



PolyUrethane Recycling Towards
a Smart Circular Economy

Exploring barriers for scale-up:
a TIS-perspective on CR of flexible
PU foam

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WP5 – System innovation,
sustainability assessment &
business

Presentation overview

- 1. Opening questions**
- 2. Introduction**
 - 1. Researchers & group**
 - 2. Transitions – the MLP**
 - 3. Research goal**
- 3. Research approach**
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 - 2. Research data**
- 4. Exploration of results**

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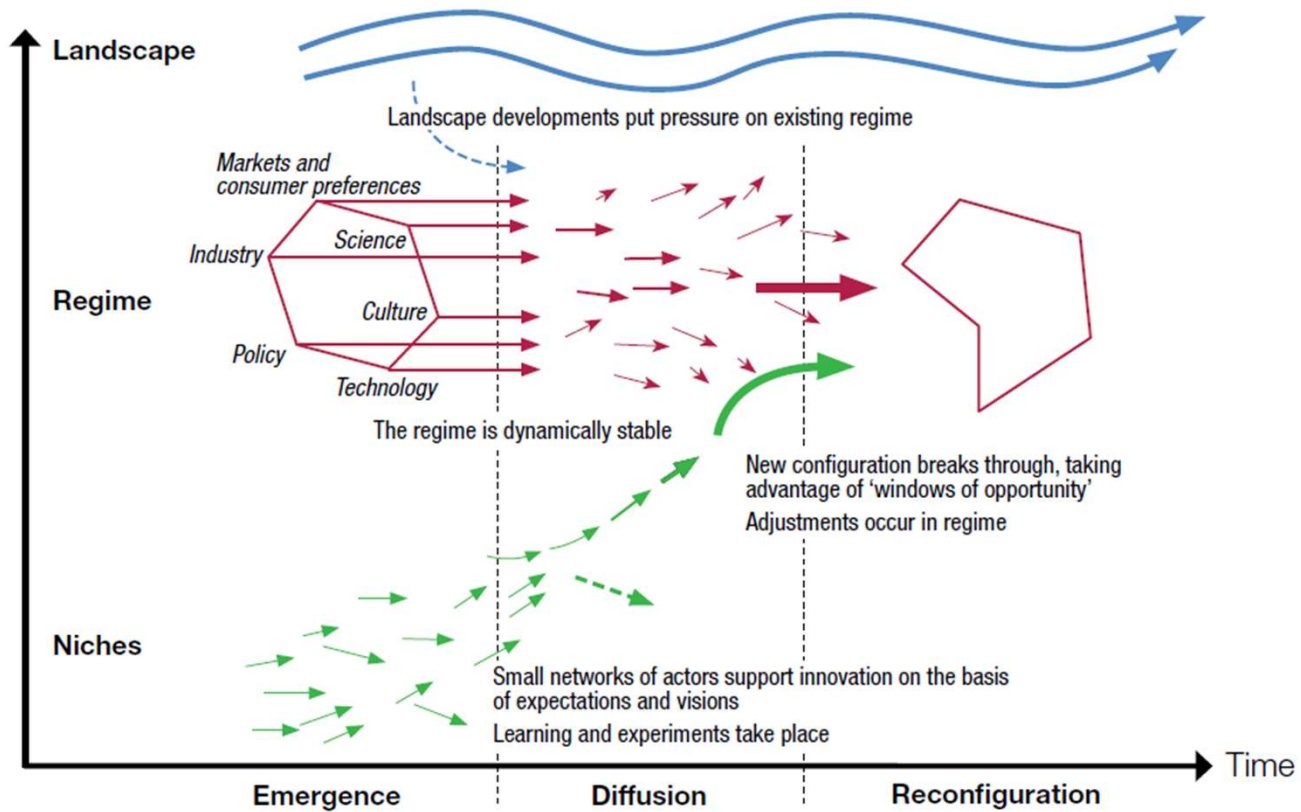
2.1 Researchers & group

Jonas Van Gaubergen, prof.dr. Thomas Block

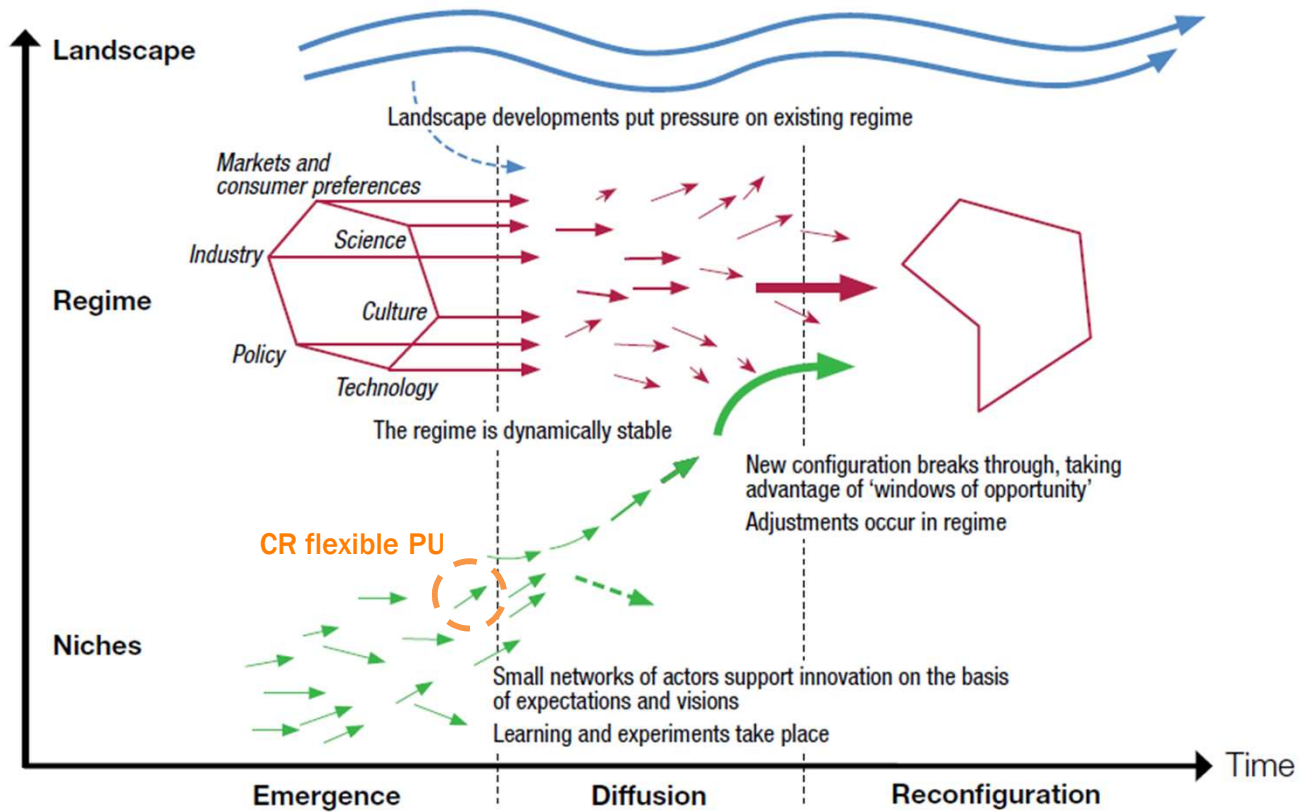
Centre for Sustainable Development, PSW UGent (www.cdo.ugent.be)

- **Inter- and transdisciplinary research center**
- **Focus on pertinent sustainability issues**
- **Particular attention to ‘sustainability transitions’**
 - **Transition to the circular economy**

2.2 Transitions - the Multi-Level Perspective (MLP)



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2.3 Research goal

Zoom in on ‘niche’: chemical recycling for flexible PU foams

→ *“What are the potential obstacles for the further development and break-through of CR technologies for flexible PU foams in the context of the EU?”*

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3.1 Technological Innovation Systems (TIS)

- Transition's framework for assessing niche development
- Not only R&D → Systemic view on innovation
 - **Various actors:** manufacturers, suppliers, users, knowledge institutes, ...
 - **Societally embedded:** legislation, policy goals, market developments,...
- **Framework core: 7 system 'functions'** (Hekkert et al. 2007)

3.1 Technological Innovation Systems (TIS)

System functions	Example diagnostic questions
F1) Entrepreneurial experimentation	<ul style="list-style-type: none"> – Do the industrial actors innovate sufficiently? – Is there commercial experimentation by entrepreneurs?
F2) Knowledge development	<ul style="list-style-type: none"> – Is the amount of knowledge development sufficient for the development of the innovation system?
F3) Knowledge diffusion	<ul style="list-style-type: none"> – Is there enough knowledge exchange between science and industry? – Are there problematic parts of the IS in terms of knowledge exchange?
F4) Guidance of the search	<ul style="list-style-type: none"> – Is there a clear vision on how the industry and market should develop?
F5) Market formation	<ul style="list-style-type: none"> – Is the current and expected market size sufficient? – Are there any incentives stimulating demand?
F6) Resources Mobilization	<ul style="list-style-type: none"> – Are there sufficient human/financial/material resources? If not, does that form a barrier?
F7) Counteract resistance to change/legitimacy creation	<ul style="list-style-type: none"> – Is there a lot of resistance towards the new technology, the innovation process, procedures,..?

3.2 Research data

- **Interviews**
 - PUReSmart project partners
 - External actors
 - **Document analysis**
 - Policy documents (e.g. EC documents)
 - Association's white papers, brochures
 - Academic research papers
 - Press releases
- **Function assessment relies heavily on expert knowledge**

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F2) Knowledge development

Basic scientific knowledge: advanced stage

- Smaller additional developments possible
- Overall deemed sufficient for scale-up

Applied knowledge development: uncertainties

- Sorting
 - Shredding
 - Performance with EoL
- Chemolysis
 - Impact of EoL

F5) Market formation

Various actors doubt financial viability of recyclates

- High production cost
- No product advantages
 - ➔ Under unchanged conditions, no profitability and limited demand

However: SPI/ESPR including obligation of recycled content (?)

- Fundamental shift in market demand
 - ➔ CR/recyclates become de facto element in PU foam industry

From barriers to opportunities

- Increasing circular design, both chemically and on product-level
- Increasing knowledge sharing in function of reaching societal goals
- Prioritizing less energy-intensive processes
- Increasing producer responsibility to facilitate waste collection and distribution
- Introducing more restrictive policy frameworks: push away from linear

Thank you

Any question?

