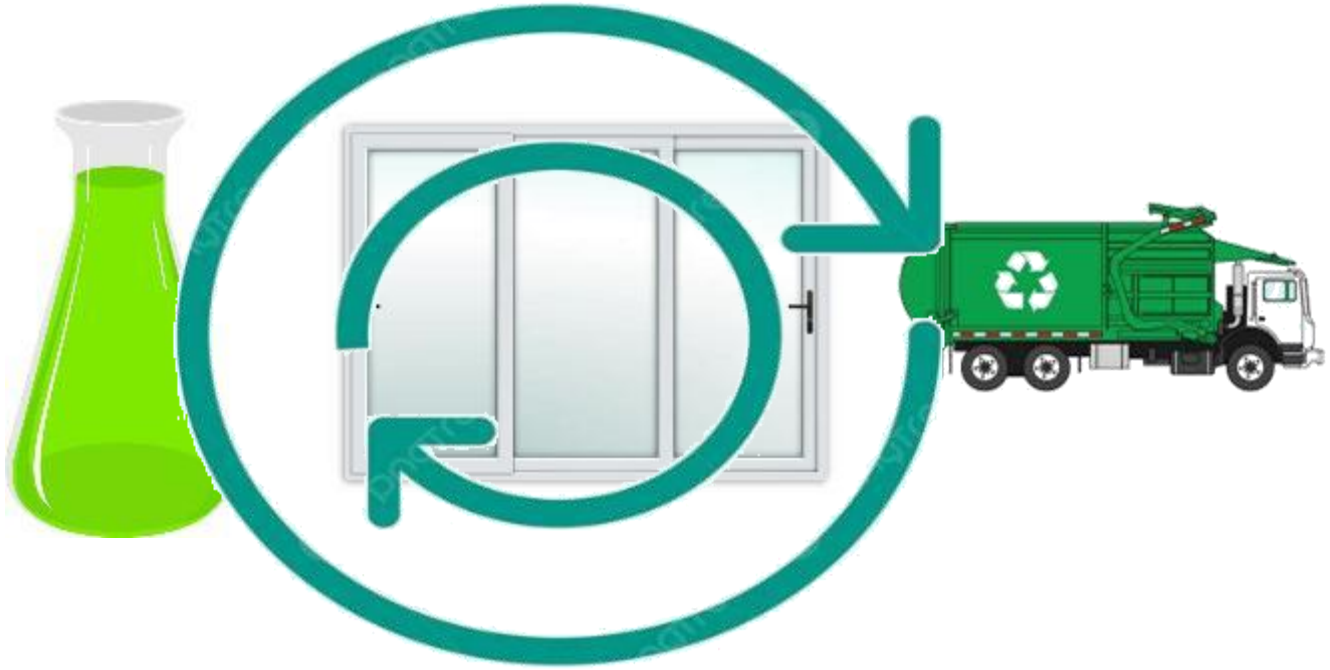
What is ASF (and VSC and the Product Label)?

Supporting the sustainable use of PVC and its additives



Professor Mark Everard

mark.everard@uwe.ac.uk; +44-7747-120019

Pundamilia Ltd

What is ASF (and VSC and the Product Label)?

Supporting sustainable use of PVC and its additives

- VinylPlus certifications: ASF in context
  - The Natural Step (TNS) approach
- VSC (VinylPlus Supplier Certificates)
- ASF (Additive Sustainability Footprint)
- Working towards a ‘level playing field’

Additive Sustainability Footprint (ASF): Where does it fit?

Construction, procurement, disposal

Ethical and ‘de-risked’ procurement

Specifiers (purchasers)

The VinylPlus Product Label

https://productlabel.vinylplus.eu/

PVC articles (products)

VinylPlus Supplier Certificates

https://productlabel.vinylplus.eu/vinylplus-supplier-certificates/

PVC compound

PVC additives

Additive Sustainability Footprint

https://www.vinylplus.eu/sustainability/our-contribution-to-sustainability/additive-sustainability-footprint/

PVC additives

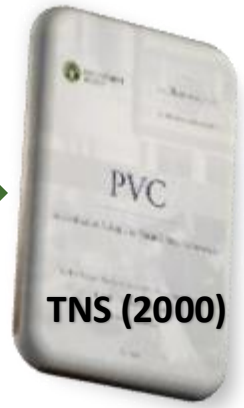
Raw materials

The VinylPlus Product Label

https://productlabel.vinylplus.eu/

PVC articles

1. VinylPlus partnership programme
2. Organisational management
3. Supply chain management



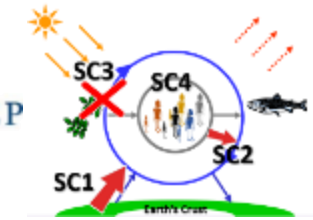
TNS (2000)

4. Controlled loop
5. Emissions / sustainable resin
6. Use of additives
7. Energy / climate
8. Value chain connections

TNS System Conditions

1.
2.
3.
4.

the NATURAL STEP



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A scientific basis for sustainable development

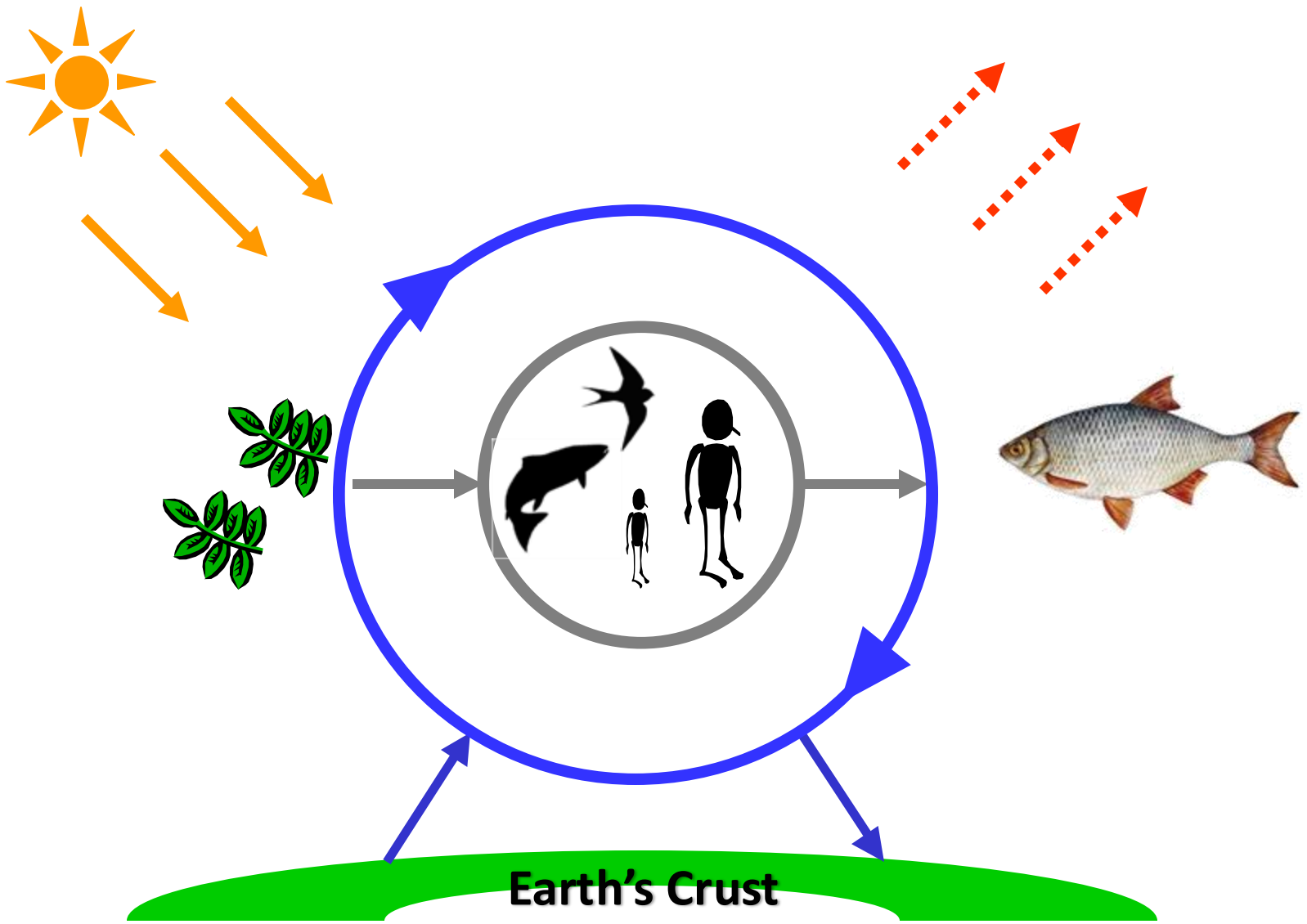
Disagreements:

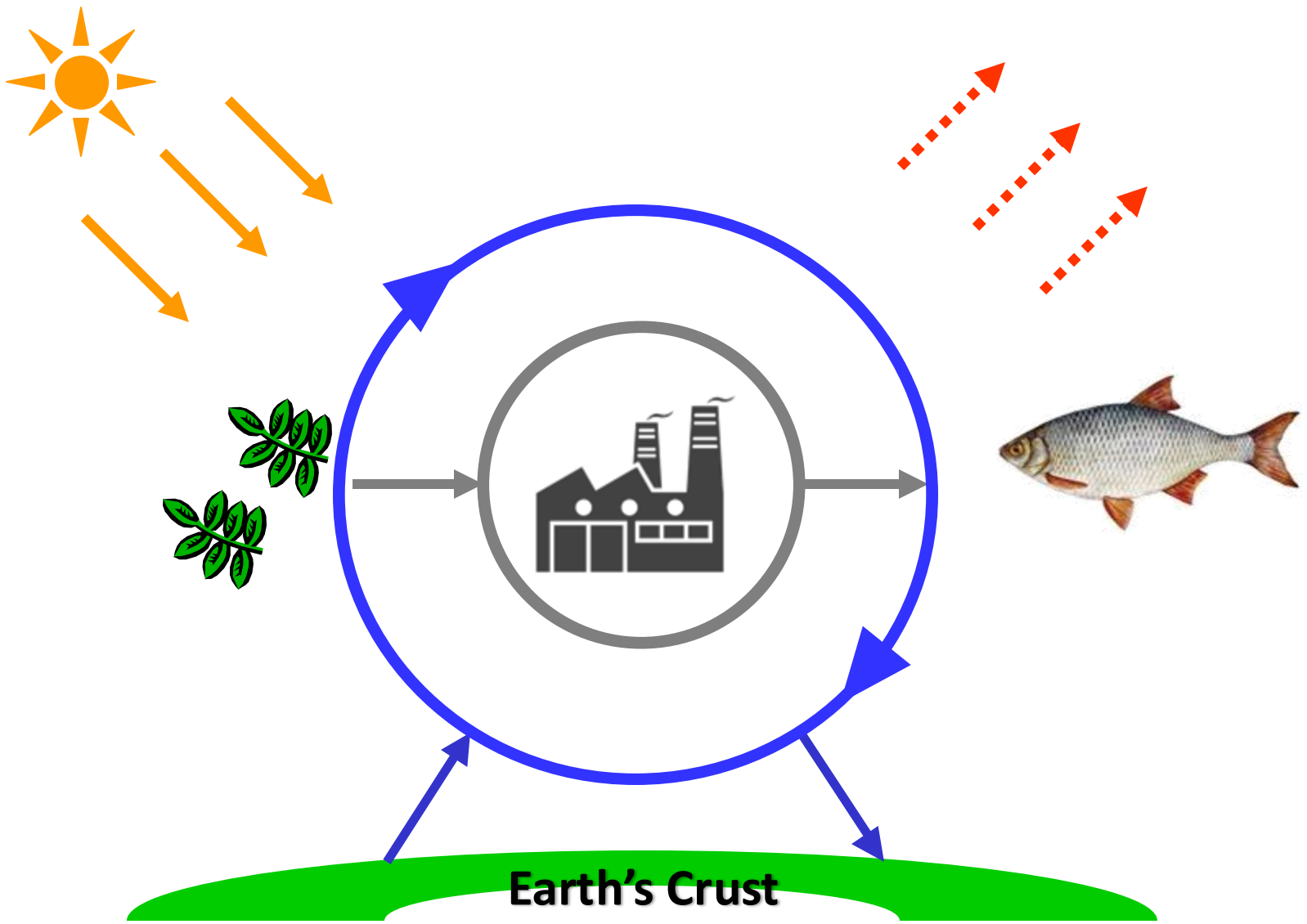
- Ecotoxicology
- Epigenetics
- Persistence
- Metabolites
- Vulnerable species
- Vulnerable humans
- Etc.

the NATURAL STEP

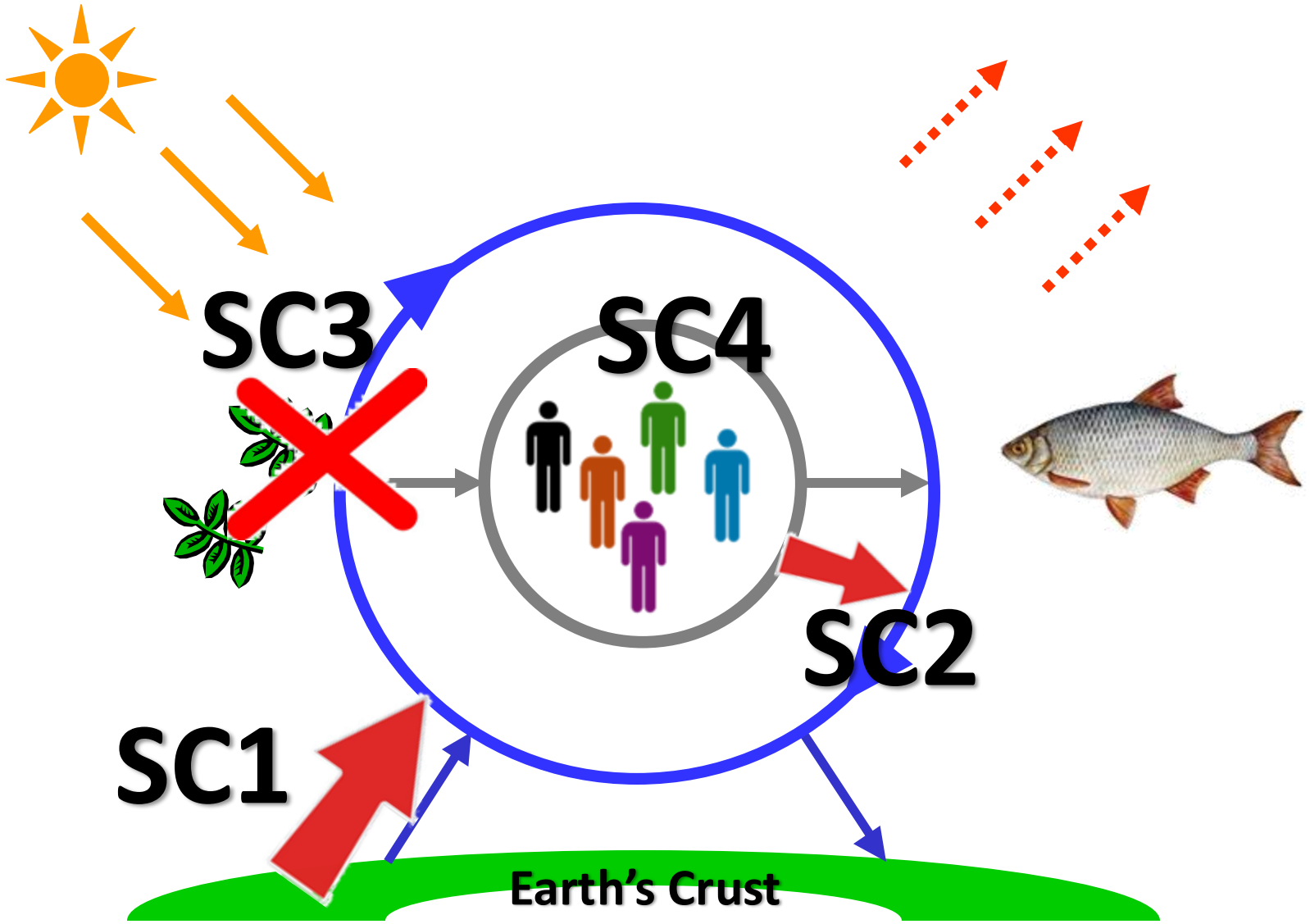
Uncontested ‘Natural laws’:

- Thermodynamics
- Principle of matter conservation
- Cell biology
- Biospheric processes


Earth's Crust

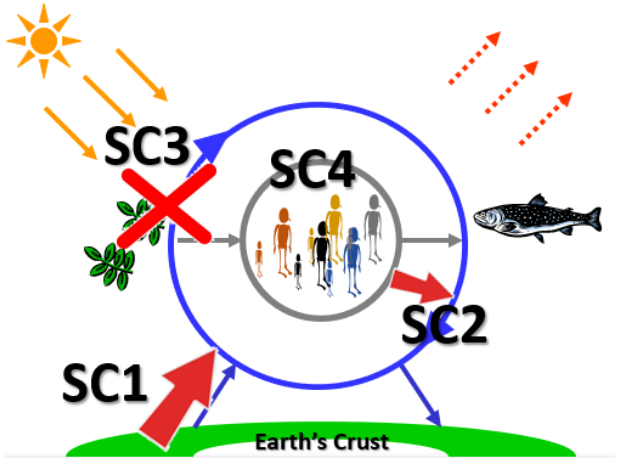

Earth's Crust

The four TNS System Conditions (SCs)



The four TNS System Conditions (SCs)

the NATURAL STEP



In the sustainable society, nature is not subject to systematically increasing…

1… concentrations of substances extracted from the **Earth's crust**

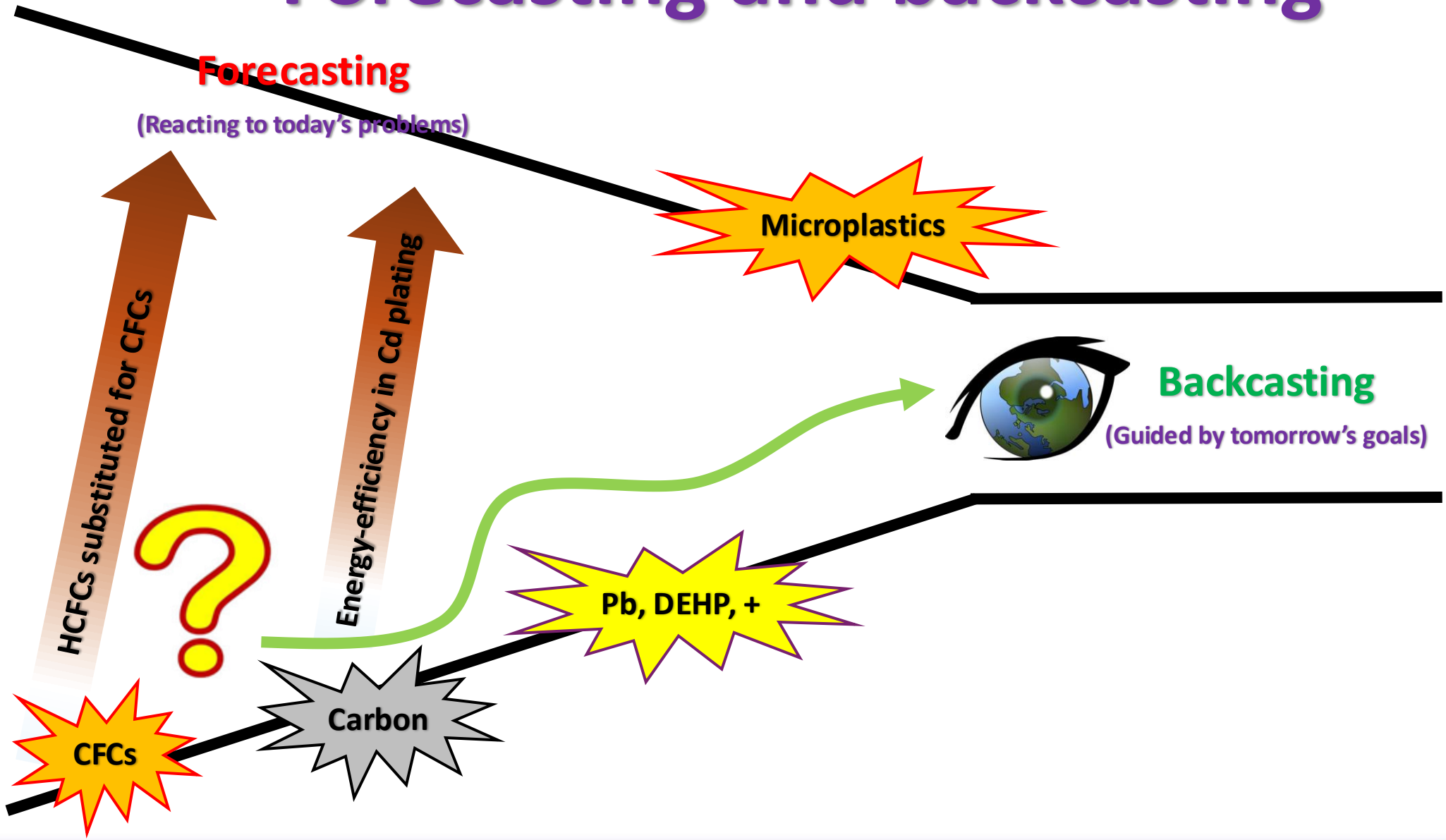
2….concentrations of substances **produced by society**

3… degradation by **physical means**

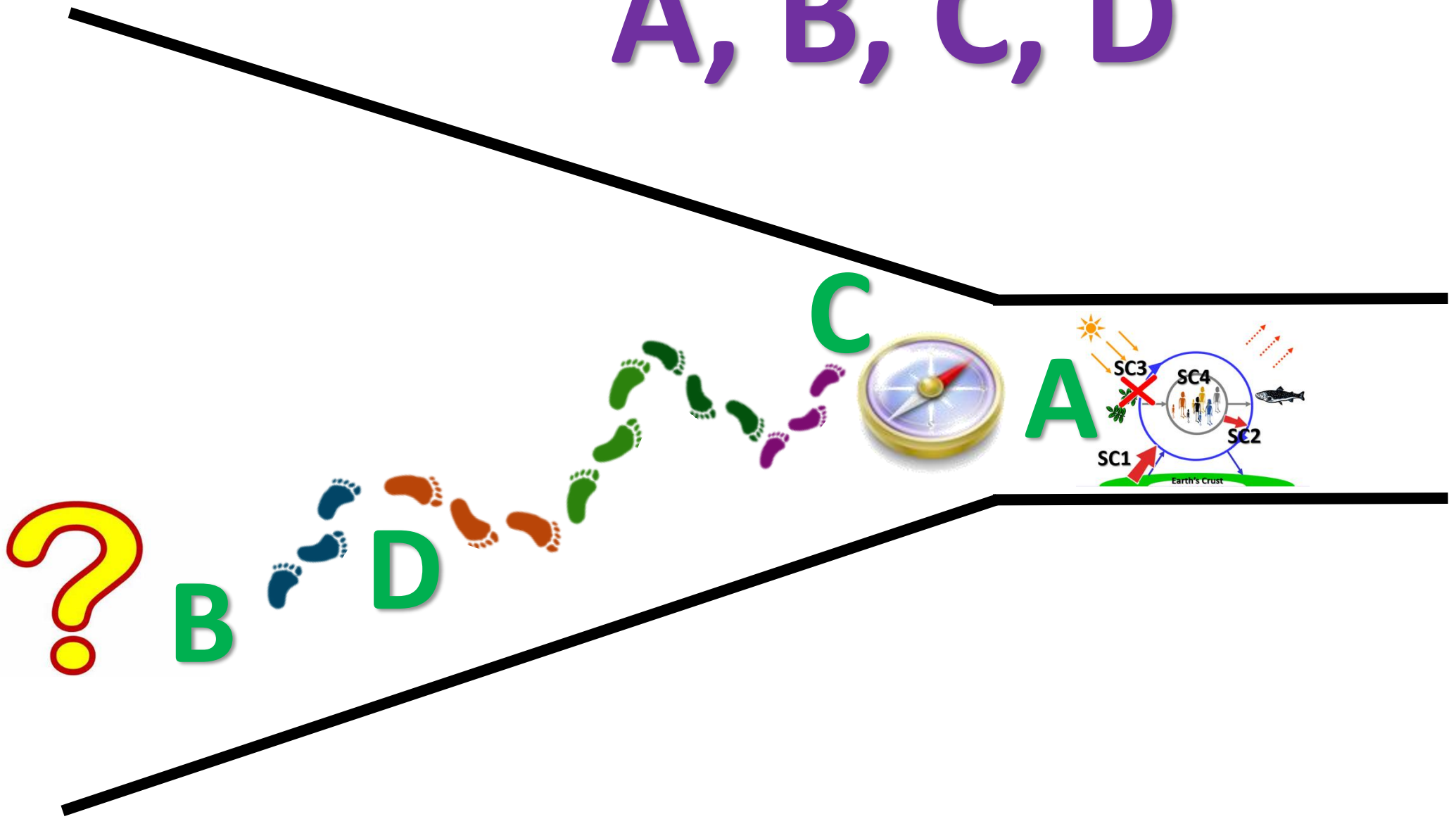
and, in that society

4… people are not subject to conditions that systemically undermine their **capacity to meet their needs**

Forecasting and backcasting



A, B, C, D



the NATURAL STEP

1. VinylPlus partnership programme
2. Organisational management
3. Supply chain management
4. Controlled loop
5. Emissions and sustainable resin
6. Use of additives
7. Energy/climate
8. Value chain connections

verified vinyl®

vinyl plus

VinylPlus® Supplier Certificates

Additive Sustainability Footprint

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VinylPlus Supplier Certificates

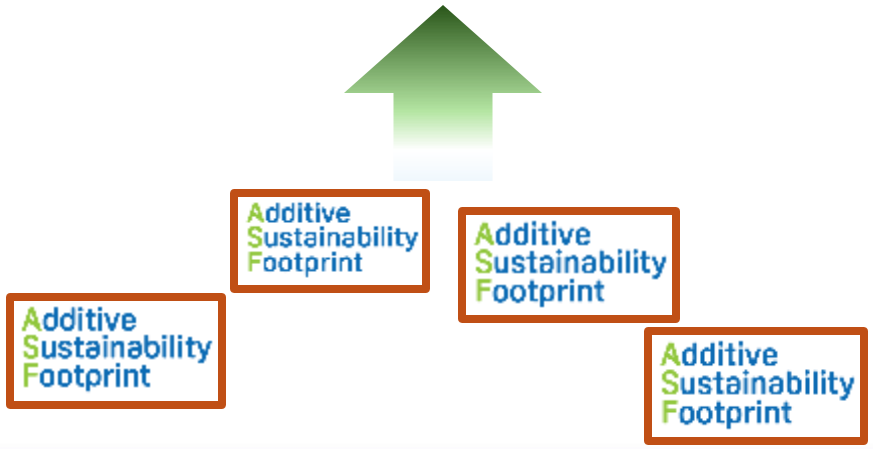
https://productlabel.vinylplus.eu/vinylplus-supplier-certificates/

PVC compound

PVC additives

1. VinylPlus partnership programme
2. Organisational management
3. Supply chain management

4. Controlled loop
5. Emissions / sustainable resin
6. Use of additives
7. Energy / climate
8. Value chain connections



VinylPlus Supplier Certificates

https://productlabel.vinylplus.eu/vinylplus-supplier-certificates/

The VSC scheme for PVC additives

Can be applied to:

- A single additive product
- An additive product system
  - Parent additive and ‘mirroring’ products with slight variations
- An additive product range
  - A group of additives with at least one attribute in common

VSC certification is possible when:

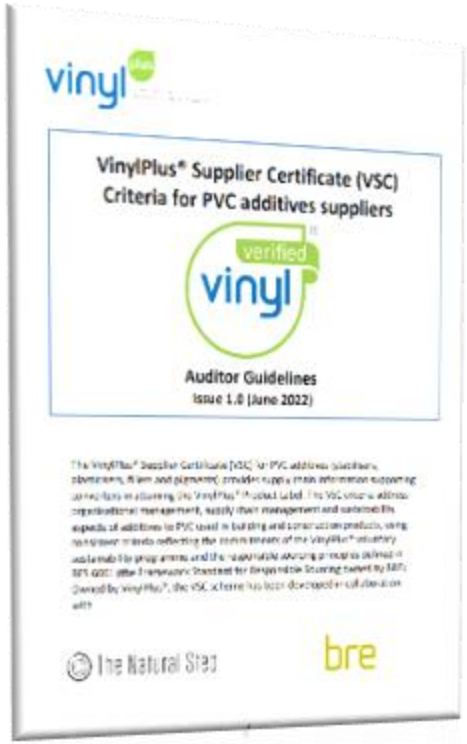
- Requirements are equally met by all additive products of the system or range

In which case:

- A single evaluation per management system and manufacturing location

VinylPlus Supplier Certificates

… steps towards certification



Compulsory

Points

	Requirements	a)	b)	c)	d)	e)	f)	g)	Maximum number of points
1.1	Integration of the VinylPlus programme into company life	C	1, 2 or 3	1					4
2.1	Responsible sourcing policy	C							0
2.2	Legal compliance	C							0
2.3	Quality management system	C	2						2
2.4	Supplier management system	C	1						1
3.1	Material traceability through the supply chain	C	1	Or 2	1	Or 2			4
3.2	Environmental management systems in the supply chain	C	1	Or 2	Or 3				3
3.3	Health and safety management systems in the supply chain	C	1	Or 2	Or 3				3
4.1	Use of recycled PVC	NA	NA	NA	NA				0
4.2	Waste management	C	2	Or 3	1				4
4.3	Product Design for Controlled Loop Material Management	2, 3 or 4							4
5.1	PVC resin used in manufacturing the product	NA	NA						0
6.1	Use of additives in the assessed product	C	1	4	8	1	2	3	19
7.1	Greenhouse gas emission reduction	C	3	Or 5					5
7.2	Energy use	1							1
7.3	Use of renewable energy resources	1	Or 2	Or 3	Or 4				4
7.4	Transport impacts	C	2	1					3
7.5	Lifecycle assessment (LCA)	C	2	Or 3					3
8.1	Demonstrating commitment and communication	C	2	Or 3					3
8.2	Local Communities	C	1	Or 2					3
									65

"The organisation should obtain a total of minimum 43% of maximum number of points (28 points) for certification of the product(s) or product system(s)"

A pre-assessment can be helpful *en route* to formal auditing

External audit

VSC Certificate issued (time-limited)

https://productlabel.vinylplus.eu/wp-content/uploads/2022/06/VinylPlus-Supplier-Certificate_Auditor-Guidelines-1.0-additives-suppliers-202205.pdf

VinylPlus Supplier Certificates

https://productlabel.vinylplus.eu/vinylplus-supplier-certificates/

PVC compound

PVC additives

Why apply for the VSCs?

https://productlabel.vinylplus.eu/vinylplus-supplier-certificates/

- Showcases sustainability efforts
- Helps customers attain the VinylPlus Product Label
- Provides transparency to customers
- Helps converters make sustainable choices
- Benefits from promotion by VinylPlus

And from my own experience…

- Collates policies, codes, guidance addressing ALL dimensions of sustainability
- Identifies gaps / 'blind spots'
- Helps inform responses to diverse customer requests (GRI301, C2C, etc.)
- Promotes awareness, best practice and coherence across the company/site
- Stimulates innovation

What is ASF (and VSC and the Product Label)?

Supporting sustainable use of PVC and its additives

- VinylPlus certifications: ASF in context
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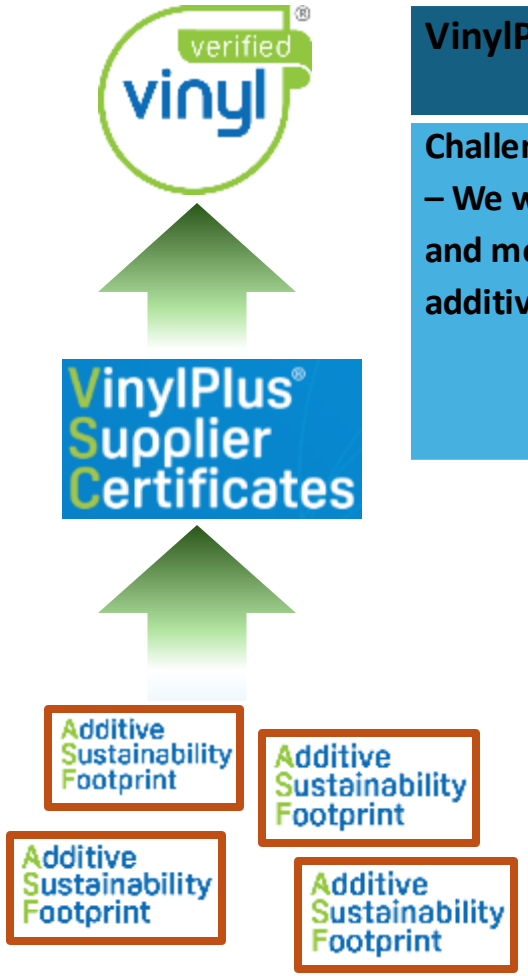
- ASF (Additive Sustainability Footprint)
- Working towards a ‘level playing field’

Additive Sustainability Footprint

https://www.vinylplus.eu/sustainability/our-contribution-to-sustainability/additive-sustainability-footprint/

PVC additives



VinylPlus® Voluntary Commitment	PVC Evaluation using The Natural Step Framework (2000)
Challenge 3. Sustainable use of additives – We will review the use of PVC additives and move towards more sustainable additives systems.	Challenge 4. The industry should review the use of all additives consistent with attaining full sustainability, and especially commit to phasing out long term substances that can accumulate in nature or where there is reasonable doubt regarding toxic effects

- Use across whole product life cycle
- ALL dimensions of sustainability…
  - …unlike most other chemical management approaches
- 'Real world' RISK
  - Not HAZARD alone
- Recognising positive BENEFITS (meeting needs)…
  - …unlike other chemical management approaches
- Unique to application / life cycle
  - Evidence can inform further ASF assessments

The bad stuff...

...the good stuff

Potential for hazard

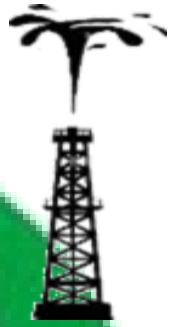
REACH

ecovadis

LCA

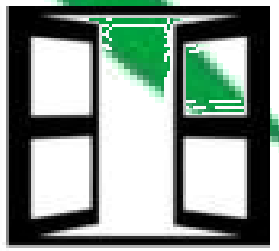
EPD

PEF



ASF
(Additives)

Risk across whole product life cycle



Meeting needs

SUSTAINABLE DEVELOPMENT GOALS

The peer-reviewed ASF paper (2019)

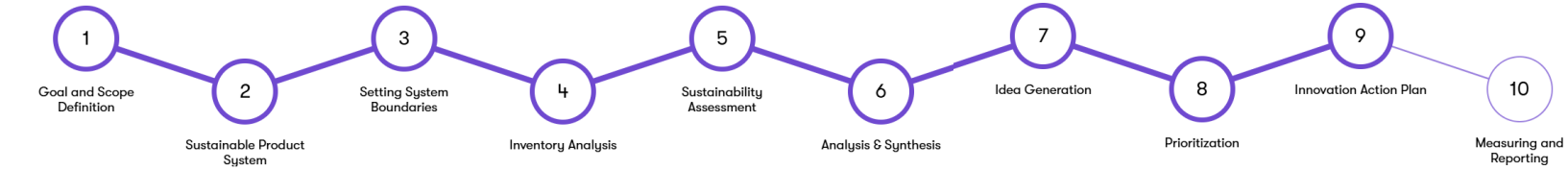

Additive Sustainability Footprint: Rationale and Pilot Evaluation of a Tool for Assessing the Sustainable Use of PVC Additives

- Published as Open Access
  - Downloadable for free
- Peer-reviewed with no industry co-authors
- External validation of robustness
- Explains structure and process
- Refers to pilot ASF application
  - European generic PVC window profile
- Subsequent ASF: Generic homogeneous flooring
- 2024 ASF 'train the trainers' programme

Everard, M. and Blume, R. (2019). Additive Sustainability Footprint (ASF): rationale and pilot evaluation of a tool for assessing the sustainable use of PVC additives. *Journal of Vinyl and Additive Technology, 26(2), 196-208*
DOI: https://onlinelibrary.wiley.com/doi/10.1002/vnl.21733.

ASF: A ten-step process consistent with ISO14040 LCA flow

The 10 steps used in ASF are presented below. Information will be made available for each step successively as we go through the training programme.



1. Goal and Scope Definition
2. Sustainable Product System
3. Setting System Boundaries
4. Inventory Analysis
5. Sustainability Assessment
6. Analysis & Synthesis
7. Idea Generation
8. Prioritization
9. Innovation Action Plan
10. Measuring and Reporting

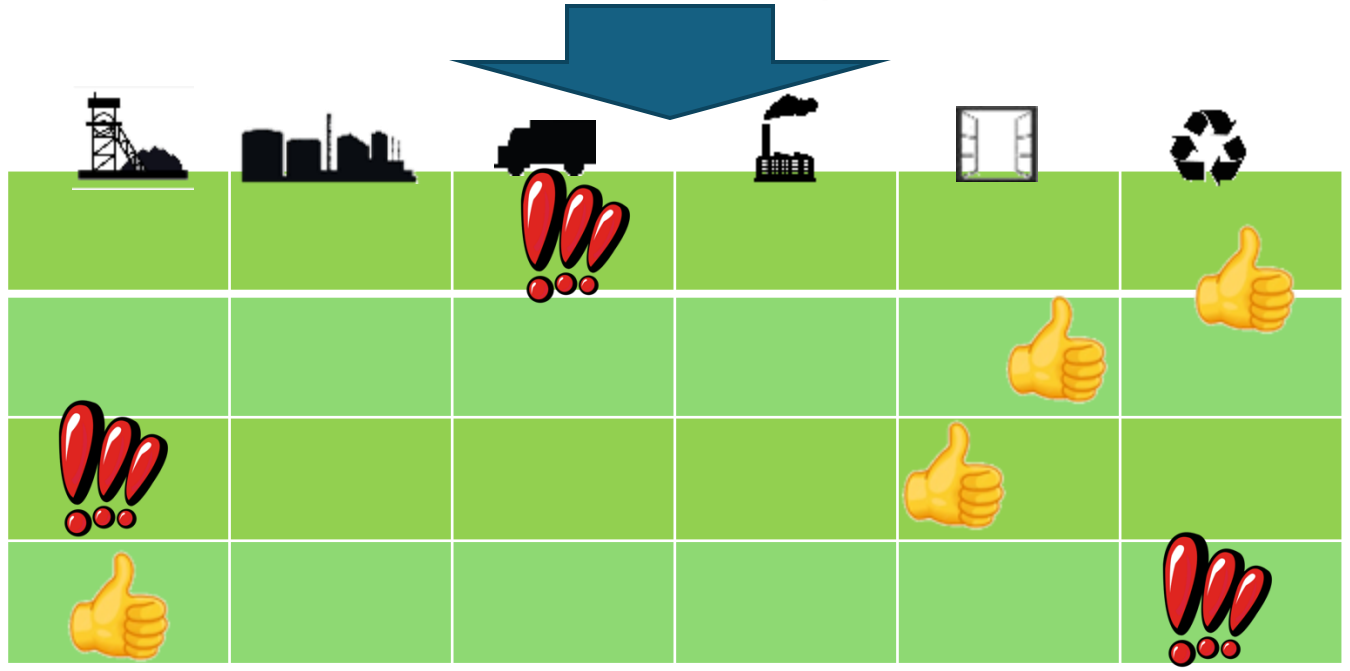
ASF: An adaptation of the TNS
Strategic Life Cycle Assessment (SLCA) approach

the NATURAL STEP

System Conditions

1.
2.
3.
4.

RISK across whole article life cycle (ISO 14040:2006)



- Positive sustainability contributions
- Hotspots that may have been overlooked
- A framework for:
  - Innovation
  - Communication

Additive Sustainability Footprint (ASF)

Sustainable USE of PVC additives (TNS Challenge 4; VinylPlus Challenge 3)

the NATURAL STEP

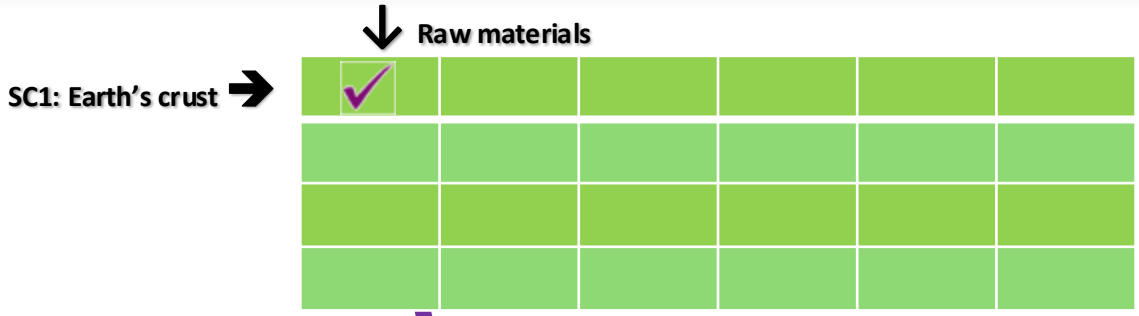
System Conditions

1.
2.
3.
4.

RISK across whole article life cycle (ISO 14040:2006)

Three 'impact questions'

Four 'progress questions'



Raw Materials Acquisition

For details on what is included or excluded in this Phase, refer to the Life Cycle Scenario and System Boundaries defined in Step 3.

Questionnaire summary	1	Question	Answer	Verified?	Improvement?	Explain your answer (comment)	ASF Coach Feedback / Comments
System Condition 1	1.1.1	Are the raw materials free from metals, minerals and hydrocarbons that risk accumulating in nature (e.g. mined materials that are scarce in nature* such as with Cu, Ag, Sn, Cd, Hg, etc. or due dispersive use / disposal)?	No	☐	☐	← Free from metals, hydrocarbons potentially accumulating in nature?	
	1.1.2	Are the raw materials sourced in ways that avoid release of substances from the earth's crust that can accumulate in nature? (i.e. during virgin extraction, sourcing mineral resources and/or recycled or reused materials etc.)?	Not applicable	☐	☐	← Sourced in way that avoid potential releases to nature?	
	1.1.3	Are all raw materials extracted, processed and transported using renewable energy sources?	Yes	☑	☐	← Releases from raw material transport?	
	1.1.4	Are there targets and actions being taken to phase out use of metals, minerals and hydrocarbons that risk accumulating in nature (i.e. through product development, R&D, switching to bio-alternatives, replacement with chemically recycled substances, etc.)?	Not answered	☐	☐	← Targets/actions to phase out content?	
	1.1.5	Are there targets and actions being taken to improve resource efficiency and achieve zero waste/emissions of metals / minerals / hydrocarbons in supply chain? (e.g. improved processes, switching to materials with lower sourcing impacts etc.)	Not answered	☐	☐	← Targets/actions for resource efficiency and zero waste?	
	1.1.6	Are there targets and actions being taken to source raw materials from suppliers using renewable energy?	Not answered	☐	☐	← Targets/actions to source from suppliers using renewable energy?	
	1.1.7	Are raw materials sourced in accordance with a responsible sourcing policy* that addresses the risk of metals, minerals and hydrocarbons accumulating in nature?	Not answered	☐	☐	← Relevant responsible resourcing policy?	

Three 'impact questions'
"The bad stuff"

Four 'progress questions'
"The good stuff"

Additive Sustainability Footprint (ASF)

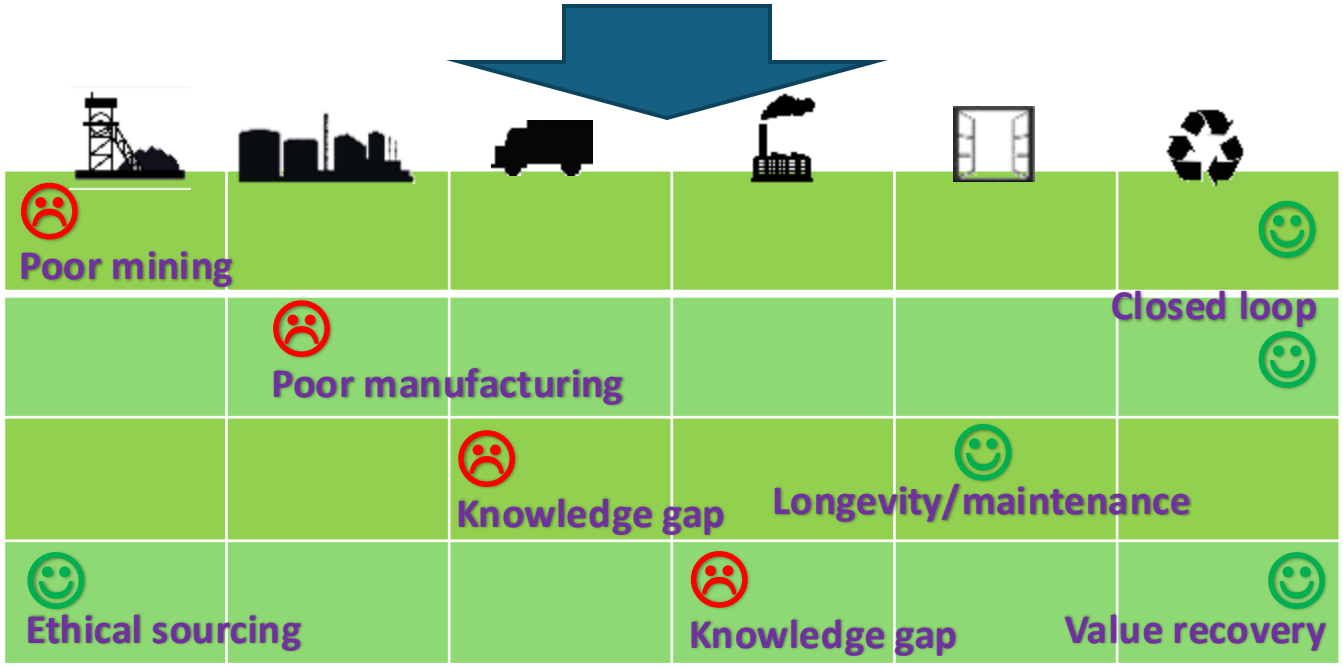
Sustainable USE of PVC additives (TNS Challenge 4; VinylPlus Challenge 3)

the NATURAL STEP

System Conditions

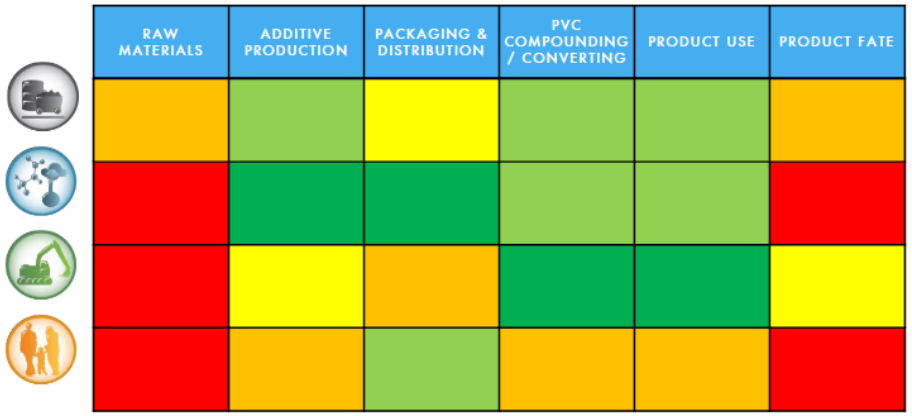
1. 
2. 
3. 
4. 

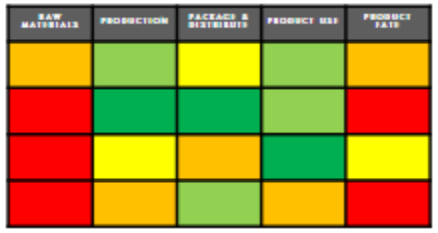
RISK across whole article life cycle (ISO 14040:2006)



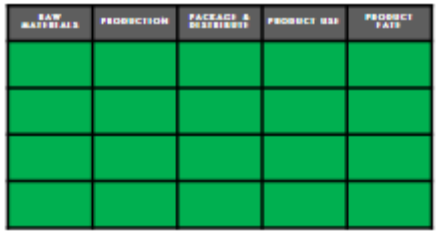
- Uses existing investments (REACH, etc.)
- Builds whole picture of sustainability
- Recognises BENEFITS and problems

- 168 questions…
- …but work ongoing on auto-filling





Innovation for (profitable) sustainability



- A changing world
- Customer demands
- Regulatory demands
- Reduced liabilities
- Future-proofing
- Wise investment
- Communication

Everard, M. (2022). Assessment of the sustainable use of chemicals on a level playing field. *Integrated Environmental Assessment and Management, 19(4), pp.1131-1146.*

DOI: https://doi.org/10.1002/ieam.4723.

	Full dimensions of sustainable development	Transparently science-based	Based on full article life cycle risk (rather than potential hazard alone)	Recognises positive contributions to meeting human needs	Open access	Free to use (albeit with guidance and external auditing)	Applicable across products/materials	Statutory	Peer reviewed in science literature
Life Cycle Assessment (LCA)	NO	YES	Partially	NO	Partially	Partially	YES	NO	YES
Environmental Product Declaration (EPD)	NO	YES	Partially	NO	Partially	YES	YES	NO	YES
Product Environmental Footprint (PEF)	NO	YES	Partially	NO	Partially	YES	YES	NO	YES
EU REACH	NO	YES	NO	NO	YES	YES	YES	YES	YES
SciveraLENS®	NO	YES	Partially	NO	NO	NO	YES	NO	NO
Greensuite®	NO	YES	Partially	NO	NO	NO	YES	NO	YES
GreenScreen List Translator™	NO	YES	NO	NO	NO	NO	YES	NO	Partially
GreenWERKS	NO	YES	NO	NO	NO	NO	YES	NO	NO
Green Chemistry and Commerce Council (GC3)	NO	YES	NO	NO	Partially	Partially	YES	NO	NO
OECD Substitution and Alternatives Assessment	NO	YES	NO	NO	Partially	Partially	YES	NO	NO
ECHA Plastic Additives Initiative	NO	YES	Partially	NO	YES	YES	Partially	NO	NO
Cradle to Cradle	YES	YES	YES	NO	NO	NO	YES	NO	YES
Additive Sustainability Footprint (ASF)	YES	YES	YES	YES	YES	YES	YES	NO	YES
Ecovadis	YES	YES	NO	NO	NO	NO	YES	NO	NO
Carbon Handprint	NO	YES	YES	NO	YES	YES	YES	NO	YES
Material flow cost accounting (MFCA)	NO	YES	Partially	NO	NO	No	Partially	NO	YES
GRI 301: Materials	NO	YES	NO	NO	YES	YES	YES	NO	NO

ASF evaluated as Good Practice from ICESP in Italy

- Supports ECODESIGN (sustainable design/planning)
- Addresses the whole product life cycle
- Supports policy and economic aims
- Stimulus of innovation and wise investment

What is ASF (and VSC and the Product Label)?

Supporting sustainable use of PVC and its additives

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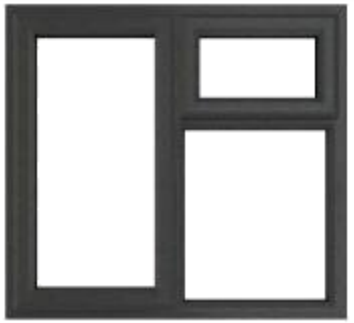
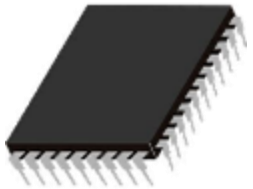
- Working towards a ‘level playing field’

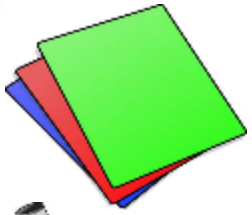







BAD
GOOD









भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA
प्लास्टिक हटाओं,
दुनिया बचाओं
Avoid Plastic,
Save Earth

The need for a science-based ‘level playing field’

- ASF is based on the TNS Strategic Life Cycle Assessment (SLCA) approach
- A transparent architecture, potentially adaptable to ALL materials used by society

Everard, M. (2024). Seeking Sustainable Development on a Level Playing Field: A PVC Case Study. Routledge.

Everard, M. (2023). Assessment of the sustainable use of chemicals on a level playing field. *Integrated Environmental Assessment and Management*, 19(4), pp.1131-1146.

Illustrative / comparative assessment of:

- Metal-based stabiliser additives in PVC
- Brominated flame retardants in polyolefins
- Biocides in timber window profiles
- Cobalt in solar panels

Four illustrative rapid assessments

PVC: Metal-based stabiliser additives in PVC

Br: Brominated flame retardants in polyolefins

Timber: Biocides in timber window profiles

Co: Mined cobalt in solar panels





Co				Co Br PVC	PVC
Br		PVC		Timber PVC	Timber Br PVC
Co Timber					Timber
Co				Br	Br



…no clear ‘winner’ or ‘loser’!

The need for a science-based ‘level playing field’

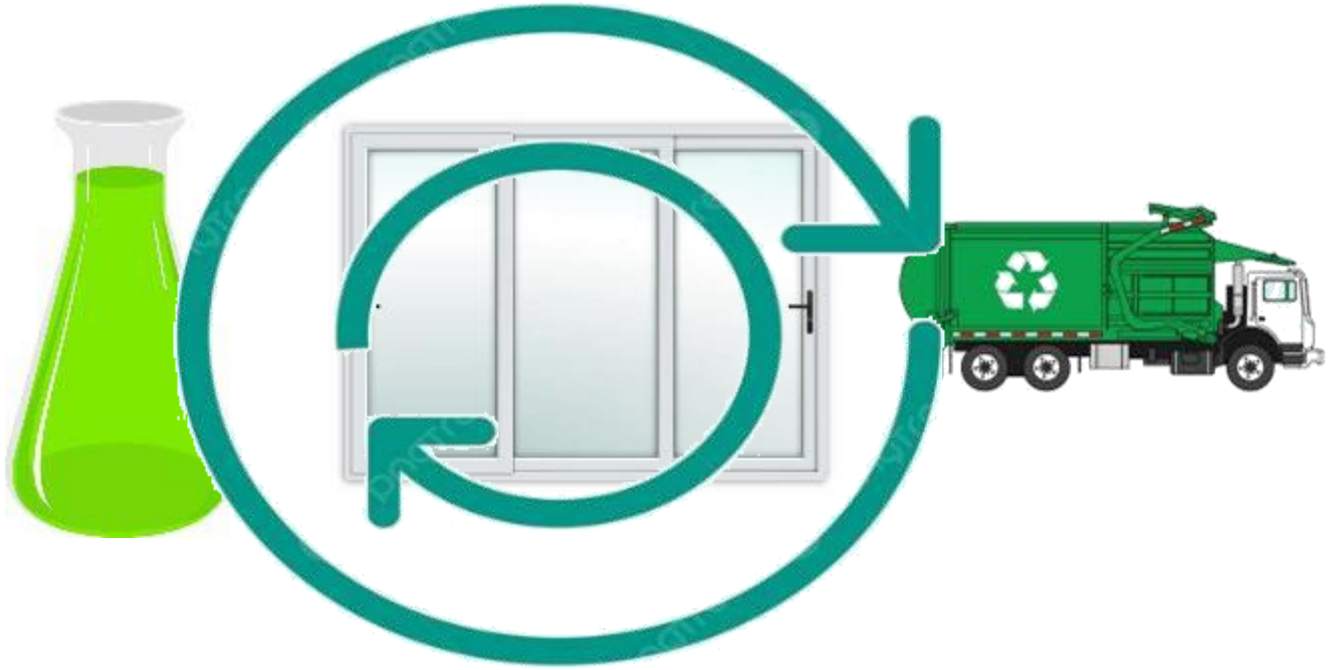
ASF / Strategic Life Cycle Assessment (SLCA) informs:

- Material **USE** within whole product life cycles
- Relevant to **ALL materials**
- Takes account of **ALL dimensions of sustainable development**
- Focus on **benefits** as well as problems
- Exposes overlooked issues
- Stimulus for innovation and wise investment
- Building blocks to link up the whole value chain

- Requires development beyond the narrow VinylPlus focus on PVC
- Beneficial to all additive manufacturers…
- …informing sustainable innovation along whole value chains

What is ASF (and VSC and the Product Label)?

Supporting the sustainable use of PVC and its additives



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