Use of Life Cycle Assessment in view of Eco-Design for a glass wool process

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LABORATORY of CHEMICAL ENGINEERING

Processes and Sustainable development

[b]Knauf Insulation

Agenda

1. Introduction
2. Life Cycle Assessment
3. Production process and its modeling
4. Results
5. Conclusion

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Introduction

- Collaboration Knauf Insulation – Laboratory of Chemical Engineering (ULg): February 2012

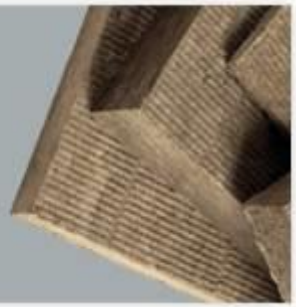
Knauf Insulation

MINERAL WOOL

Glass Mineral Wool

with ECOSE TECHNOLOGY

Rock Mineral Wool



PLASTIC FOAMS

EPS

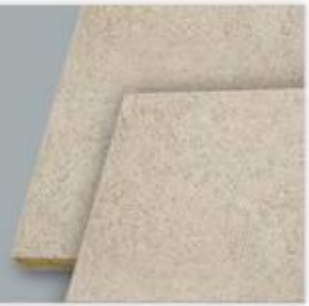
Expanded Polystyrene

XPS

Extruded Polystyrene

WOOD WOOL

Heraklith®



Heradesign®

Knauf Insulation

- Why LCA within Knauf Insulation ?
  - First = market demand
    - Environmental Product Declaration (E.P.D.),
    - …

KNAUFINSULATION

DECLARATION

ENVIRONNEMENTALE et SANITAIRE

CONFORME A LA NORME *NF P 01-010*

Acoustilaine 035 100 mm

Laine de verre

with ECOSE TECHNOLOGY

Janvier 2013

N° 09-293 : 2012

Cette déclaration est présentée selon le modèle de Fiche de Déclaration Environnementale et Sanitaire validé par l'AIMCC (FDE&S Version 2005)

Knauf Insulation Acoustilaine 035 100 mm avec ECOSE Technology
1

Le 9 janvier 2013

ion

Umwelt-Produktdeklaration
nach ISO 14025

Holzwolle-Mehrschichtplatten
mit Steinwollekern

Heraklith.

Heraklith® is aregistered trademark o

KNAUFINSULATION

Deklarationsnummer
EPD-KNI-2011711-D

Institut Bauen und Umwelt e. V.
www.bau-umwelt.com

Institut Bauen und Umwelt e.V.

inies

tal Product

DAPc® PANEL PLUS (TP 138) de 100 mm
KNAUF INSULATION S.L.

DECLARACIÓN AMBIENTAL DE PRODUCTO

DAPc® 001.006

DE ACUERDO CON LAS NORMAS
ISO 14.025 e ISO 21.930

PRODUCTO

PANEL PLUS (TP 138) de 100 mm

EMPRESA

KNAUFINSULATION

DESCRIPCIÓN DEL PRODUCTO

Panel semi-rígido de Lana Mineral de Vidrio no hidrófila, sin revestimiento, de 100 mm de espesor nominal, 1.350 mm de longitud y 600 mm de anchura

RCP DE REFERENCIA

RCP001 - Productos aislantes térmicos – V.1 (2010)

PLANTA PRODUCCIÓN

KNAUF INSULATION LANNEMEZAN SAS
301, Voie Napoléon III
F-65300 Lannemezan (France)

VALIDEZ

Desde: 31.01.2013
Hasta: 30.01.2018

La validez de la DAPc® 001.006 está sujeta a las condiciones del reglamento DAPc®. La edición vigente de esta DAPc® es la que figura en el registro que mantiene CAATEEB; a título informativo, se incorpora en la página web del Sistema http://es.csostenible.net/dapc

1

KNAUFINSULATION

Introduction

- Why LCA within Knauf Insulation ?
  - First = market demand
    - Environmental Product Declaration (E.P.D.),
    - …
  - **ECO-DESIGN**

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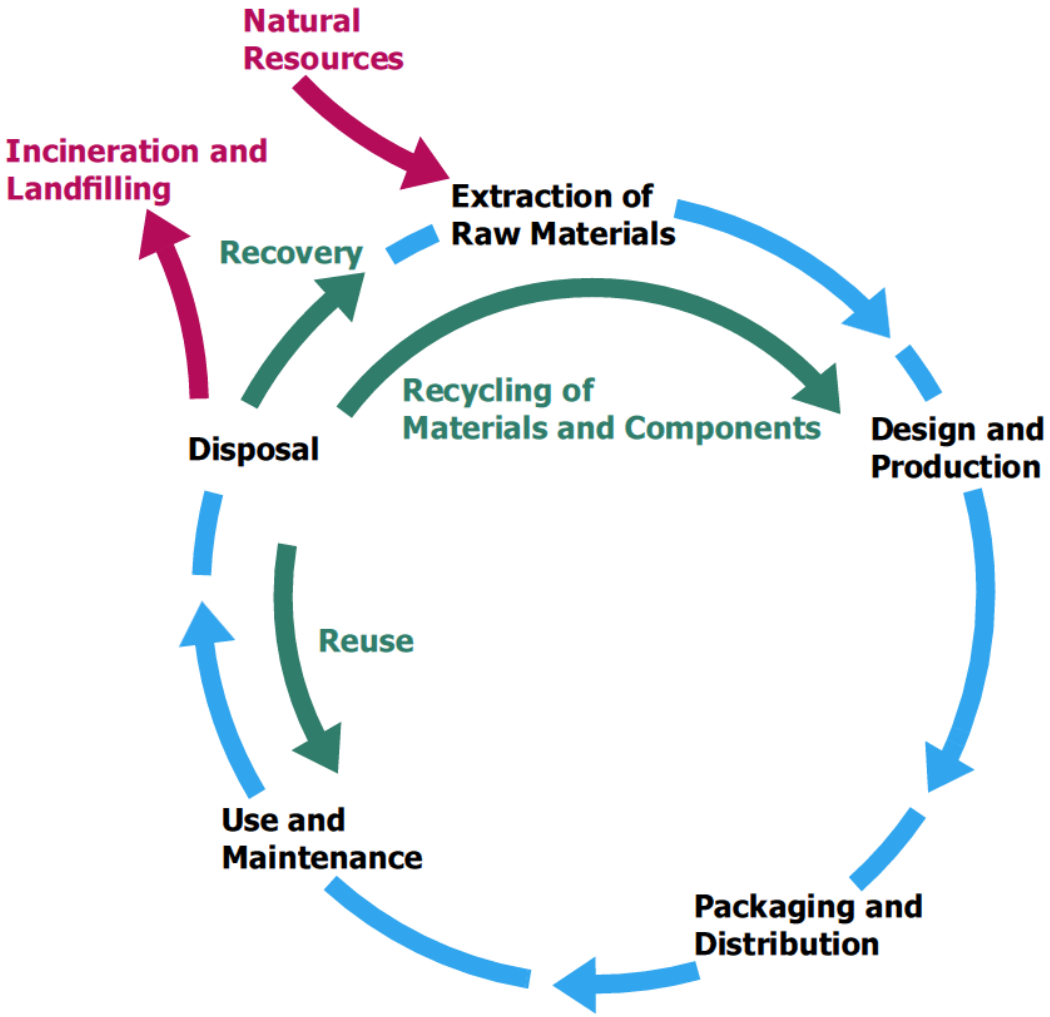
LCA methodology



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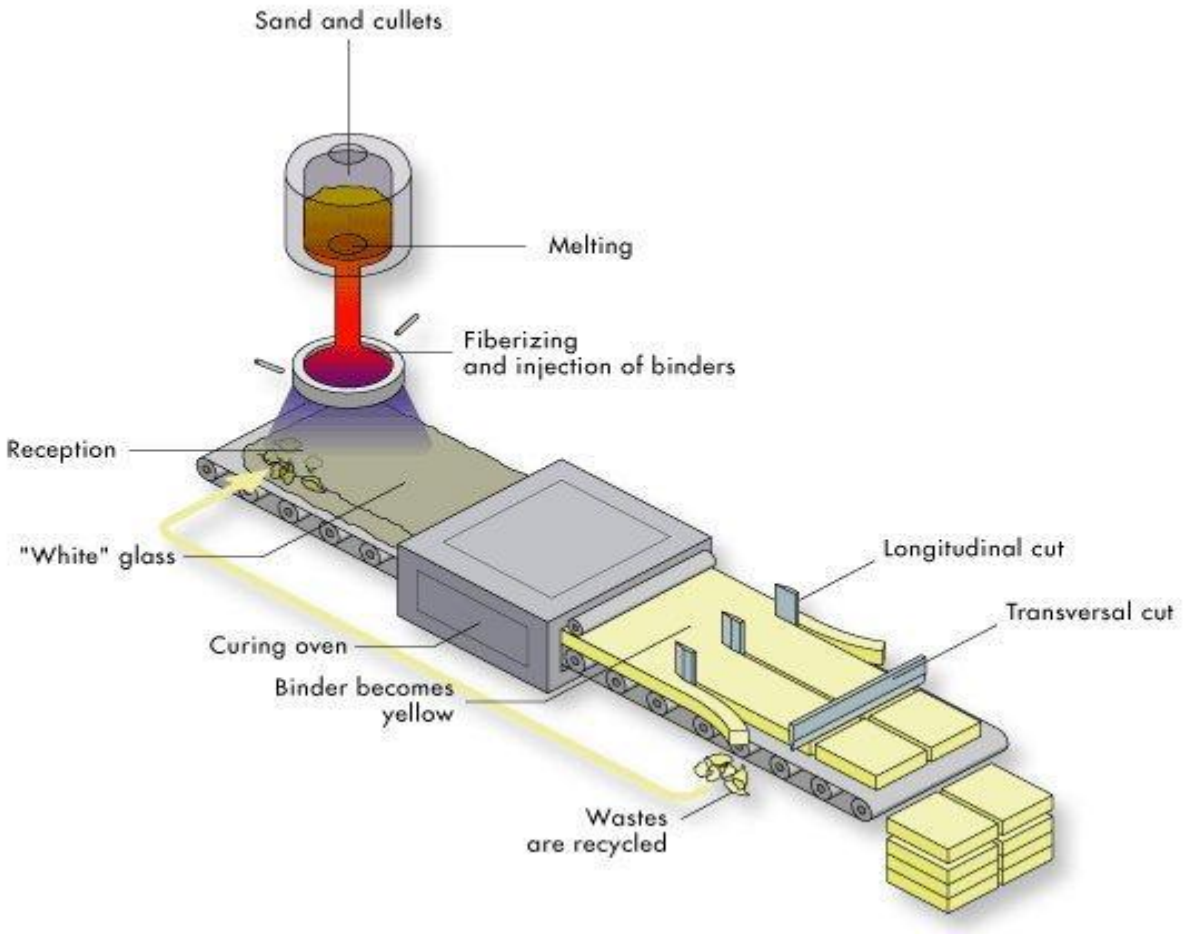
The production process

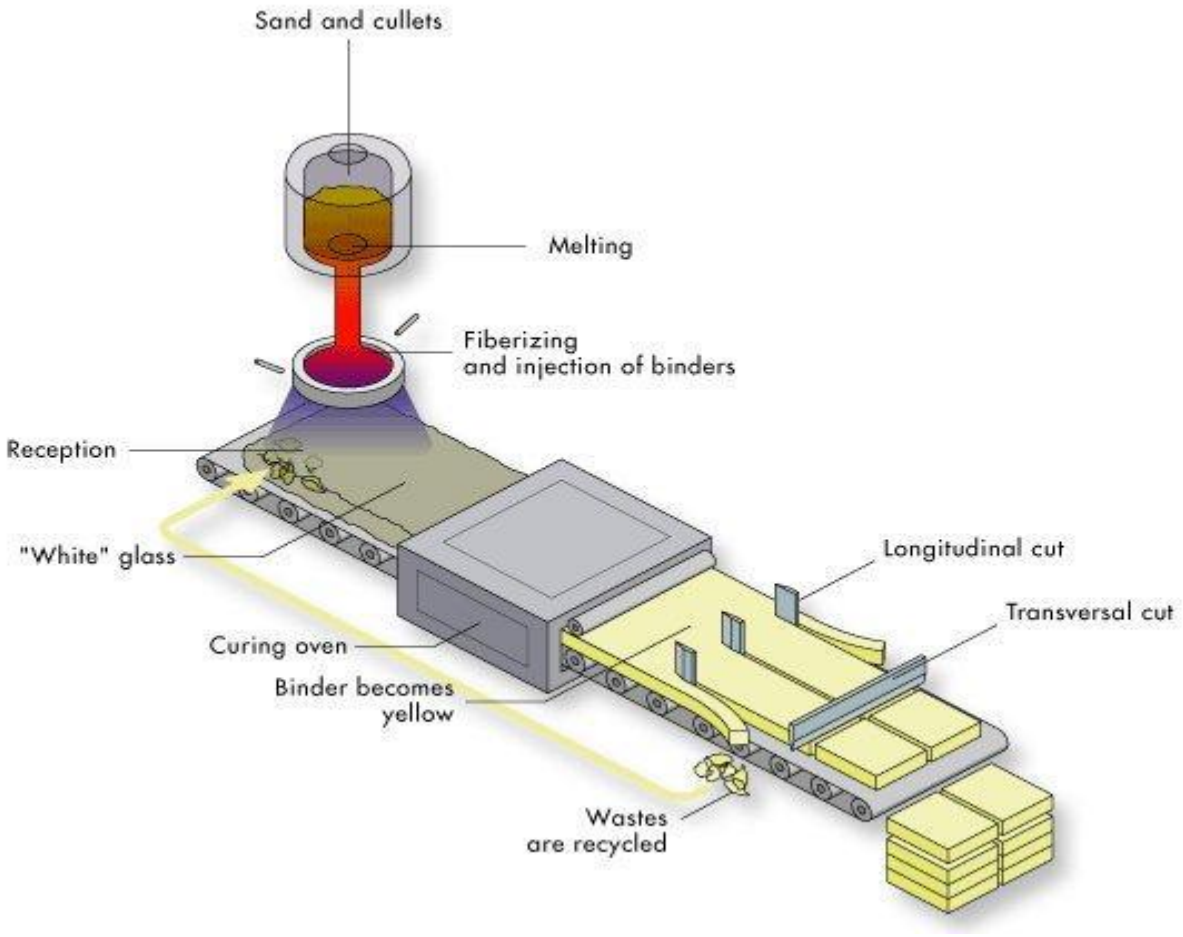
The production process



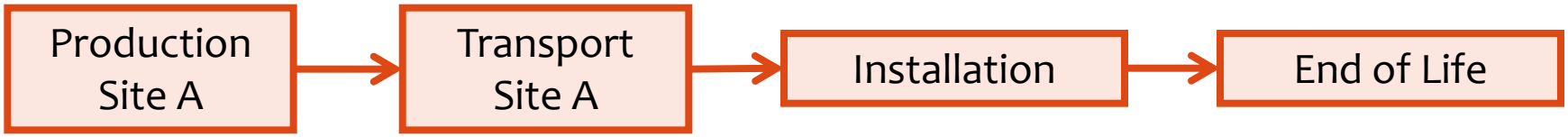
The production process

Binder:
formaldehyde ➔ bio based product obtained from vegetal starch

The production process



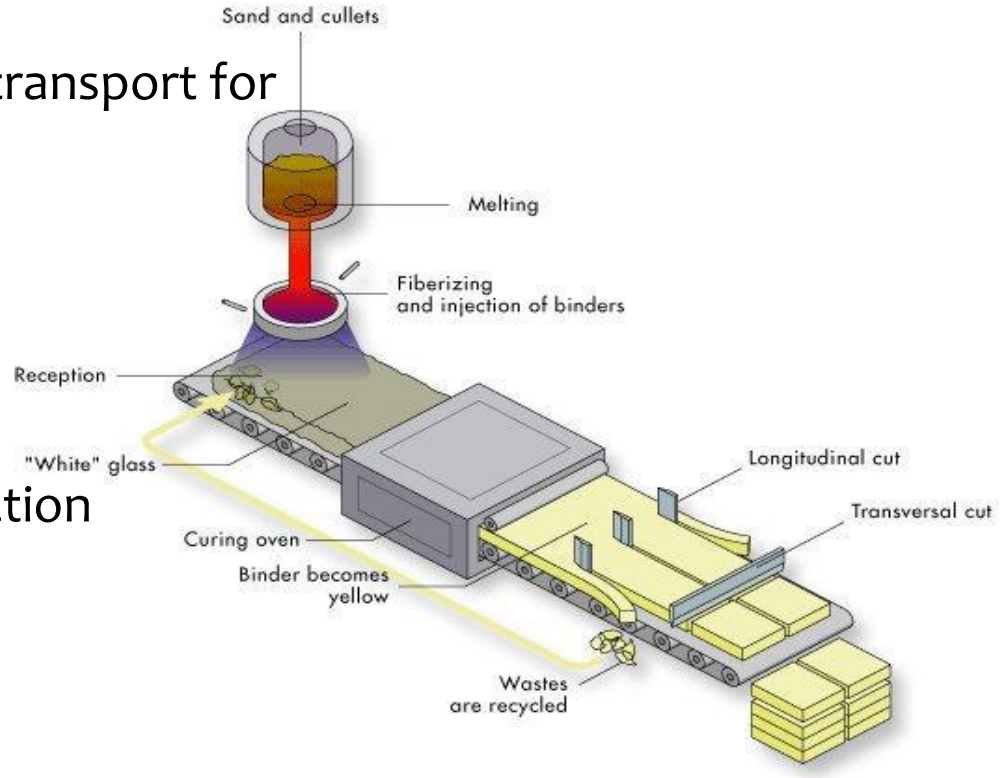
Modeling


Production Site A
Transport Site A
Installation
End of Life

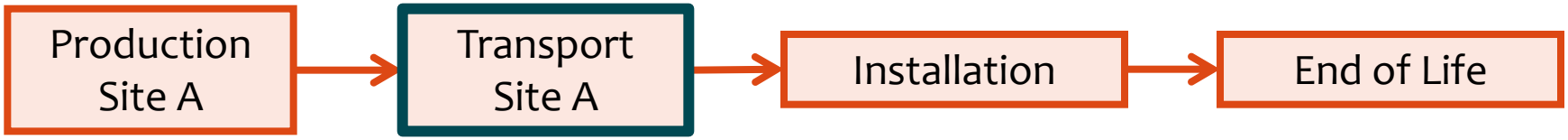
Modeling

Production Site A → Transport Site A → Installation → End of Life

- Raw material extraction and transport for
  - Glass
  - Binder
  - Packaging
  - Facing
  - Plant
- Electricity and oxygen production
- Natural gas production
- Plant emission



Modeling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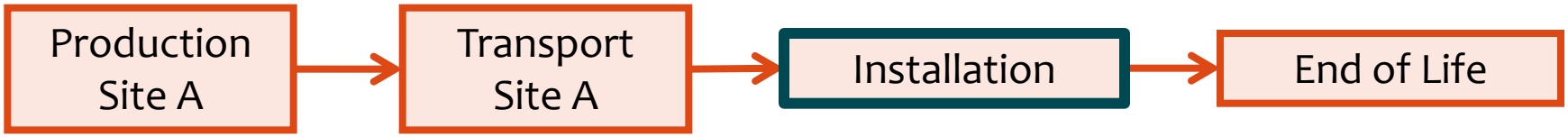
Modeling


Production Site A
Transport Site A
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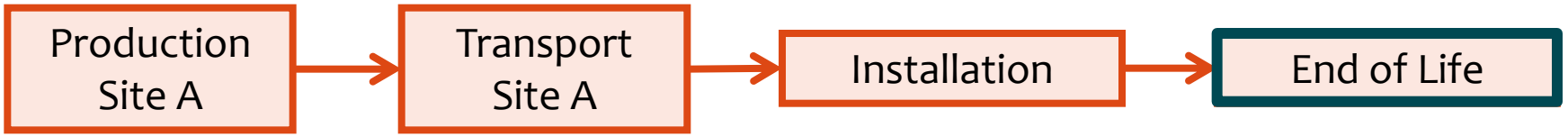
Modeling



Landfilling

- Binder
- Glass

Agenda

1. Introduction
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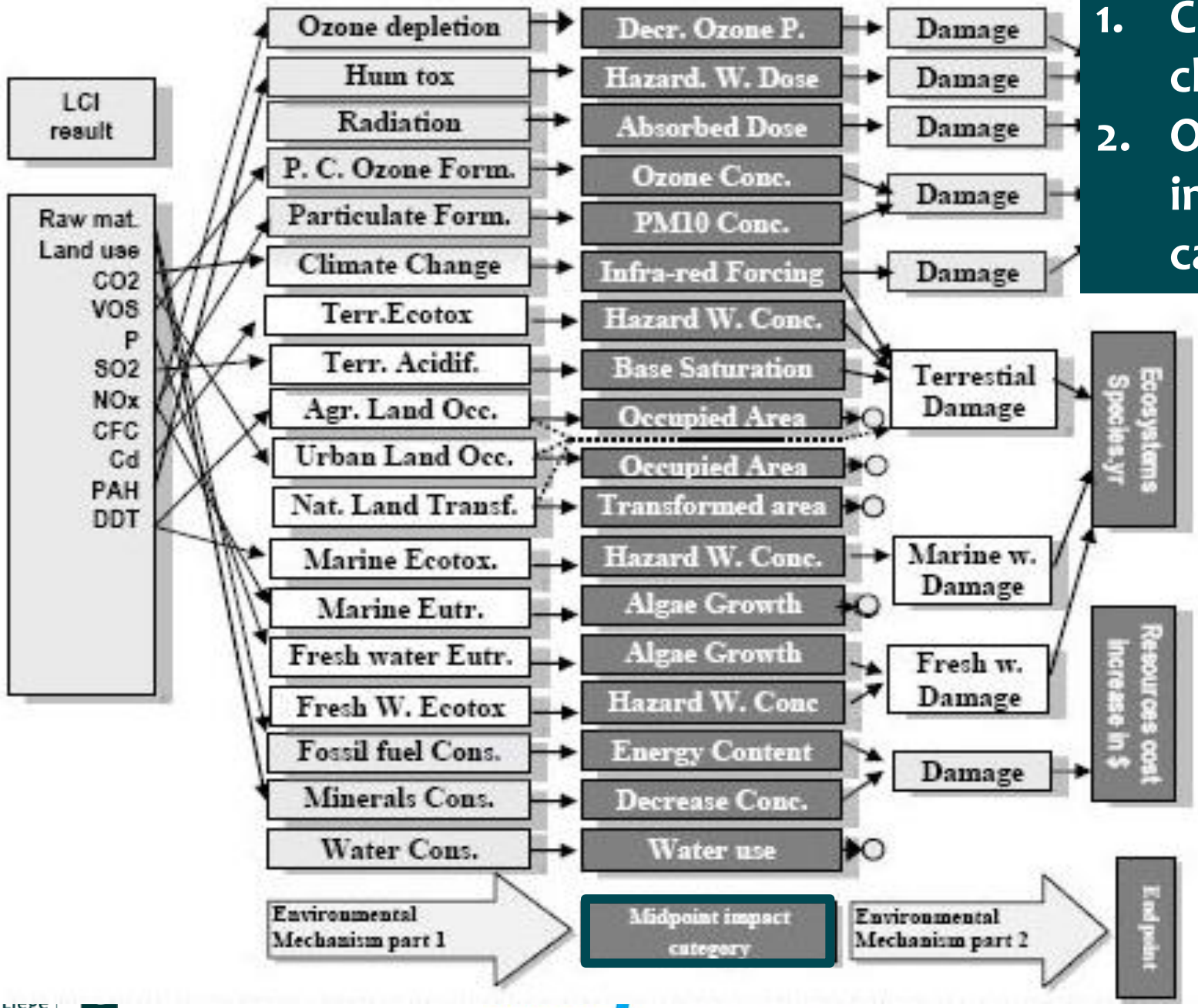
4. **Results**
    1. Climate change
    2. Eco-Design
        - Line waste efficiency
        - Energy mix
5. Conclusion

Results

- The ReCiPe methodology



Only MidPoint:

1. Climate change
2. Other impacts categories

Results

- The ReCiPe methodology
- 1 m^2 of glass mineral wool roll

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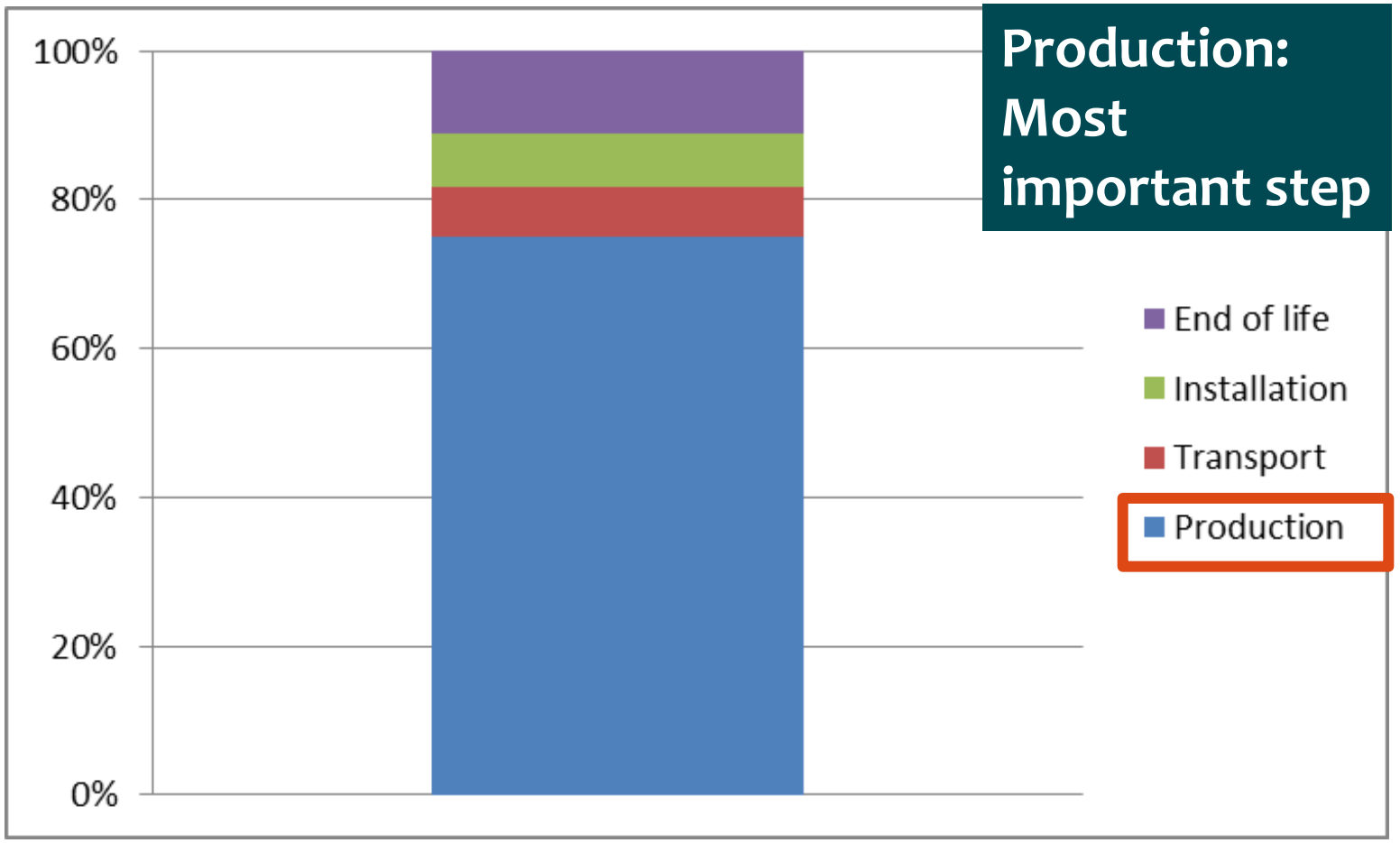
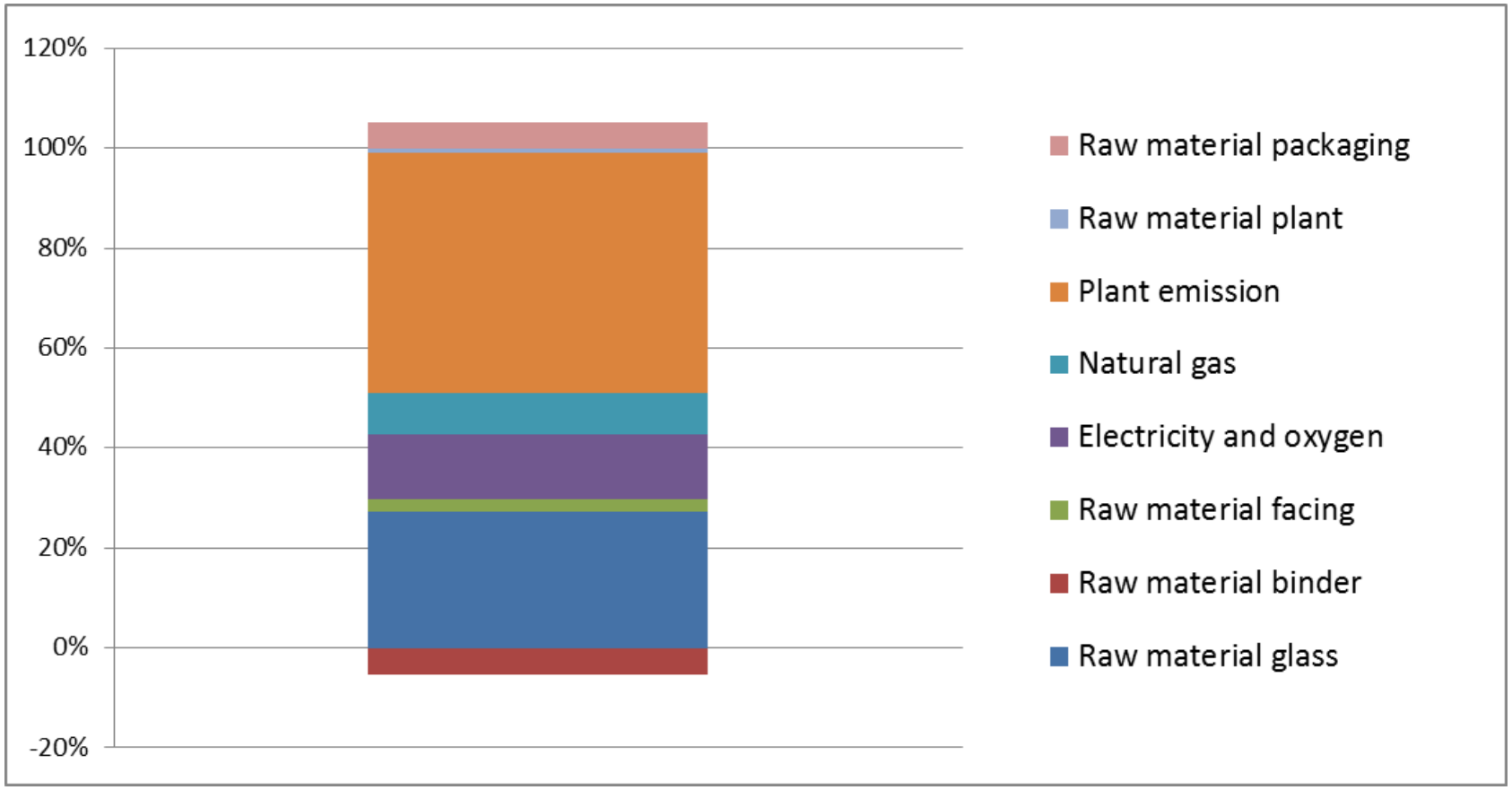
Climate Change



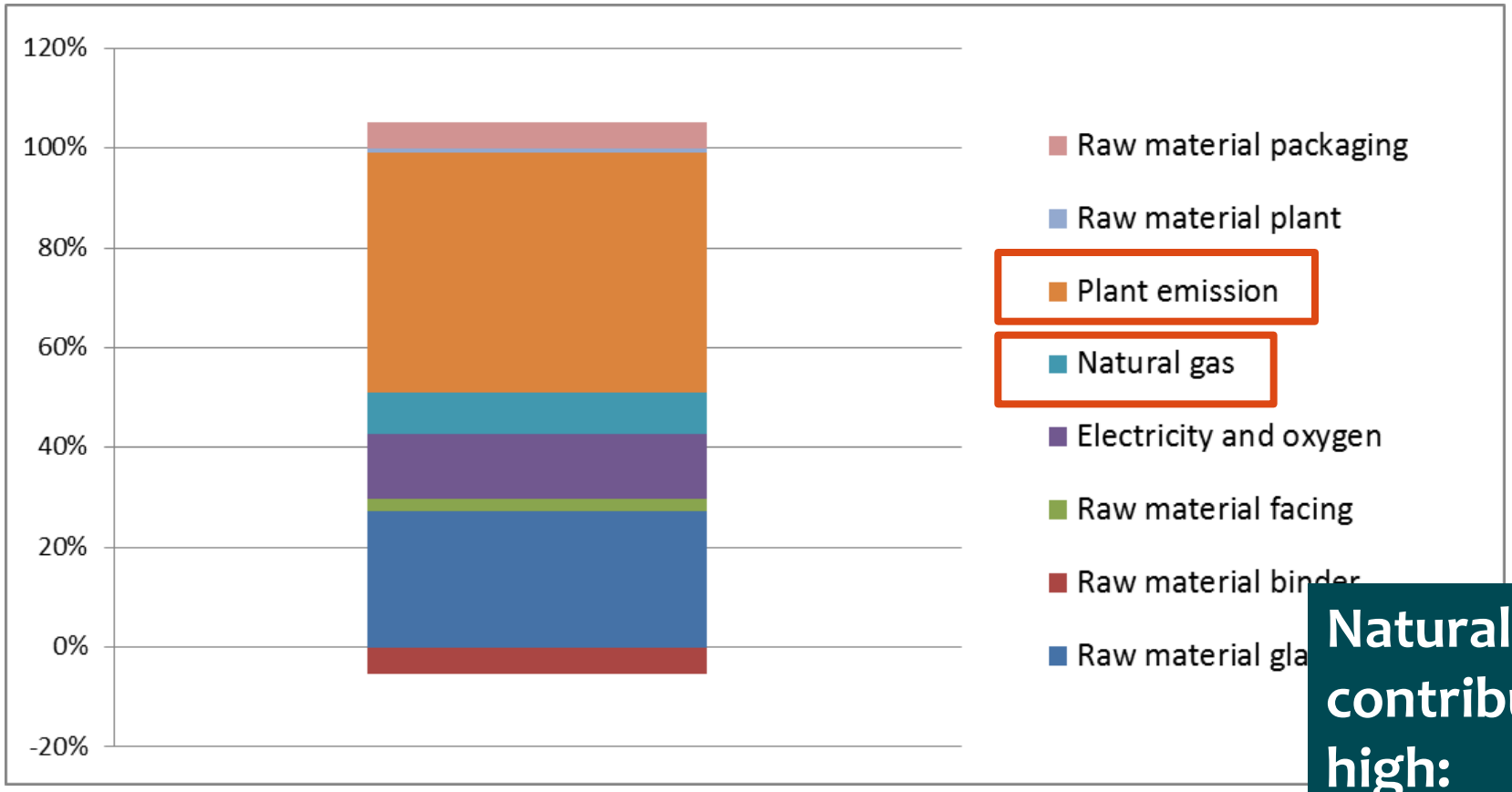
Glass mineral wool roll– 1 m² – Climate Change ReCiPe – whole life cycle

Climate Change – production step



Glass mineral wool roll– 1 m² – Climate Change ReCiPe – Production step

Climate Change – production step

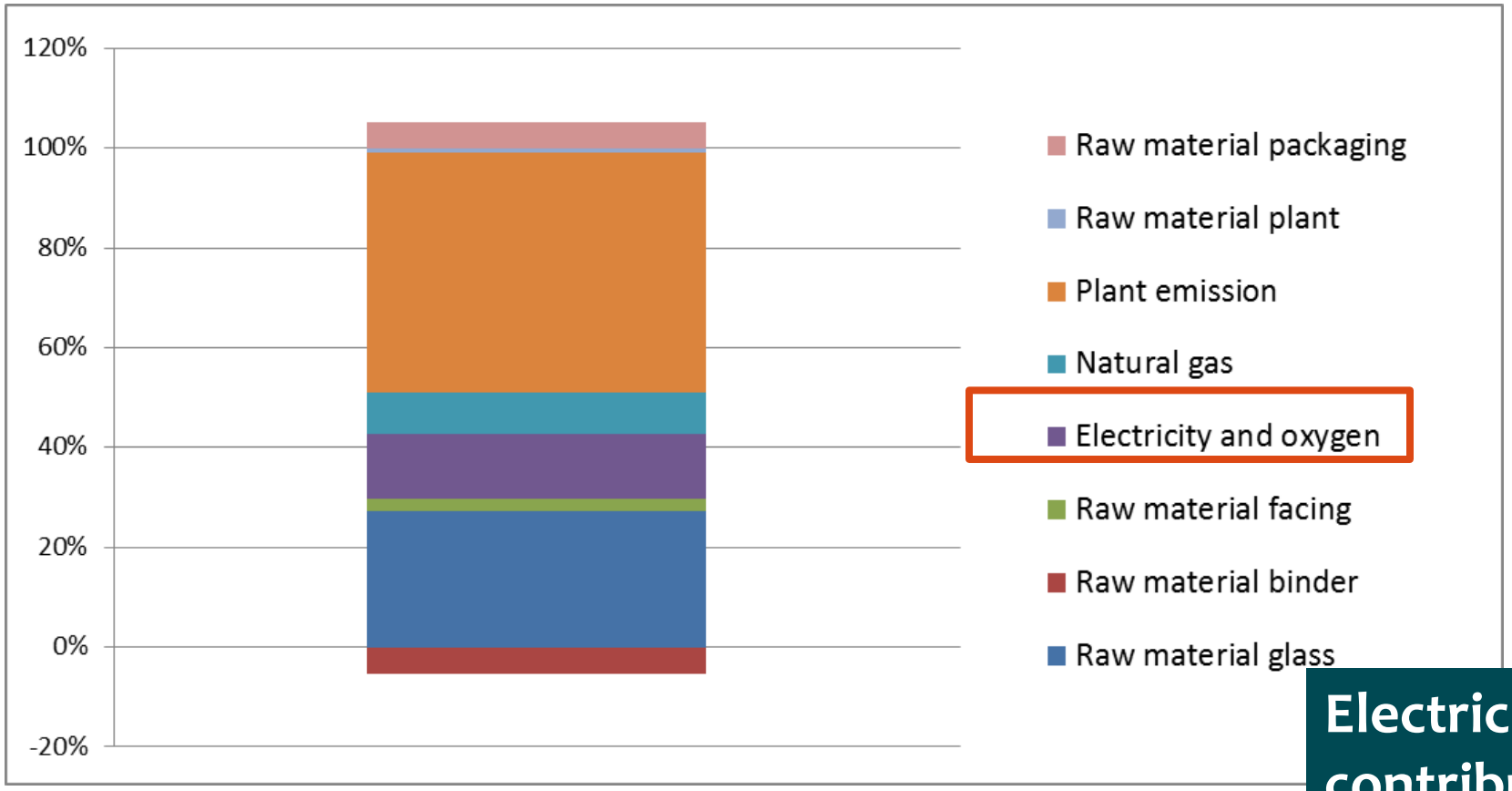


Glass mineral wool roll– 1 m² – Climate Change ReCiPe – Production step

Natural gaz contribution is high:

- **Production**
- **Combustion**

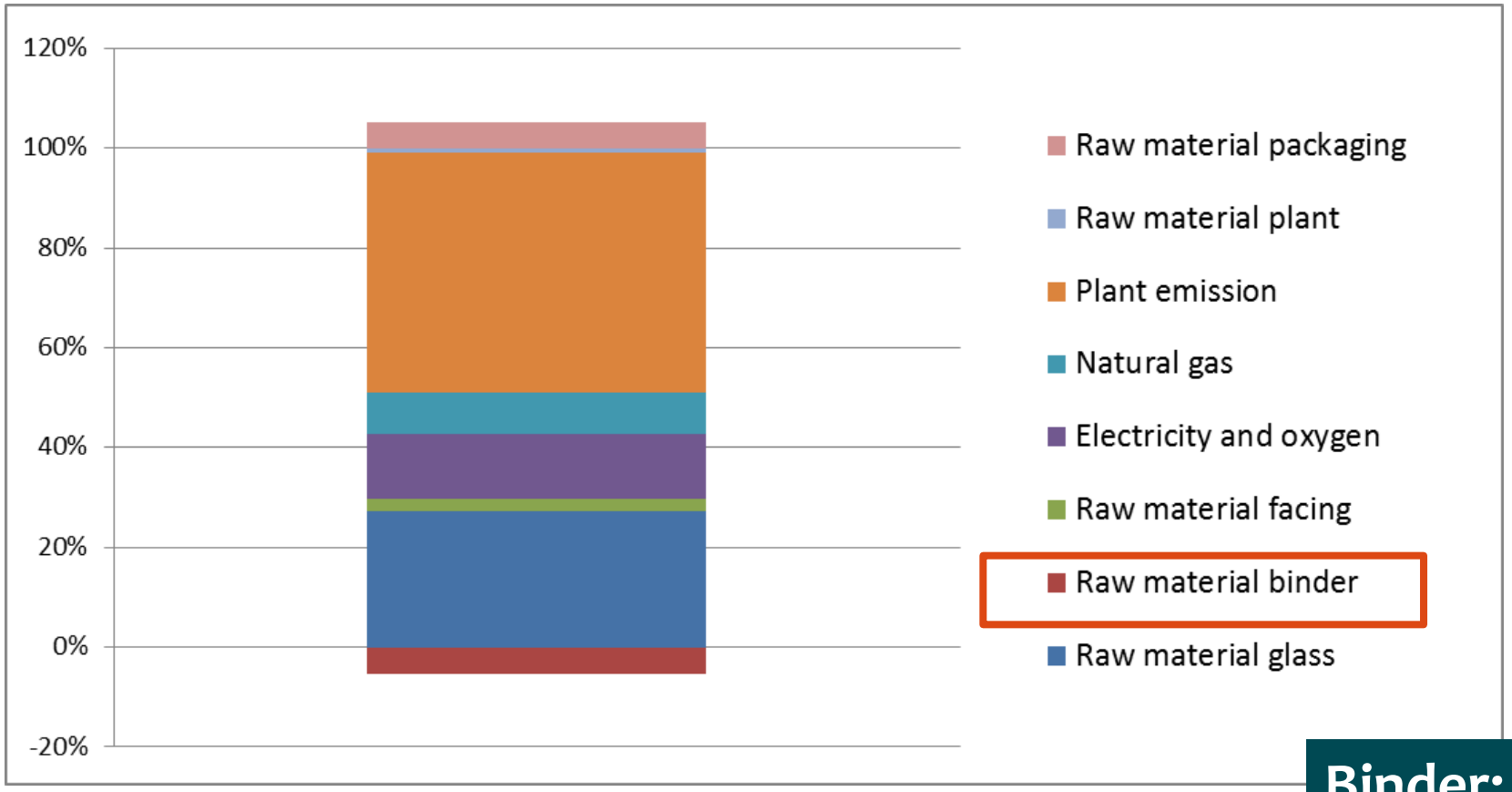
Climate Change – production step



Glass mineral wool roll– 1 m^2 – Climate Change ReCiPe – Production step

Electricity contribution is low:
French mix

Climate Change – production step

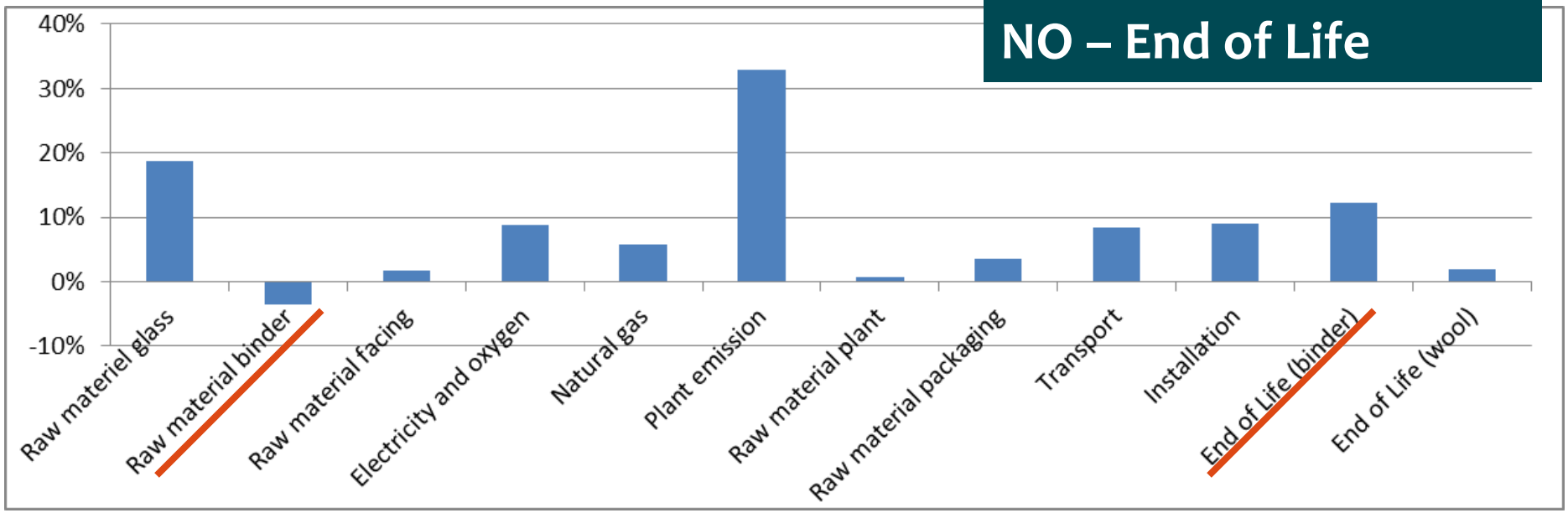


Glass mineral wool roll– 1 m^2 – Climate Change ReCiPe – Production step

Binder: negative contribution ?

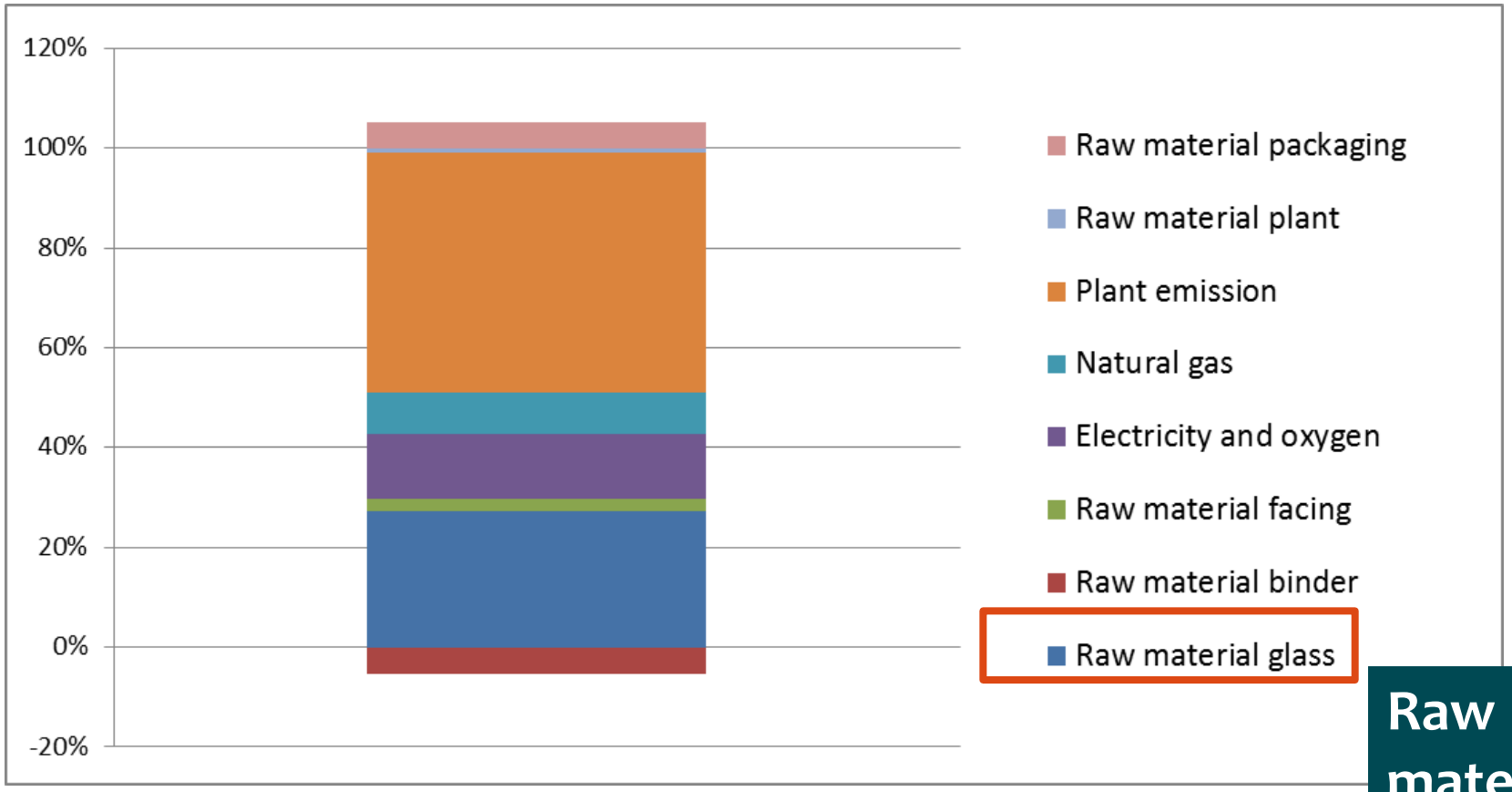
Climate Change

Binder: negative contribution ?
NO – End of Life



Glass mineral wool roll– 1 m^2 – Climate Change ReCiPe – Whole life cycle

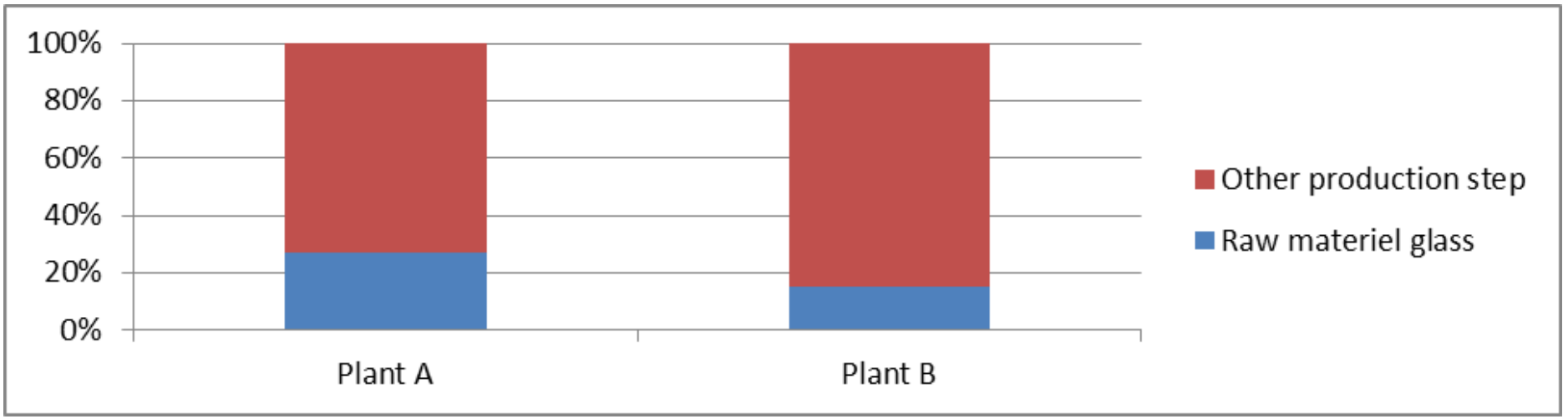
Climate Change – production step



Glass mineral wool roll– 1 m^2 – Climate Change ReCiPe – Production step

Raw material glass: High impact

Climate Change – Production step



Glass mineral wool roll– 1 m² – Climate Change ReCiPe – Production step – Comparison between two plant

Comparison with another plant:

Raw material for wool has an higher contribution in plant A than in plant B.

Why? More waste generated !

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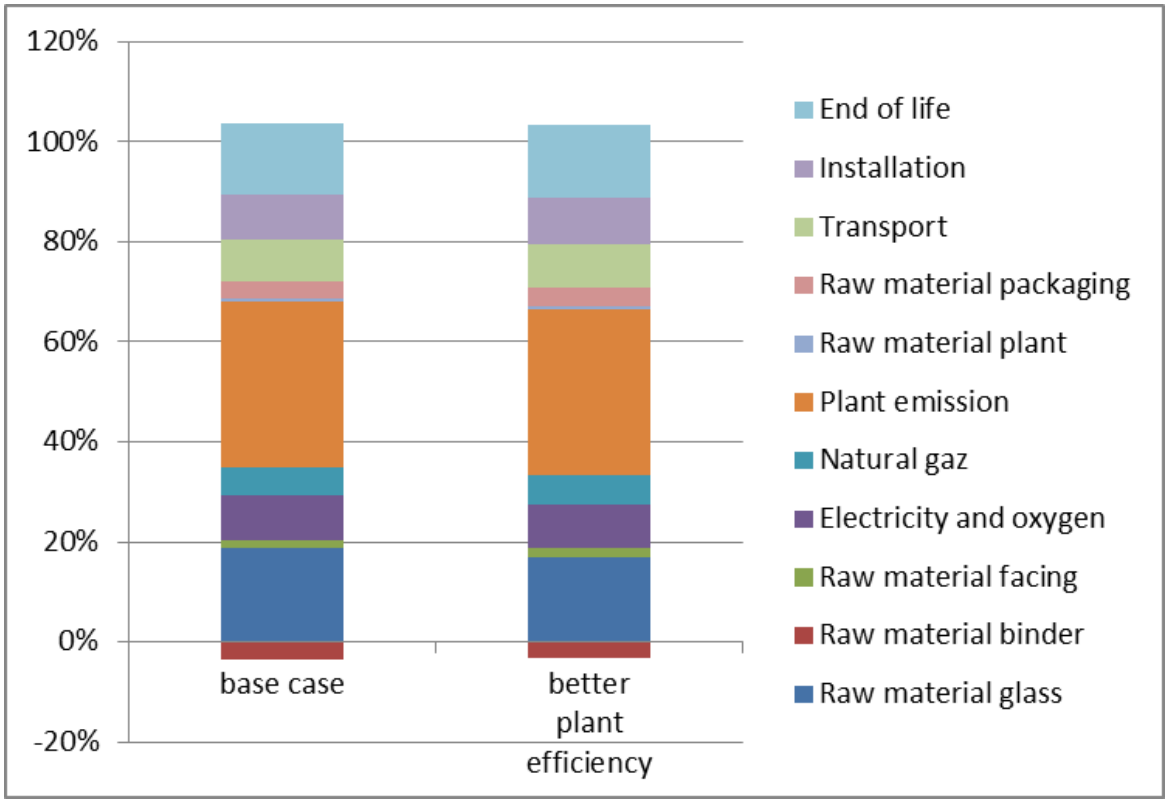
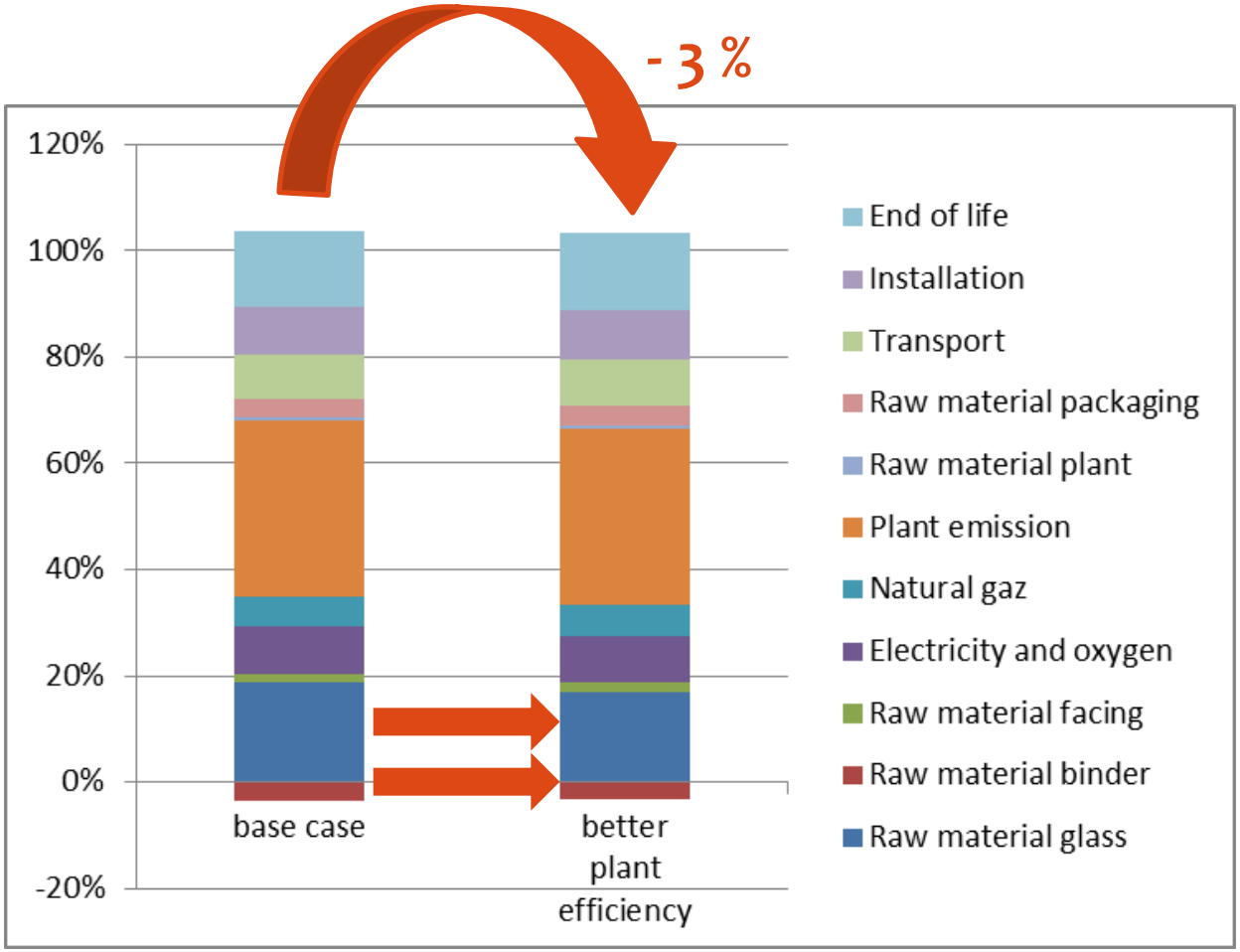
Line waste efficiency – Climate Change

- Amount of wastes in plant A = Plant B



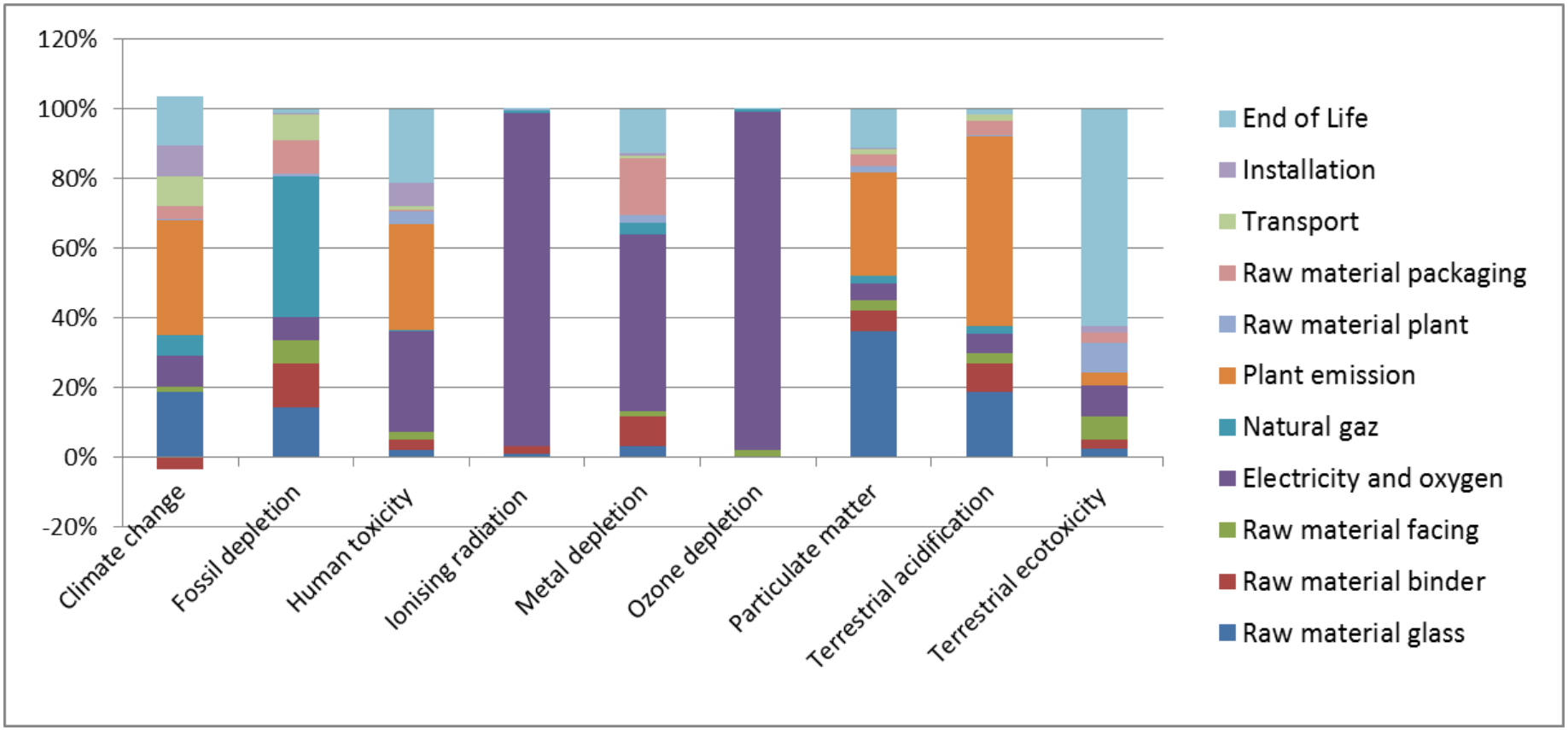
Glass mineral wool roll– 1 m² – Climate Change ReCiPe – Whole life cycle – Comparison between two wastes generation cases on the same plant

Line waste efficiency – Climate Change



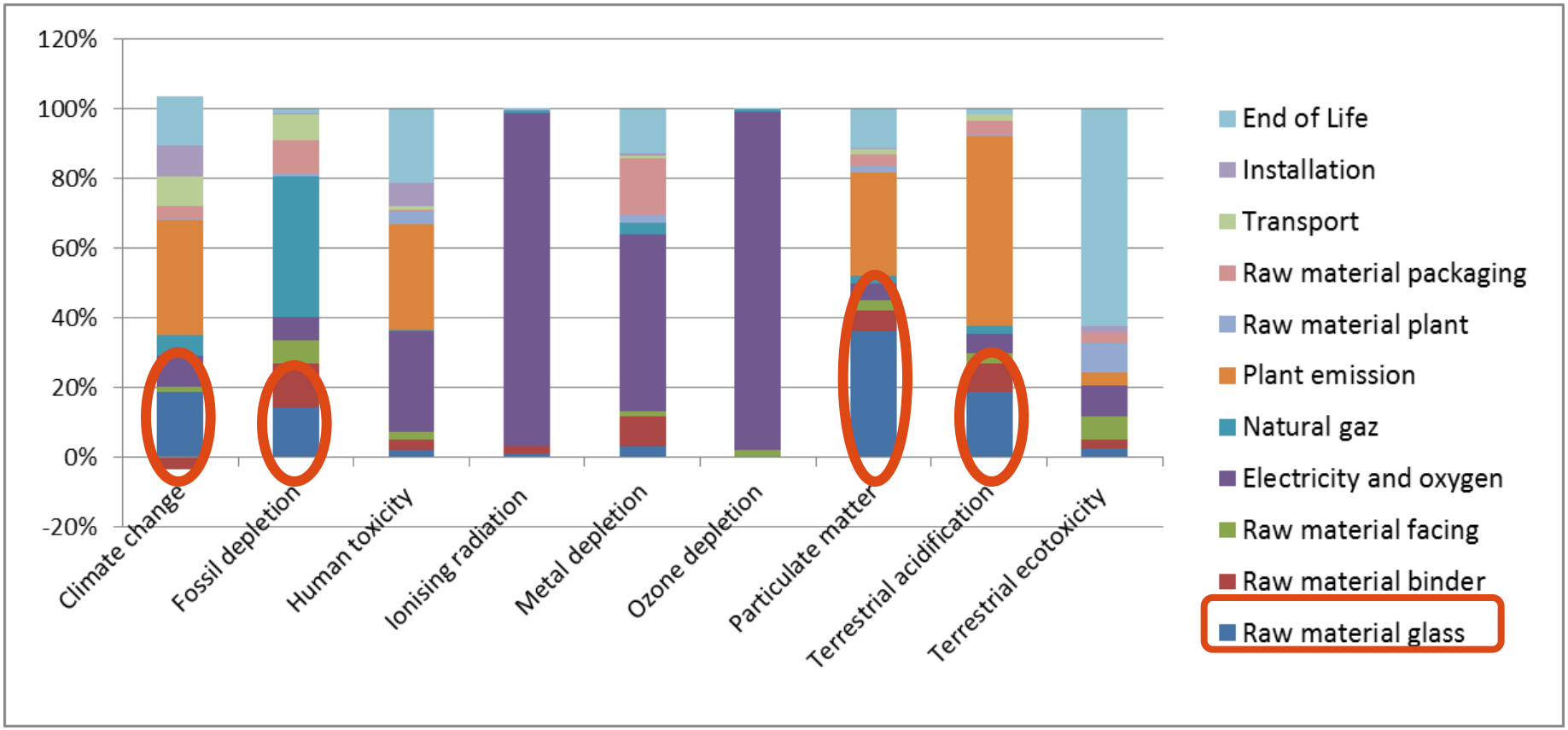
Glass mineral wool roll– 1 m² – Climate Change ReCiPe – Whole life cycle – Comparison between two wastes generation cases on the same plant

Base case– ReCiPe

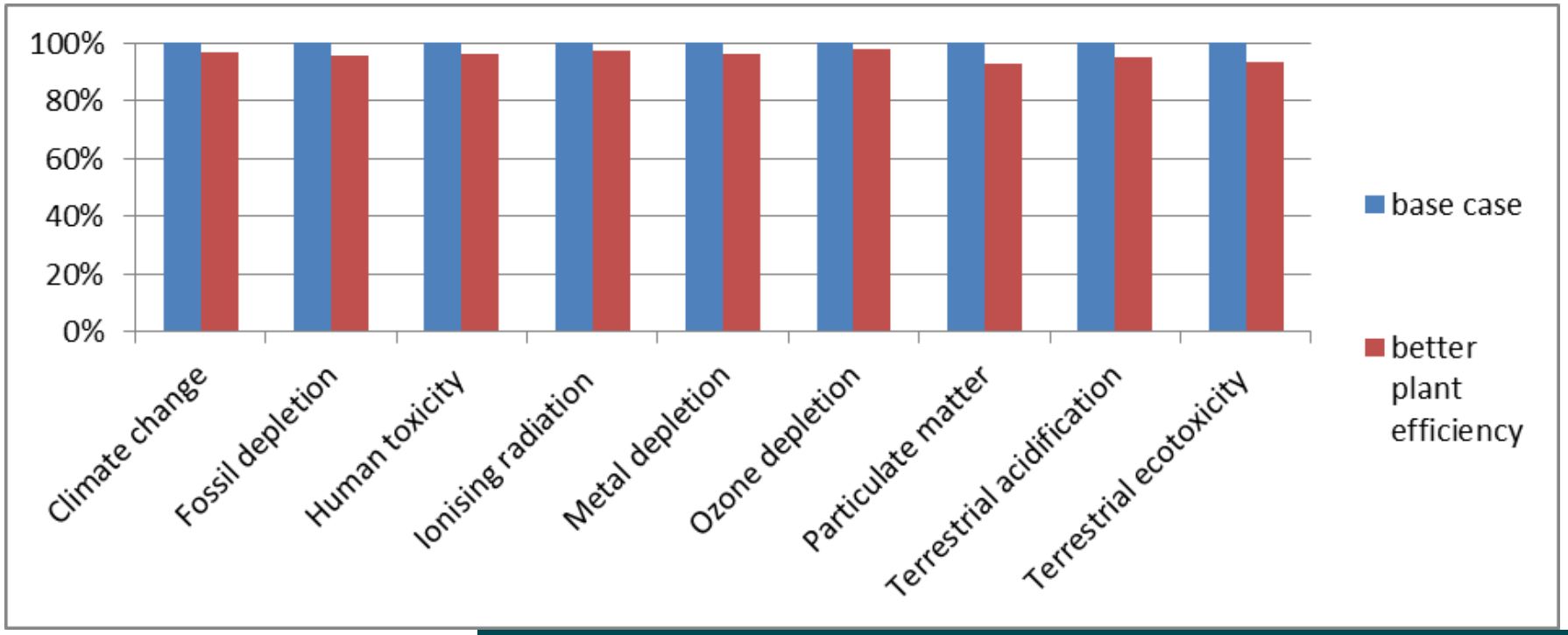


Glass mineral wool roll– 1 m^2 – ReCiPe – Whole life cycle

Base case – ReCiPe



Line waste efficiency – ReCiPe



Glass mineral wool roll– 1 m²

Higher reduction in categories where raw matter glass has an high impact

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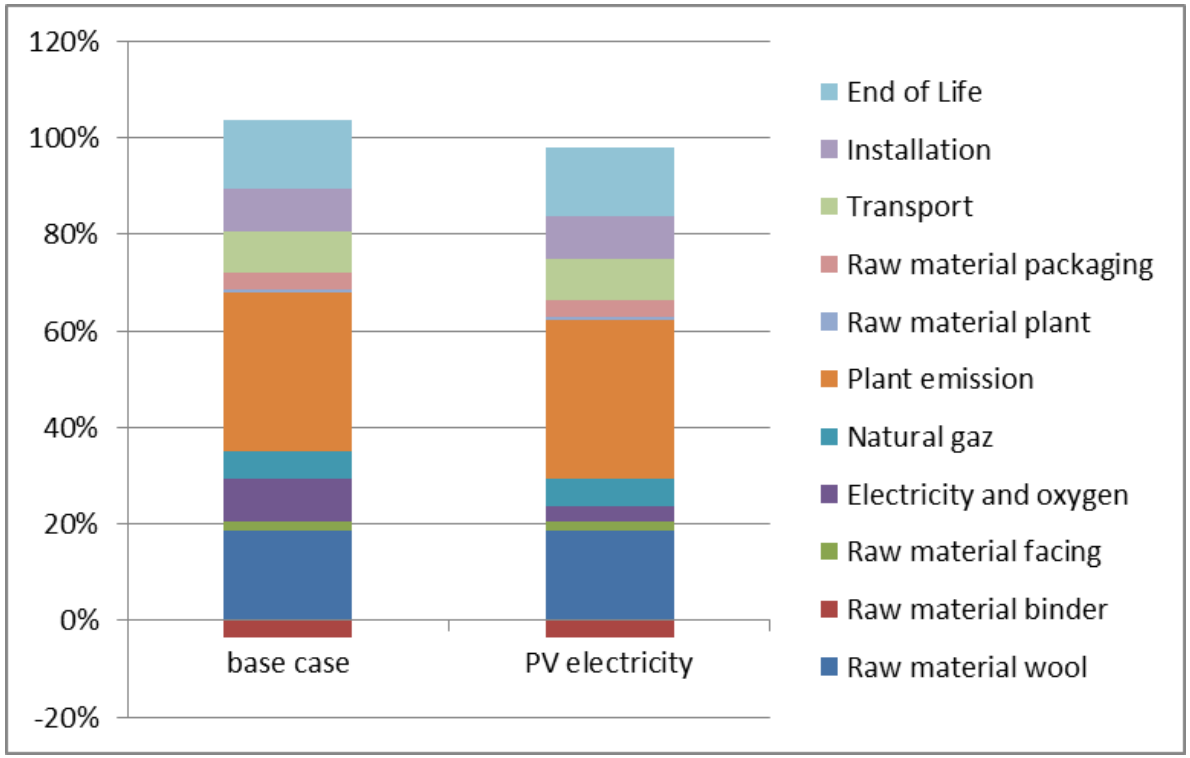
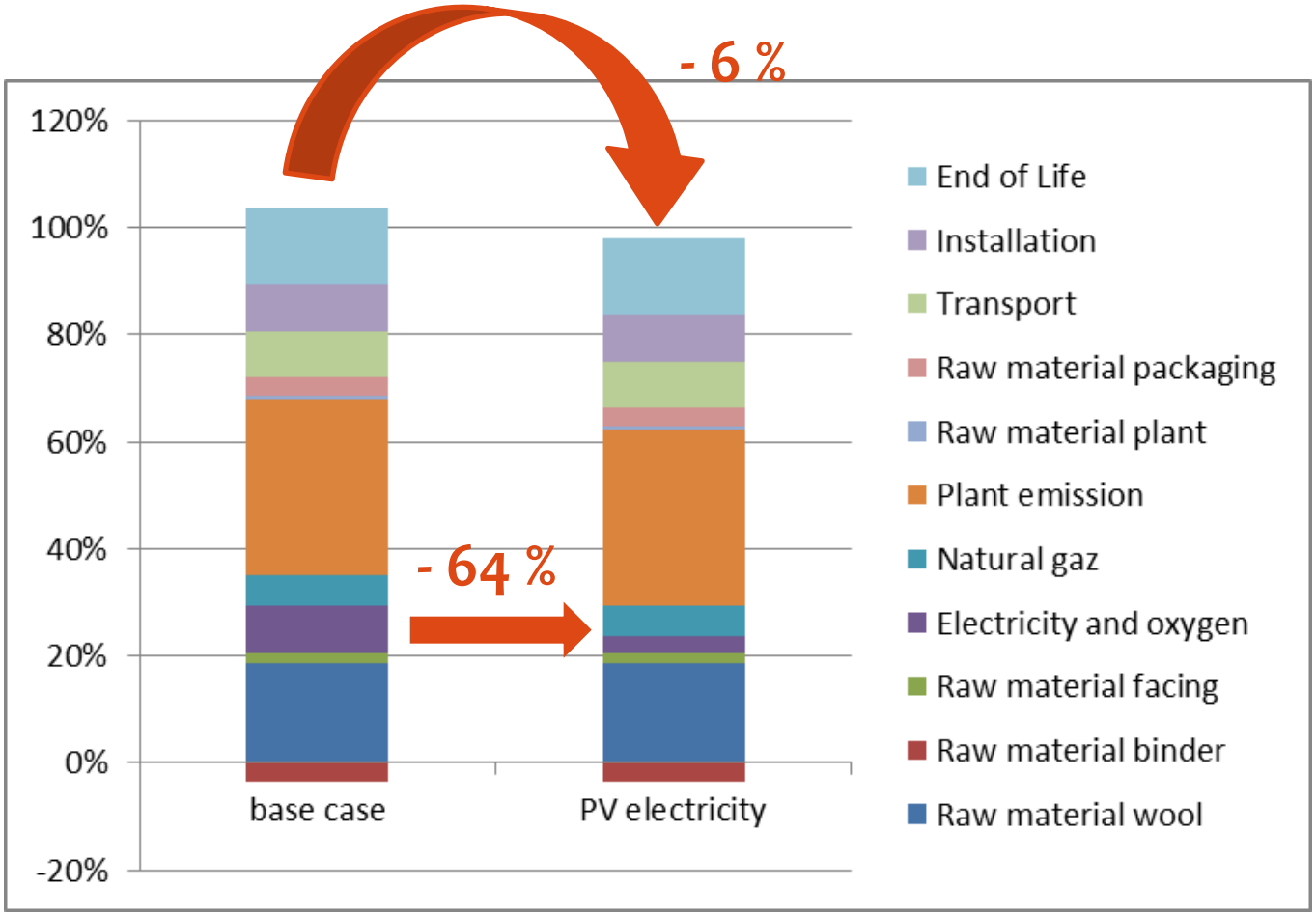
Electricity mix – Climate change

- Only Photovoltaic (PV) electricity (storage system and intermittence take into account)



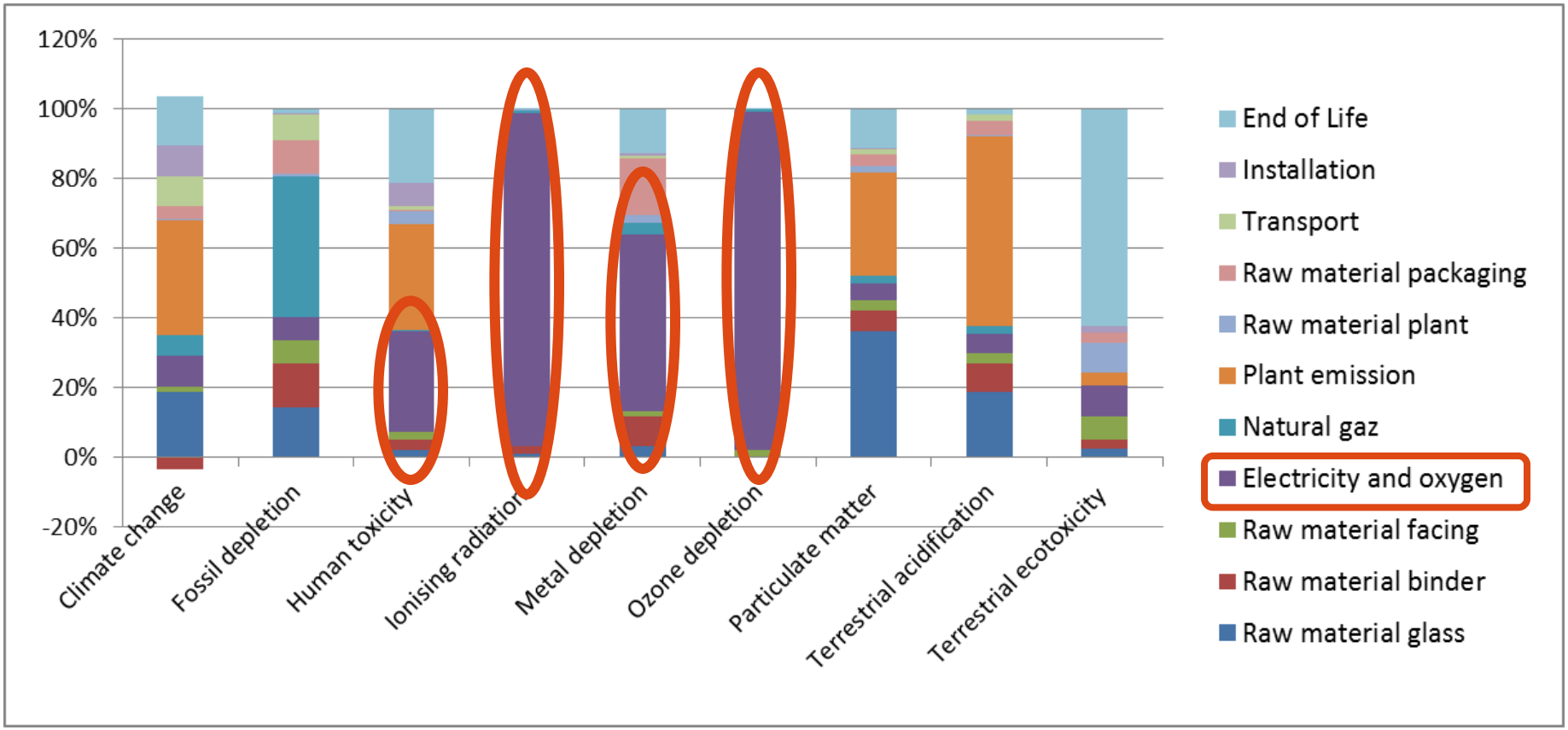
Glass mineral wool roll– 1 m² – Climate Change ReCiPe – Whole life cycle – Comparison between two electricity generation

Electricity mix – Climate change



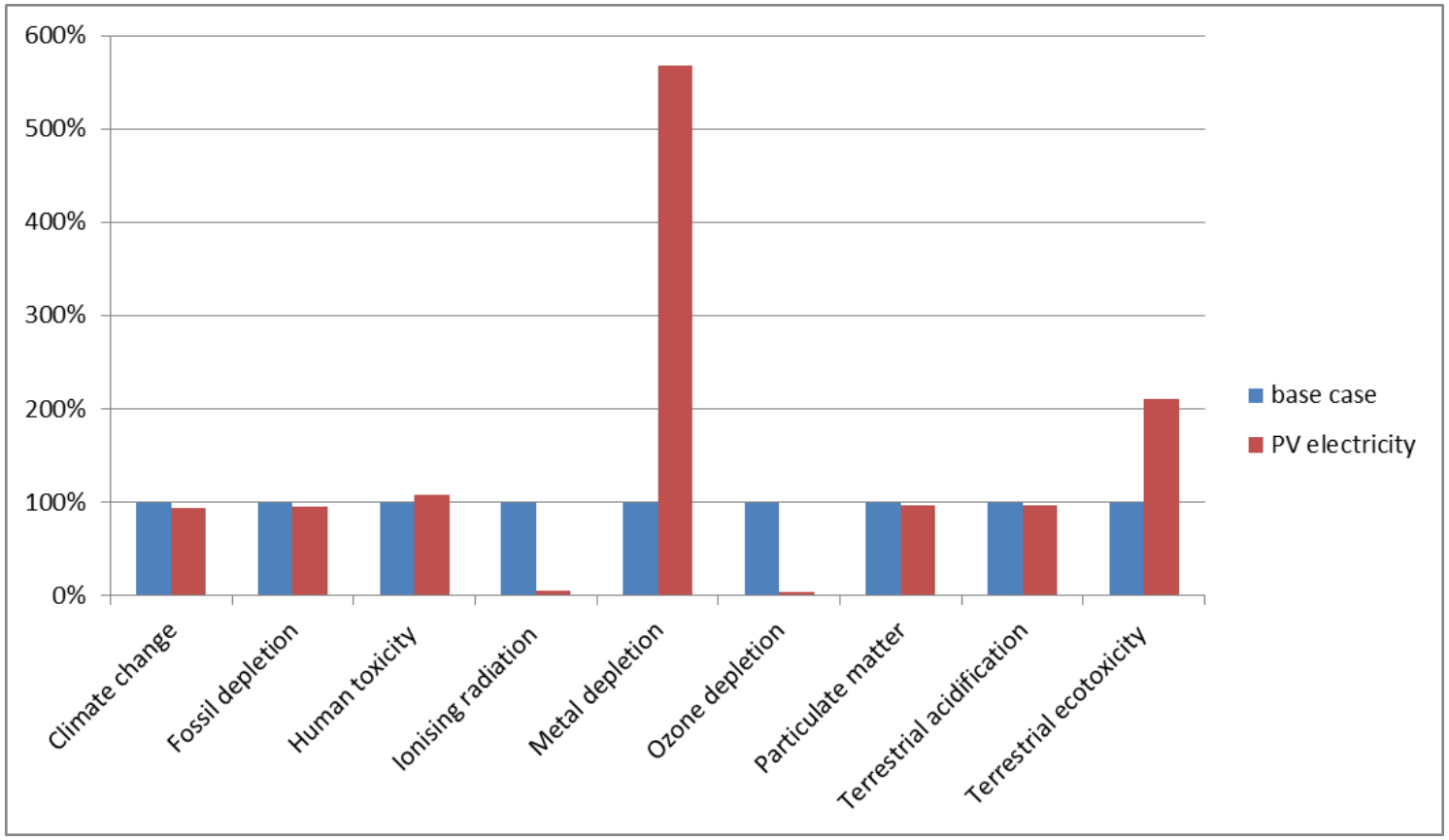
Glass mineral wool roll– 1 m² – Climate Change ReCiPe – Whole life cycle – Comparison between two electricity generation

Base Case– ReCiPe



Glass mineral wool roll– 1 m^2 – ReCiPe – Whole life cycle

Electricity mix - ReCiPe



Glass mineral wool roll– 1 m² – ReCiPe – Whole life cycle – Comparison between two electricity generation

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Conclusion and perspectives

- LCA = essential tool in an Eco-Design view
  - Details the environmental impact → **potential improvements**
  - **Avoids impact transfers** from one category to another or between life cycle steps
  - Accurate environmental performance **measures** → internal and external **communication**
- ReCiPe : several impacts categories
- Study other eco-Design strategy (other indicators, other ways, etc.)

Thank you for your attention

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