RISE in brief

- RISE is an independent, state-owned research institute.
- As an innovation partner, we help develop technologies, products, services and processes that contribute to a sustainable world and a competitive business community.
- We do this in collaboration with and on behalf of companies, academia and the public sector.
- 2,800 employees across the country. Researchers, technicians, testers and other experts needed in working with tomorrow's innovations. 30 % with a PhD.

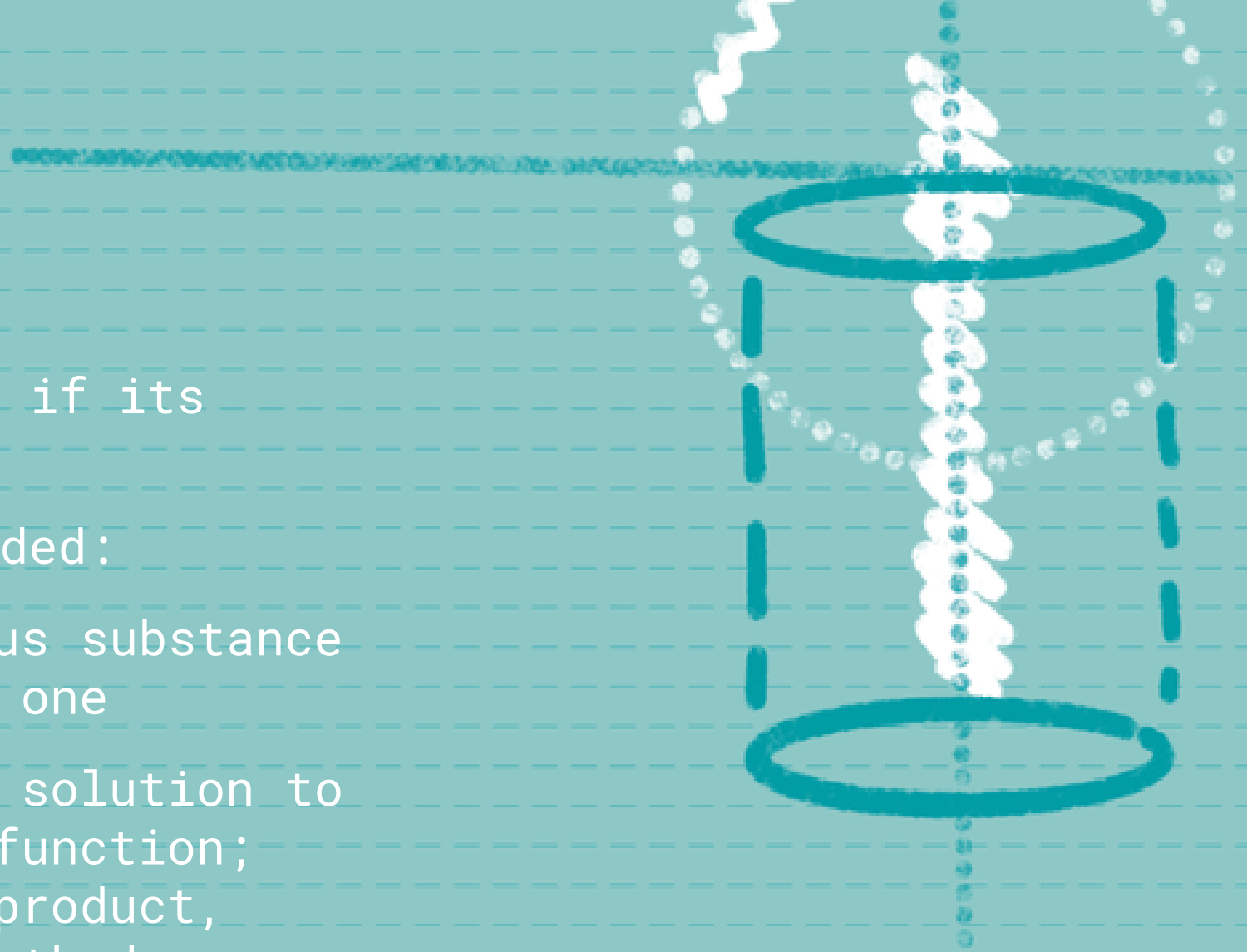
The Swedish Centre for Chemical Substitution, placed at RISE

Initiated and funded by the Swedish Government 2018, as part of reaching the environmental quality goal A non-toxic environment.

- Inspire and motivate
- Give tools and guidance
- Tell about alternatives and good examples

Substitution

- Remove the substance - if its function is not needed
- If the function is needed:
  - Replace the hazardous substance with a less harmful one
  - Find an alternative solution to obtain the certain function; replace to another product, material, design, method or process



POPFREE
– Promotion of PFAS-free alternatives

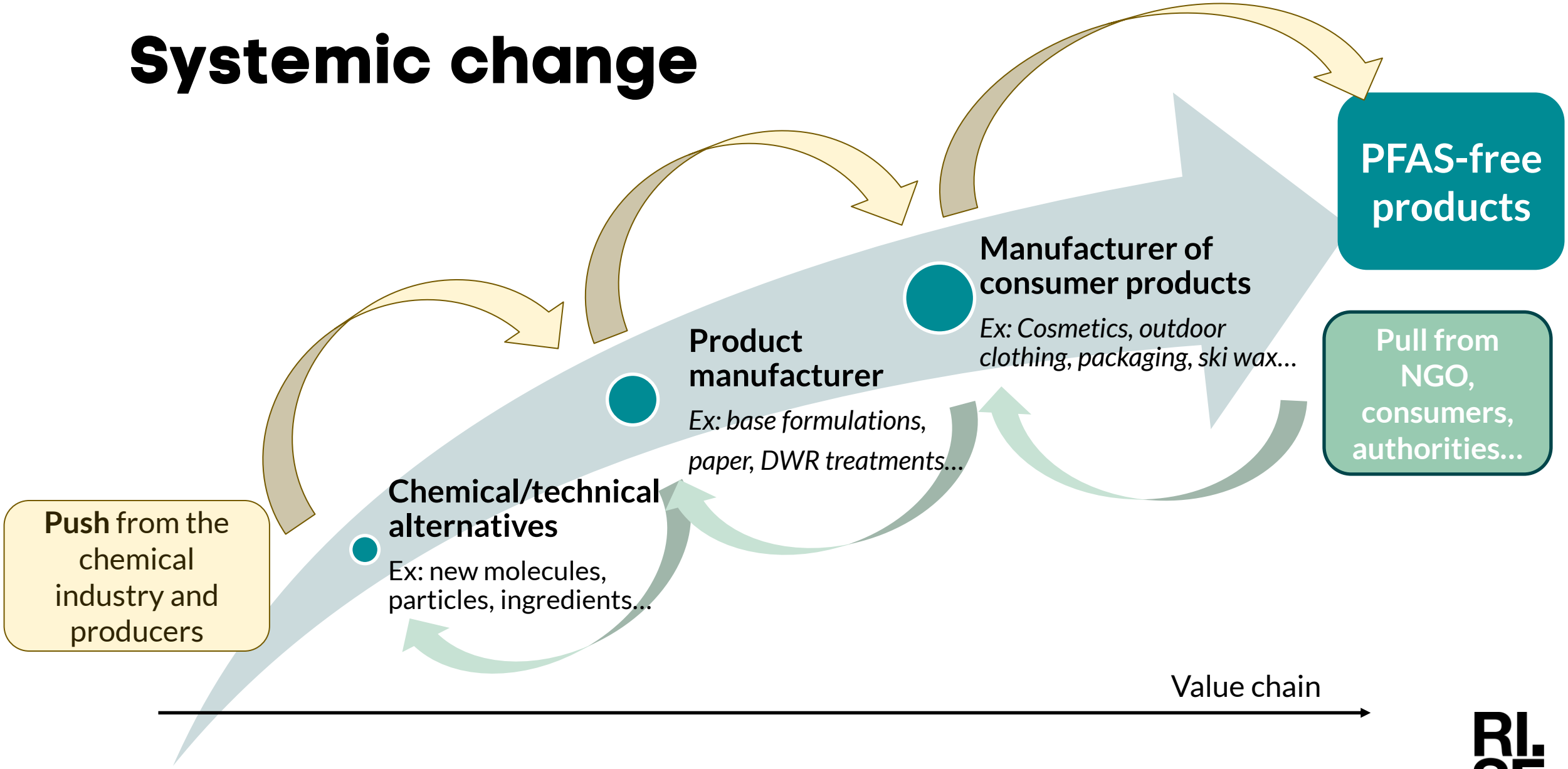
Financing from Vinnova, the Swedish Innovations Agency,

More than 30 partners involved and engaged in PFAS phase-out

Alternatives assessment in 6 different product cases

Information and project report at www.popfree.se

Systemic change



PFAS is used also in bike oils…

More products with PFAS exist than the examples shown here.

Difficult for consumers to know whether a product contains PFAS since there are no ingredient lists.

PTFE formula and biodegradable does not seem right to fit on the same product…

Suppliers and producers

- Awareness of PFAS
- Motivation for initiating PFAS phase-out and start screening and benchmarking of alternatives

Retailers

- Awareness of PFAS
- Increased knowledge how to answer customer inquires related to sustainability of products
- Think about what products you want to sell and how to communicate with suppliers

Users

- Awareness of PFAS
- Sustainable purchasing
- Ask questions before purchase

PFAS, their concerns and PFAS-free alternatives

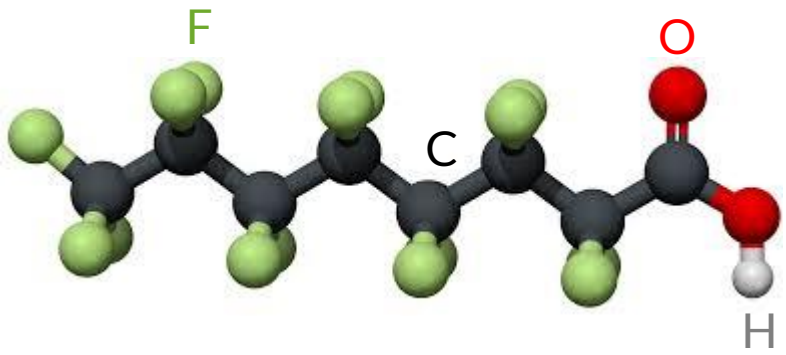
Lisa Skedung, Project Manager, POPFREE, RISE

Per-and polyFluoroAlkyl Substanses

At least one perfluorinated alkyl group ($-C_nF_{2n+1}$)

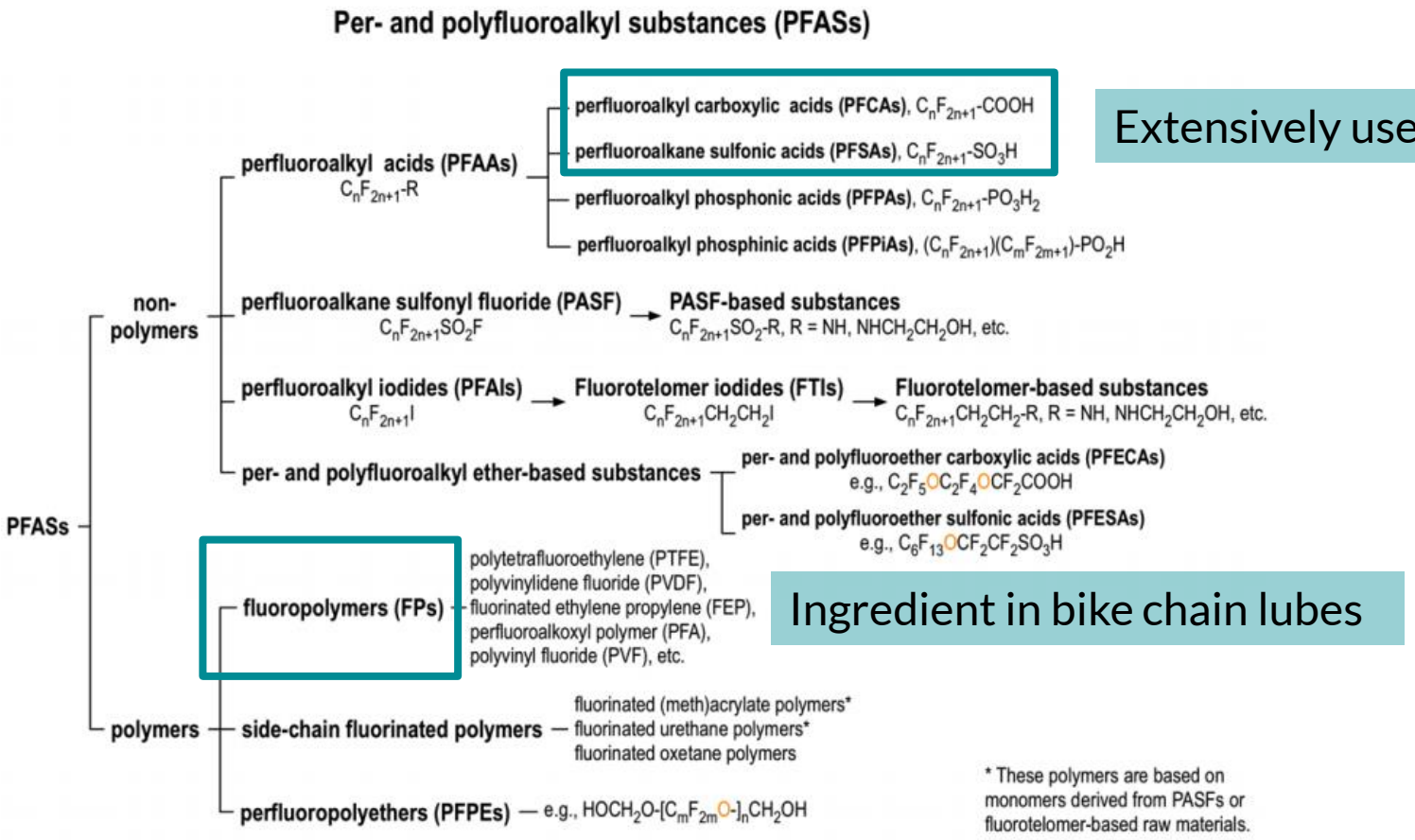
Synthetic chemicals

Over 4730 substances



PFOA

Fluoropolymers are PFAS

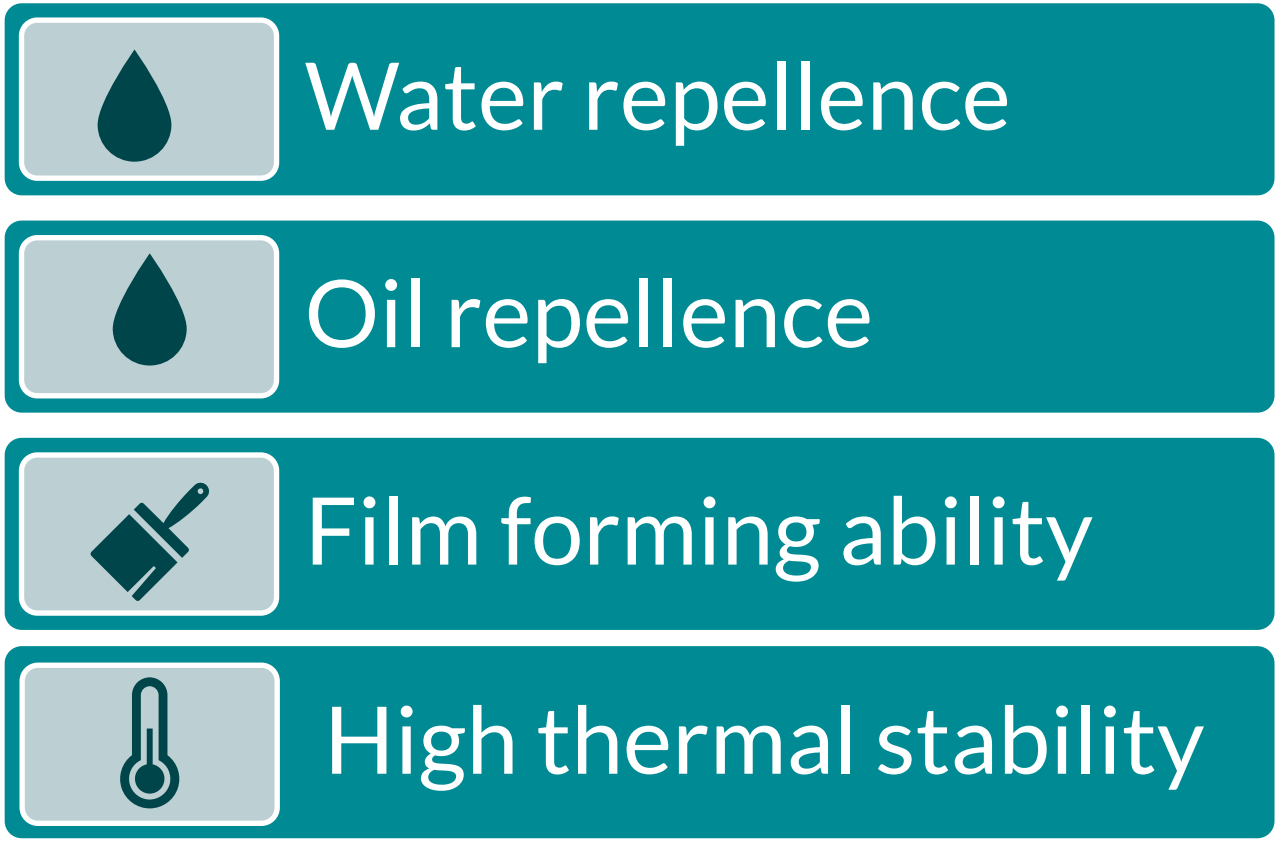


Extensively used and studied

Ingredient in bike chain lubes

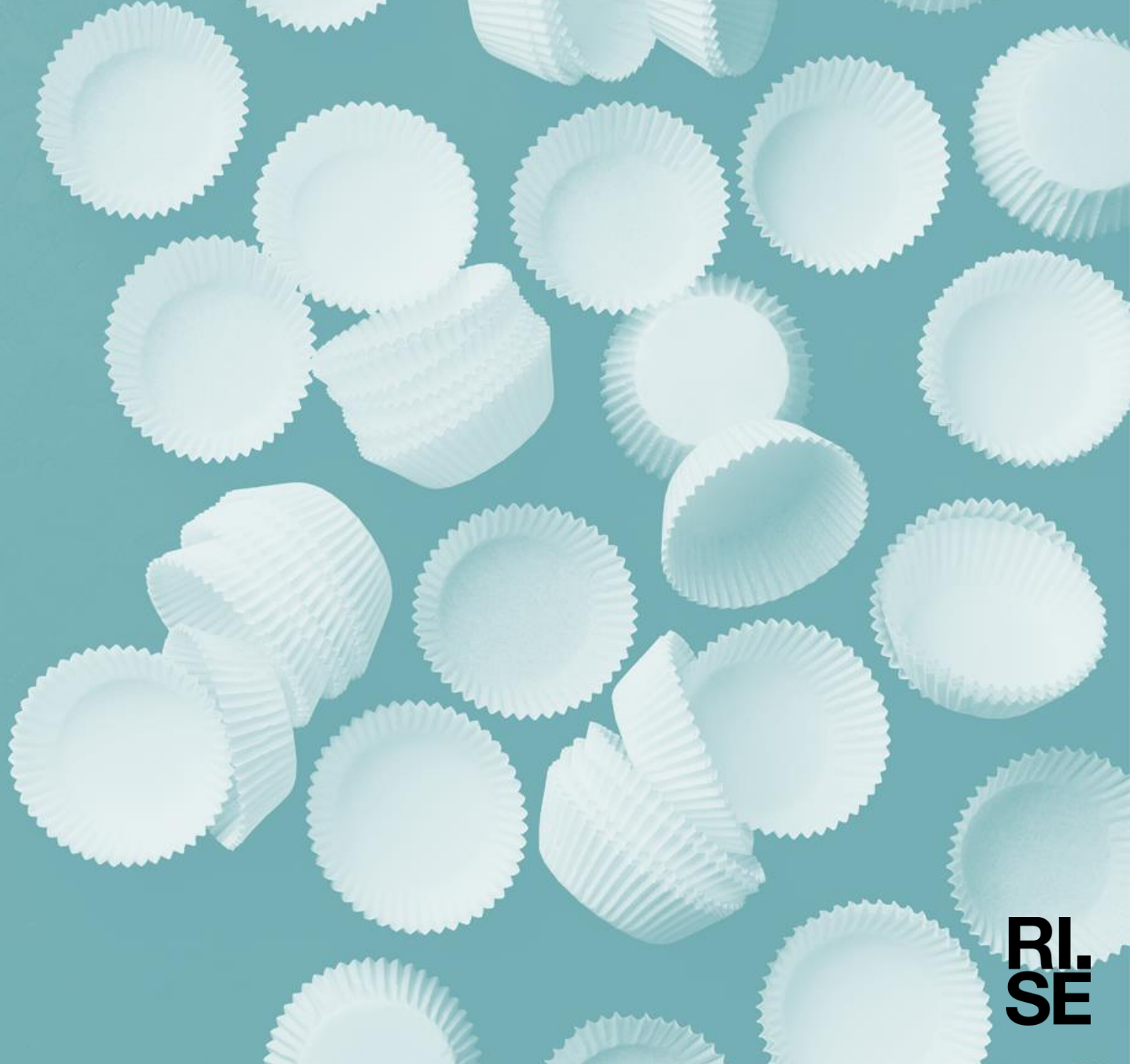
https://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/aboutpfass/

PFAS provide unique properties



Usage

- Food contact paper
- Outdoor/DWR textiles
- Protective clothing
- Impregnation
- Firefighting foam
- Ski wax
- Cosmetic products
- Electronics
- Brake fluid
- Lubricants



Why promote a phase-out?

- Persistent chemicals (degrade extremely slowly)
- Bioaccumulative and biomagnifying
- Mobile (available anywhere in the environment)
- Polluting soil and water
- Some bind to proteins
- High thermal stability

S. Banzhaf, M. Filipovic, J. Lewis, C. J. Sparrenbom, and R. Barthel, "A review of contamination of surface-, ground-, and drinking water in Sweden by perfluoroalkyl and polyfluoroalkyl substances (PFASs)," Ambio, vol. 46, no. 3, pp. 335-346, 2017/04/01 2017.

Spreading and exposure of PFAS

S. Banzhaf, M. Filipovic, J. Lewis, C. J. Sparrenbom, and R. Barthel, "A review of contamination of surface-, ground-, and drinking water in Sweden by perfluoroalkyl and polyfluoroalkyl substances (PFASs)," Ambio, vol. 46, no. 3, pp. 335-346, 2017/04/01 2017.

Health risks in humans

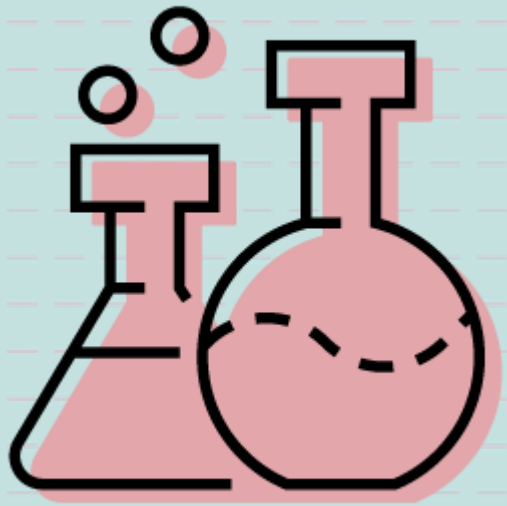
- Developmental effects (decrease in birth weight)
- Hepatic effects (e.g. increased levels of cholesterol and liver damage)
- Cardiovascular effects
- Endocrine effects (e.g. increased risk of thyroid disease)
- Immune effects (e.g. lower response to vaccines)
- Reproductive effects (decreased fertility)
- Proposed risk of testicular and kidney cancer

http://www.c8sciencepanel.org/
https://www.atsdr.cdc.gov/toxprofiles/tp200-c2.pdf

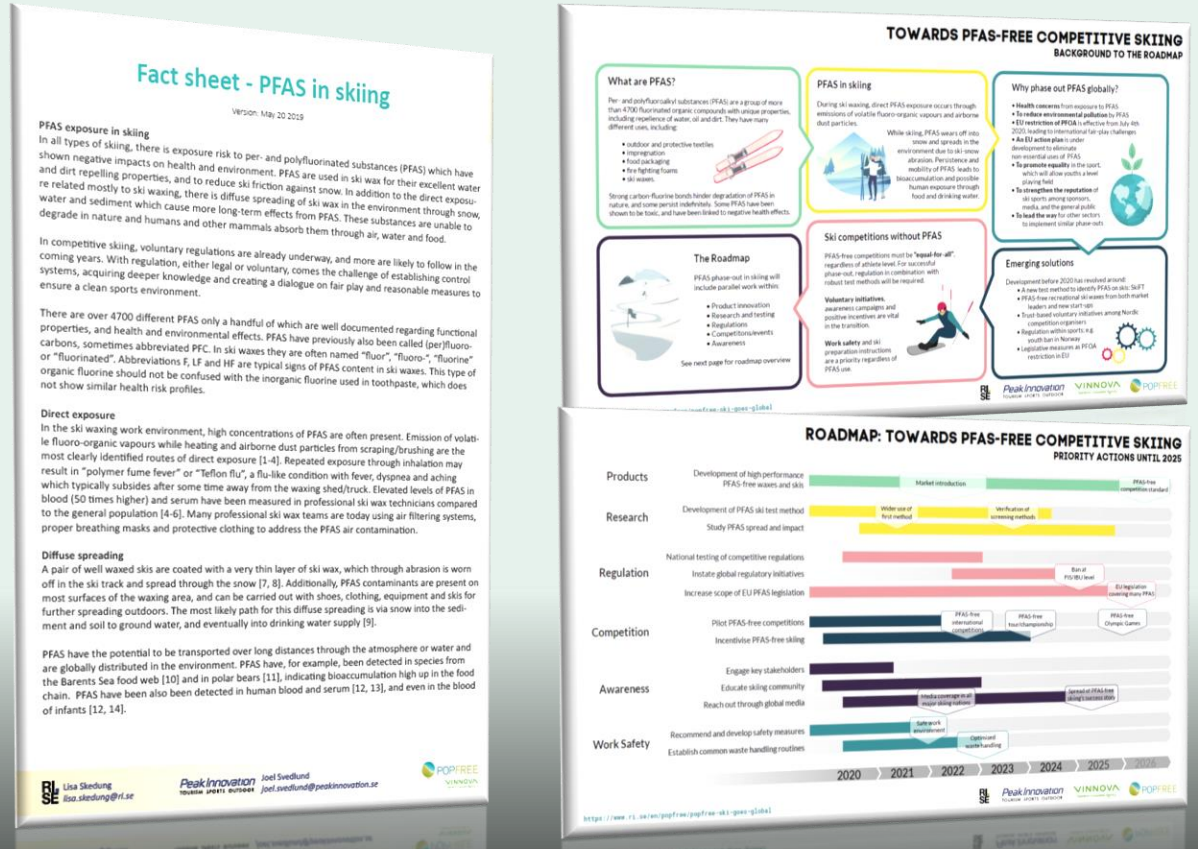
V. M. Vieira, K. Hoffman, H.-M. Shin, J. M. Weinberg, T. F. Webster, and T. Fletcher, "Perfluorooctanoic acid exposure and cancer outcomes in a contaminated community: a geographic analysis," (in eng), Environmental health perspectives, vol. 121, no. 3, pp. 318-323, 2013.

Yet unregulated substances may also be of very high concern!

- Only a few PFAS substances have been studied thoroughly in terms of health risks.
- Only a few PFAS substances are regulated today.
- More restrictions will most probably come in the future.
  - A **large number of substances** makes a substance-by-substance evaluation impossible.
  - Most PFAS substances show **similar properties of concern**
  - **Avoid regrettable substitution** from one PFAS to another



POPFREE Ski Goes Global



Factsheet - PFAS in skiing

30 stakeholders in workshop

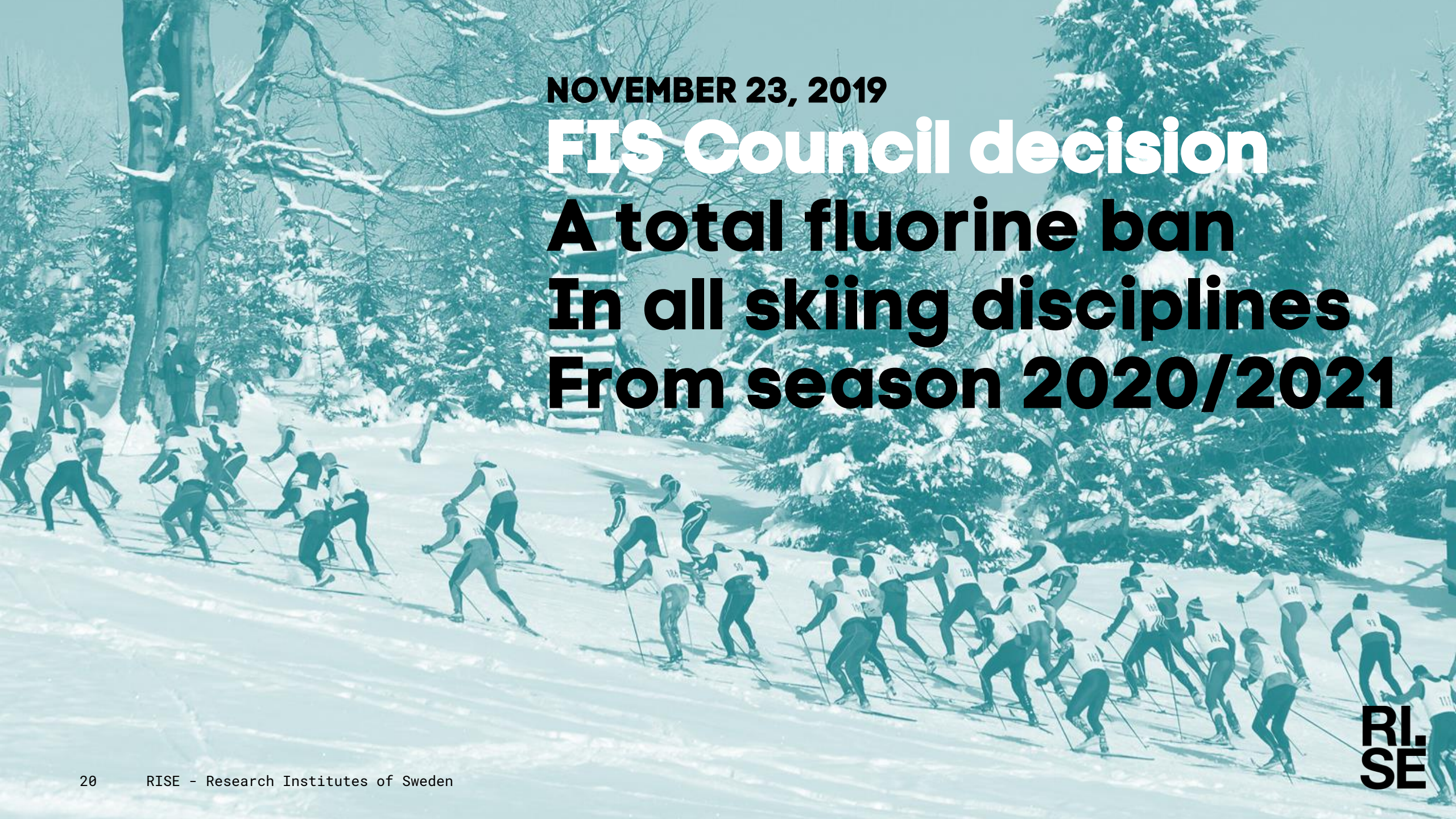
Roadmap

6 focus areas

Milestones

Activities

Four possible PFAS screening methods



NOVEMBER 23, 2019

FIS Council decision

A total fluorine ban
In all skiing disciplines
From season 2020/2021

Screening alternatives to PFAS

1. Determine PFAS function and define essential criteria for alternatives
2. Identify and screen potential alternatives in terms of technical performance (with identified relevant methods) and chemical risk assessment
3. Evaluate approved alternatives at pilot scale and/or using industrial standard
4. Qualitative Hot-spot or full Life Cycle Assessment for promising alternatives

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www.popfree.se