

Casi di successo: progetti LIFE per il Tessile (MIDWOR-LIFE e LIFE-FLAREX)

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MIDWOR-LIFE and LIFE-FLAREX are two projects co-funded by the European Union under the LIFE+ Financial Instrument within the axe Environment Policy and Governance and under the Grant Agreement n. LIFE14 ENV/ES/000670 and LIFE16 ENV/ES/000374

I due progetti: MIDWOR e FLAREX



Riduzione dell'impatto ambientale causato dai DWOR (prodotti idro-oleo repellenti), utilizzati nel finissaggio tessile, utilizzando alternative non tossiche.



Riduzione dell'impatto ambientale causato dai prodotti ritardanti di fiamma utilizzati nel finissaggio tessile



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Punti in comune: Partenariato

Midwor Flarex

Centri tecnologici:

- LEITAT (Spagna – Catalonia)	X	X
- IQAC Institute of Advanced Chemistry of Catalonia	X	X
- Centexbel (Belgio)		X
- Fundación CETIM (Spagna – Galizia)	X	

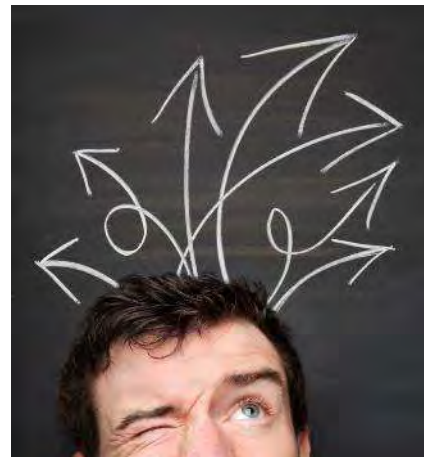
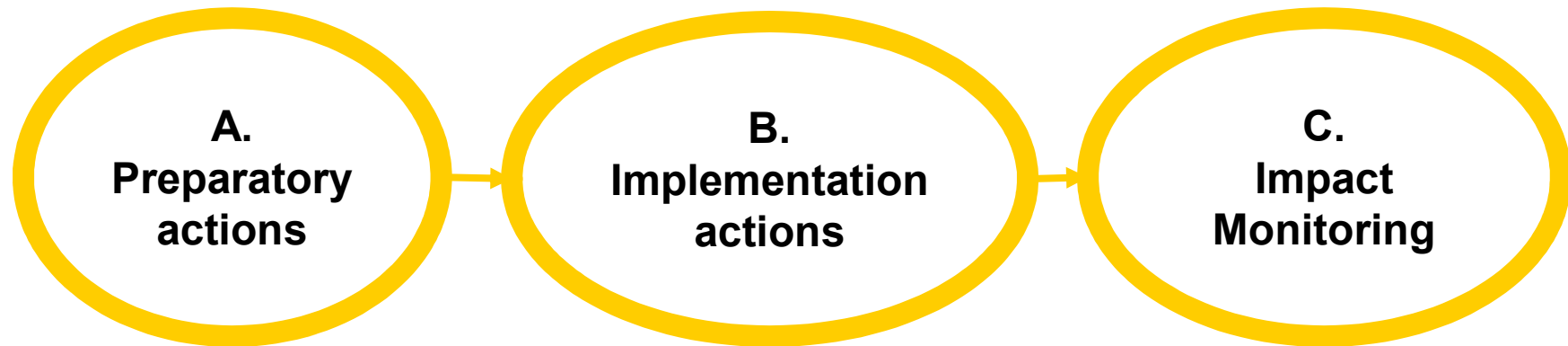
Poli tessili:

- AEI Textils (Spagna – Catalonia)	X	X
- Ateval (Spagna – Valencia)		X
- Clutex (Repubblica Ceca)	X	X
- Pointex	X	X



Punti in comune: Struttura del progetto

PROJECT STEPS



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Punti in comune: Struttura del progetto

Preparatory and implementation actions

Selection of chemicals and fabrics

With the participation of industrial SME several chemicals and alternatives will be selected for pre-screening of functionality and environmental impact on several fabrics

Industrial demonstration

Material processing will be tested using the selected chemicals under pre-industrial and industrial conditions involving manufacturing SMEs through workshops and on-site pilots



Selection of textiles and finishing, demonstration of alternative products and workshops, risk assessment, LCA & roadmap



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Punti in comune: Struttura del progetto

Impact monitoring

Risk assesment

Exposure
Toxicity
Environmental assessment
Life-cycle assessment

Monitoring

Environmnetal impact
Socioeconomic impact
Stakeholder engagement

Recommendations

Best practices
Policy recommendations
REACH annexes proposals



Policy recommendations, impact monitoring on environmental, socio-economic and cost efficient replicability



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Mitigation of environmental impact caused by DWOR (**Durable Water and Oil Repellents**) textile finishing chemicals studying their nontoxic alternatives



Coordinating
partner:



Beneficiary
partners:



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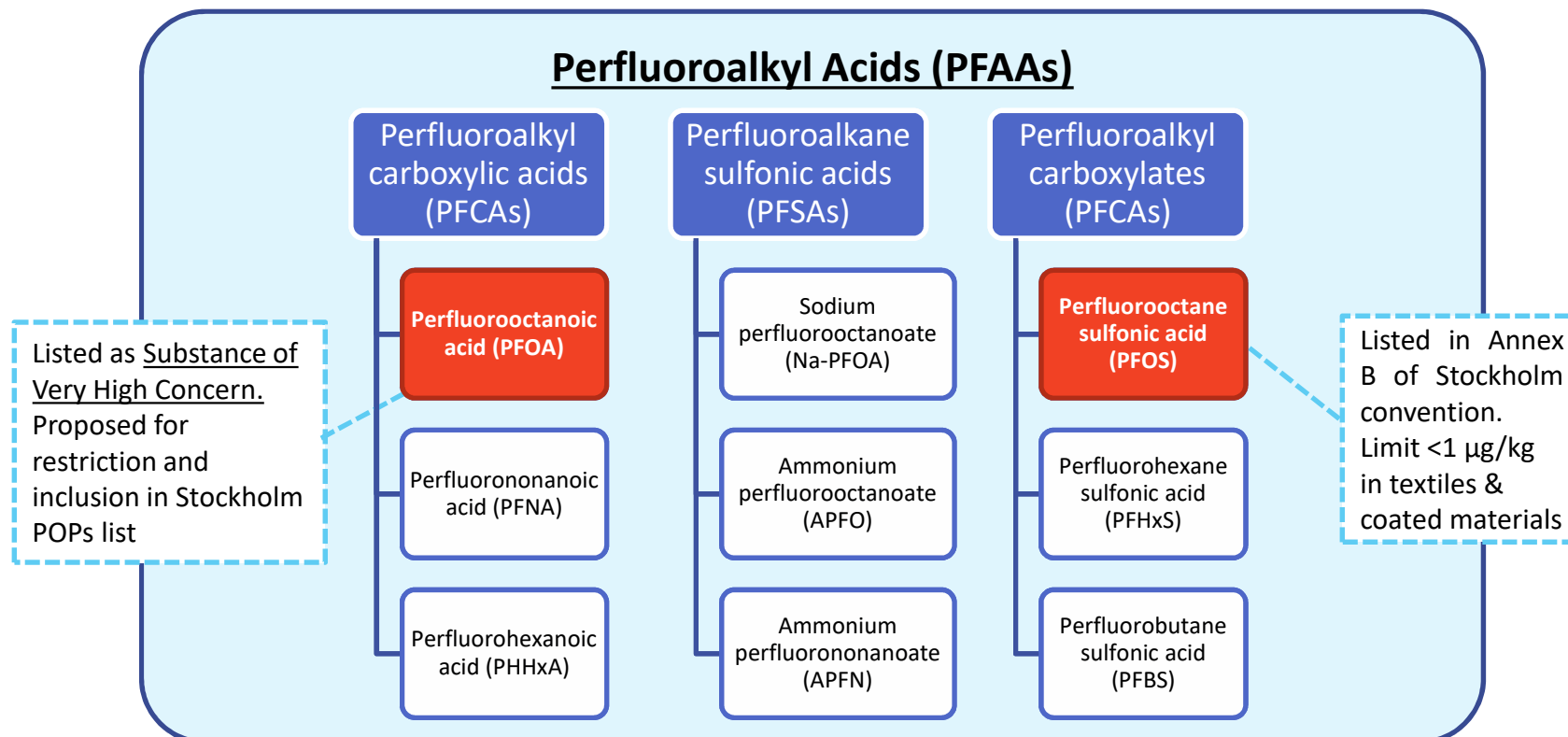
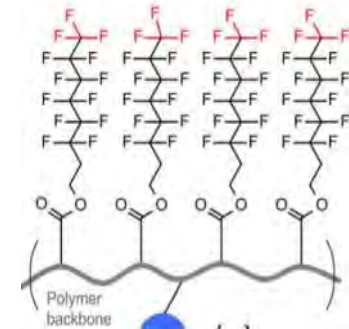
DWOR: Durable Water and Oil Repellents

Chemical products used in the textile finishing industry to provide water and oil repellency in fabrics

Conventional DWORs based on long-chain fluorocarbon (C8)

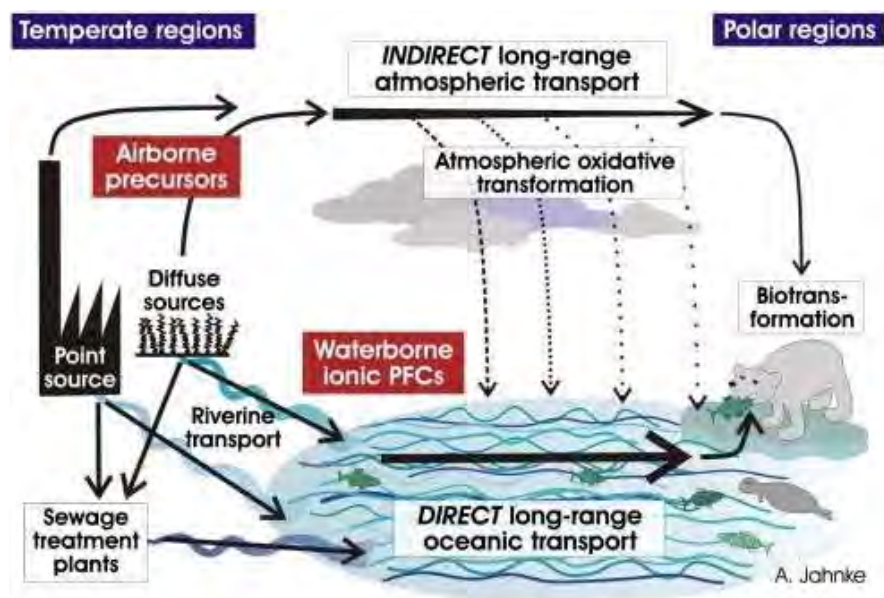
Main **environmental concern** raised by these DWORs is that its **fluorinated chains** may be **severed from the polymeric backbone**, releasing perfluoroalkyl substances (PFAs) that degrade to perfluoroalkyl acids (PFAAs)

Among the different PFAAs, two compounds are the most concerning and studied: Perfluorooctanoic acid (PFOA) and Perfluorooctane sulfonic acid (PFOS).





Persistent and bioaccumulative chemicals represent a high-risk to both the ecosystem and humans





Let's make a more sustainable world

The project is studying how the environmental impact of DWORs can be mitigated by using non-toxic alternatives



Aims and objectives

Aims:

- To evaluate the **environmental impact** of current DWORs and their alternatives
- To evaluate the risks posed to **human** and **environmental** health
- To compare the **technical performance** between current and alternative DWORs

REDUCE OF THE EMISSION AND EXPOSITION TO TOXIC COMPOUNDS DERIVED FROM THE USE OF DWORS

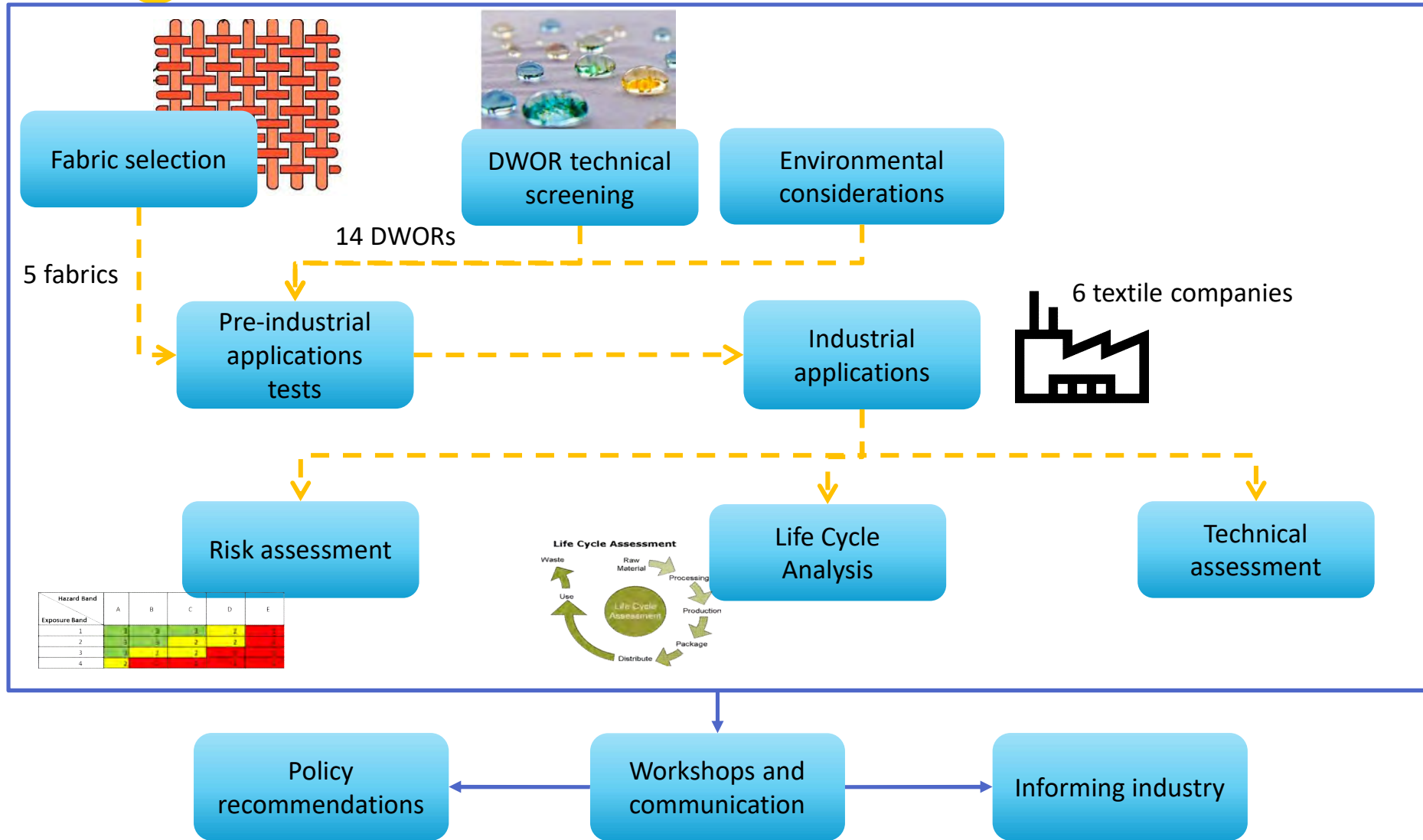


Partners





Project Outline



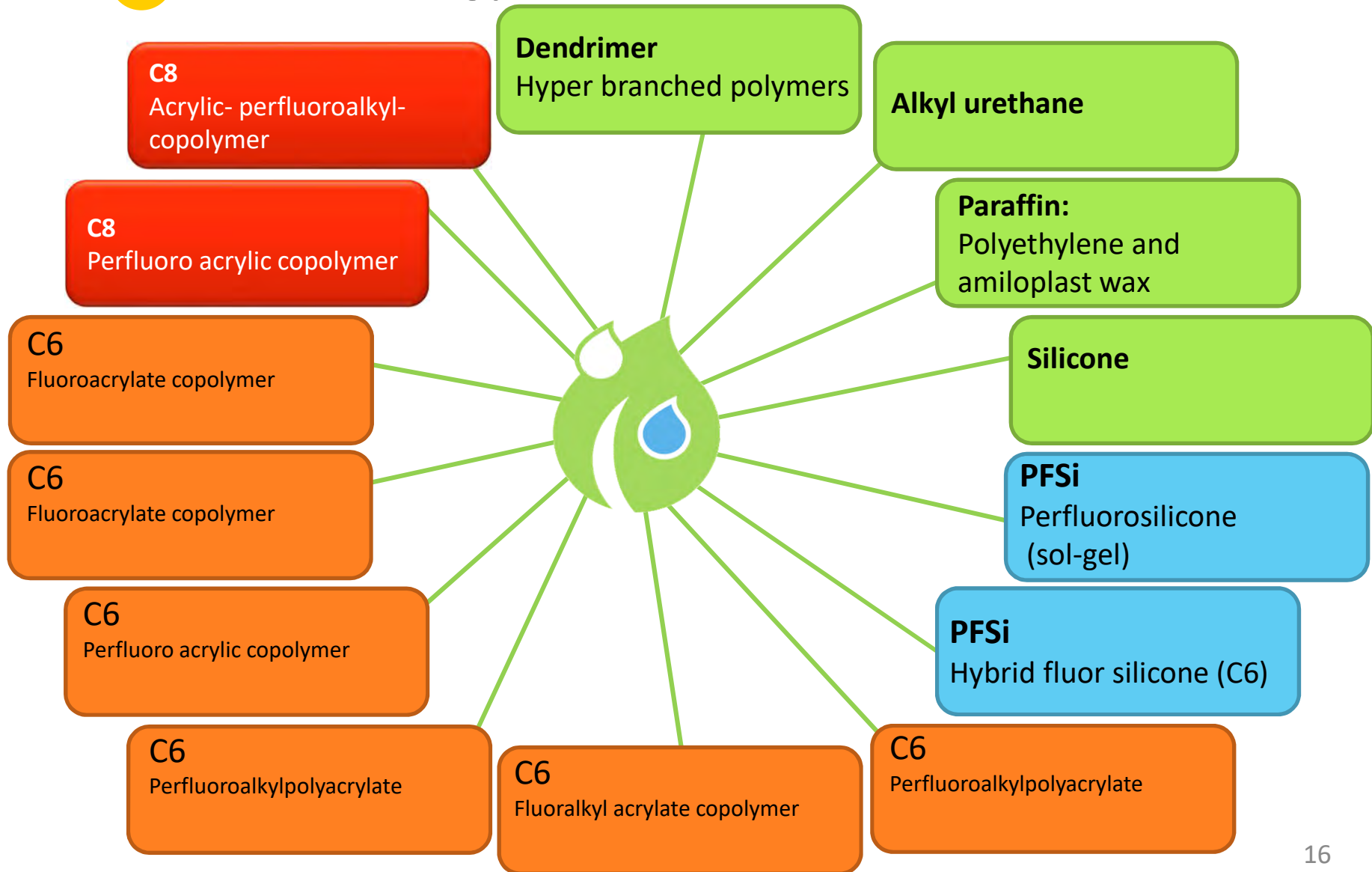


Textile applications and fabrics





DWOR finishing products selected

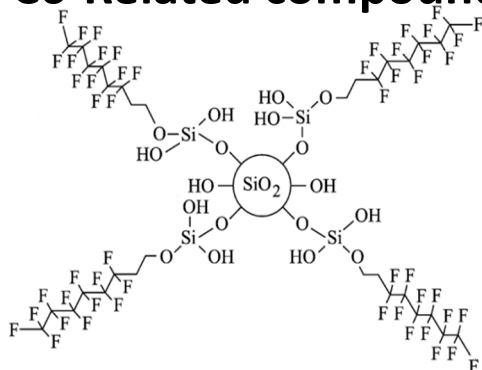


Fluorinated-DWORs

Side-chain fluorinated polymers based on C8 or C6

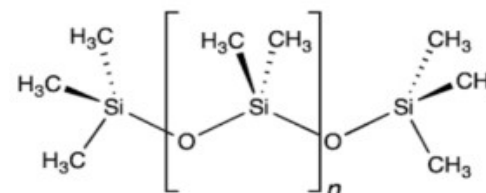


(Perfluorosilicone)
C6-Related compound

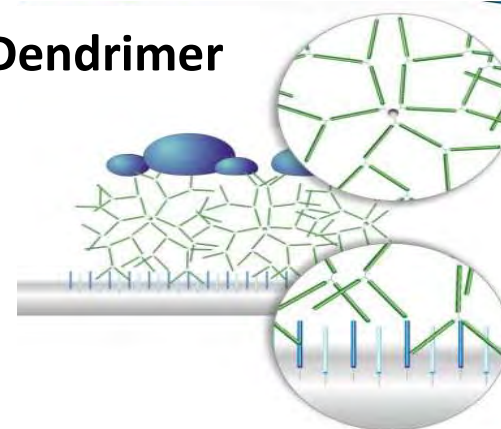


Fluorine-free DWORs

Silicone

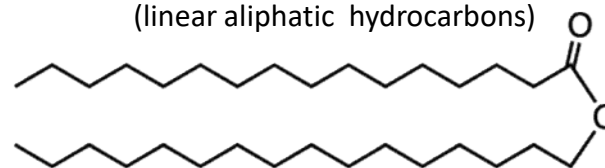


Dendrimer



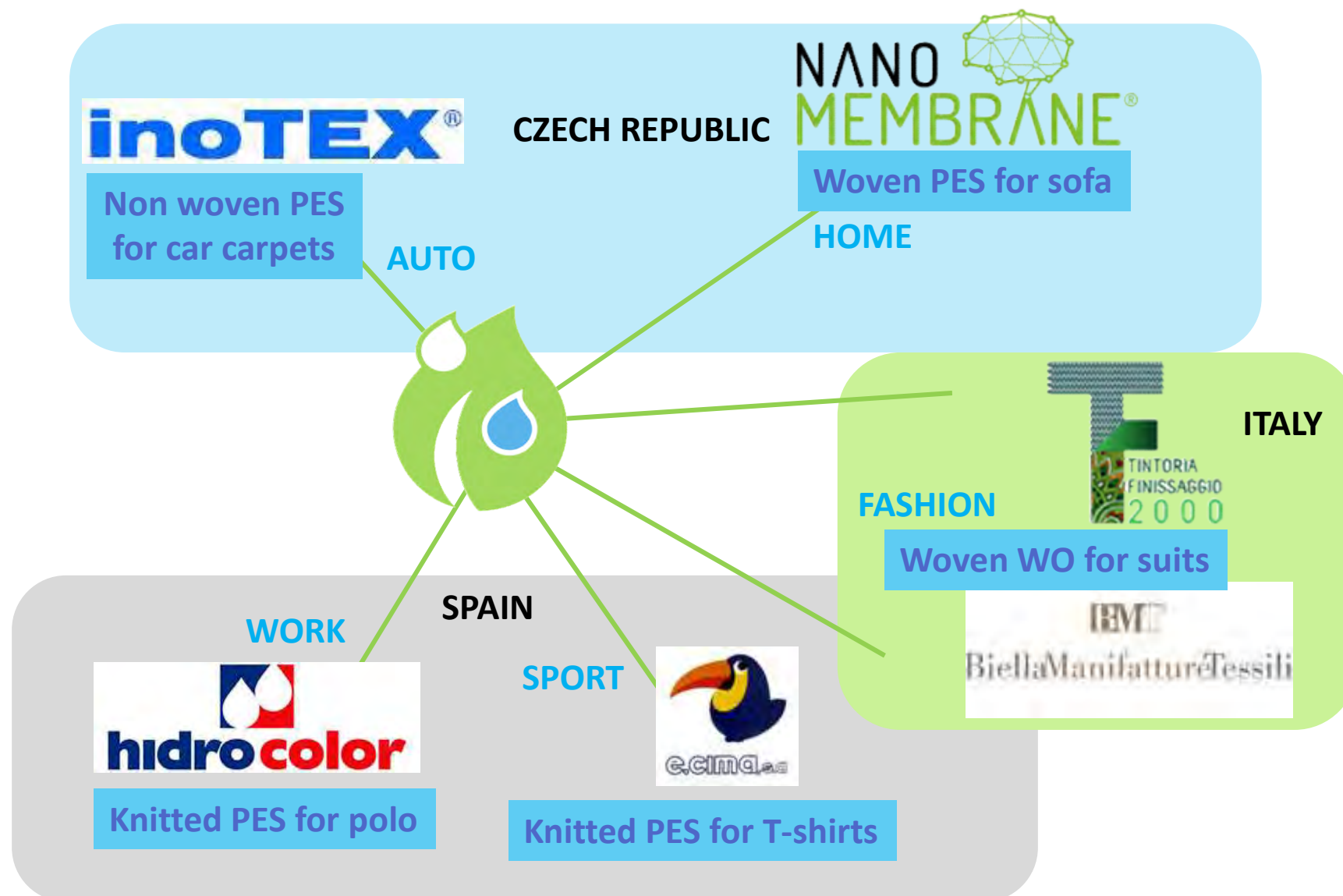
Long chain alkanes

(linear aliphatic hydrocarbons)



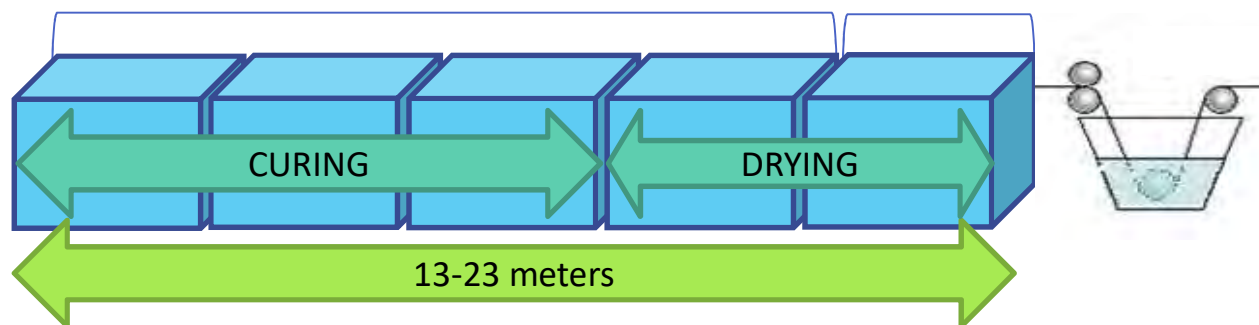


Industrial demonstration partners



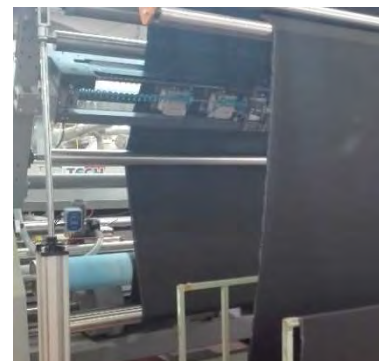
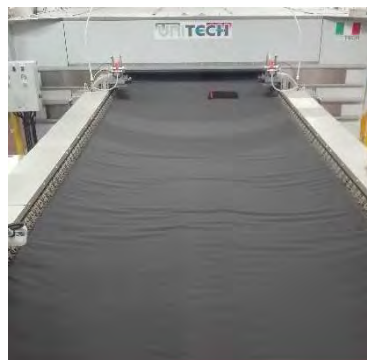


Industrial demonstration

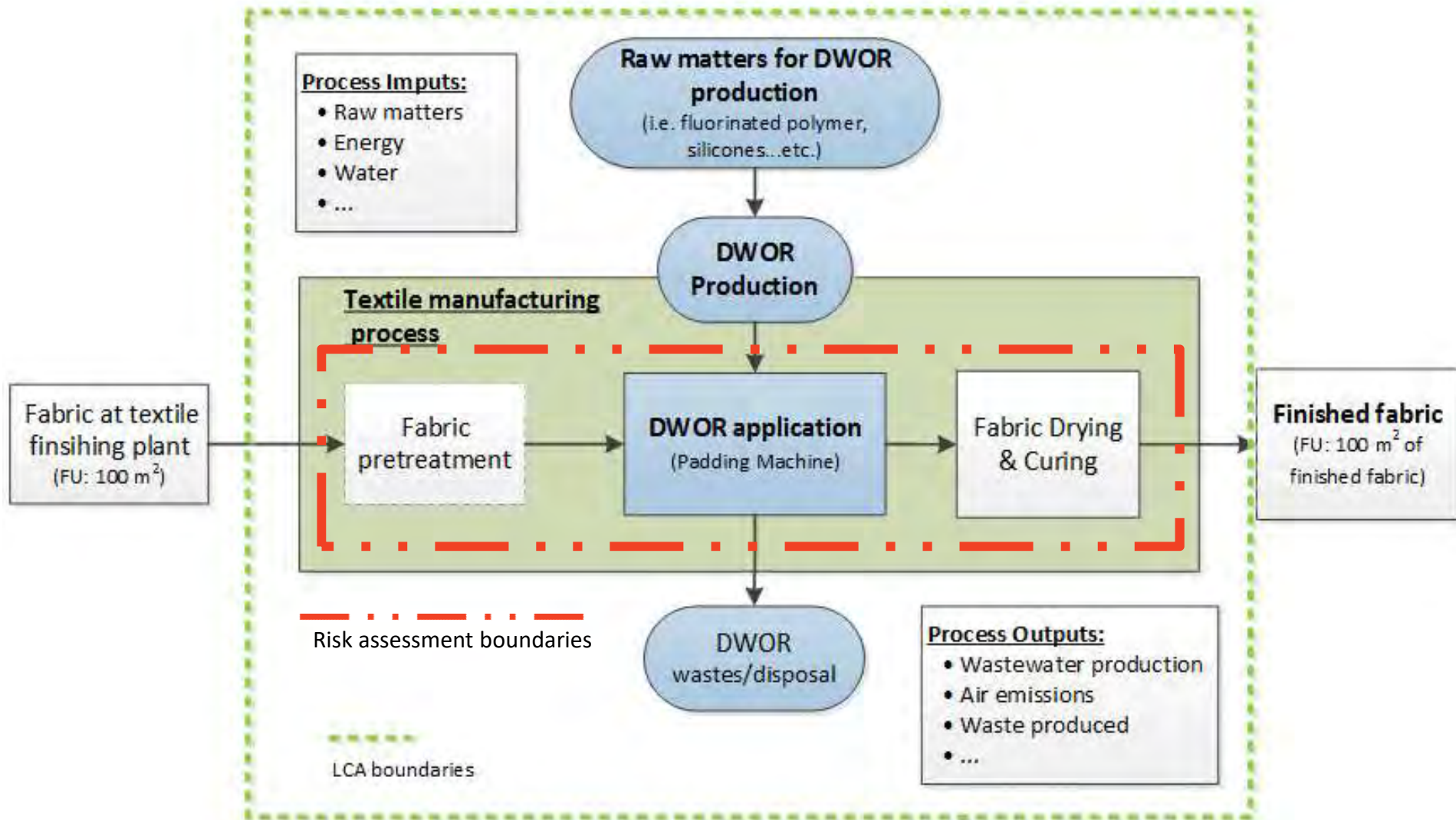


Goals:

- Gather data for **hazard exposure** parameters
- Gather data for **life cycle assessment** and **environmental impact**
- Validate **technical results** of DWORs



LCA and Risk Assessments boundaries





Risk assessment methodology: Stoffenmanager

In **control banding**, the substance is initially assigned to a **hazard band**, using the hazard classification of the substance. Based on the occupational activity, the **substance properties** and **potential for exposure**, a exposure band is derived. Then, the **risk score** is calculated with the **priority bands** (high, moderate and low).

Company specific operating conditions determined (questionnaire, visual assessment, process used, safety measures...)

Product specific inherent hazards (MSDS, databases, etc.)

Hazard Band \ Exposure Band	A	B	C	D	E
1	3	3	3	2	1
2	3	3	2	2	1
3	3	2	2	1	1
4	2	1	1	1	1

Priority bands in the Stoffenmanager:

Hazard: A=lowest hazard and E= highest hazard.

Exposure: 1= lowest exposure and 4=highest exposure.

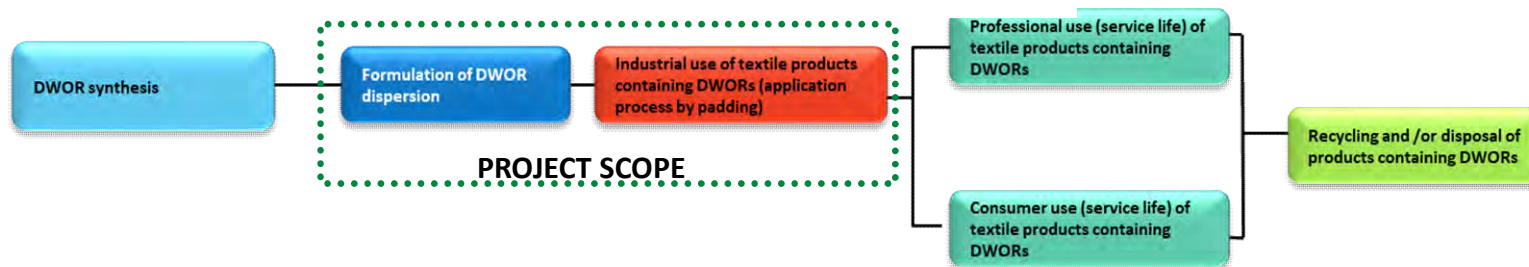
Overall result: 1= highest priority and 3=lowest priority.

Hazard band assignment

	Chemical family of active ingredient	Substance for the hazard assessment	Hazard profile of the Substance for Hazard Assessment	Stoffenmanager hazard band
Fluorinated	Polymer based on C8	PFOA	HARM. CLASS.*: Acute Tox. 4 (H302); Eye Dam. 1 (H318); Acute tox. 4 (H332); Carc. 2 (H351); Lact. (H362); STOT RE 1 (H372-liver); Repr. 1B (H360D)	D
		PFOS	HARM. CLASS.*: Acute Tox. 4 (H302); Acute tox. 4 (H332); Carc. 2 (H351); Lact. (H362); STOT RE 1 (H372); Repr. 1B (H360D)); Aquatic Chronic 2 (H411)	
	Polymer based on C6	PFHxA	Majority of Notifications: Skin Corr. 1B (H314)	C
		PFSi based on C6	No notified classifications, but in SVHC Candidate List due to read-across with PFOS and other long-chained PFCAs.	
Fluorine-free	Silicone	PDMS	Majority of Notifications: Not classified Other Notifications: Aquatic Chronic 4 (H413); Eye Irrit 2 (H319); Aquatic Chronic 2 (H411)	A
	Dendrimer	Dendrimer	SDS of the commercial product: Skin Irrit 2 (H315); Eye Irrit 2 (H319)	A
	Wax / Paraffin	Wax / Paraffin	Majority of Notifications: Not classified Other Notifications: Eye irrit. 2 (H319)	A



Exposure-significant activities/tasks



Activity /Task Contributing exposure Scenarios (CES)	E.CIMA	HIDROCOLOR	TF2000	INOTEX
Formulation of DWOR dispersion		Weighing /Transfer to tank / Mixing		Weighing /Transfer to tank / Mixing
Filling finishing machine				
Impregnation treatment (padding application) including drying and curing processes	Padding including drying and curing processes			



Hatched box indicated the activity is carried out for that process but is not considered exposure significant (confined automatic process)



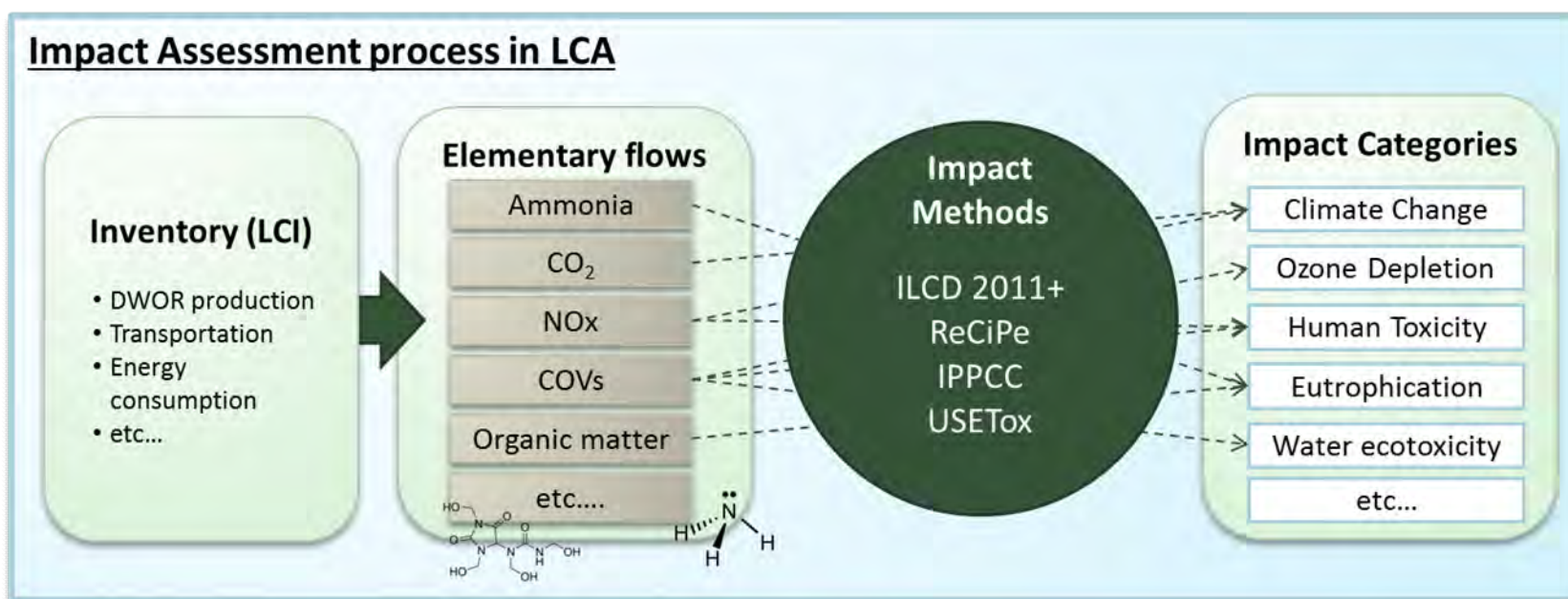
Risk assessment summary

Hazard Band \ Exposure Band	_*	A	B	C	D	E
1	PFSi (less duration, frequency product use volume)	3	3 DENDRIMER	3	2 C8 (less duration, frequency product use volume)	1
2	PFSi (more duration, frequency product use volume)	3	3	2	2 C8 (more duration, frequency product use volume)	1
3		3	2	2	1	1
4		2	1	1	1	1

* No CLP hazard classification

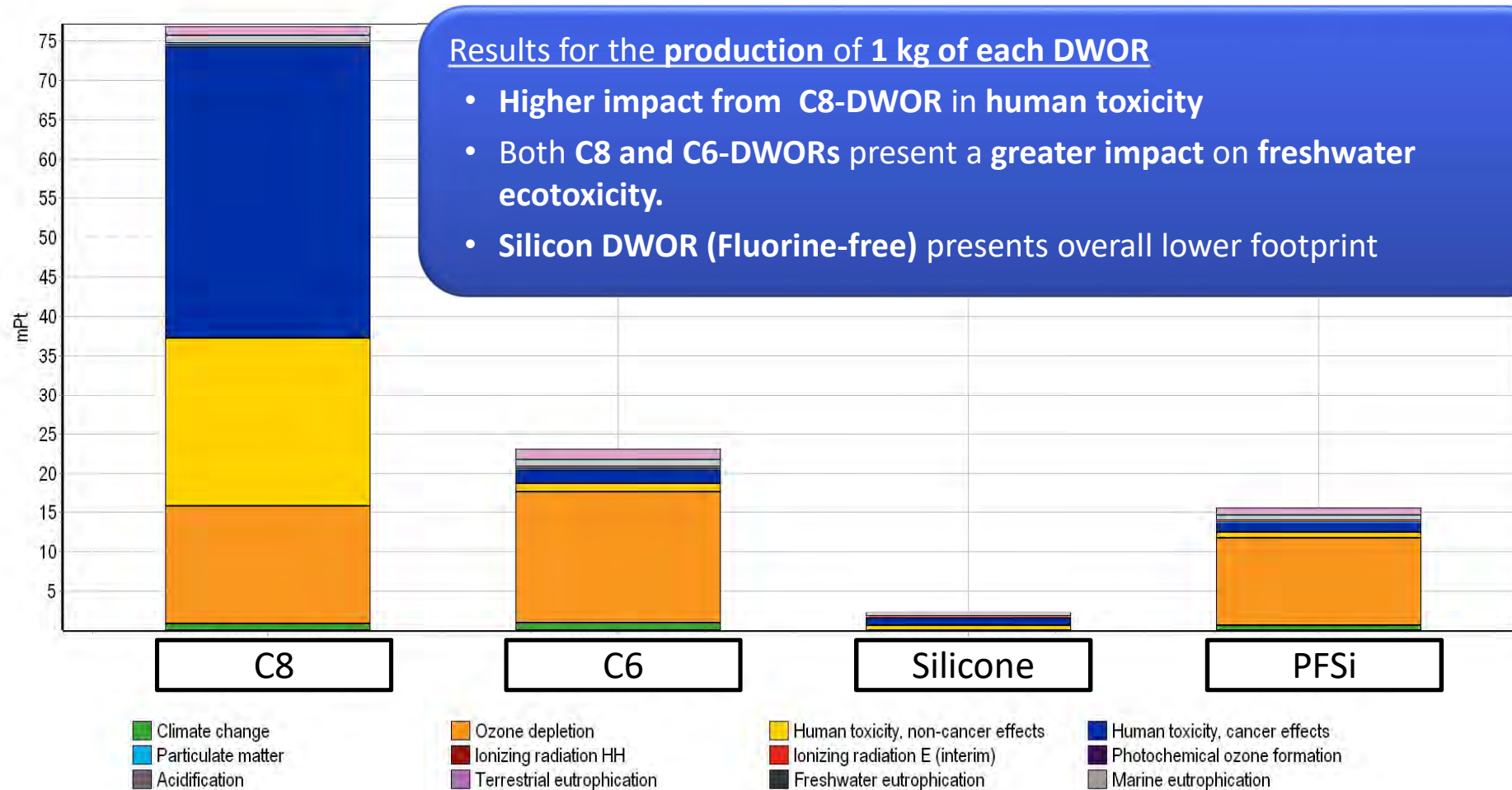


Environmental impact: LCA



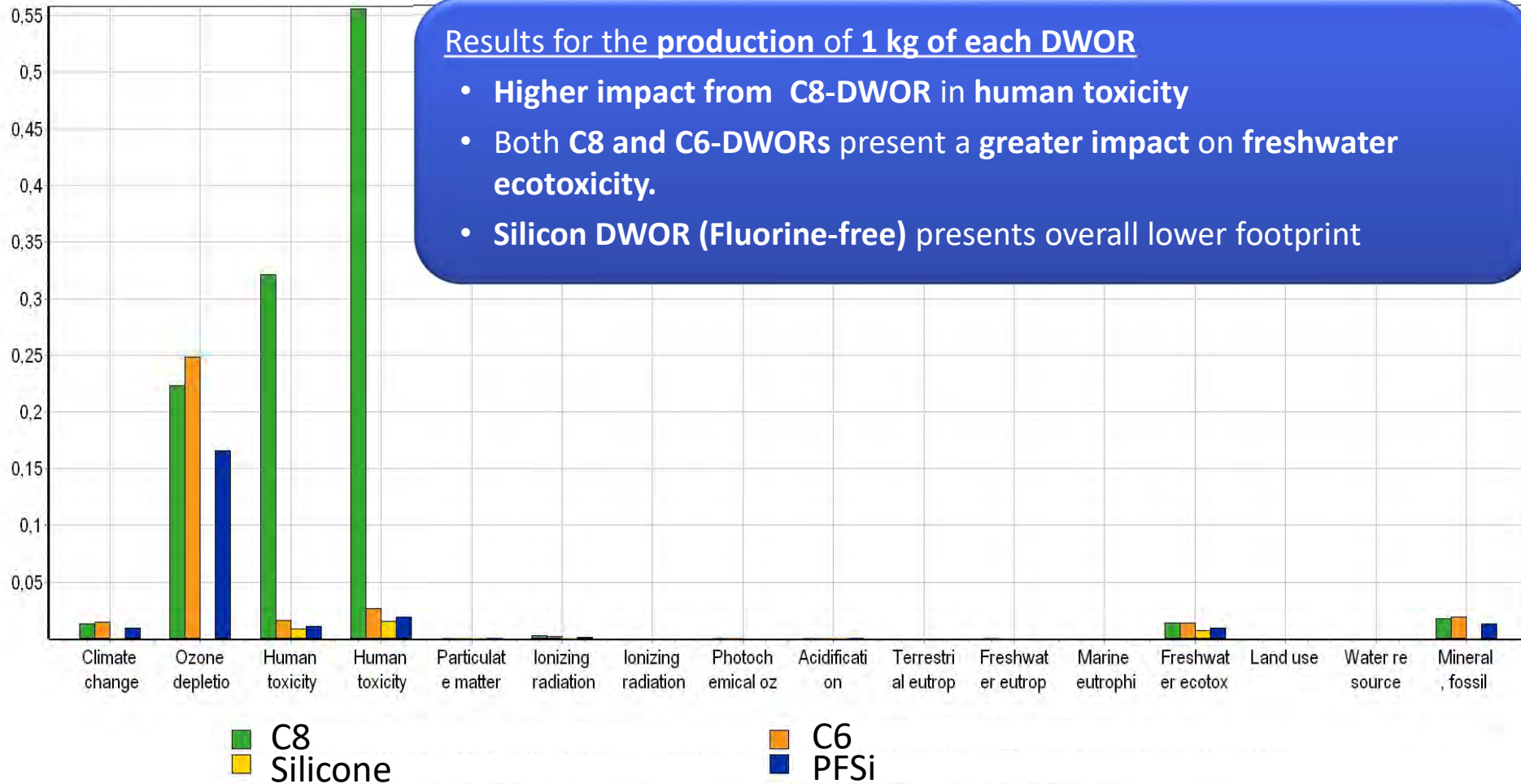


Environmental impact: LCA





Environmental impact: LCA





Technical results summary

AUTO

SPORT / WORK

HOME

FASHION

AATCC 22,
UNE EN ISO 4920

			Polyester nonwoven	Polyester knitted	Polyester woven	Wool woven
Water repellency	PFCs	C8	3,5	4,5	5	3
		C6	5	4,5	3	3
		PFSi	2,5	4,5	4,5	<i>not tested</i>
	F-free	Silicone	3	2	<i>not tested</i>	<i>not tested</i>
		Dendrimer	2,5	4,5	2,5	2
		Paraffin	2	0,5	2,5	2,5
		Alkyl urethane	2	2	4,5	<i>not tested</i>

AATCC 118,
UNE EN ISO 14419

			Polyester nonwoven	Polyester knitted	Polyester woven	Wool woven
Oil repellency	PFCs	C8	8	5,5	6,5	0
		C6	6,5	5,5	2	2,5
		PFSi	6,5	5	6	<i>not tested</i>
	F-free	Silicone	0	0	<i>not tested</i>	<i>not tested</i>
		Dendrimer	0	0	0	0
		Paraffin	0	0	0	0
		Alkyl urethane	0	0	0	<i>not tested</i>

Unwashed

10 washing cycles + ironing

*10 washing cycles + ironing**

1 dry cleaning cycle + ironing

* Only the industrial samples have been ironed -- Bold indicates results from tests performed on the industrial demonstration



Summary and conclusions

- ◉ There is **NO easy drop-in substitute DWOR**
- ◉ Case-by-case studies are needed to evaluate if oil repellency is actually required
- ◉ The finishing product selection should be done according to the **final application** (fashion, workwear, sport, upholstery, automotive...).
- ◉ **Fluorine-free durable water repellents are available** and demonstrated technically: dendrimers and silicone
- ◉ Environmental and occupational safety **impact is diminished** for fluorine-free products



Open questions / recommendations

Need to evaluate whether **oil repellency** is actually **required**

- Substitution should follow a case-by-case review. For example:
 - § **Personal protective equipment** for oil rigs needs oil repellency and only currently available solutions are fluorinated compounds (PFSi / C6).
Fluorinated C6 chemistry should **not be banned** as no fluorine-free substitute has been identified yet providing oil repellency
 - § Does **fashion clothing** actually need oil repellency? Water repellency is not enough.
Fluorine-free solutions **are available** for water repellency.
Industry might focus on these alternatives providing only water repellency to mitigate the environmental impact



Mitigation of environmental impact caused by **Flame Retardant** textile finishing chemicals

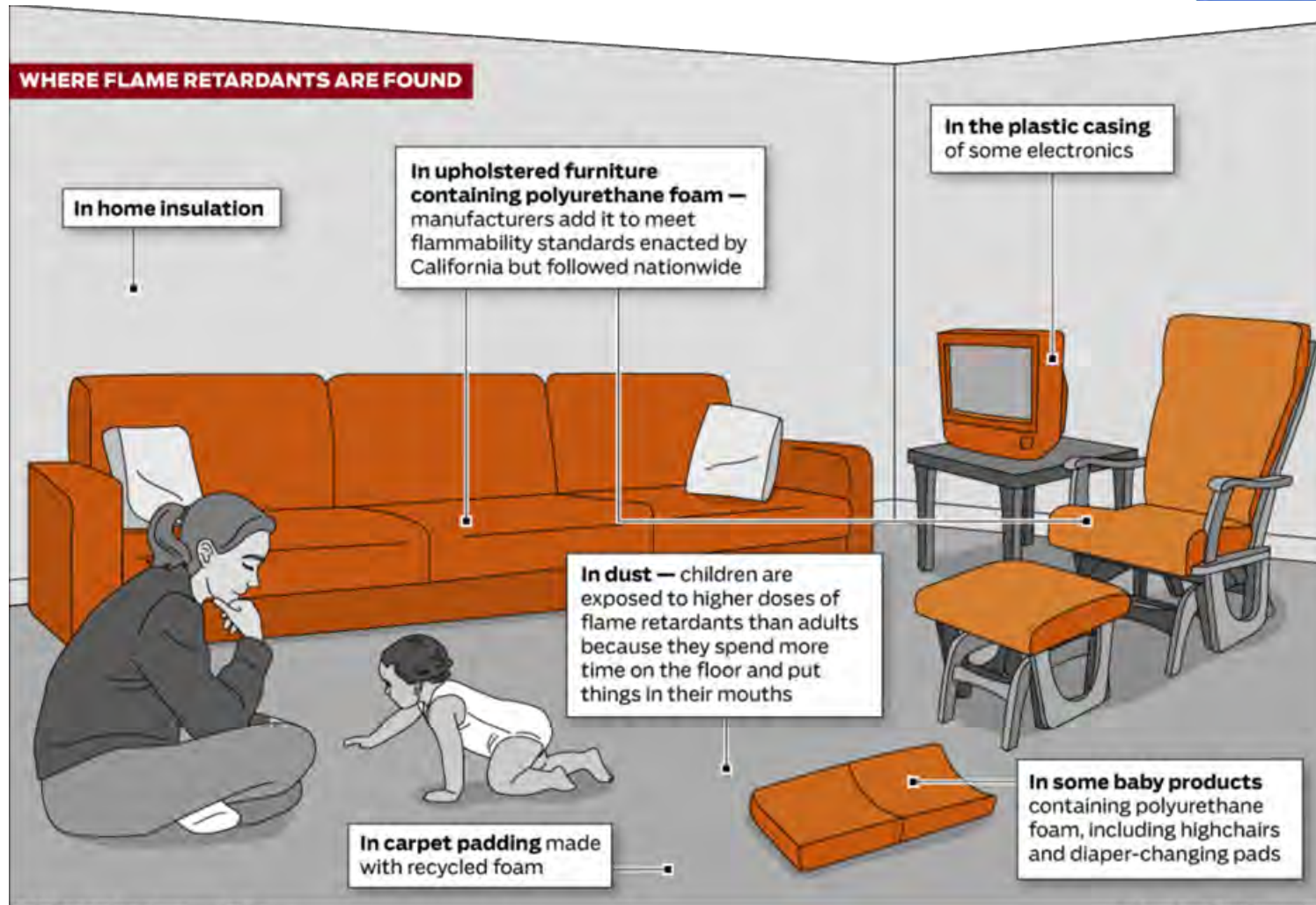
Coordinating
partner:



Beneficiary
partners:



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SOURCES: EPA, Tribune reporting

KATIE NIELAND/TRIBUNE

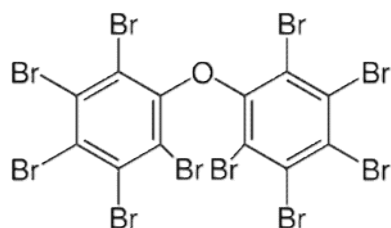


Flame retardants are needed



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Some flame retardants
are **HARMFUL!**



Others are **UNCLEAR**
yet





**We are committed to a safer and
more sustainable world**

Are you? 

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PROJECT TARGET



>20% reduction

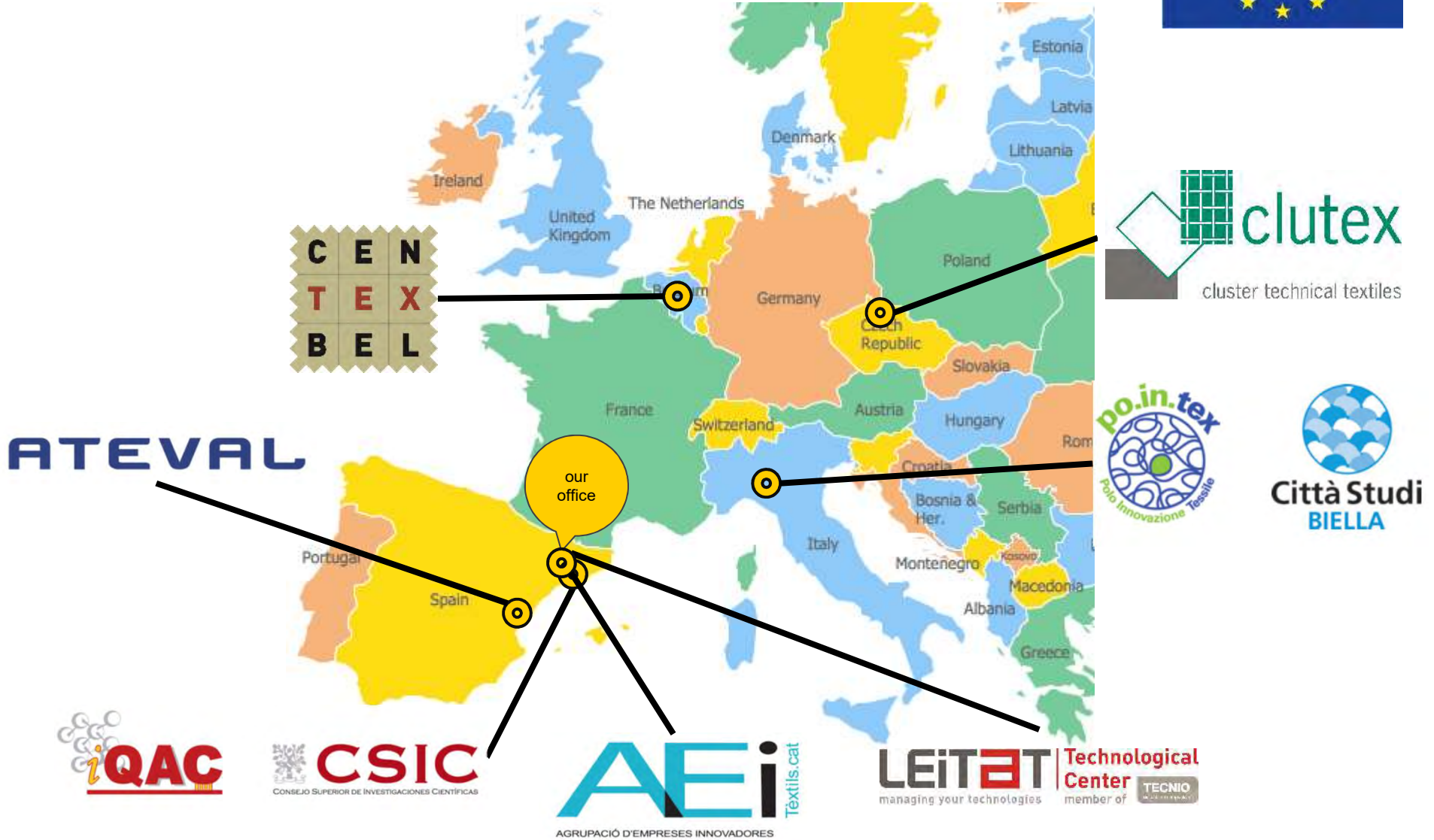
of tonnage use of **harmful** flame retardant compounds

100%

Commitment to success and
to environmental sustainability!



PROJECT CONSORTIUM



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- To apply the substitution principle to FR chemicals
- To demonstrate and evaluate suitable FR alternatives
- To encourage the substitution



WHAT THE PROJECT IS AND IS NOT



✗ No

✓ Yes

- ◉ R&D project

We will not develop new FR
We are not your competitors

- ◉ Promoting any ban

We are not fighting anyone

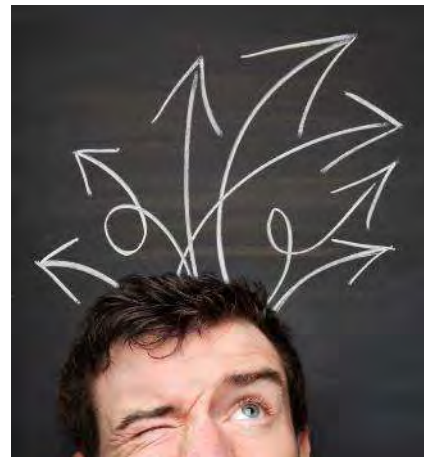
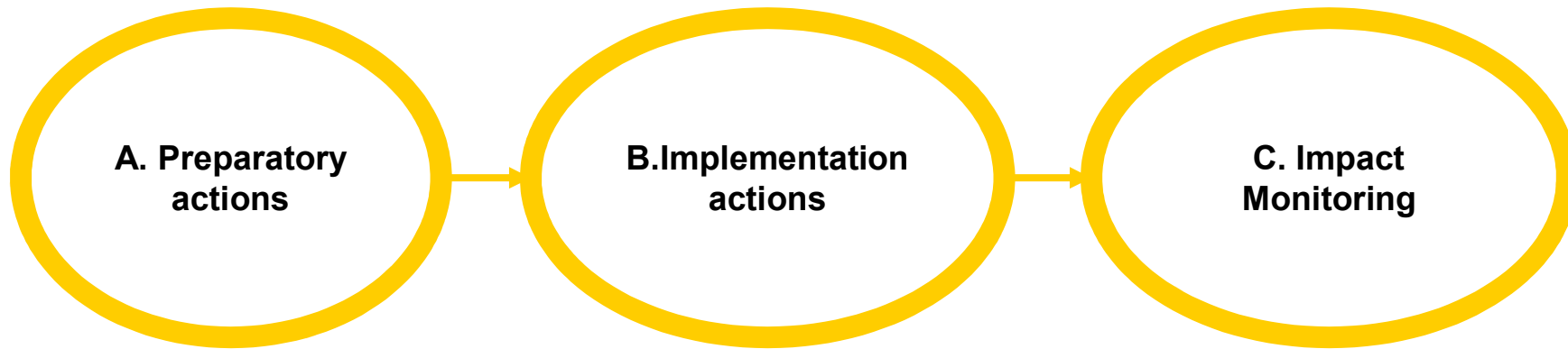
- ◉ Demonstration and validation project

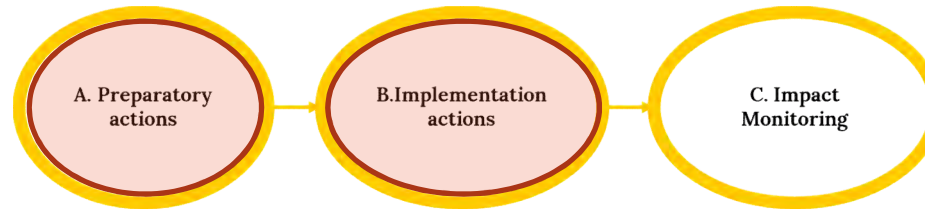
We will evaluate solutions in the market
or close to market

- ◉ Promoting green solutions

We want to support greener solutions
substitution

PROJECT STEPS





Preparatory and implementation actions

○ Selection of FRs and fabrics

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○ Industrial demonstration

Material processing will be tested using the selected FRs under pre-industrial and industrial conditions involving manufacturing SMEs through workshops and on-site pilots



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Impact monitoring

○ Risk assesment

Exposure
Toxicity
Environmental
assessment
Life-cycle assessment

○ Monitoring

Environmnetal impact
Socioeconomic impact
Stakeholder engagement

○ Recommendations

Best practices
Policy recommendations
REACH annexes
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Policy recommendations, impact monitoring on environmental, socio-economic and cost efficient replicability

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Lets
**work
together**

for a safer and greener future

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Grazie per l'attenzione

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