



LCA & Construction 2012

Methods for Construction Materials

Life Cycle Inventory: Bitumen 2011

Philippe Dewez
General Director of Eurobitume

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Nantes



Bitumen LCI 2011

- A need for an updated bitumen LCI
- 2011 Eurobitume study:
 - Goal and Scope
 - System boundaries
 - The story
 - Main results
 - Sensitivity analysis
 - Process
 - Acknowledgement

A need for an update

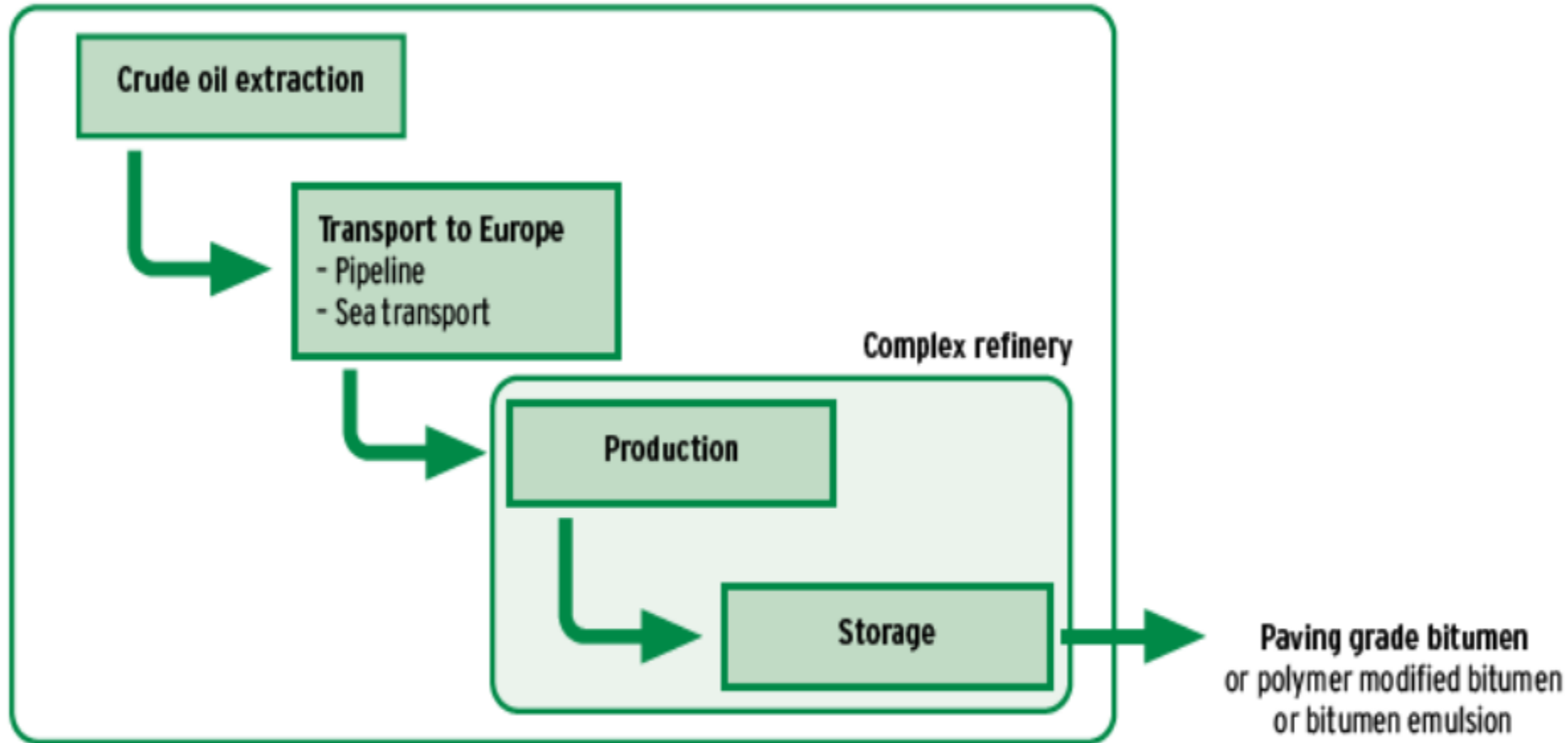
- Last Eurobitume LCI dates back to 1999
- Context changes:
 - Revision of LCA standards in 2006
 - Development in LCA practices:
 - Sensitivity analysis
 - Infrastructure analysis
 - Data update and new data available
 - A request for LCI data regarding products and production routes
 - LCA approach is entering the day to day business world

Bitumen LCI 2011

- Update of the 1999 bitumen LCI
- The cradle to gate study covers:
 - Crude oil extraction
 - Transport by pipeline and ship
 - Bitumen manufacture in a complex refinery
 - Hot storage
 - Production of Paving Bitumen*, PMB and Emulsion
 - Infrastructure
 - *Paving grade bitumens, EN 12591 - table 1
- penetration grades 20 to 220 1/10 mm

System boundaries

System boundary



Bitumen LCI 2011

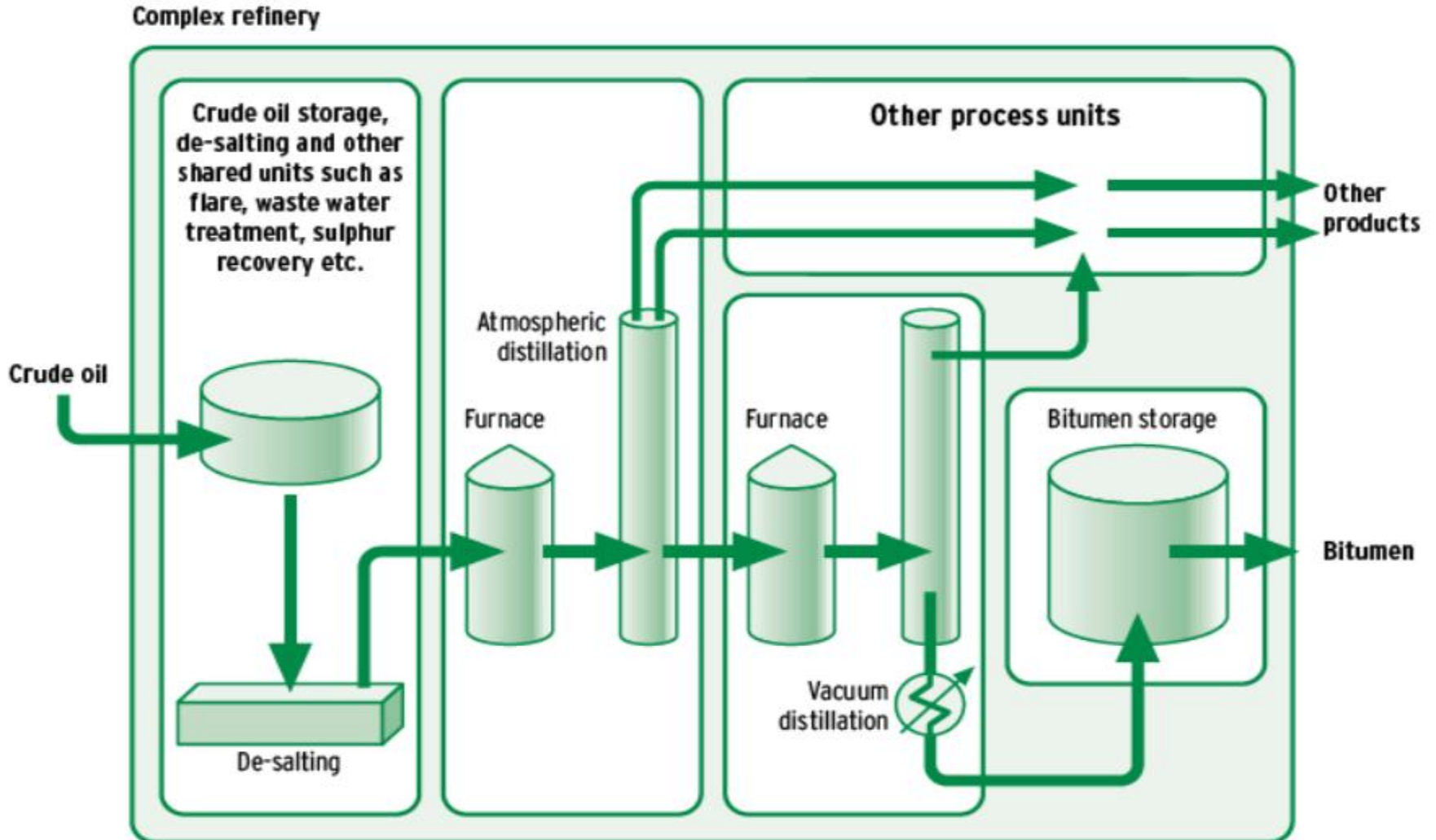
- LCI for producing 1 ton of Bitumen or PMB, 1,54 ton of Emulsion
- Reflects the latest data
 - 2009 Oil & Gas Producers' data
 - Eurobitume & Concawe energy and air emissions data
 - 2010 Concawe water emissions data
 - Members production survey
- Latest revisions of ISO standards
 - Allocation
 - Infrastructure
- Sensitivity evaluation on processes
 - Air Rectification, Solvent Deasphalting, Visbreaking + Vacuum
- Infrastructure: crude oil wells, ships, pipeline, refinery

Key Inputs

- Crude oil slate
(61% Former Soviet Union (FSU), 18% Middle East, 11% South America, 10% Europe)
- Transport: ship & Pipeline from FSU
- Refining: Straight- Run Vacuum Distillation
- Allocations rules:
 - Production, transport: by mass
 - Refining: by economic factor (ISO)
 - Storage: 100%



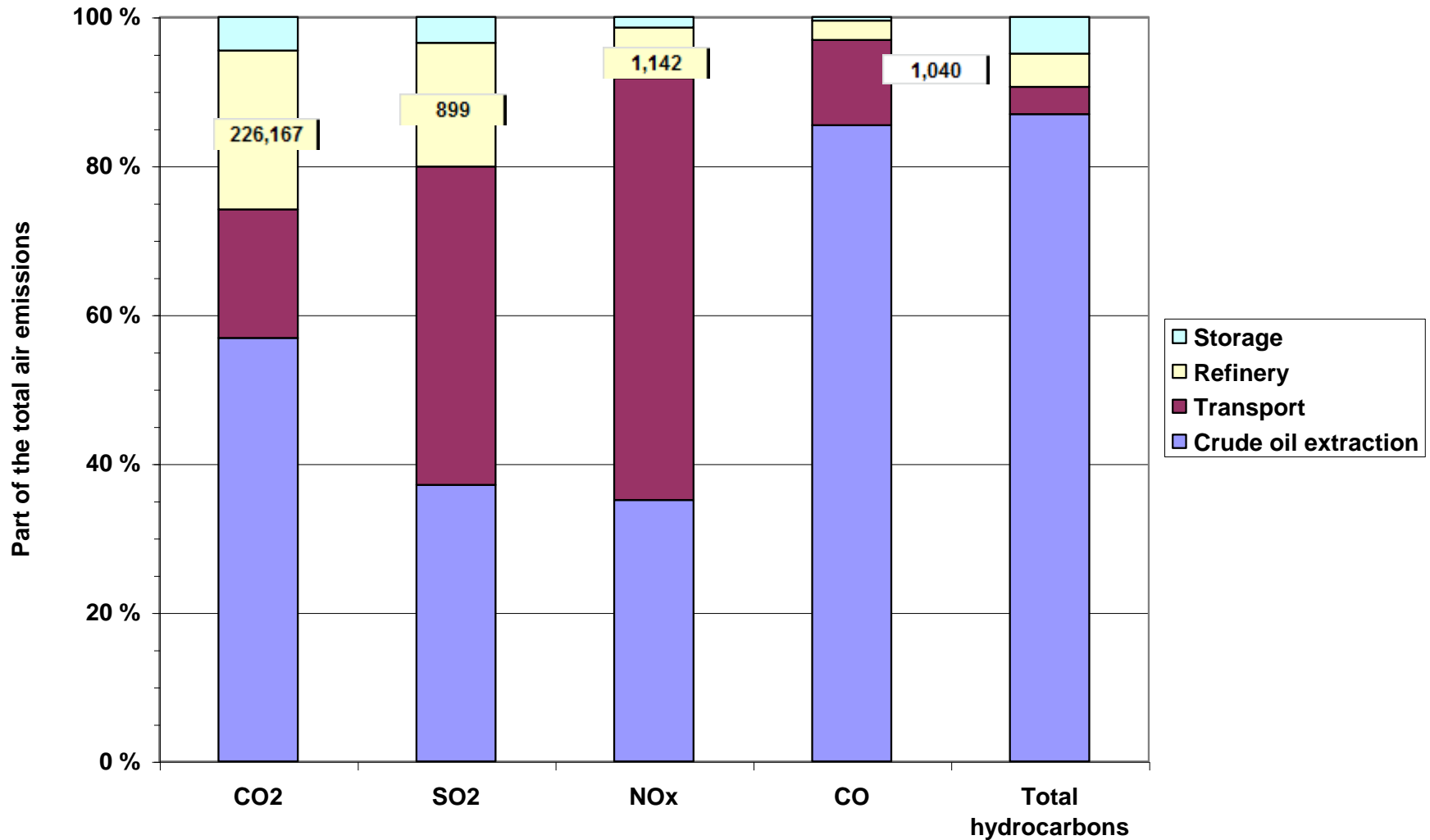
Bitumen refining process



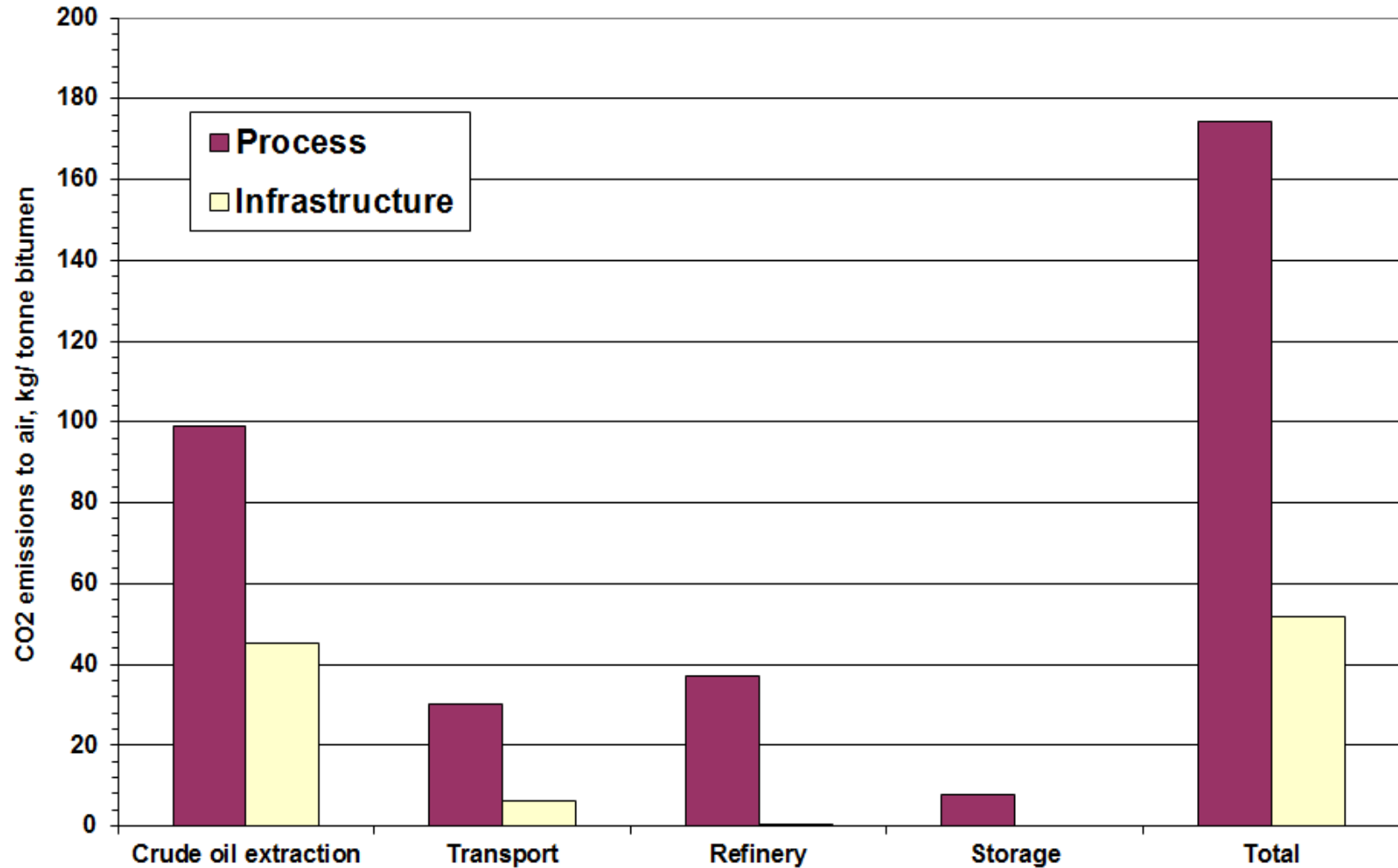
Main results

- LCIs of paving grade bitumen, PMB and bitumen emulsion:
 - More than 1'300 flows (Ecoinvent-enable format)
 - Breakdown by production steps
 - Breakdown by environmental compartment (air, water soil) and energy resource consumption.
 - LCIs are given both with and without infrastructure.
- Results of sensitivity analysis:
 - Allocation: the mixed mass/economic approach is conservative compared to fully mass and economic ones
 - Processing routes: the impact of secondary processes is marginal
 - Infrastructure: globally increases the importance of flows and in particular water, coal and uranium use.

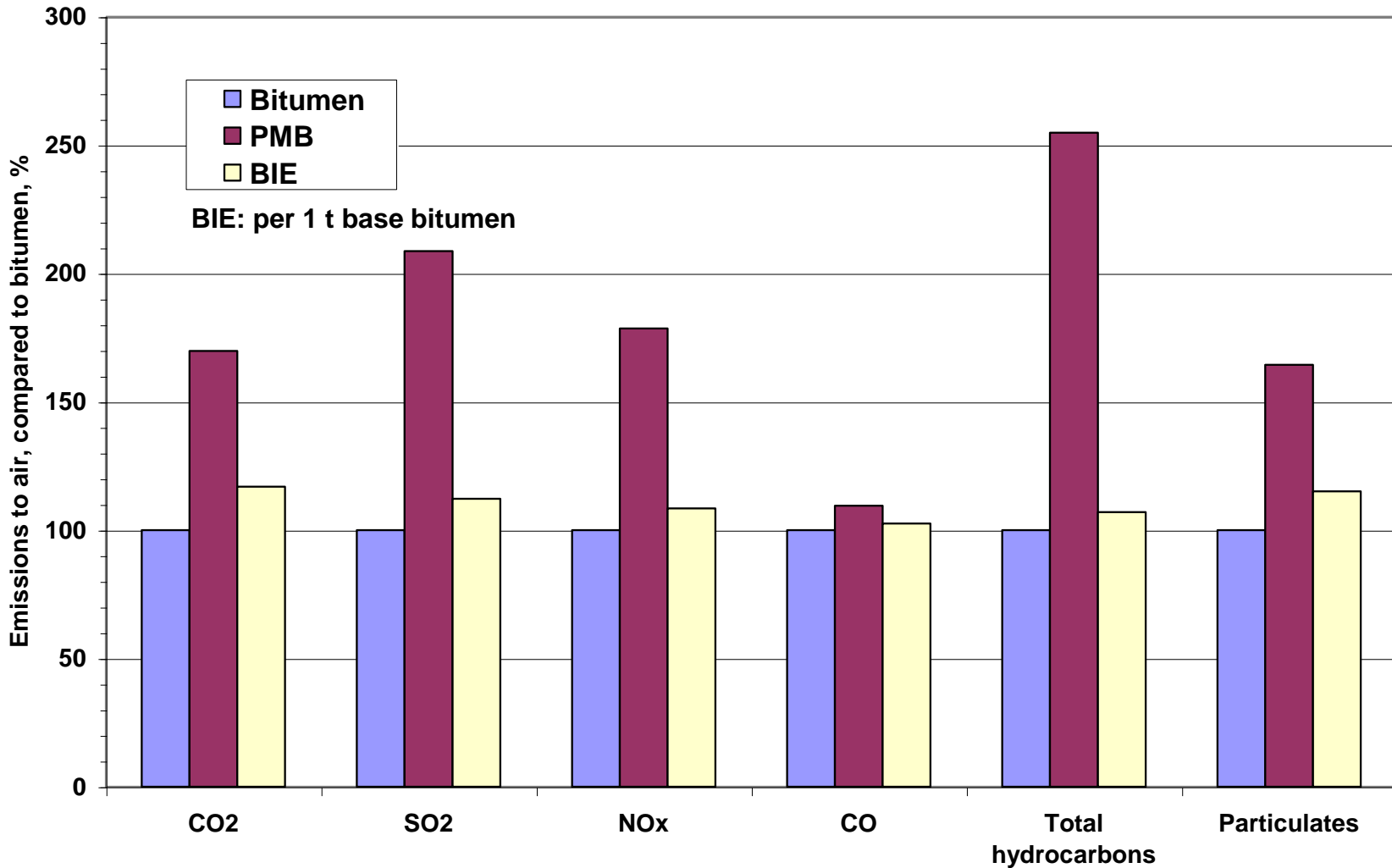
Emissions to air from the different parts of the production chain (gr/ton, process & infrastructure)



Emissions to air: LCI 2011 + infrastructure

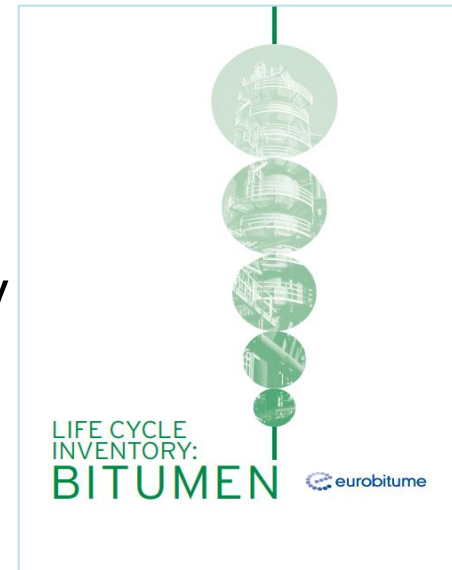


Emissions to air, PMB and emulsion compared to bitumen



Process

- The study is consistent with international LCA standards
- The inventory has been performed by experts of the bitumen industry (Eurobitume members) in collaboration with LCA consultants (Bio Intelligence Service)
- Report details assumptions and approach, and provides a complete Ecoinvent-enabled inventory
Freely available online www.eurobitume.eu
- The study has been peer reviewed by an independent LCA expert: N. Jungbluth – ESU
Reviewer report is reported in Appendix of Eurobitume report



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Back – up slides

Bitumen, PMB and bitumen emulsion LCI (w/o infrastructure) breakdown: selection of emissions to air

