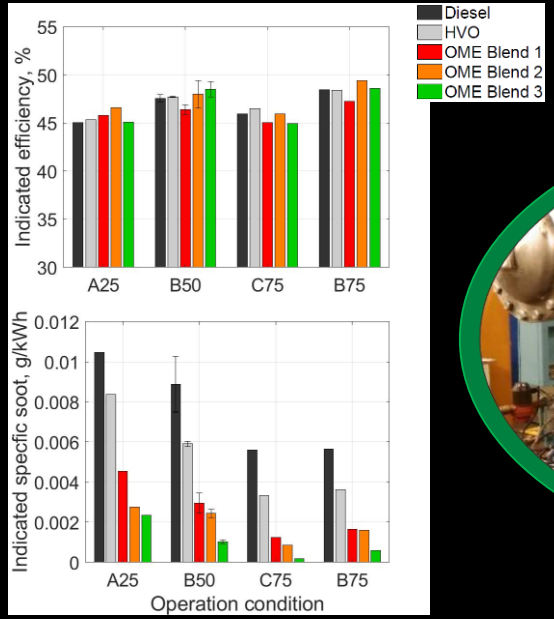
Kristoffer Clasén

RENEWABLE FUEL

Heavy Duty Diesel

		A25	B50	B75	C75
Speed	rpm	1200	1500	1500	1800
Torque	Nm	85	160	239	209
EGR	%	16,5	12,9	12,5	17,5

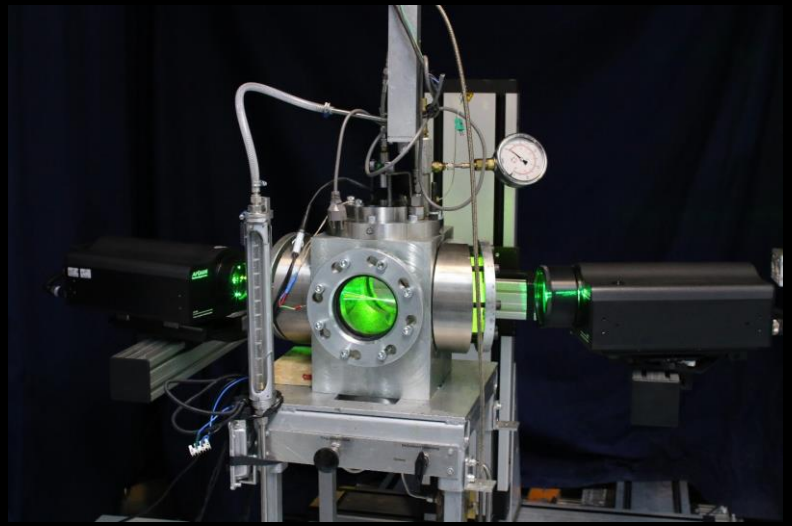
Investigating the effects of different renewable fuel blends

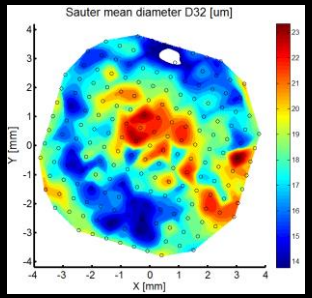


Josefine Preuss

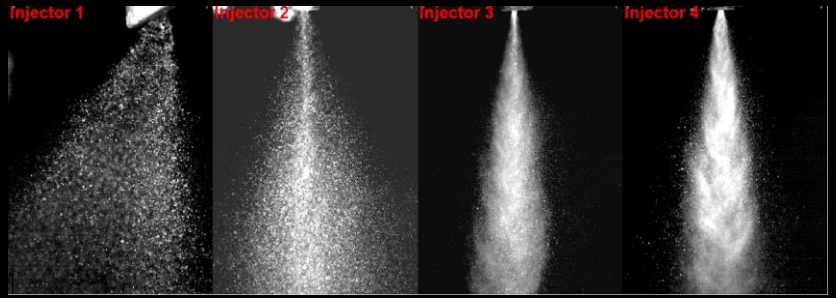
UREA SPRAY SCR

Diesel and lean exhaust gas aftertreatment





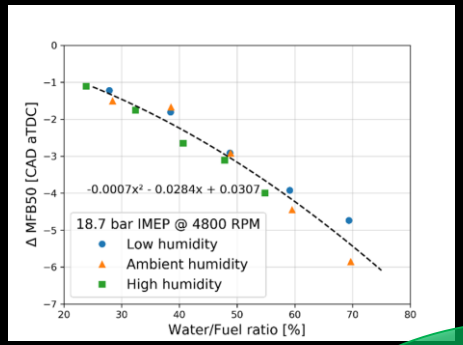
Investigating different UREA spray properties

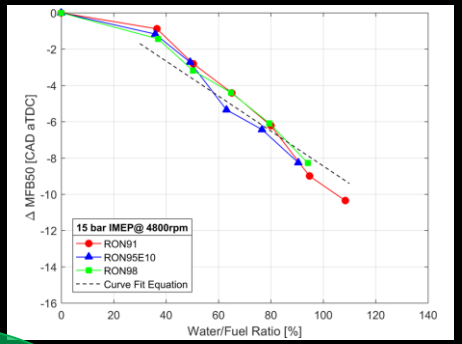


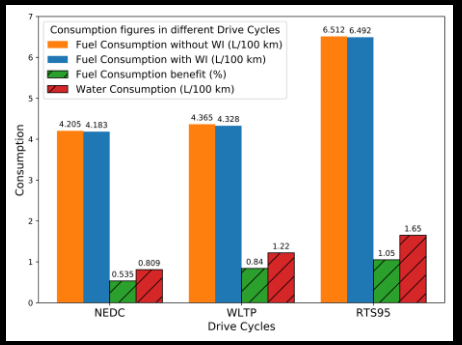
Petter Dahlander

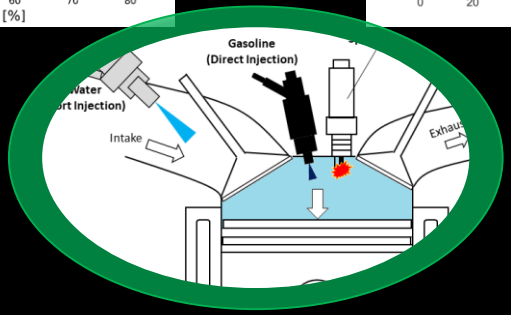
WATER INJECTION

Spark ignited engines





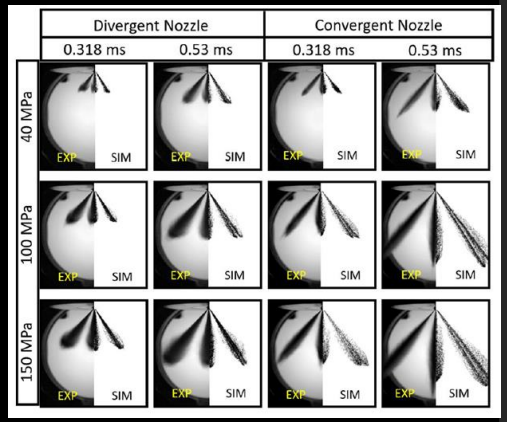


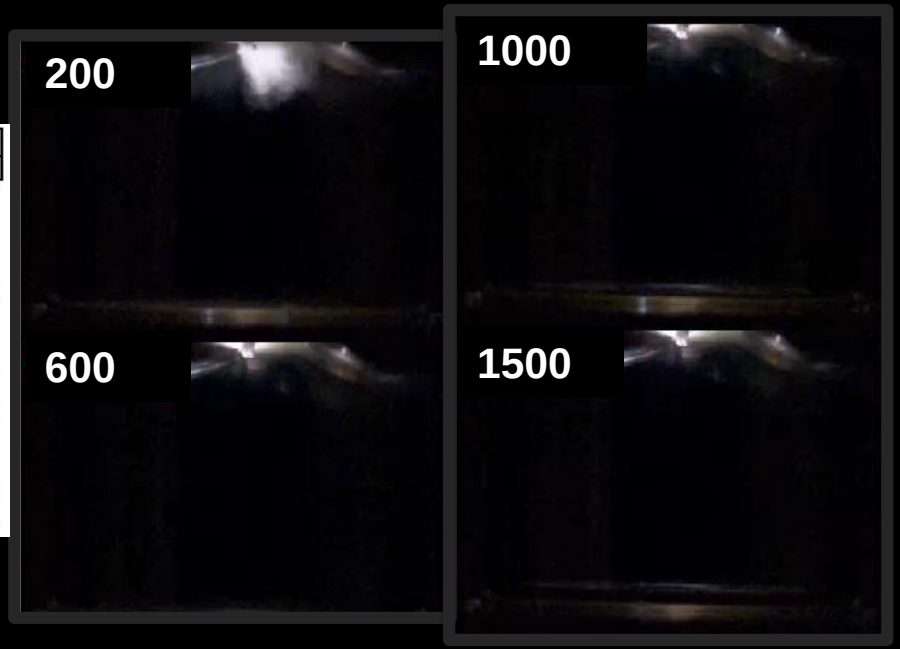


Investigating mechanisms behind benefits of water injection

Jayesh Khatri

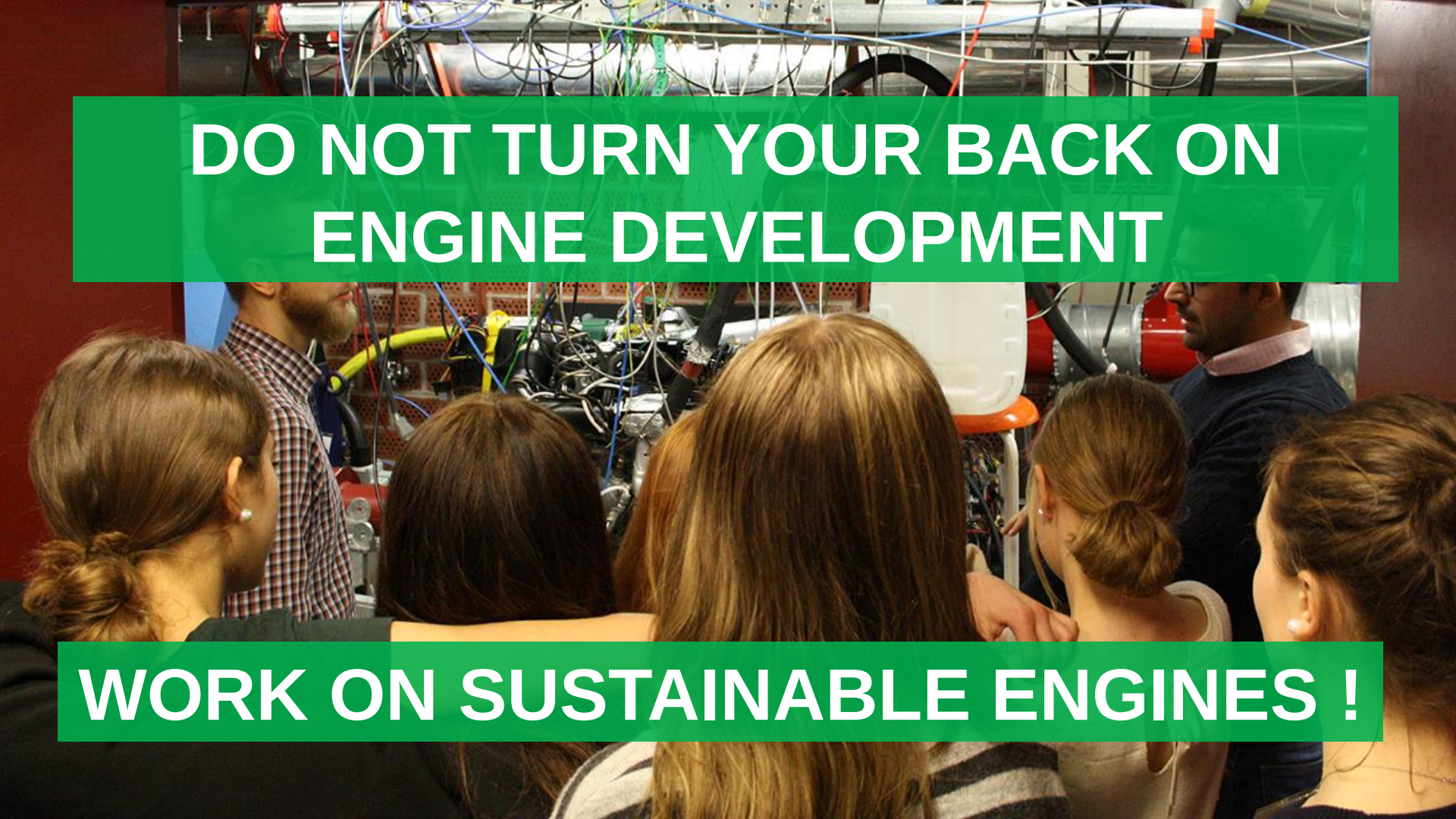
ULTRA HIGH FUEL PRESSURE gasoline





Investigating mechanisms behind benefits of ultra high fuel injection pressures

Akichika Yamaguchi & Sandip Wadekar


DO NOT TURN YOUR BACK ON ENGINE DEVELOPMENT
WORK ON SUSTAINABLE ENGINES !

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