




**Water Mist and NECs -
SUVEREN Research Project**


ASKING - ANALYSING - ANSWERING




Content of presentation

- Water mist & NEC keywords
- SUVEREN research project
 - Numbers
 - Motivation
 - Water mist
- Conclusions

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DRAFT



**Water Mist and NECs -
Keywords**

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History of water mist

- Water mist got the boost in early 1990's, but why?
 - Some **new fire risks** noticed
 - e.g. Cruiseliners
 - **Environmental** aspects
 - HALON
 - Water mist with pure water / no additives

The history of modern water mist fire protection

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History of new energy carriers

- Environmental aspects
- New fire risks are noticed



POSSIBILITY FOR WATER MIST!

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SUVEREN Research Project



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SUVEREN:

„Safety of New Energy Carrier Vehicles
in Urban Underground Transportation
Infrastructure“


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- Budget
– 2 M€
- Timeframe
– 2018-2020
- Innovative research problem focusing on fire safety of NECs.
- Will develop very unique and innovative knowledge that can be used for building/operating infrastructure with NECs.
- Creating knowledge that can be used in other applications and industries dealing with NECs



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SUVEREN Contributors

- Partners:




- Associated Partners:





- Advisory board:

International specialists, facility operators, universities, research institutes etc.

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European Union

“Transport needs to develop along a more sustainable path. With the COP21 Paris Climate agreement, efforts to reduce greenhouse gas emissions are becoming even more urgent. An energy-efficient, de-carbonised transport sector is needed.”

“The European Commission is pushing the electrification of all modes of transport, including road, rail, air and sea.”

“Recent events regarding diesel technology clearly show the limits of current technologies to achieve our goals and show the need for a clear technological shift.”



Foreword to ZEEUS report 2017
Claire Depré
 Head of Unit, "Sustainable and Intelligent Transport"
 Directorate-General for Mobility and Transport
 European Commission

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NEC categories (most common)

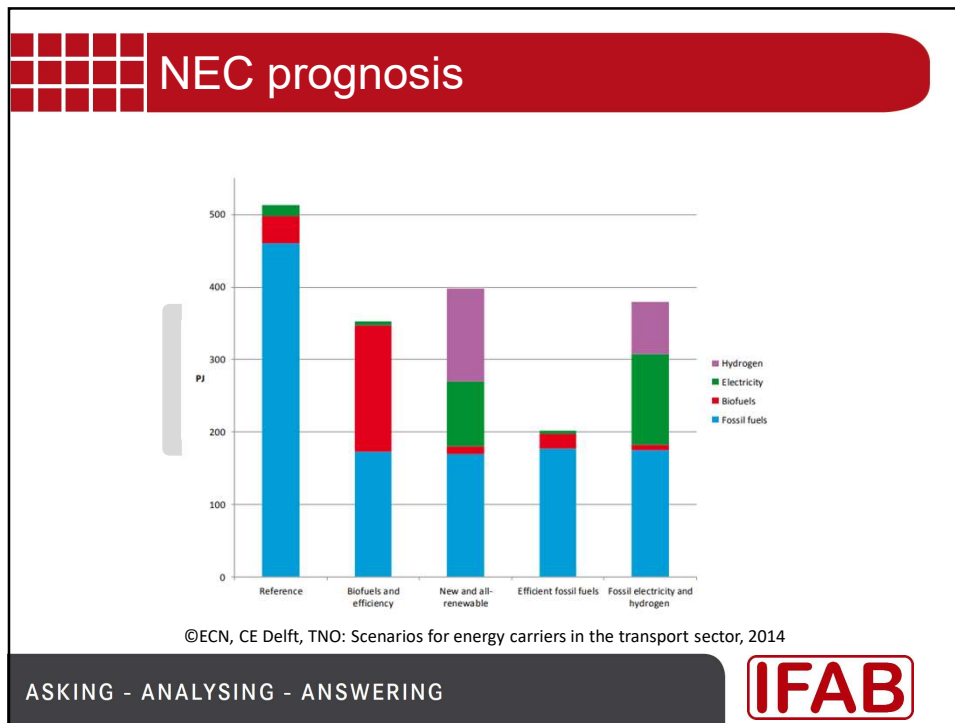
Acronym	Type of NEC Vehicle
BEV	Battery Electric Vehicles
CNG	Compressed Natural Gas Vehicles
FCEV	Hydrogen Fuel Cell (Electric) Vehicles
LPG	Liquified Petroleum Gas Vehicles
PHEV	Plug in Hybrid Electric Vehicles
ICE	<i>Internal Combustion Engine (conventional gasoline or diesel engines)</i>

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NEC prognosis

©ERTRAC Working Group: Energy and Environment: Energy Carriers for Powertrains <for a clean and efficient mobility>, 2014

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Major difference between countries




- Norway
 - 2018: More electric and hybrid vehicles sold than conventional gasoline and diesel vehicles
- Germany
 - Major focus to NECs, especially to electric
- Finland
 - Both gas vehicles (CNG) and electric
- Difficult to predict trends and future


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Passenger cars or other vehicles

- Passenger cars
 - Many different technologies (emerging or stable)
 - Many fires that have reached media attraction
- Busses
 - Already utilise new energies to large extent
 - Electric, gasous, LPG, hydrogen, etc., all technologies are developing.
- Trucks
 - Still developing, first prototypes of electric vehicles shown.
 - LPG, CNG etc. related to combustion engines is already been in use.

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NEC and fires – Media attraction



| Regio15.nl |

WELCOME TO THE FUTURE Terrifying Tesla video shows electric car inferno that took 35 firefighters to extinguish

A Tesla Model S caught fire after a car crash in Austria and teams of firefighters battled the blaze. But the lithium ion batteries meant the inferno raged until crews beat the flames and could cut power to the hi-tech motor prompting electric car safety fears

By Joe Foweraker, Digital Motors Editor
19th October 2017, 1:54 pm | Updated: 23rd October 2017, 8:32 am



Why the Fire that Incinerated a Tesla Was Such a Nightmare to Put Out

By Aylin Woodward, Live Science Contributor | March 30, 2018 01:27pm ET

On March 23, a 38-year-old man driving a Tesla Model S headfirst into an unshielded highway median while traveling on U.S. Highway 101 near Mountain View, California. The vehicles subsequently rear-ended the SUV, which caught the driver, who later died from his injuries, was pulled from wreckage.




Paris Autolib' electric cars go up in smoke

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NEC and fires ?

- Not really known in detail or is it true?
- What is known:
 - New risks?
 - More difficult to extinguish?
 - Toxic gases?
 - Different energy releases?



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SUVEREN – „Underground“

- Fires in a closed compartment will emphasize the importance of fire safety
- All special risks of NEC will be emphasised in underground
- Many famous fires, e.g. Liverpool 2018 with 1400 cars

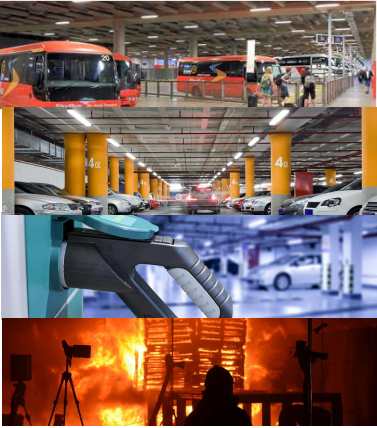



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- Main application areas:
 - Car parks (closed/underground)
 - Bus terminals
 - Road tunnel
 - Underground loading zones
- Further knowledge for other applications



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SUVEREN – „Underground“

- How to save infrastructure?
- How to save people?
- How to secure safety of fire services?
- Solution is holistic
 - Fire risks: reignition of batteries, vapour clouds etc.
 - Design: fire compartments, ventilation
 - Technology: FFFS (**water mist**), detection etc.
 - Implementing

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SUVEREN Tools

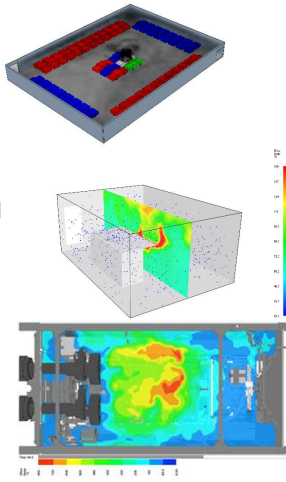
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- Working tools:
 - Analyses, prior data, car industry
 - CFD and development of new design tools
 - Fire testing
 - Reporting and guidance
 - Networking for distributing developed guidance



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Further knowledge

- Knowledge with battery fires
 - Fire tests with real car batteries
 - Data can be used for other important applications and whole life cycle
 - Production / storage
 - Development areas
 - Transportation
 - Disposal
- Hydrogen fires
 - Co-operation with other research projects



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Water mist

- Water mist selected as tested extinguishing / controlling technology
 - Electric vehicles & battery packs
- Things to be considered
 - Electricity in combination with water
 - Especially with battery fires, large amounts of water seem to be needed
 - Fires also last long and batteries may reignite
 - Water will increase of vaporisation rate in case of liquefied gas
 - Is cooling & penetration capacity enough
 - Reduction of fire risks of gaseous energy sources (explosion)


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Water mist

- Testing:
 - Fire tests with
 - Batteries
 - Mock-up with reference fire load
 - Gas flames
 - With and without water mist
 - May emerge to new reference
 - Good opportunity for water mist industry to show with new risks
 - Will also be tested in CFD


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Conclusions

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Conclusions

- There is very high interest towards NECs due to environmental and related political interest
- The fire risks are relatively little studied with NECs
- NECs are developing quickly and they will impact to many facilities such as underground infrastructure
- SUVEREN research project is for studying the fire safety of NECs


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Conclusions

- Water mist is part of SUVEREN research project.
 - Tested against battery fires
 - Tested against design fire load of representative new energy passenger vehicle
 - Water mist has potentially some benefits against NEC fires
- The keyword are same promoted by water mist and NEC industry – „Environmental friendliness“

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