Data-driven estimation of chemical releases from industrial end-of-life management activities

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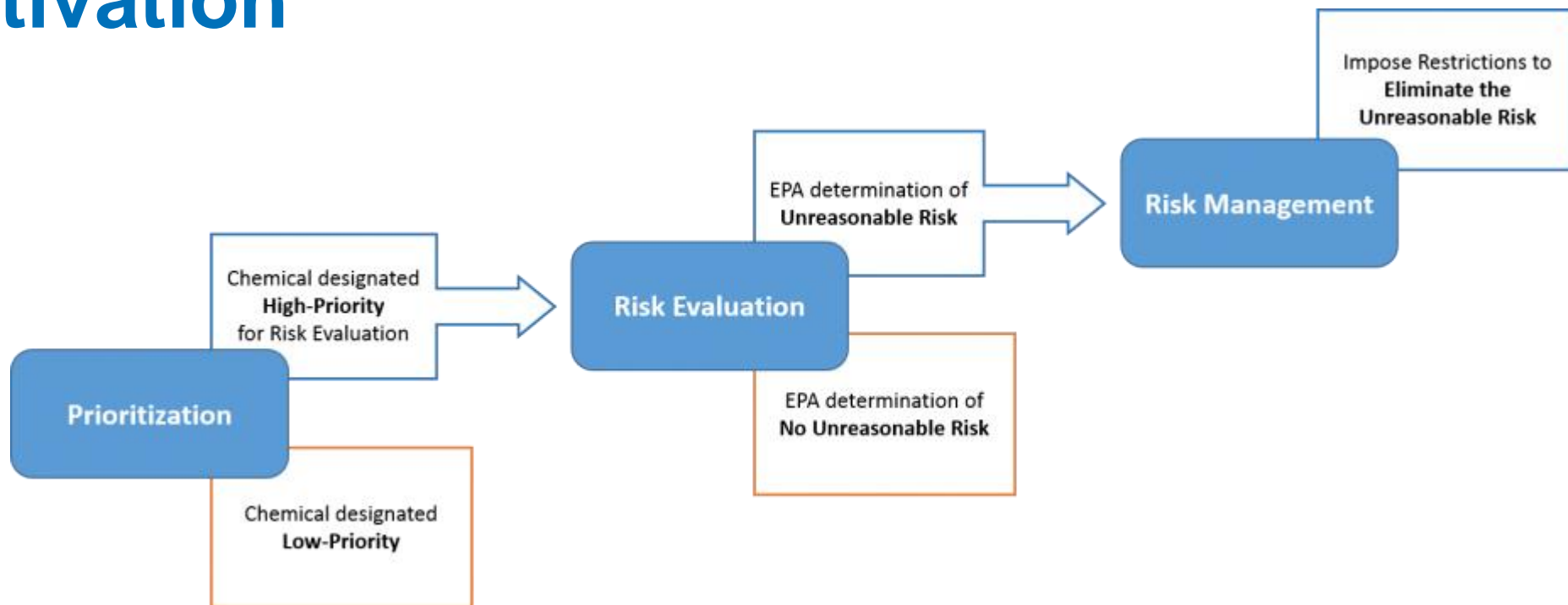**August 17-21, 2020| Virtual**

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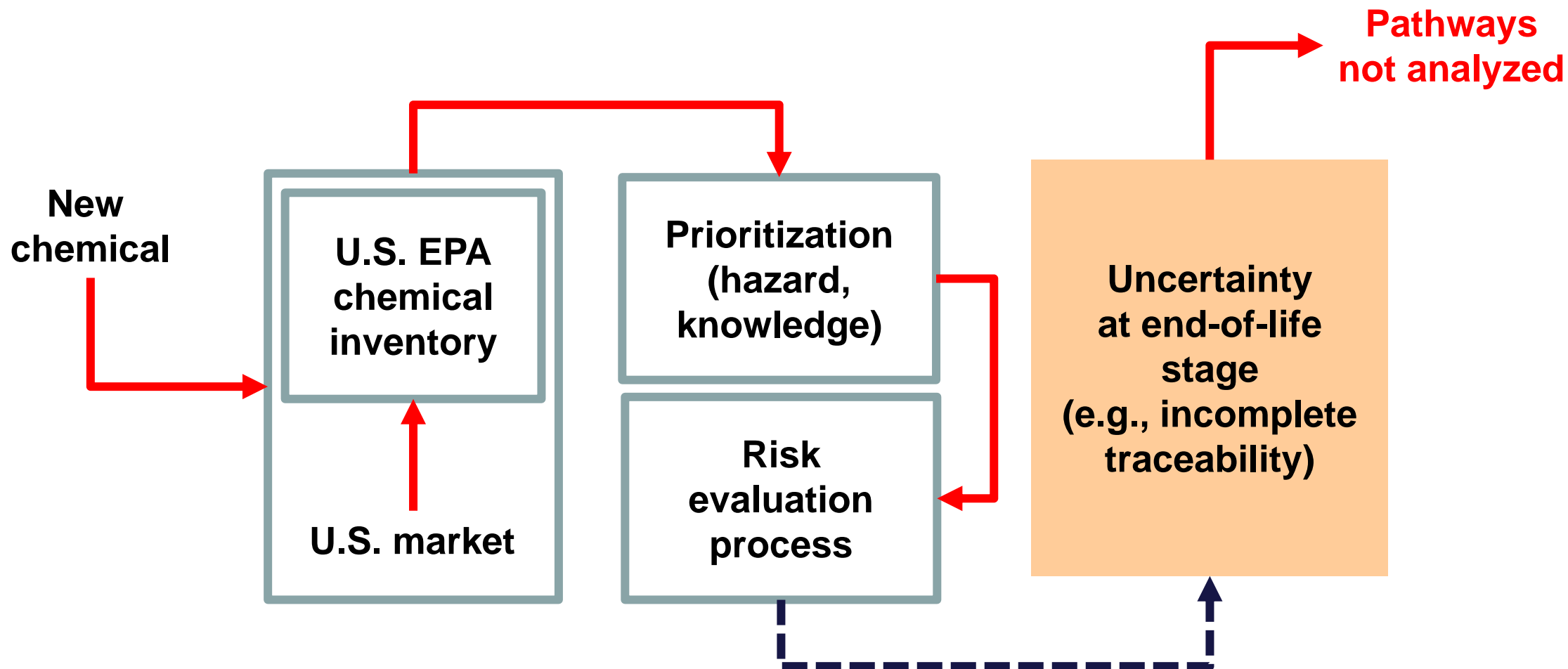Office of Research and Development

Agenda

- Motivation
- Methodology
- Case study
- Results
- Conclusions and future directions
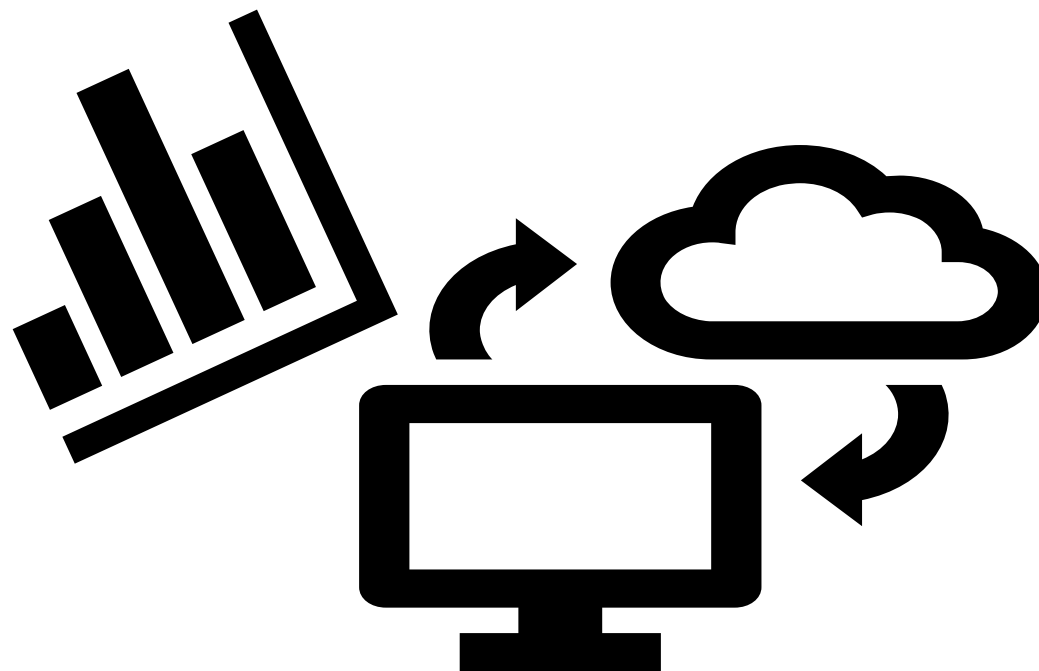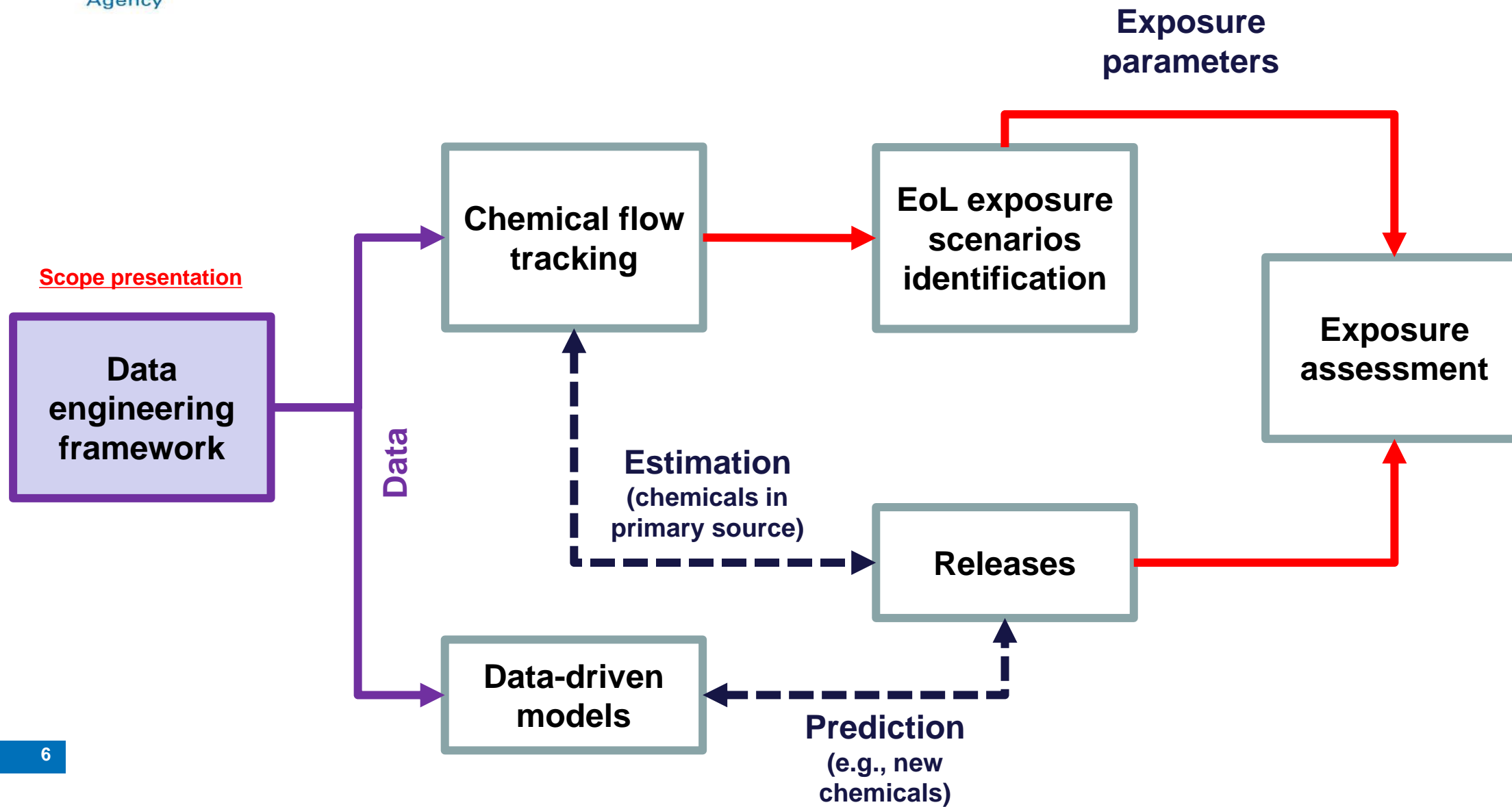
Motivation

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Scope of this study:

- Develop a **framework** for **tracking chemicals** in industrial waste streams at **end-of-life** scenarios to support exposure assessment in pathways not further analyzed under Toxic Substances Control Act (TSCA) needs
- Provide a methodology to calculate emission factors at **end-of-life** scenarios based on publicly-available information
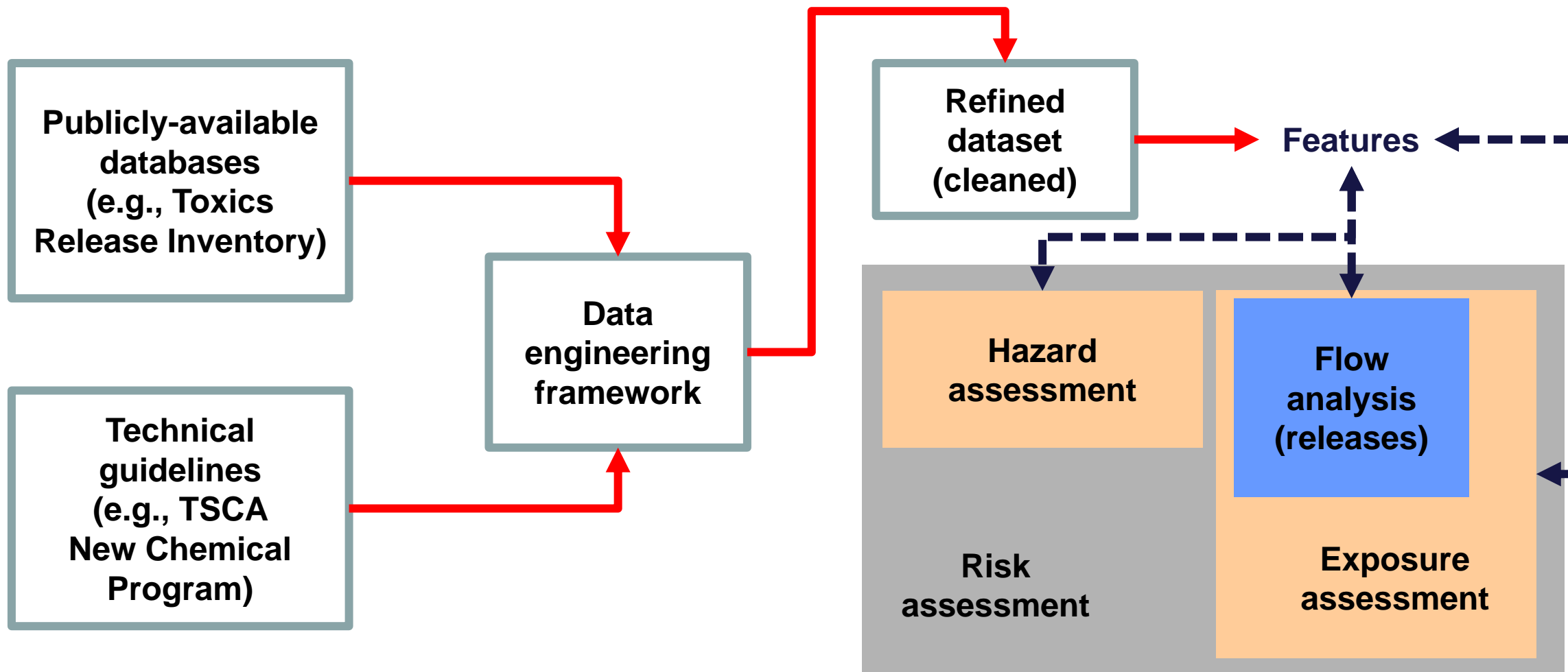
Methodology

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Generator → Chemical → RETDF (Recycling, energy recovery, treatment and disposal facility)

Generator → Broker → RETDF

RETDF → Releases
1. Fugitive air emission
2. On-site surface soil
3. On-site surface water
4. Stack air emission

RETDF → End-of-life
1. Recycling
2. Energy recovery
3. Treatment
4. Disposal
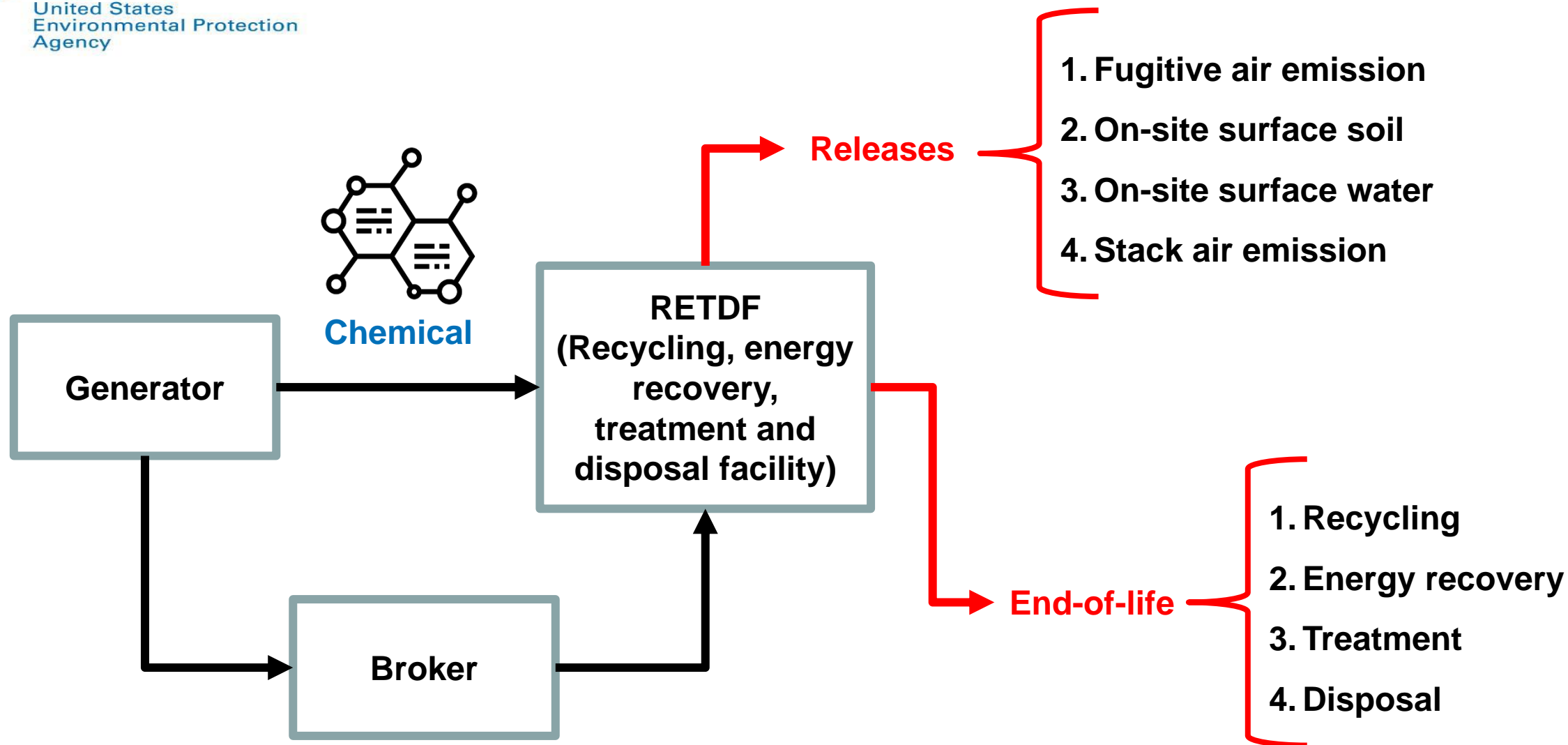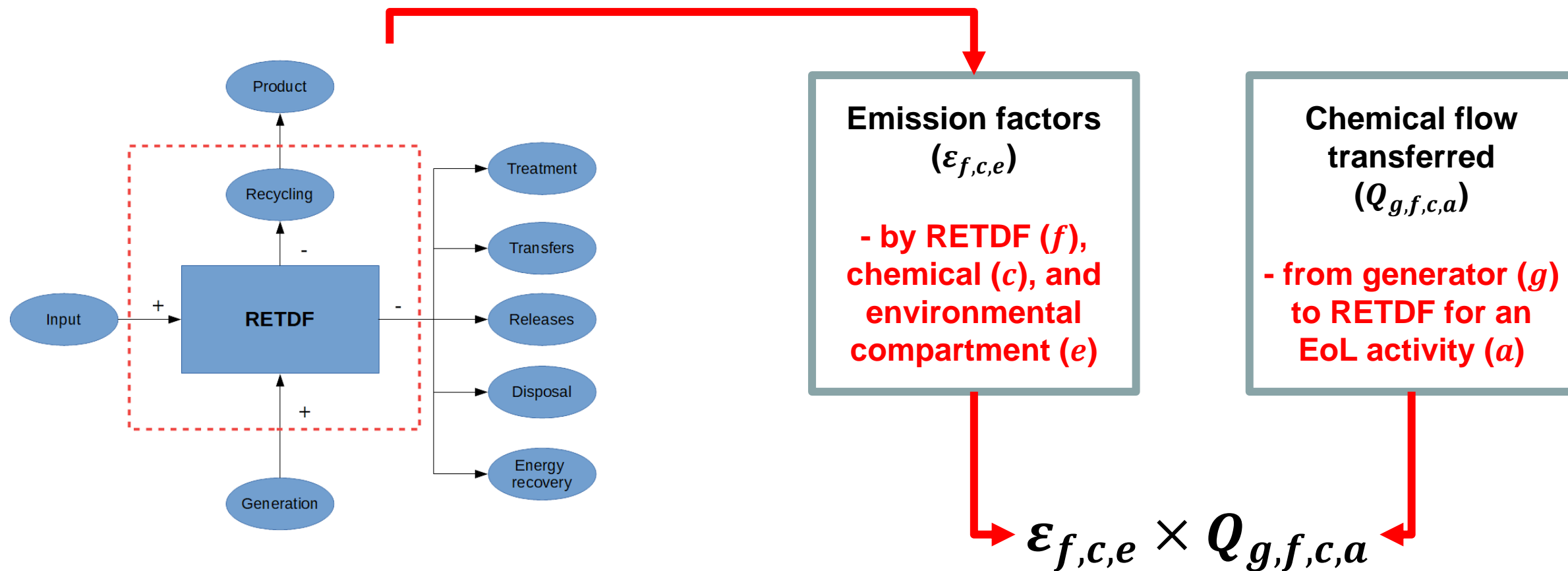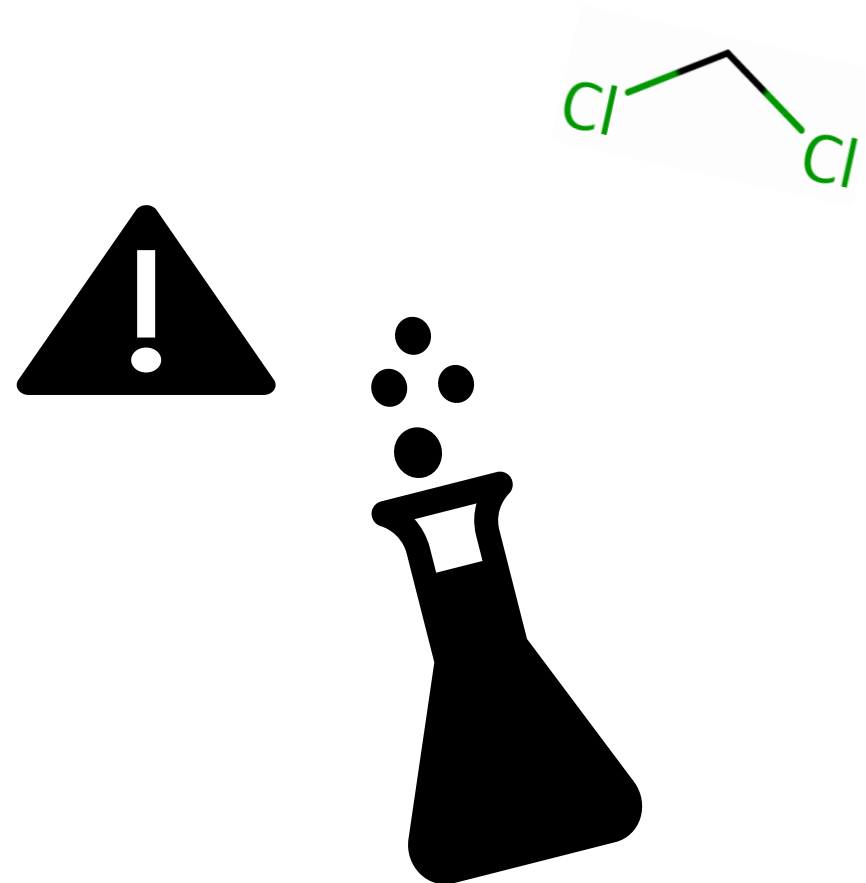
Methodology

RETDF: Recycling, energy recovery, treatment & disposal facility
EoL activity, a: recycling, energy recovery, treatment, disposal
Environmental compartment, e: fugitive and stack air emission, surface water, soil

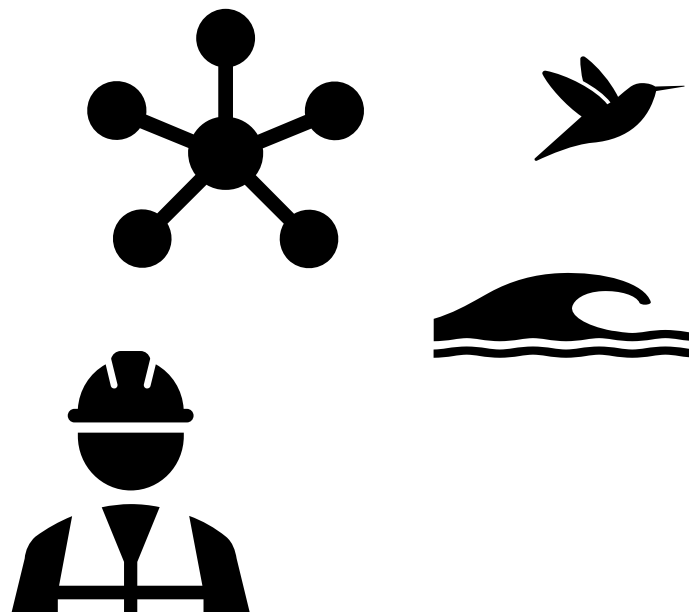$$\varepsilon_{f,c,e} \times Q_{g,f,c,a}$$

Case study

Case study

Methylene Chloride (MC) - CAS: 75-09-2

- High production volume chemical (equal to or greater than 53,593kg/yr)
- A chemical from TSCA inventory
- One of the 10 first high-priority chemicals for risk evaluation under TSCA
- Hazardous Air Pollutant, Clean Air Act (CAA)
- Priority Pollutant, Clean Water Act (CWA)
- Listed Hazardous Waste, Resource Conservation and Recovery Act (RCRA)
- National Primary Drinking Water Regulation, Safe Drinking Water Act (SDWA)

Results

Generators

RETDF

EoL

Uses

Compartments

Legend for relevant elements in the 6-level Sankey structure			
Label	Name	Label	Name
GiS-10	Hazardous waste treatment and disposal	WMH-4	Disposal
GiS-15	Medicinal and botanical manufacturing	EoL-3	Incineration
GiS-19	Other basic inorganic chemical manufacturing	EC-1	Fugitive air emission
GiS-25	Pharmaceutical preparation manufacturing	EC-2	On-site soil
CoU-12	Chemical processing and manufacturing aid	EC-3	On-site surface water
CoU-13	As a reactant, as a formulation component, and produce the chemical	EC-4	Stack air emission
RETDFiS-2	Hazardous waste treatment and disposal	EC-5	Net recycling
RETDFiS-3	Cement manufacturing	EC-6	Net energy recovery
WMH-1 and EoL-1	Recycling	EC-7	Net treatment
WMH-2 and EoL-2	Energy recovery	EC-8	Net disposal
WMH-3	Treatment		

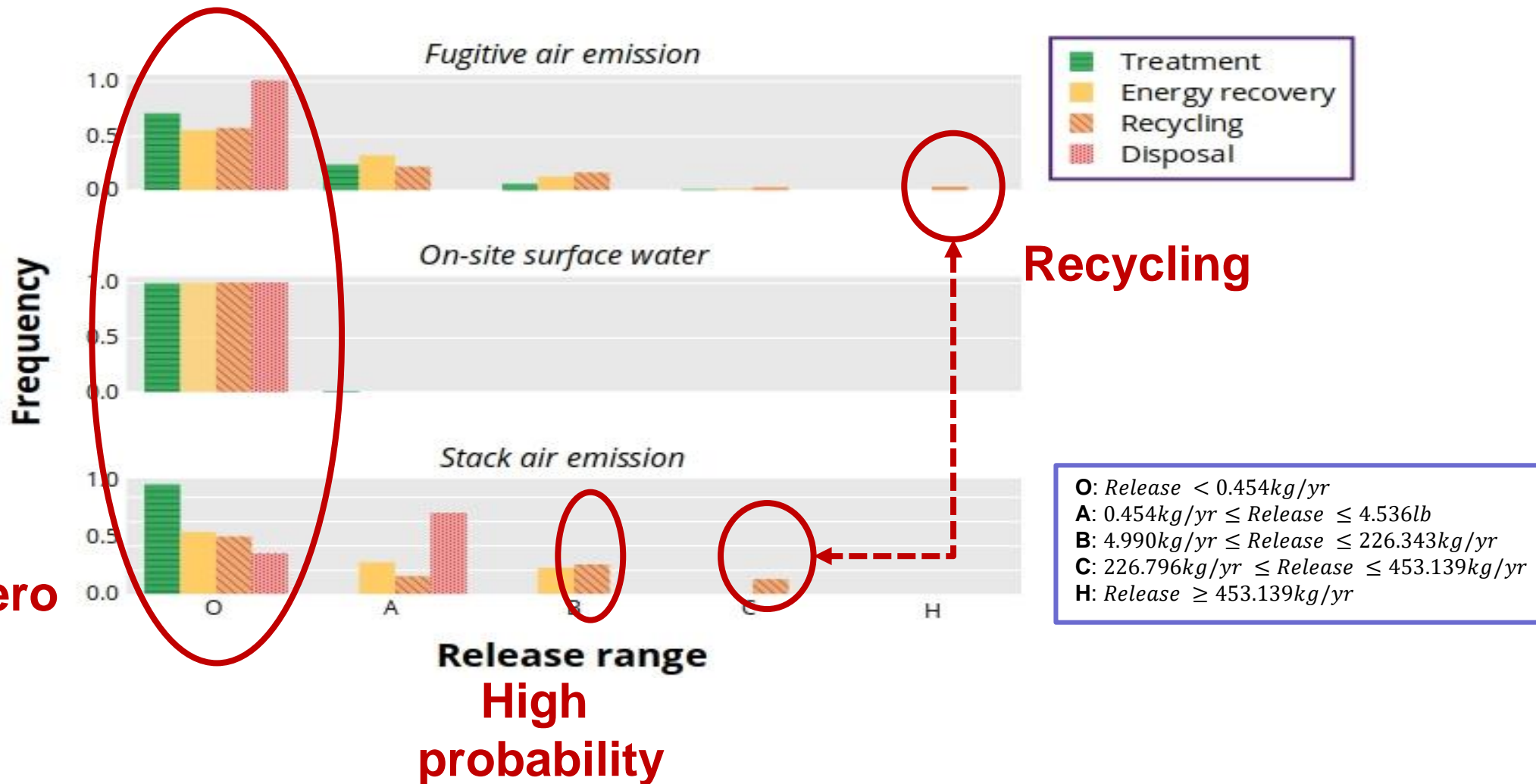*Environmental releases from disposal, treatment, energy recovery, and recycling*

In 2017, the total quantity of MC transferred for further management was 12.321.001kg.

12,321 kg of transferred MC might have been potentially released from stack due to recycling activities in 2017
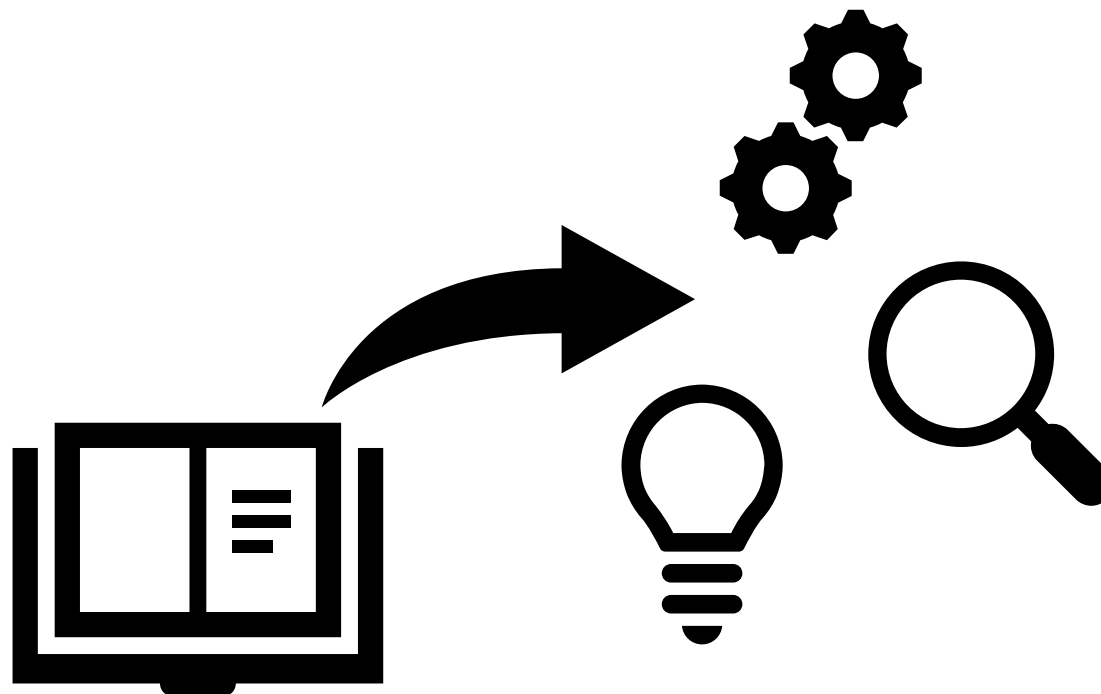
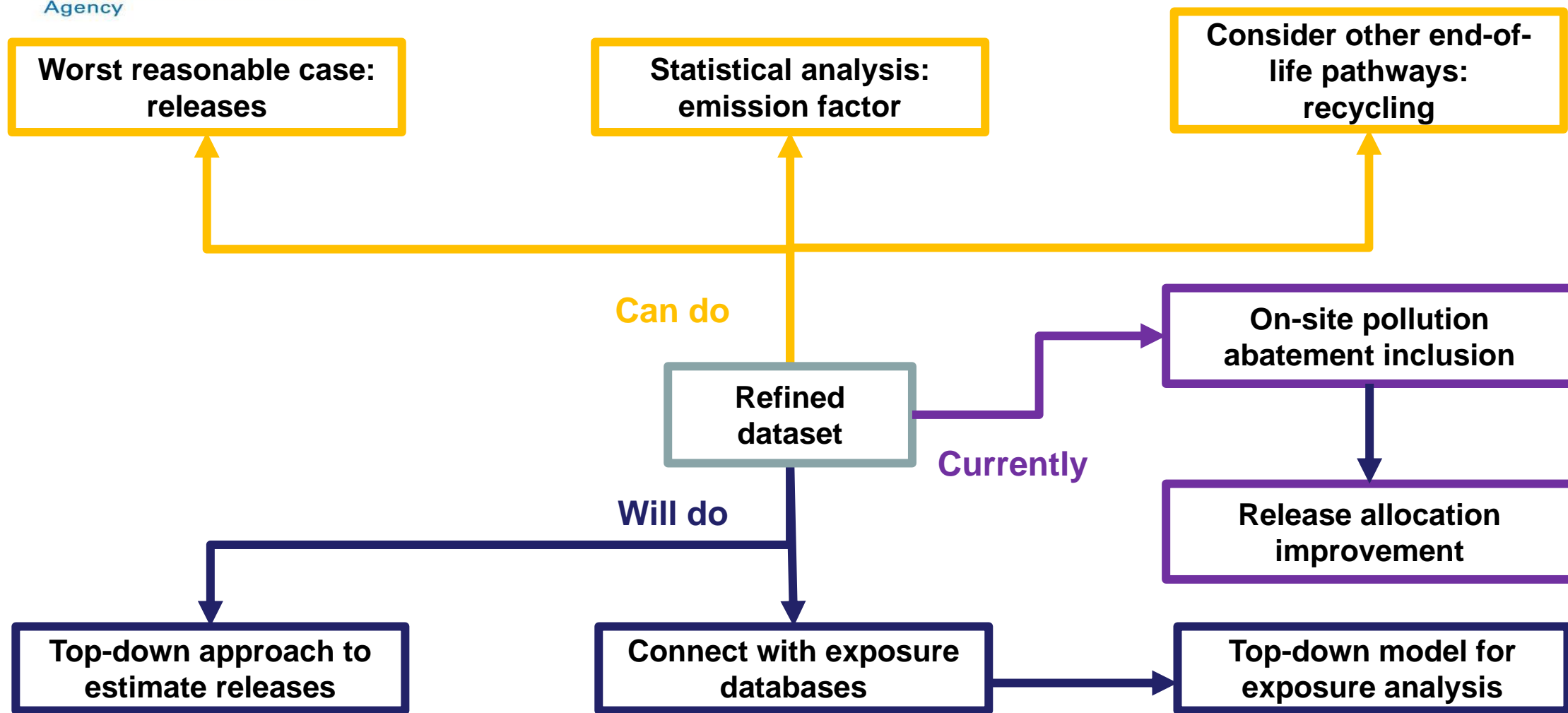# Results – Uncertainty and Central tendency
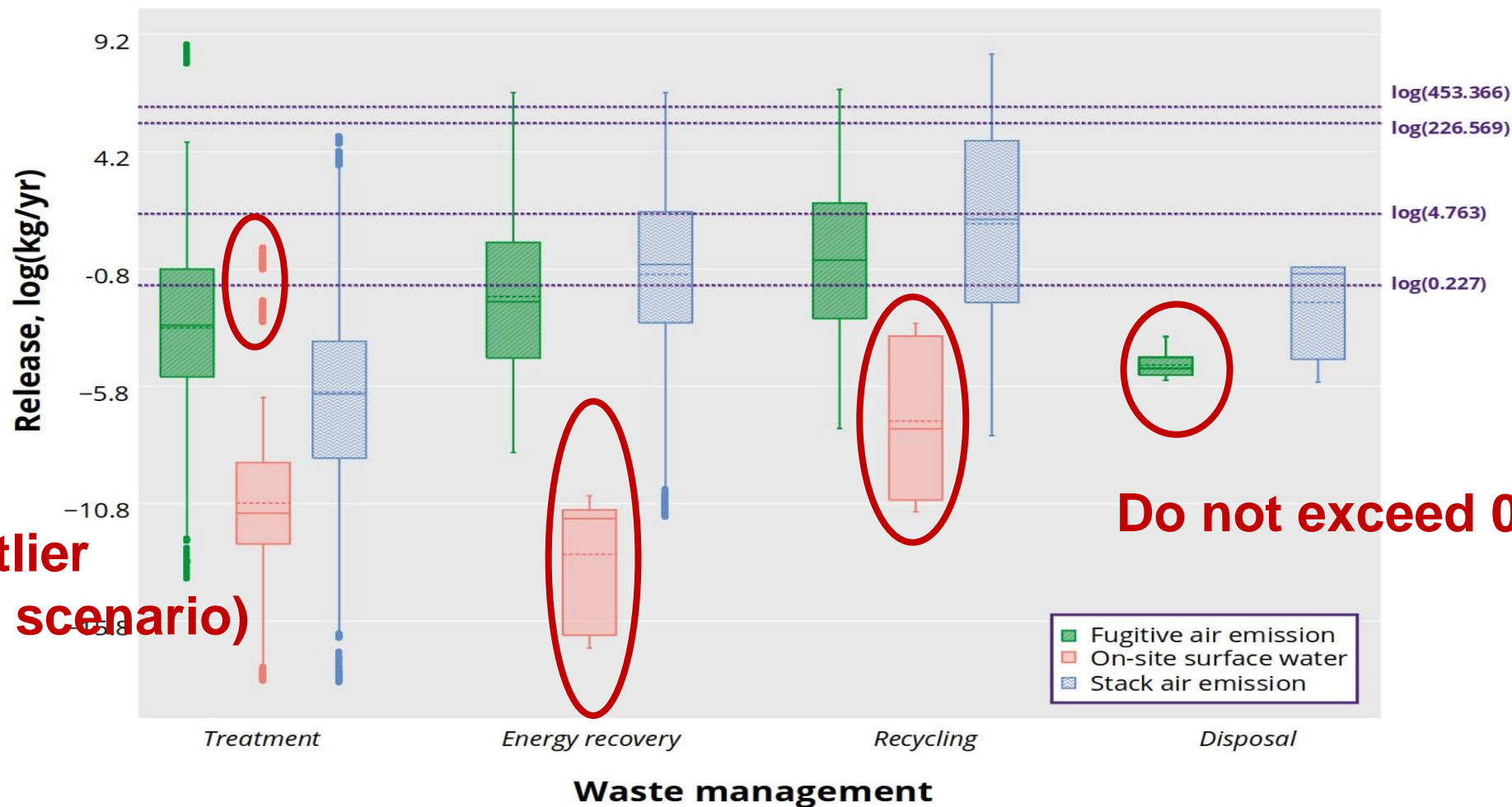
Results – Frequency/distribution

Conclusions and future directions

Conclusions and future directions

Thanks!

Questions, comments?

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