

PFAS – Bekymringer og regulering

Audun Heggelund, NOVAP seminar, 20-01-2022

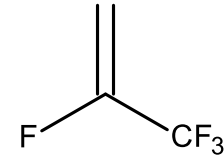


PFAS Restriksjonsforslag

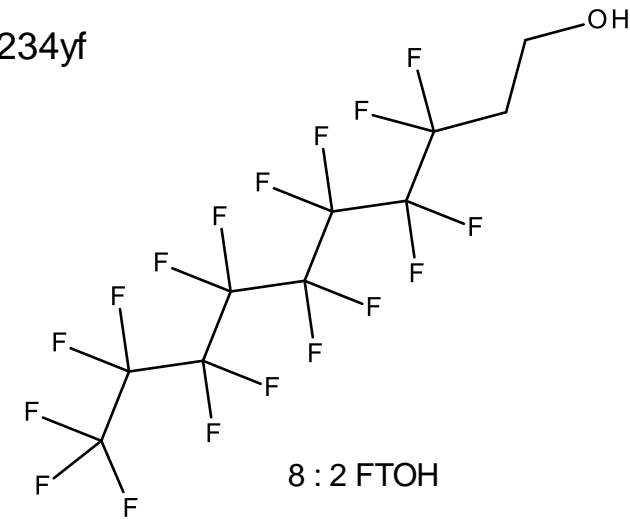
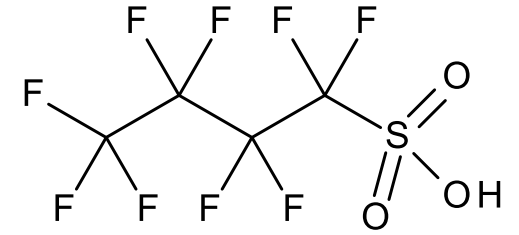
- Restriksjon under EUs kjemikaliereregulering REACH
- Alle PFASer i alle anvendelser...
- ... med visse unntak
- Forslag skal leveres i juli 2022
- Endelig vedtak ventet ca. 2024/2025



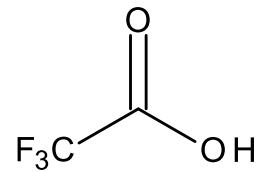
PFAS



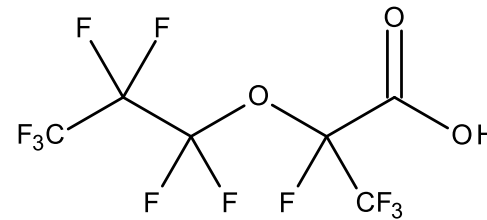
HFO-1234yf



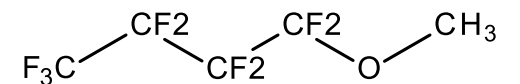
8 : 2 FTOH



TFA



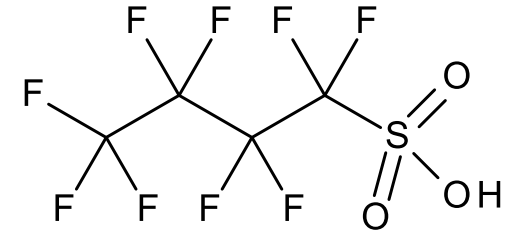
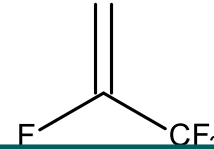
GenX



HFE-7100



PFAS

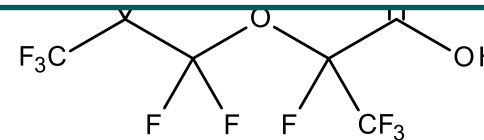


Foreløpig definisjon:

PFAS = Per- og polyfluoralkylstoffer

Any substance that contains at least one fully fluorinated methyl (CF₃) or methylene (CF₂) carbon atom (without any H/Cl/Br/I attached to it).

Totalt 5000 – 10.000 ulike PFAS



GenX



HFE-7100



Bekymringer



Persistens



Mobilitet

Bioakkumulering

Toksiske for miljø og mennesker



PFAS

F-gasser



PFAS og kjølemedier



- Noen F-gasser brukt som kjølemedier er PFAS
- F-gasser: Global oppvarming vs. andre bekymringer
- F-gass forordningen

Supermarket refrigerators: 'Refrigerators in supermarket' by Open Grid Scheduler / Grid Engine is marked under CC0 1.0.



Klima

Miljø/helse

Bidrar til global oppvarming

Reguleres i F-gass forordningen



F-gasser



Bidrar til andre miljø/helseeffekter gjennom stoffer som faller ned med regn (**TFA**)

Inkluderes i forslag til regulering av PFAS

Gamle F-gasser

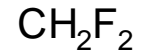
Nye F-gasser (HFO)



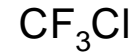
Foreløpig definisjon av PFAS:

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Utenfor scope



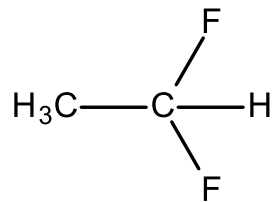
R-32



R-13

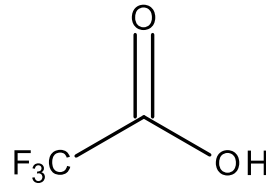


R-23 (fluoroform)

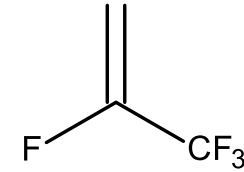


R-152a

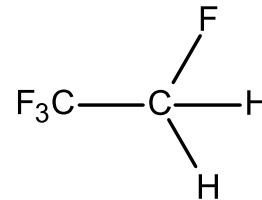
Innenfor scope



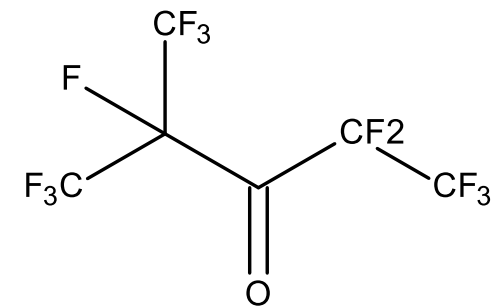
TFA



HFO-1234yf



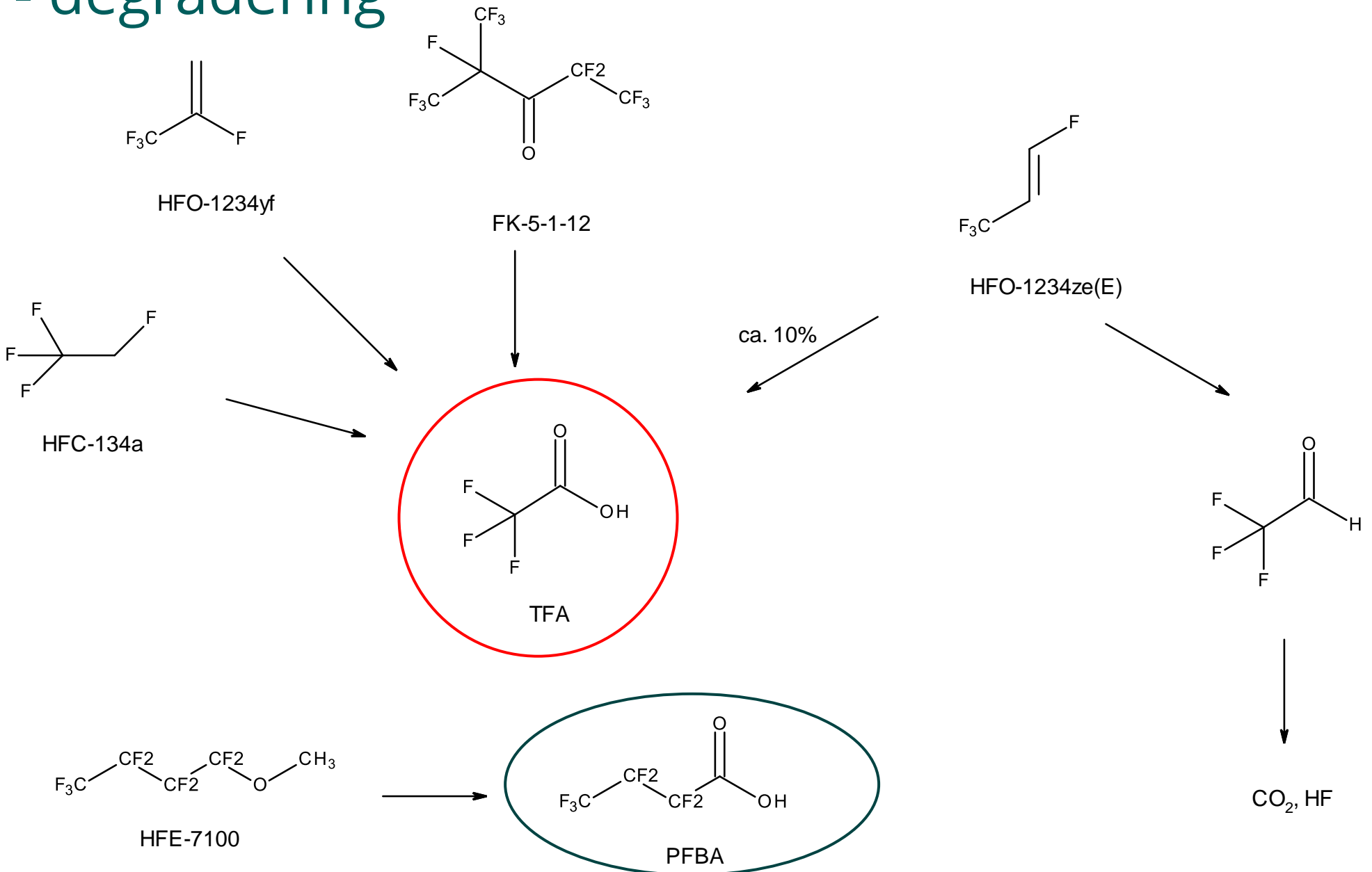
HFK-134a



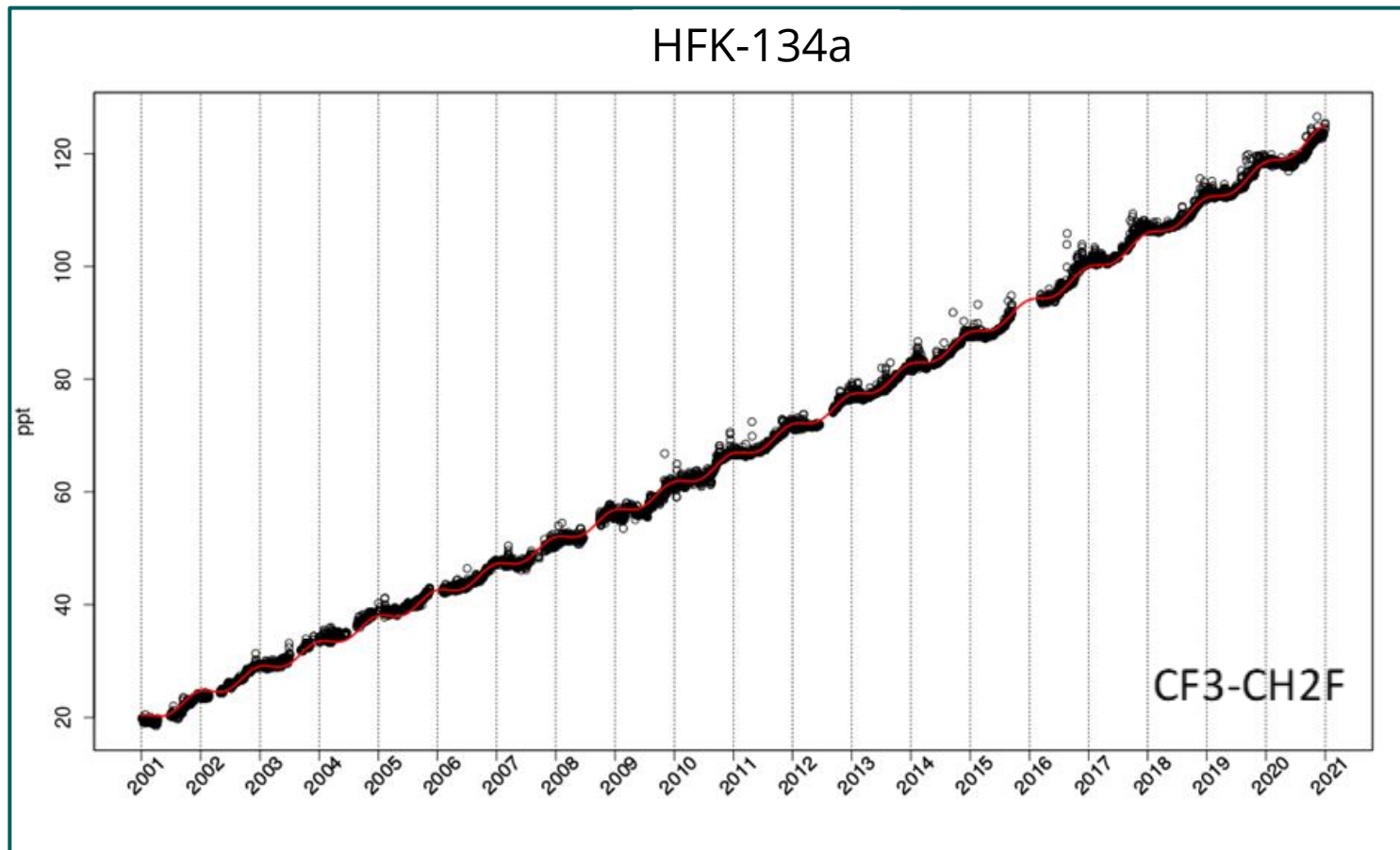
FK-5-1-12



F-gasser - degradering



Atmosfæriske konsentrasjoner, HFK-134a



HFK-134a → TFA (7-20%)

Målt på Zeppelinstasjonen, Svalbard



TFA i miljøet

Danmark 2021:

- TFA funnet/målt i 219 av 247 grunnvannsprøver rundt om i landet
- TFA funnet også i drikkevannskilder

Kina, Beijing, 2002 - 2012:

- 17-ganger økning i TFA i urbant overflatevann
- TFA i kranvann økt fra ikke detekterbar til 155 ng/L

EU, 2021:

- Overgang **HFK-134a** → **HFO-1234yf** i aircondition i biler
- 250 ganger økning i TFA-konsentrasjoner i Europa (!)

<https://mst.dk/service/nyheder/nyhedsarkiv/2021/jan/nyt-stof-fundet-i-grundvandet/>

Zhai et al. (2015), *Chemosphere*, 129, 110-117.

Holland et al. (2021), *ACS Earth and Space Chemistry*, 5, 849-857.



Perfluorerte syrer som degraderingsprodukter

Eksempler på
anvendelser

Skismøring

degradering



Brannskum, tekstiler,
matkontakt-
materialer, ...

F-gasser

Div. CF₃-forbindelser

PFTeDA	C-14	<chem>F3C-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFTrDA	C-13	<chem>F3C-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFDoDA	C-12	<chem>F3C-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFUnDA	C-11	<chem>F3C-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFDA	C-10	<chem>F3C-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFNA	C-9	<chem>F3C-CF2-CF2-CF2-CF2-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFOA	C-8	<chem>F3C-CF2-CF2-CF2-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFHpA	C-7	<chem>F3C-CF2-CF2-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFHxA	C-6	<chem>F3C-CF2-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFPeA	C-5	<chem>F3C-CF2-CF2-CF2-CF2-C(=O)O</chem>
PFBA	C-4	<chem>F3C-CF2-CF2-C(=O)O</chem>
PFPrPA	C-3	<chem>F3C-CF2-C(=O)O</chem>
TFA	C-2	<chem>F3C-C(=O)O</chem>



Hvorfor et restriksjonsforslag?
Og hva er det?



Handlingsplan og kjemikaliestrategi



“Chemicals Strategy for Sustainability- Towards a Toxic-Free Environment”

EU Kommisjonen, oktober 2020

PFAS⁶²

The Commission will:

- ban **all PFAS** as a group in **fire-fighting foams** as well as in **other uses**, allowing their use only where they are essential for society;
- address PFAS with a **group approach**, under relevant legislation on water, sustainable products, food, industrial emissions, and waste;
- address PFAS **concerns on a global scale** through the relevant international fora⁶³ and in bilateral policy dialogues with third countries;
- establish an EU-wide approach and provide financial support under research and innovation programmes to identify and develop **innovative methodologies for remediating PFAS contamination** in the environment and in products;
- provide research and innovation funding for safe **innovations to substitute PFAS** under Horizon Europe.

REACH Restriksjon

- REACH = **R**egistration, **E**valuation, **A**uthorisation and **restriction** of **C**hemicals
- Restriksjonsforslag:
 - Substance ID
 - Fare, effekter, risiko
 - Anvendelser
 - Alternativer
 - Sosioøkonomiske analyse av konsekvenser av en regulering



Restriksjonsforslag - prosess

- Innlevering (submission) f.eks. 16. juli 2022
- Offentlig høring 6 måneder
- Opinion development hos ECHAs komiteer:
 - RAC = Risk Assessment Committee* 9 måneder
 - SEAC = Socioeconomic Analysis Committee* 12 måneder
- Runde i Europaparlamentet og -rådet
- Vedtak i EU Kommisjonen Ca. 2024/2025





Miljø-
direktoratet