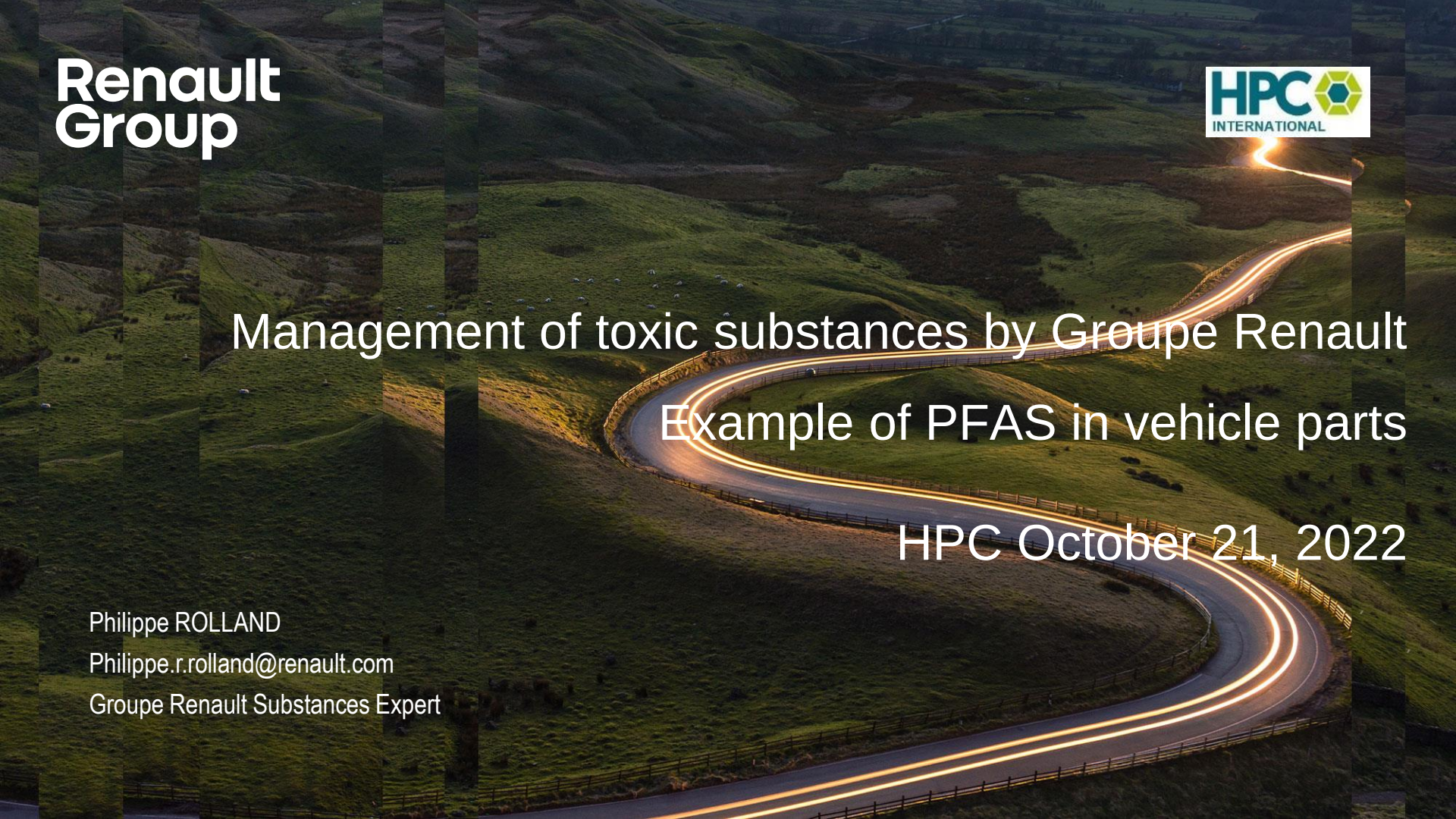


# Management of toxic substances by Groupe Renault

## Example of PFAS in vehicle parts

HPC October 21, 2022

Philippe ROLLAND
Philippe.r.rolland@renault.com
Groupe Renault Substances Expert

# SYNOPSIS

01 Key Global Substance Regulations - The Case of PFAS Families

02 Networking of the subject of substances in the Renault Group

03 When to replace a substance?

04 The case of PFAS

05 Conclusion

# 01

## Main regulations substances world
## The case of PFAS families

# Major regulations

## REACH Europe

| REACH Europe, Candidate List | REACH Europe, Authorisation (Annex XIV) | REACH Europe, Restriction (Annex XVII) | Waste Framework Directive=>SCIP |
|---|---|---|---|
| Registration Evaluation Autorisation and restriction of CHemical substances N°1907/2006 | | | Imposes the SCIP database |
| **Report** substances contained in items (exhibits) | **Prohibition** of manufacture in Europe with these substances | Highly variable | Declare |
| sold in **Europe** | european-**made** | manufactured and/or sold in **Europe** | sold in **Europe** |
| 223 substances | 52 substances | 76 entries | 223 substances |

## Copies of REACH

| REACH UK *New!* | Korean REACH | KKDIK= Turkish REACH |
|---|---|---|
| | | |
| | ? | ? |
| UK | Korea | Turkey |
| | ? | ? |

Anticipative standard

RENAULT NISSAN MITSUBISHI

| RNES-B-00027 |
|---|
| Contractual standard with suppliers |
| Renault Nissan |
| **World** |

## The many other regulations

| POP |
|---|
| Persistent Organic Pollutants |
| **prohibition** |
| Local **Global** Engagement |
| 26 families |

| ELV (heavy metals) |
|---|
| End-of-Life Vehicles (2000/53) |
| **Prohibition**, except 20 uses of lead |
| **Europe (+ Korea)** |
| "4 heavy metals" |

| BPR (biocides) |
|---|
| Biocidal Product Regulation |
| The substance is authorized for biocidal use in certain types of products |
| **Europe** |
| ? |

| AGEC *New!* |
|---|
| Anti-Gaspillage for a Circular Economy |
| **Declare** |
| sold in **France** |
| 226 (223 SVHC + 3 ) |

**PFAS:**
**A test case for changing the way of regulation**

https://echa.europa.eu/en/hot-topics/perfluoroalkyl-chemicals-pfas

# Assess PFAS to be regulated

Authorities review ECHA's registration database

- But there are more than 2000 PFAS marketed

The sub-group approach covered only the most urgent cases.

# The "CSS" tests a holistic approach:

**Eliminate all PFAS all at once.**

**Allow their use only when it is proven that they are irreplaceable** (and essential to society)

*CSS: EU's chemicals strategy for sustainability

# Major regulations

Anticipative standard

PFHxS 2023

PFCA 2023

PFHxA 2026?

PFAS 2026/28

| REACH Europe, Candidate List | REACH Europe, Authorisation (Annex XIV) | REACH Europe, Restriction (Annex XVII) | Framework Directive=>SCIP |
|---|---|---|---|
| Registration Evaluation [illegible]torisation and re[illegible]tion of CHemic[illegible]ubstances N°1907/20 | | | imposes the SCIP database |
| **Report** substanc[illegible] contained in items ([illegible]oits) | **Prohibi[illegible]on** of manufacture [illegible]Europe with these [illegible]ubstances | [illegible]ighly variable | Declare |
| sold in E[illegible]ope | eu[illegible]pean-**made** | manufactu[illegible]ed and/or s[illegible]d in Eu[illegible]pe | sold in **Europe** |
| 223 substances | [illegible]52 substances | 76 entries | 223 substances |

Copies of REACH

| REACH UK *New!* | Korean REACH | KKDIK= Turkish REACH |
|---|---|---|
| | | |
| | ? | ? |
| UK | Korea | Turkey |
| | ? | ? |

PFHxS 2023

PFCA 2026?

PFHxA 2028?

PFAS 2029?

PFOA 2020

PFOS 2009

Other regulations

| POP | [illegible]LV (heavy metals) | BPR (biocides) | AGEC *New!* |
|---|---|---|---|
| [illegible]rsistent Organic Pollutants | End-of-Life Vehicles (2000/53) | Biocidal Product Regulation | Anti-Gaspillage for a Circular Economy |
| **prohibition** | **Prohibition**, except 20 uses of lead | The substance is authorized for biocidal use in certain types of products | **Declare** |
| Local **Global** [illegible]gement | **Europe (+ Korea)** | **Europe** | sold in **France** |
| 26 families | "4 heavy metals" | ? | 226 (223 SVHC + 3 ) |

| RNES-B-00027 |
|---|
| Contractual standard with suppliers |
| Renault Nissan |
| **World** |

# 02

# Network organization of the subject substances In the Renault Group

# Organization in network substances, to design «Safe» cars

RG

Contacts

PFA

cetim

Professional Associations & Consortia

ACEA

Renault Group Design department

Expertise

Affairs Public

Material & Substance specialists

Responsible for Homologation/Compliance

Pilot for environment objective in each new vehicle

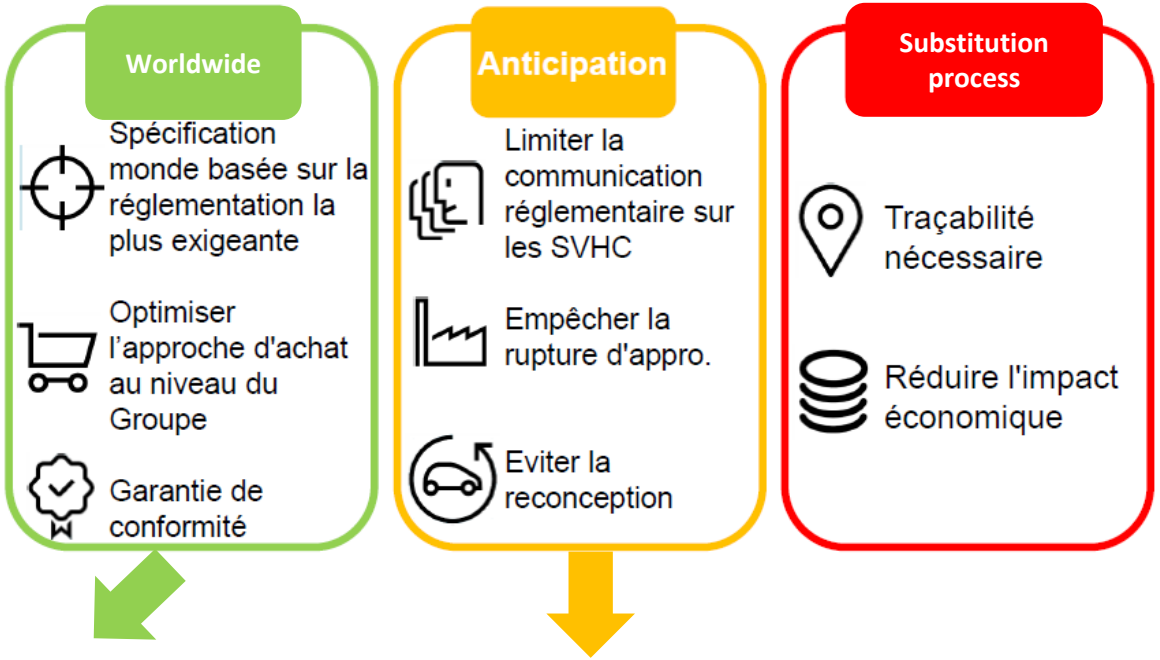
Correspondents engineering

Management Regulation

## The tools:

RG

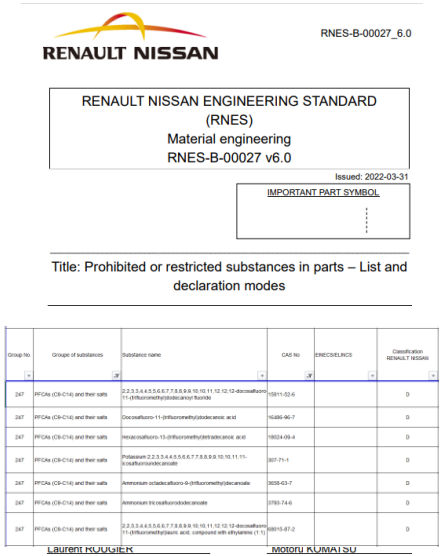
### 1-A substance policy for parts & vehicles:




**Global regulatory base**

**We anticipate 7 years ahead to avoid re-designing in «serial life»**

### 2-A contractual substances standard with suppliers



RENAULT NISSAN

RNES-B-00027_6.0

RENAULT NISSAN ENGINEERING STANDARD
(RNES)
Material engineering
RNES-B-00027 v6.0

Issued: 2022-03-31

IMPORTANT PART SYMBOL

Title: Prohibited or restricted substances in parts – List and declaration modes

| Group No. | Groups of substances | Substance name | CAS No | EINECS/ELINCS | Classification RENAULT NISSAN |
|---|---|---|---|---|---|
| 247 | PFCAs (C8-C14) and their salts | 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,12,12,12-docosafluoro-11-(trifluoromethyl)dodecanoyl fluoride | 10811-52-6 | | D |
| 247 | PFCAs (C8-C14) and their salts | Docosafluoro-11-(trifluoromethyl)dodecanoic acid | 16486-96-7 | | D |
| 247 | PFCAs (C8-C14) and their salts | Hexacosafluoro-13-(trifluoromethyl)tetradecanoic acid | 19024-09-4 | | D |
| 247 | PFCAs (C8-C14) and their salts | Potassium 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,11-icosafluoroundecanoate | 307-71-1 | | D |
| 247 | PFCAs (C8-C14) and their salts | Ammonium octadecafluoro-9-(trifluoromethyl)decanoate | 3055-43-7 | | D |
| 247 | PFCAs (C8-C14) and their salts | Ammonium tricosafluorododecanoate | 3793-74-6 | | D |
| 247 | PFCAs (C8-C14) and their salts | 2,2,3,3,4,4,5,5,6,6,7,7,8,8,9,9,10,10,11,12,12,12-docosafluoro-11-(trifluoromethyl)stearic acid - compound with ethylamine (1:1) | 69015-87-2 | | D |

Laurent ROUGIER — Motoru KUMATSU

**Includes "GADSL" automotive list**

# 3-A DATABASE FILLED BY SUPPLIERS

## STRUCTURE OF SUBSTANCE INFORMATION

Vehicle

Part

Component

Material

Substance

*In IMDS*

# REGULATORY TRACEABILITY

Internet

MATERIALDATA SYSTEM

IMDS base = the "MDS"
Documented by suppliers

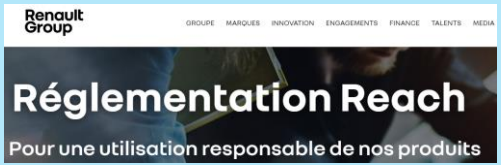
Renault Group

Nomenclature of
Car parts

RENAULT

Designer

"Regulatory" declarations
of REACH-SVHC substances




# 03

## When to replace a substance in car parts?

# NEED TO ARRANGE SUBSTITUTION

Duration of substitution depends on each case

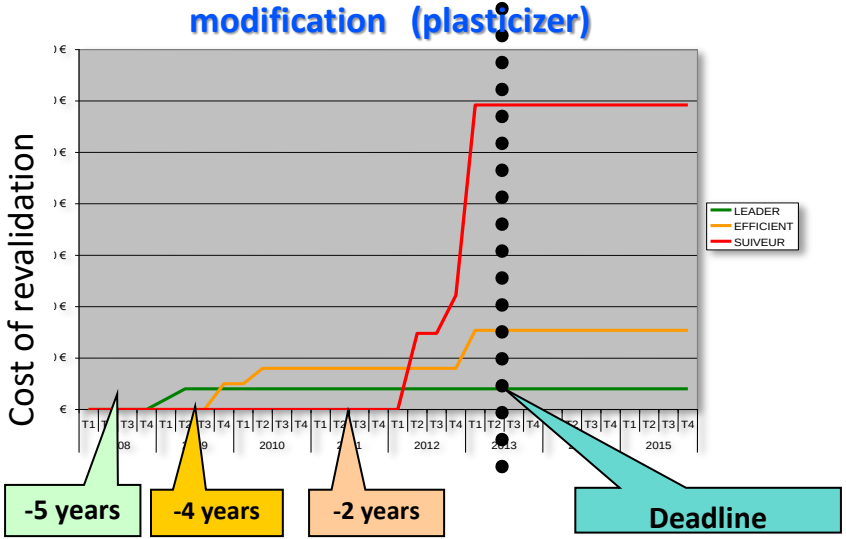
Minimum: 2 years to validate the solution in laboratory, 18 months to deploy industrially.

➔ We're looking for a seven-year window

STEP 1 ➔ STEP 2

At least 2 years


**Example: deploying a dashboard modification (plasticizer)**



# 04

## The case of PFAS

# HISTORY OF FLUORINATED POLYMERS

RG

Polymères fluorés :
synthèses, propriétés et applications

**Bruno Ameduri*, Bernard Boutevin***

L'ACTUALITÉ CHIMIQUE • FÉVRIER 2000

| | |
|---|---|
| | **1re Génération : homopolymères fluorés** |
| **1934-1938** | PCTFE ($C_2F_3Cl$), PTFE ($C_2F_4$) |
| **1950** | PVDF ($C_2H_2F_2$), PVF ($C_2FH_3$), PTrFE ($C_2F_3H$) |
| | **2e Génération : copolymères fluorés** |
| **1950-1960** | VDF-CTFE ($C_2H_2F_2$ - $C_2F_3Cl$)<br>VDF-HFP ($C_2H_2F_2$ - $C_3F_6$)<br>FEP ($C_2F_4$ - $C_3F_6$)<br>PFA ($C_2F_4$ - $CF_2$=CF-$OC_3F_7$) |
| **1980** | ETFE ($C_2H_4$ - $C_2F_4$)<br>E-CTFE ($C_2H_4$ - $C_2F_3Cl$)<br>Elastomères (voir *tableau III*)<br>Copolymères d'acrylates fluorés |
| **1989** | Copolymères amorphes transparents :<br>Cytop® et Teflon® AF (voir *tableau V*) |
| | **3e Génération : polymères fonctionnels fluorés** |
| **1980** | Membranes échangeuses d'ions<br>Peintures réticulables à température ambiante |
| **1995** | Résines et élastomères réticulables |

**Today: essential in batteries, fuel cells, etc.**

## PFAS specificities

- Several sub-families already regulated, or ongoing, so disappearance is managed

But

- The full family is huge: about 2200 marketed out of 12,000 identified
- Partial traceability in “IMDS” as the substances are not “SVHC”

## Issues for the automotive industry

- Replace short-chain PFAS whenever possible: Responsibility of polymerists and chemists
- Preserving fluorinated polymers: essential for the energy transition
- Evaluate the relevance of alternatives for air conditioning gases

# 05

# Conclusion

## Renault Group's policy of substance

- WORLD
- ANTICIPATIVE: 7 years for new car parts
- TRACABILITY & SUBSTITUTION

## PFAS

- Several families are prohibited or being prohibited
- The speed of banning all PFAS, without having gone through the REACH-SVHC "box", alters traceability and does not allow for all the necessary anticipation for the industry

# MERCI

# Chemical Strategy for sustainability

## Click to change


**Chemical Strategy for sustainability (CSS)**

- New regulatory mechanisms prompting a ‘massive test case’ to regulate at once all fluorinated substances known as ‘PFAS’
- Need to identify the use of these substances faster and we need transparency in the supply chain (help of other associations like CLEPA).
- Need for exemptions because some use are essential.

# AUTOMOTIVE INDUSTRY – EXAMPLE OF PFAS IN PRODUCTS

| Example for important PFAS uses | | R&D Challenges |
|---|---|---|
|  | Sealings in Ad- Blue circuits, Fuel sender, crank-shaft | No suitable substitutes<br>*→ Provide extensive technical evidence for an exemption |
|  | NOx Sensors → Membranes<br>$O_2$ Sensors | |
|  | Gaskets for heating fuel resistance (Gearbox, power train, Injector, | |
|  | Fuel Cell: Proton-Exchange Membrane | |
|   | Fluorinated refrigerants | Substitution required because of CO2 technology |
|  | Chrome baths for hard chromating | Substitutes available but very expensive |
|  | Li-Ion Batteries: → Cathode Coating<br>→ Electrolyte<br>→ Gasket | No suitable substitutes* |
|  | High performance lubricants | Substitutes available but with much lower performance |
|  | Hoses (Filler neck, Turbo Charger, GPF/DPF differential, ...) | No suitable substitutes* |
|  | Electronics, Displays, Sensors | No suitable substitutes* |
|  | Textiles (Engine bay, Sound insultation, Interior paneling, ···) | No suitable substitutes* |
|  | Coatings | No suitable substitutes* |

NON-Exhaustive.

**Mobile air conditioning:**

**Context:**
-Tonnage 5.2 t/PFAS per year
-Actual refrigerant R134a
-New vehicles with R1234yf

**Risk:**
>R1234yf and R134a are not harmful to health and not classified in a health hazard category
>R-1234yf is environmentally acceptable.

**Alternative:**
CO2, Propane

**Impact:**
E compressor
Limit of performance
300€ per car 5 years