

# CVORR

## Approach and first results

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# Complex-Value Optimisation for Resource Recovery from Waste

CVORR is different:

- Improvement of assessment method

Overarching research question:

- Does a *change* (policy, business model, ...) overall improve the situation?
  - Holistic & systemic perspective
  - Across all domains of value
  - Including intended and un-intended impacts!

Note: case studies are explorative & illustrative

# CVORR Core Team

- Phil Purnell: PI (engineering)
- Andy Brown: Col (political economy)
- Costas Velis: Col (waste & plastic packaging)
- Eleni Iacovidou: (metrics & framework)
- Joel Millward-Hopkins (modelling & framework)
- Oliver Zwirner (socio-economics, metrics, values & framework)
- John Hahladakis (plastic packaging, left recently)

*plus further Cols*

*plus Steering Committee / industry partners*

# Complex-Value Optimisation = multi-dimensional value assessment

Basic steps of assessment process:

1. Idea or need for a *change* (policy, tech., ...)
  2. *Making values and goals transparent*
  3. Identifying the impacted systems
  4. Understanding these systems
  5. Identifying/quantifying impacts of change
  6. Compare with values and goals
- => Assessment result (multi-dimensional)

# Selected CVORR innovations

1. Coverage of technical perspective
2. Fully integrated modelling
3. Non-standard economics

# 1 Coverage of technical perspective

- Most (sustainability) assessments analyse change from 3 perspectives/dimensions: social, environmental, economic.
- CVORR further develops technical perspective

For more:

Iacovidou et al (2017) *Metrics for optimising the multi-dimensional value of resources ... (ch.6)*

<https://doi.org/10.1016/j.jclepro.2017.07.100>

*Open access!*

## 2 Multi-dimensional modelling

- Life Cycle Sustainability Assessment (LCSA) suggests to combine (e)LCA, sLCA & LCC
- CVORR: modelling of all metrics fully integrated in one model

For more:

Millward-Hopkins et al (2018) *Fully integrated modelling for sustainability assessment ...*

<https://doi.org/10.1016/j.scitotenv.2017.08.21>

Open access!

# 3 Non-Standard Economics

Non-standard ('heterodox') economics:

- informs all assessment steps (see slide 4)
- can connect economic, social & political science with business/management & value theories

=> complex dynamic systemic picture of 'real' world useful for decision makers & stakehld.

Not possible with highly abstract

- (standard) neo-classical theory (NCT) &
- related cost-benefit analysis (CBA) &
- mono-dimensional result in €, \$, £, ¥, ...



# 3.1 CVORR uses SOP

SOP: Systems of Provision (Fine & Leopold 1993)

- Rooted in Political Economy (heterodox)
- Analyses **product specific** systems of provision along supply chain, e.g. water, housing, food
- Looks at: structures (e.g. ownership), processes (interactions), agents (actors) & (power) relations

For more: Iacovidou et al (2017) *A pathway to circular economy: Developing a conceptual framework for complex value assessment ... (section 2.3.5)*

<https://doi.org/10.1016/j.jclepro.2017.09.002> ~ Open access!

## 3.2 SOP results for CVORR

CVORR cases:

### **Low carbon electricity and concrete (LCEC)**

- electricity, steel, cement & concrete SOPs

Example result: technical processes need to be split by actors

### **Post-consumer plastic packaging waste (PCPP)**

- all SOPs related to plastic packaging (PP)

Example result: need to understand and model interaction between packaging and packed product

For more: Zwirner et al (in preparation)

# Summary

## CVORR ...

- improves (sustainability) assessment method
- models all values fully integrated, incl. technical
- uses heterodox Systems of Provision economics
- SOP splices engineering and socio-economic sciences, e.g. to
  - setting up the model (elements, processes, ...)
  - understanding and modelling system dynamics
  - actor, stakeholder and value analysis

**=> to be continued**

# Thank you



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<https://www.researchgate.net/project/CVORR-Complex-Value-Optimisation-for-Resource-Recovery-from-Waste>

