



Empa

Materials Science and Technology



Empa

Materials Science and Technology

Empa. Materials Science and Technology.

Applied research in materials science and technology

Empa, since 1880

www.empa.ch



Empa investigated the Münchenstein case

The bridge was constructed in 1875 and designed by Gustave Eiffel

Collapse of the Münchenstein railway bridge in 1891



Empa

Materials Science and Technology



Empa also investigated the Genova case

The bridge was constructed in 1963-1967 and designed by Riccardo Morandi

Collapse of the Genova motorway bridge in 2018



Empa

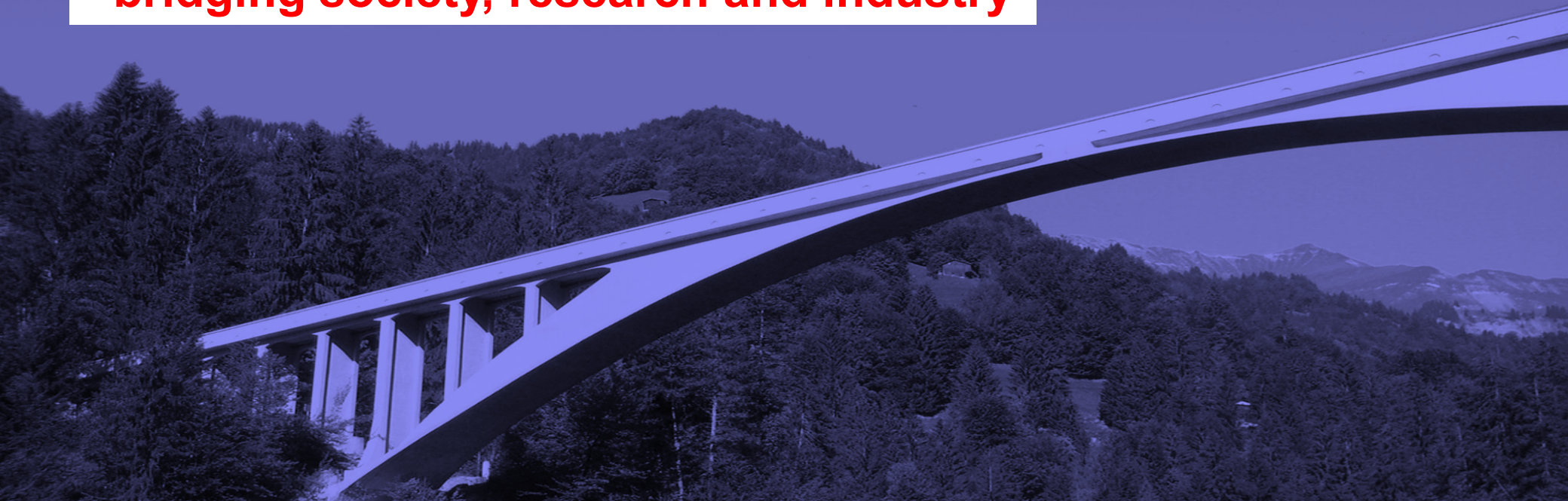
Materials Science and Technology

Empa's mission:

- build better bridges

- bridging research and applications

- bridging society, research and industry





Empa

Materials Science and Technology

Empa's mission:

- build better bridges

- bridging research and applications

- bridging society, research and industry

Online
Conference

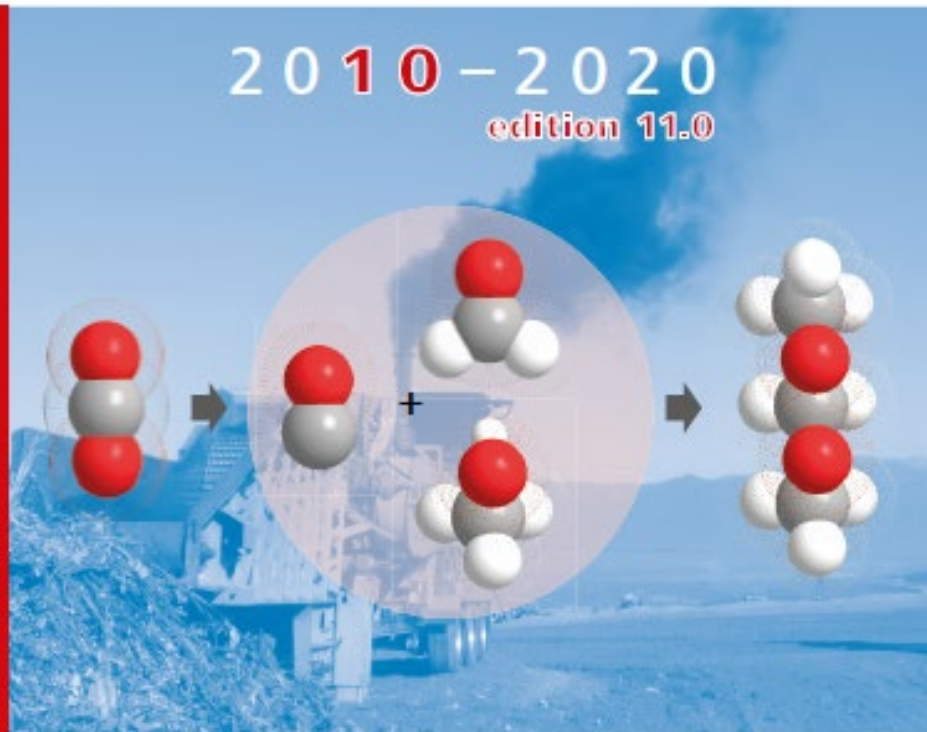
Welcome to edition 11.2 of the VERT Forum

Technologies and policies towards zero impact combustion engines

E-fuels and syn-fuels to lower CO₂ emissions

You might remember:

- flyers were printed,
- menus were ordered,
- the stage was ready!



Empa, Überlandstrasse 129, Dübendorf
Wednesday, March 18, 2020, from 9:00 to 17:00

**SARS Corona viruses:
Acute toxic bio-nanoparticles**



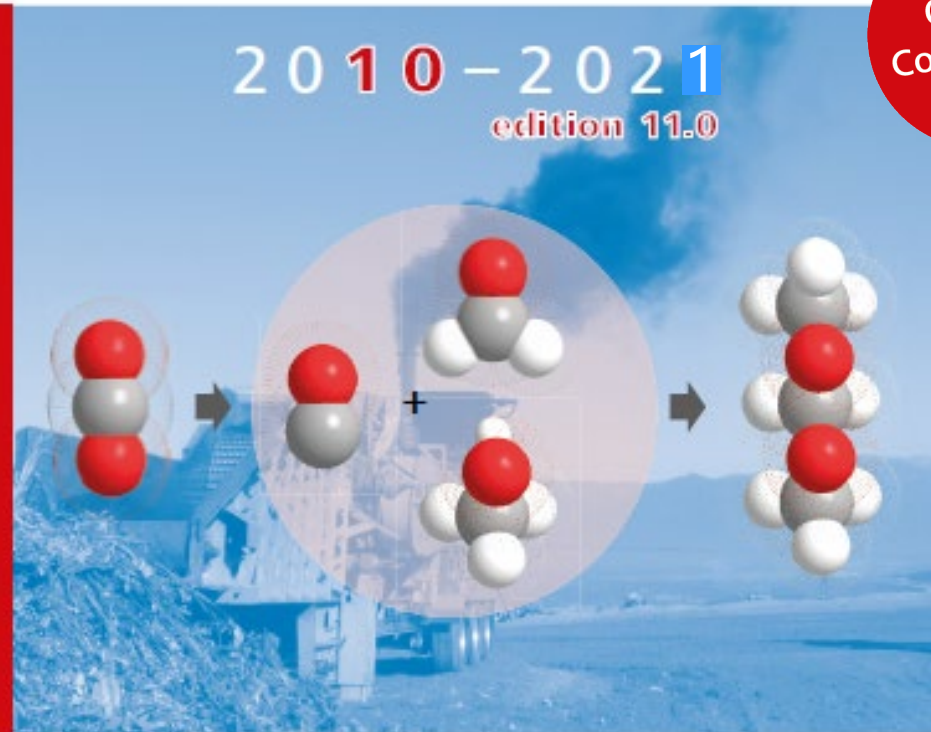
Do not inhale it!

Technologies and policies towards zero impact combustion engines

E-fuels and syn-fuels to lower CO₂ emissions

Online
Conference

1 year later, we still can't meet at Empa due to hazardous bio-nanoparticles!



Thursday, March 25, 2021 from 09:00 to 18:00



**As an introduction:
A look back to
previous editions
of the VERT Forum
and milestone achieved**

**Do particle filter
retrofits work?
What was BAT
those days?**

2010

1. VERT Forum

**Challenges and
Opportunities of BAT
Retrofit Particle Filters**



Empa, Dübendorf
Überlandstrasse 129

Friday, March 19, 2010
09.00–16.30

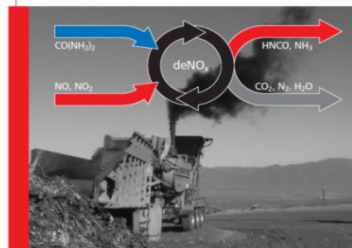
Can deNO_x system and filters work together?

2012

3. VERT FORUM

Diesel Particle Filters meet deNO_x Technologies

Opportunities and Challenges

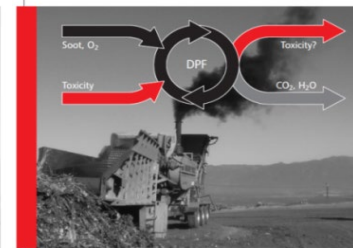


Empa, Dübendorf, Überlandstrasse 129
Thursday, March 22, 2012, 09.00–16.30

2. VERT FORUM

Diesel Particle Filter Technologies

Opportunities and Future Challenges



Empa, Dübendorf, Überlandstrasse 129
Friday, March 25, 2011, 09.00–16.30

2010

1. VERT Forum

Challenges and Opportunities of BAT Retrofit Particle Filters



Empa, Dübendorf
Überlandstrasse 129
Friday, March 19, 2010
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How about biofuels? (new fuels, new risks, e.g. PCDD/F formation in iron-catalyzed DPFs!)

2013

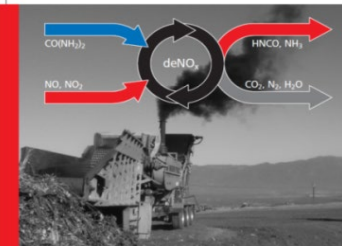
4. VERT FORUM
Advanced Diesel
Particle Filter- and
deNO_x-Technologies
Impact of Biofuels



Empa, Dübendorf, Überlandstrasse 129
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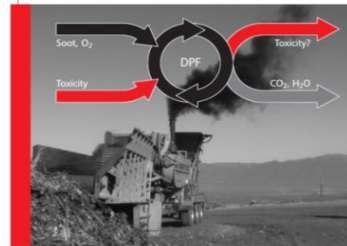
2012

3. VERT FORUM
Diesel Particle Filters
meet deNO_x Technologies
Opportunities and Challenges



Empa, Dübendorf, Überlandstrasse 129
Thursday, March 22, 2012, 09.00–16.30

2. VERT FORUM
Diesel Particle Filter
Technologies
Opportunities and Future Challenges



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2010

1. VERT Forum
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Friday, March 19, 2010
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The fate of genotoxic compounds in DPFs?

2015

6th VERT FORUM

Particle Filter Technologies both for diesel vehicles and gasoline direct injection (GDI) vehicles

genotoxic?



Empa, Dübendorf, Überlandstrasse 129
Friday, March 20, 2015, 8.30am-4.30pm

2010

1. VERT Forum

Challenges and Opportunities of BAT Retrofit Particle Filters



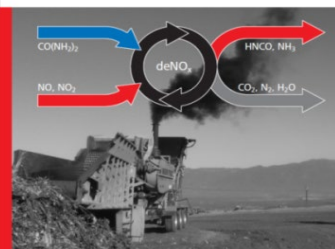
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2012

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2013

4. VERT FORUM

Advanced Diesel Particle Filter- and deNO_x-Technologies

Impact of Biofuels

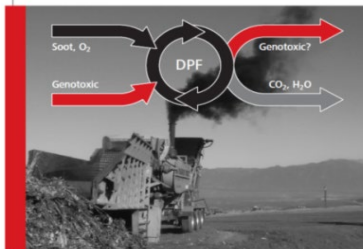


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Friday, March 22, 2013, 09.00-16.30

5th VERT FORUM

Evolution of Diesel Particle Filter and deNO_x Technologies

Catalysts at Work



Empa, Dübendorf, Überlandstrasse 129
Friday, March 21, 2014, 09.00-17.00

**Start of the blue period:
blue technology,
not green enough!**

2016

7th VERT FORUM
Filter and deNO_x-technologies:
Efficient for both, diesel and gasoline direct injection vehicles

diesel gate

Empa, Dübendorf, Überlandstrasse 129
Friday, March 18, 2016, from 9:00 to 17:00

2015

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Particle Filter Technologies
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2010

2. VERT FORUM
Diesel Particle Filter Technologies
Opportunities and Future Challenges

Empa, Dübendorf, Überlandstrasse 129
Friday, March 25, 2011, 09.00-16.30

1. VERT Forum
Challenges and Opportunities of BAT
Retrofit Particle Filters

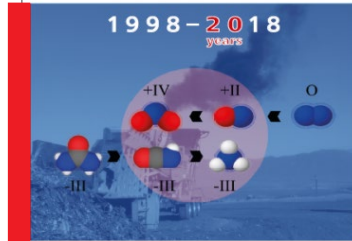
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20 years VERT certification to celebrate!



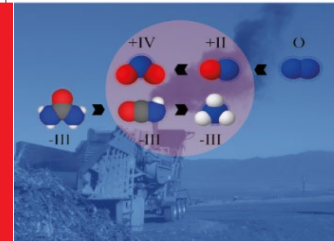
2018

9th VERT FORUM
20 years of VERT emission control certification
 Lifelong BAT for emission control of in-use and OE-vehicles and PTI



Empa, Dübendorf, Überlandstrasse 129
 Thursday, March 15, 2018, from 9:00 to 17:15

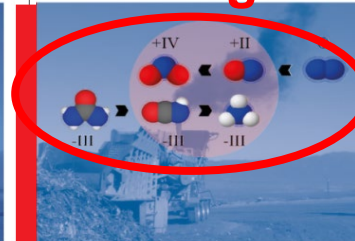
8th VERT FORUM
Combined particle filter and deNO_x-technologies
 Will blue technology be green enough in the future?



Empa, Dübendorf, Überlandstrasse 129
 Friday, March 17, 2017, from 9:00 to 17:00

2016

7th VERT FORUM
Filter and deNO_x-technologies:
 Efficient for both, diesel and gasoline direct injection (GDI) vehicles
diesel gate



Empa, Dübendorf, Überlandstrasse 129
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2015

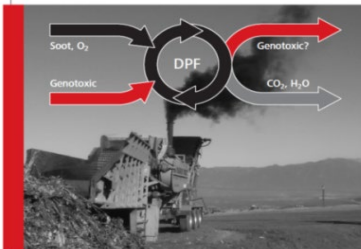
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Empa, Dübendorf, Überlandstrasse 129
 Friday, March 20, 2015, 8.30am-4.30pm

2013

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 Catalysts at Work



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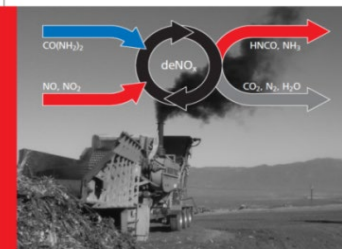
4. VERT FORUM
Advanced Diesel Particle Filter- and deNO_x-Technologies
 Impact of Biofuels



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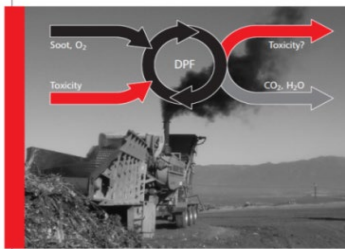
2012

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Diesel Particle Filters meet deNO_x Technologies
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Diesel Particle Filter Technologies
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2010

1. VERT Forum
Challenges and Opportunities of BAT Retrofit Particle Filters



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2010-2019
edition 10.0



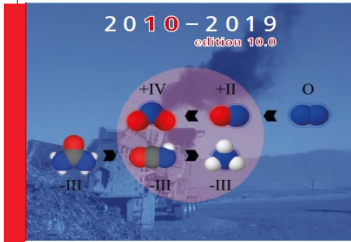
2018

2016

2015

10th VERT FORUM

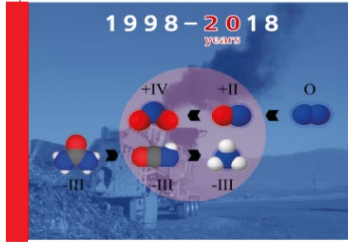
Best available emission control technology for in-use and OE-engines
 10 years VERT Forum – A moment to celebrate



Empa, Überlandstrasse 129, Dübendorf
 Thursday, March 14, 2019, from 9:00 to 18:00

9th VERT FORUM

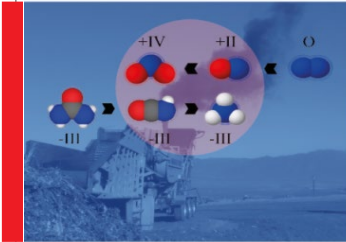
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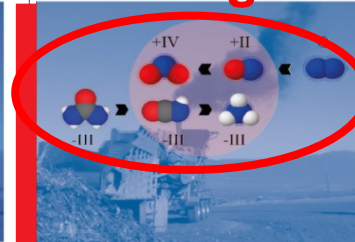
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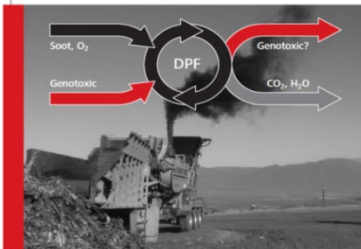
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5th VERT FORUM

Evolution of Diesel Particle Filter and deNO_x Technologies
 Catalysts at Work



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4. VERT FORUM

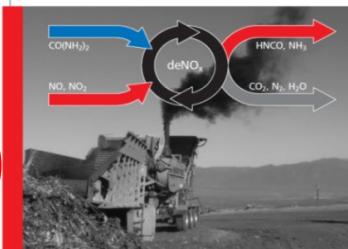
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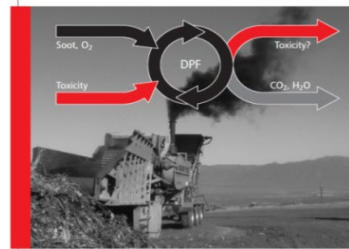
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Diesel Particle Filter Technologies
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Empa, Dübendorf, Überlandstrasse 129
 Friday, March 25, 2011, 09.00-16.30

1. VERT Forum

Challenges and Opportunities of BAT
Retrofit Particle Filters



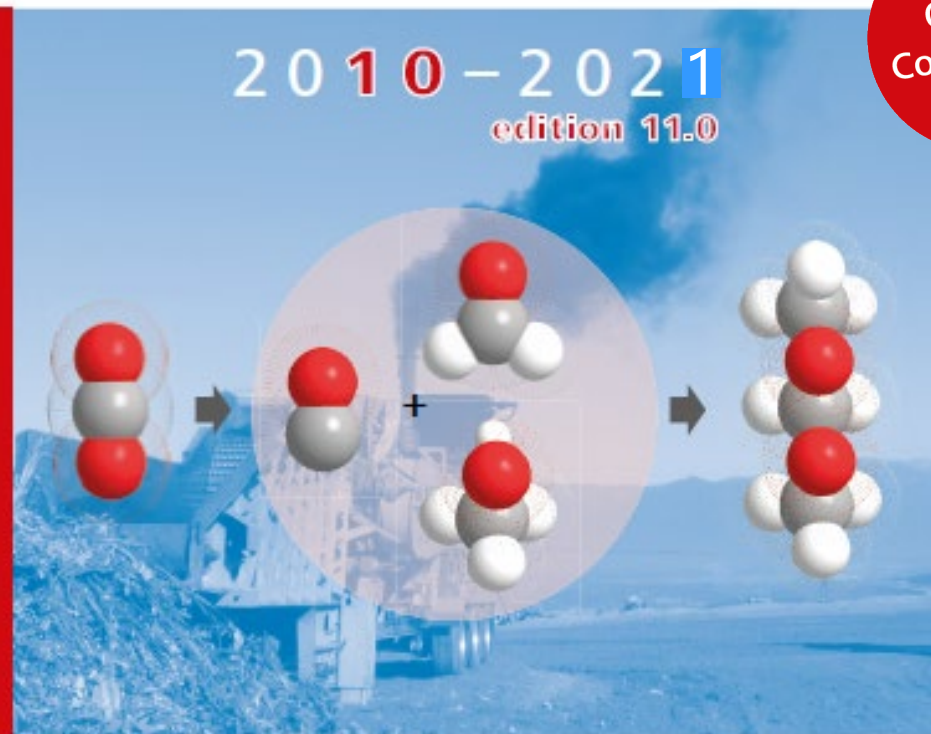
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Technologies and policies towards zero impact combustion engines

E-fuels and syn-fuels to lower CO₂ emissions

**The light blue period
has started:
Synthetic fuels to
decarbonize
combustion engines!**

Online
Conference



Thursday, March 25, 2021 from 09:00 to 18:00



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