

# IMAA Kongress 2024, San Sebastian/ES

## Vergleich der Umweltwirkungen von Gussasphalt mit offenporigen Belägen

*Joël Lenk, Nibuxs Sàrl, Bern/CH*

**Nibuxs**  
■ ■ ■

# SDA 8-12





MA 8 LA



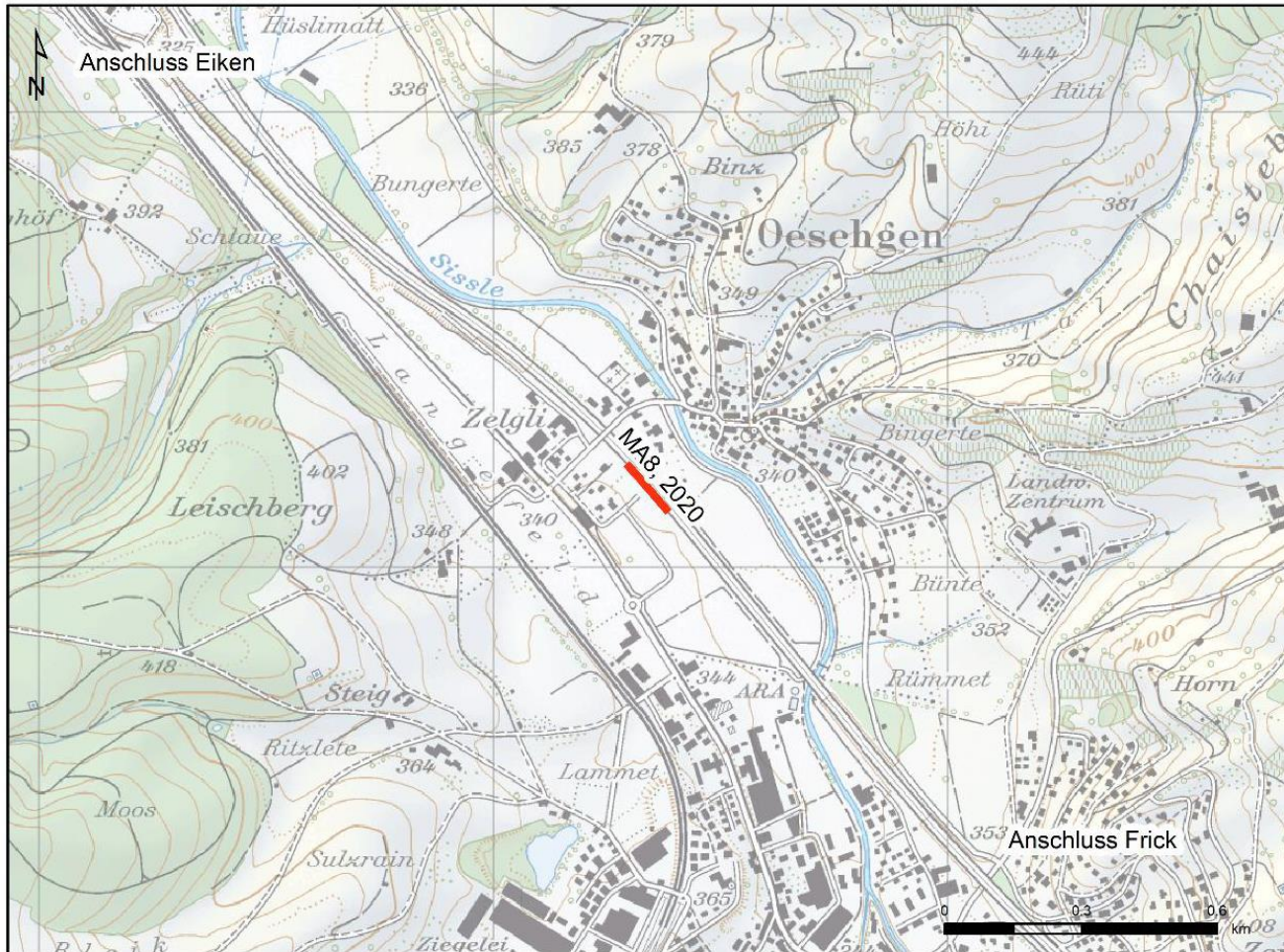
## Vorteile Gussasphalt

- Längere Lebensdauer
- Einbau benötigt keine Verdichtung
- Geringerer Erhaltungsaufwand

## Nachteile Gussasphalt

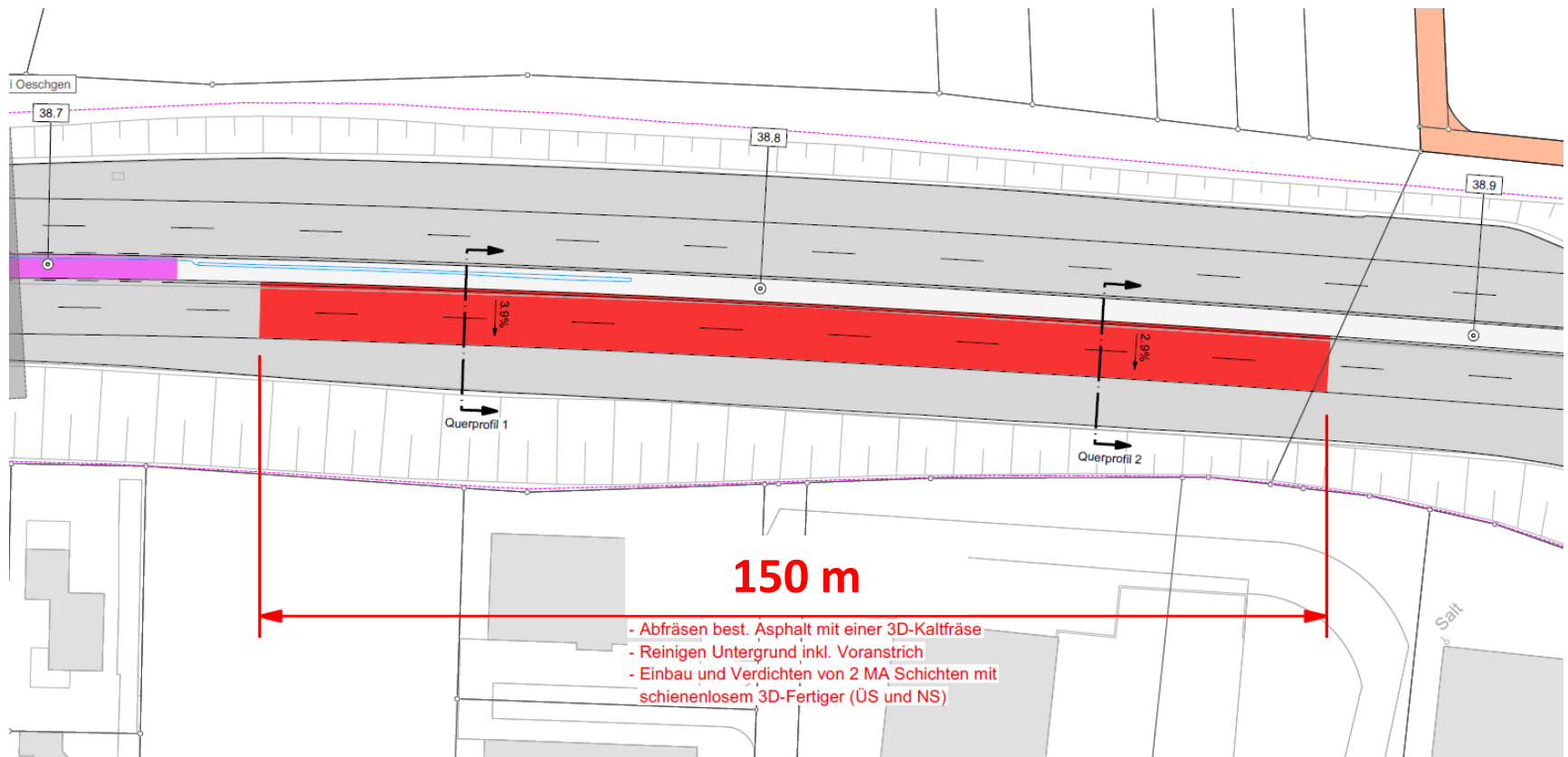
- Höherer Anteil Bindemittel
- Höhere Herstellungstemperatur
- Geringere Einbauleistung

Inwiefern ist die Verwendung von  
Gussasphalt als Deckschicht auf  
Schweizer Nationalstrassen in Puncto  
Umweltauswirkungen gegenüber  
herkömmlichem Asphalt zu bevorzugen?



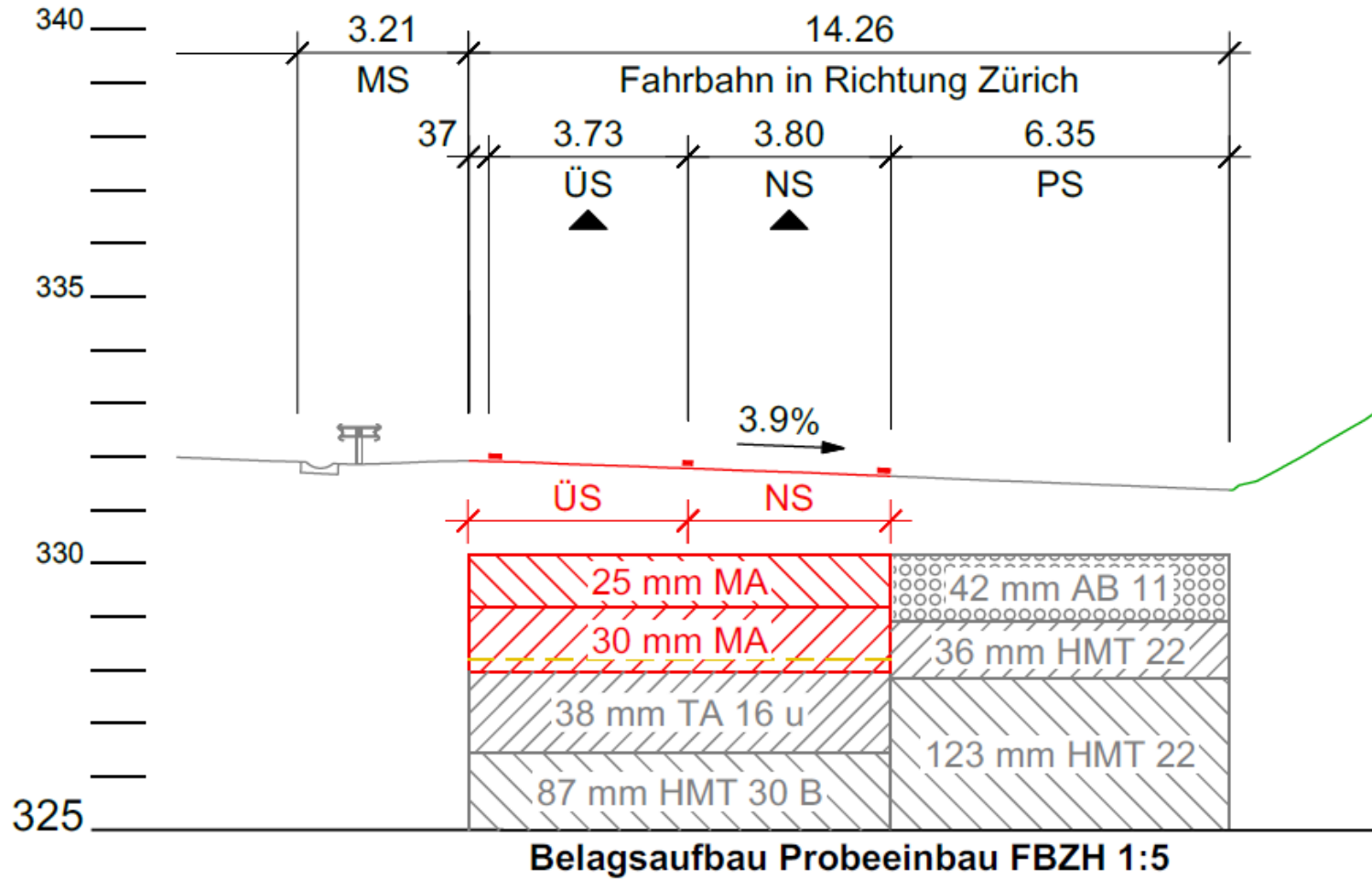
Quelle: Grolimund + Partner AG, „CPX-Belagsgütemessungen auf der N3 EP Rheinfelden-Frick, Teststrecke Gussasphalt - unveröffentlicht,“ Bern, 2020.





Quelle: Jauslin Stebler AG, ergänzt JL

# Querprofil 1 1:200



Quelle: Jauslin Stebler AG













# Ziel und Untersuchungsrahmen

- Vergleich Gussasphalt mit herkömmlichem SDA-Belag
- Konkreter Anwendungsfall Frick
  - Gussasphalt konkret in Frick eingebaut
  - SDA-Belag nicht in Frick eingebaut aber theoretisch berücksichtigt
- Zielgruppe Schweizer Fachwelt Strassenbau
- Funktionelle Einheit = 1 Meter Nationalstrasse mit Breite 7.55 m
- Wirkungskategorien
  - Global Warming Potential (GWP)
  - Kumulierter Energieaufwand (KEA)
  - Ökologische Knappheit (UBP)



### Spezifikation der zu vergleichenden Varianten

<b>Variante Gussasphalt</b>		<b>Variante SDA</b>	
<i>Spezifikation</i>	<i>Lebensdauer</i>	<i>Spezifikation</i>	<i>Lebensdauer</i>
25 mm MA 8 LA Deckschicht 30 mm MA 8 Binderschicht Abstreusplitt	24 Jahre	Einbau 1 Haftvermittler 30 mm SDA 8-12	12 Jahre
		Einbau 2 SAMI 35 mm SDA 8-12	12 Jahre

### Bestandteile Gussasphalt MA 8 LA für Teststrecke Frick

<i>Material</i>	<i>Sorte / Herkunft</i>	<i>Menge in M.%</i>
Bitumen	PmB 25/55 - 65 (CH - E)	7.2 %
Zusätze	Naturasphalt «Gilsonite»	0.5 %
Recycling	-	0 %
Füller	Füller MAXIFILL von Firma Hauri in DE	26.3 %
Brechsand 0/4	Steinbruch in CH	17.5 %
Rundsand 0/4	Kieswerk in CH	18.0 %
Splitt 4/8	Steinbruch in CH	30.5 %
Total		100 %

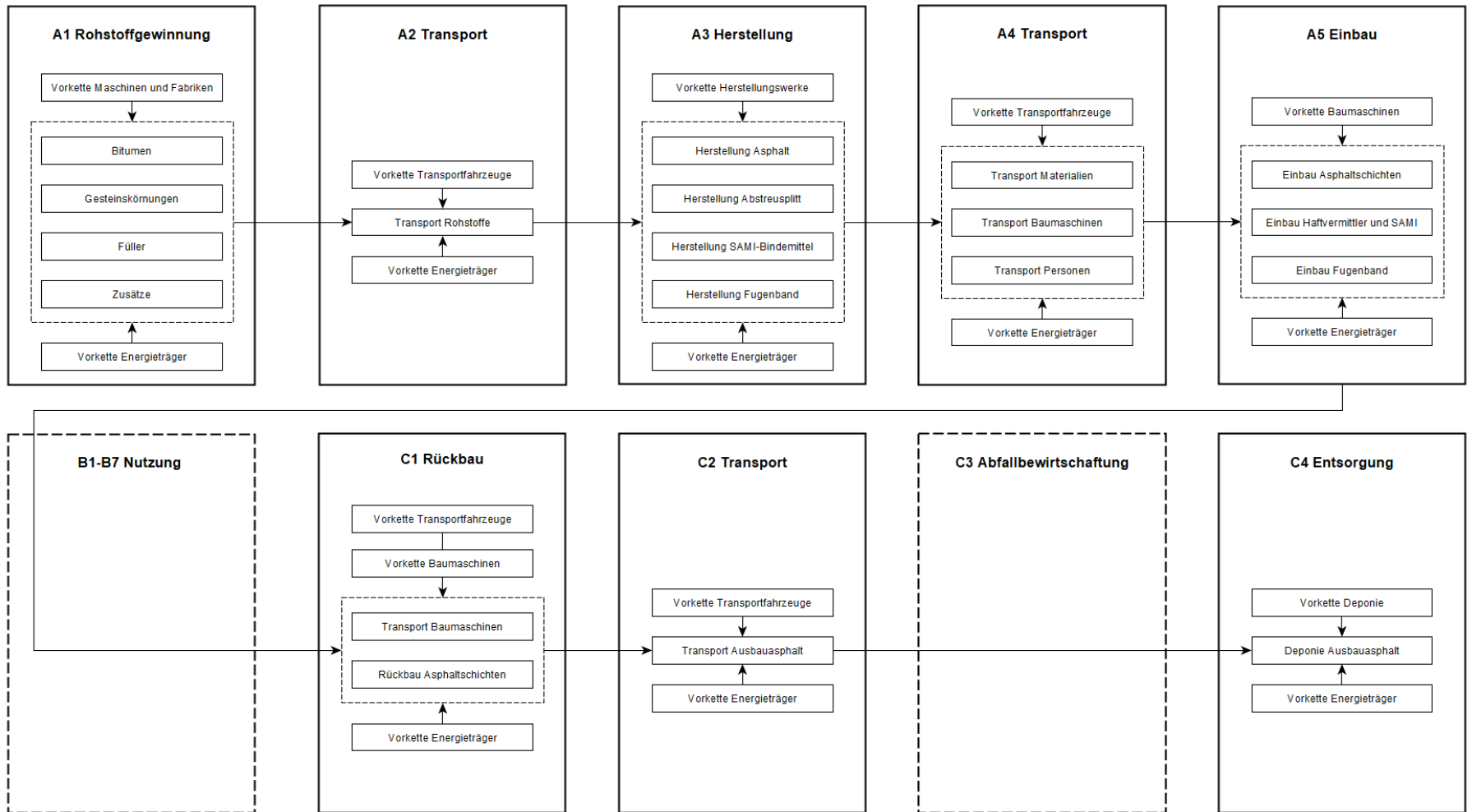


### Spezifikation der zu vergleichenden Varianten

<i>Variante Gussasphalt</i>		<i>Variante SDA</i>	
<i>Spezifikation</i>	<i>Lebensdauer</i>	<i>Spezifikation</i>	<i>Lebensdauer</i>
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### Bestandteile SDA 8-12 für Teststrecke Frick und Variante SDA-Deckschicht

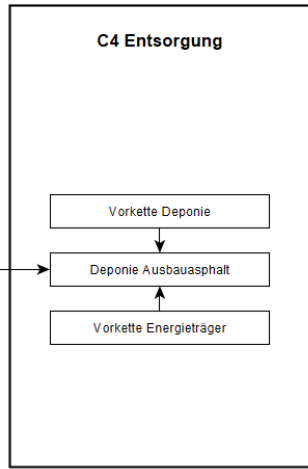
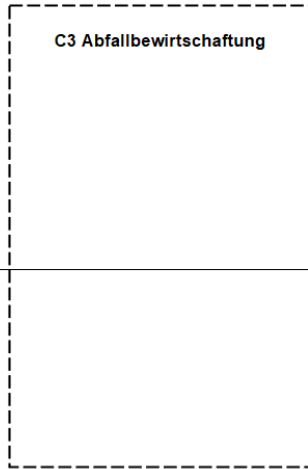
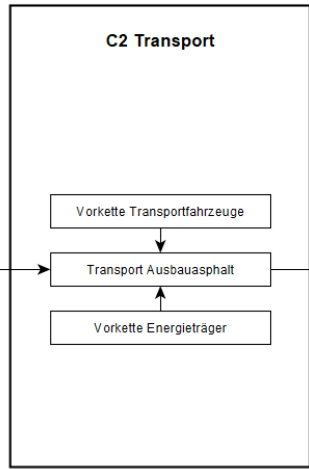
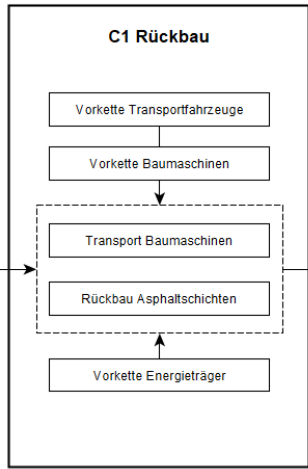
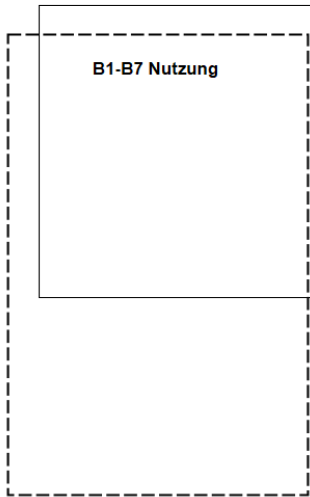
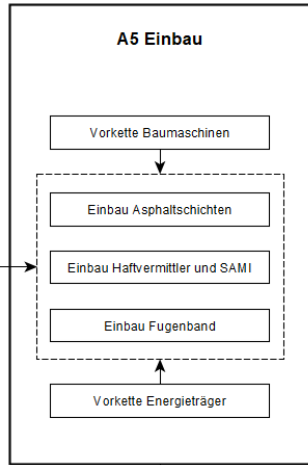
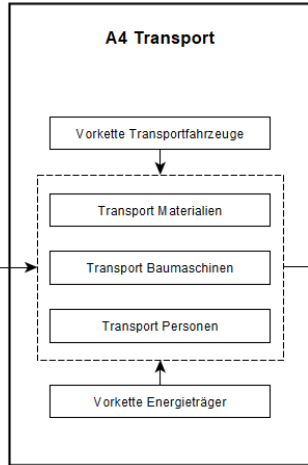
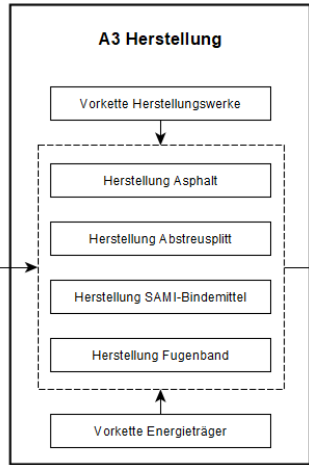
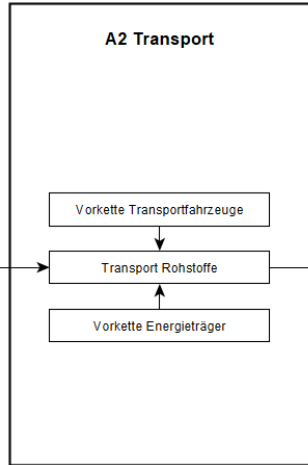
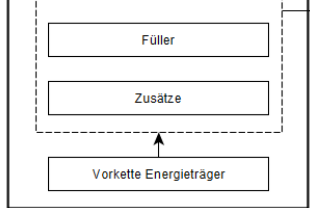
<i>Material</i>	<i>Sorte / Herkunft</i>	<i>Menge in M.%</i>
Bitumen	Polymermodifiziertes Bitumen - keine weitere Spezifizierung	5.9 %
Zusatz 1	Zellulosefasern	0.1 %
Zusatz 2	Kalkhydrat	1.5 %
Recycling	-	0 %
Füller	Eigenfüller aus Asphaltwerk	0.5 %
Brechsand 0/4	Steinbruch in CH	21.3 %
Splitt 4/8	Steinbruch in CH	70.7 %
Total		100 %



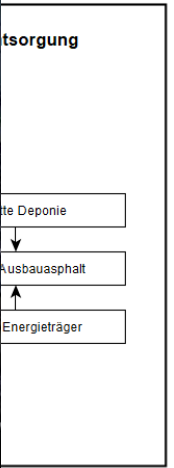
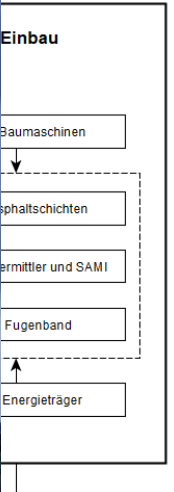
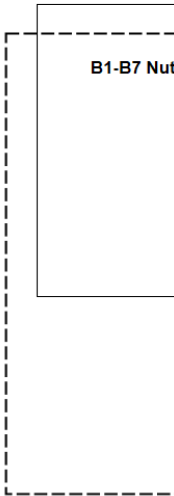
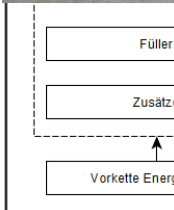




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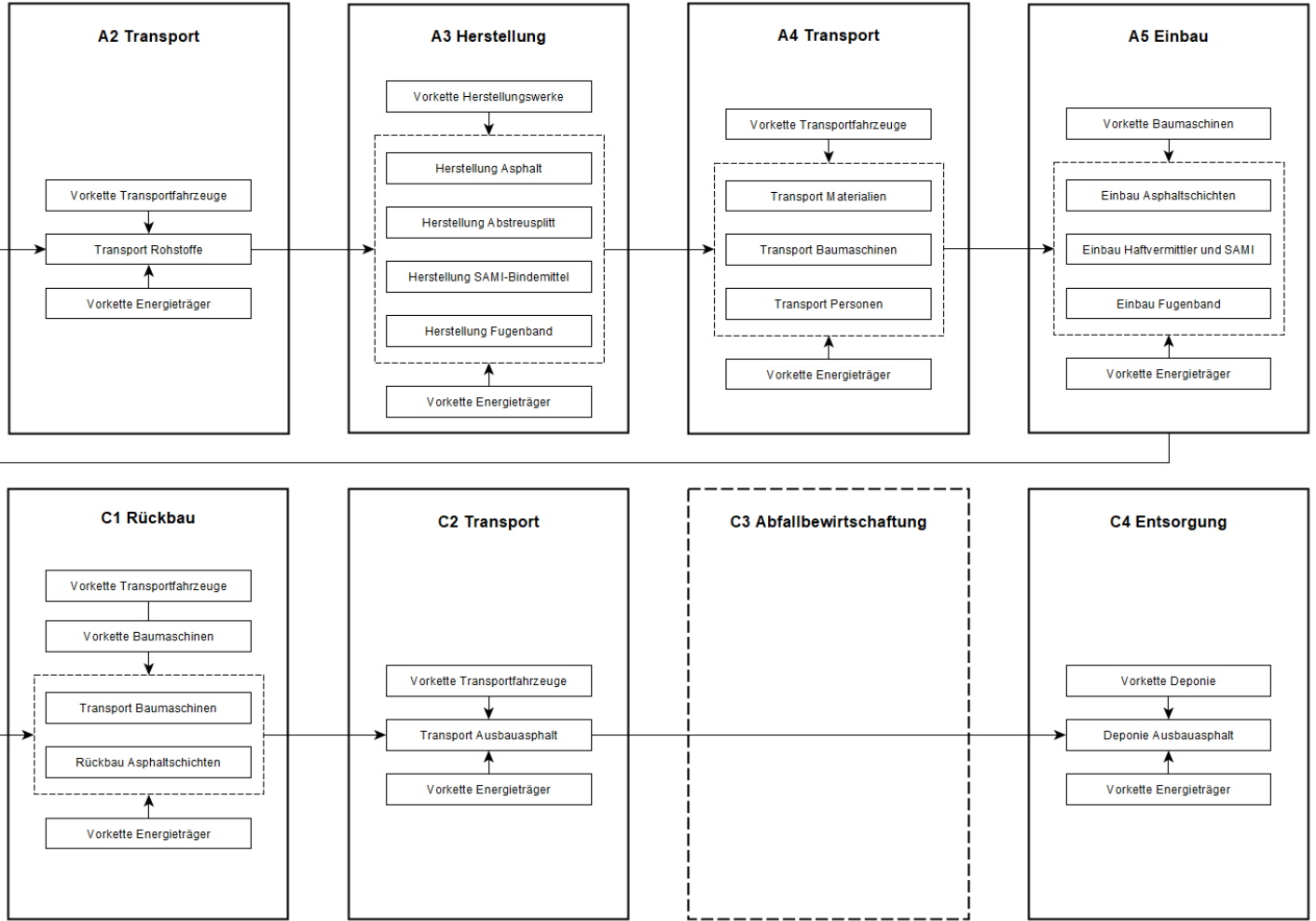






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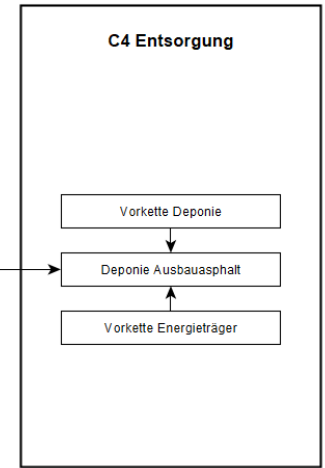
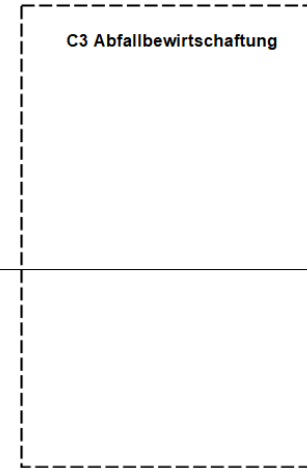
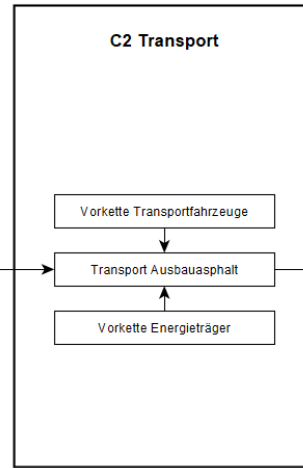
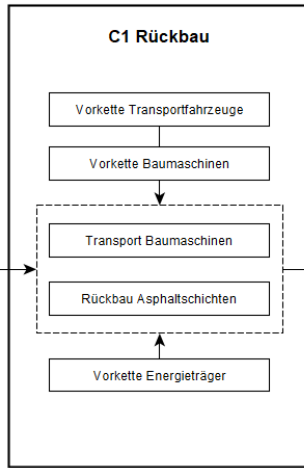
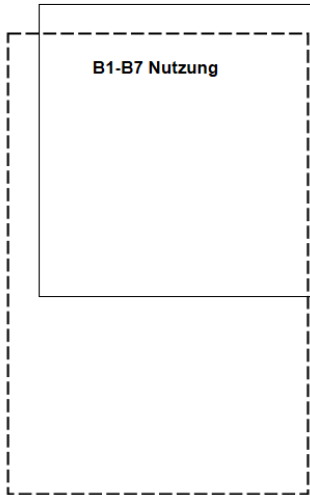
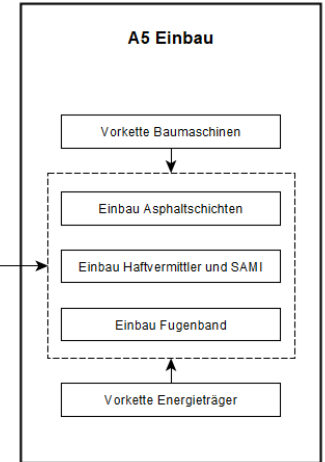
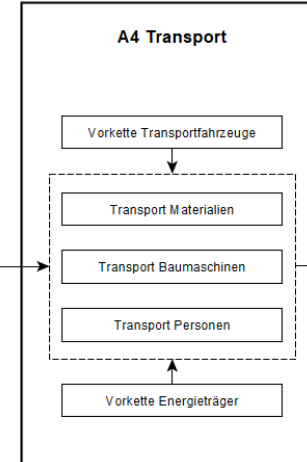
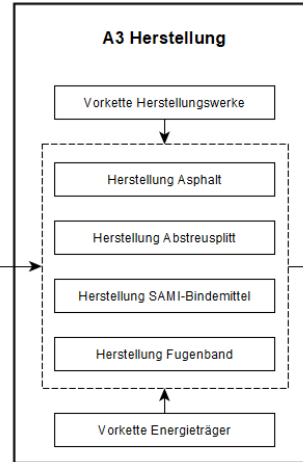




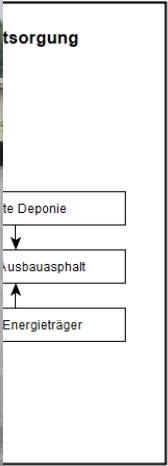
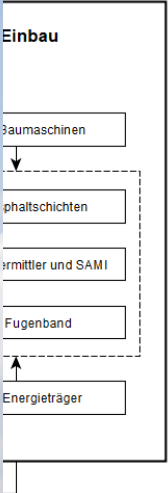
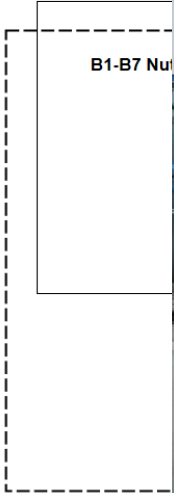


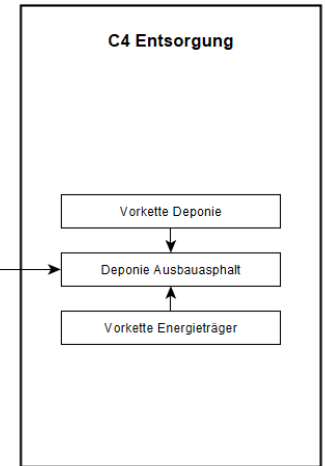
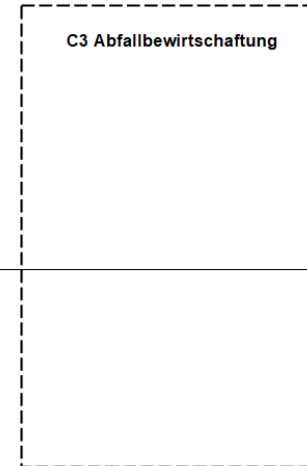
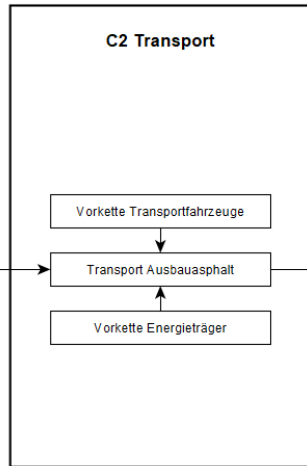
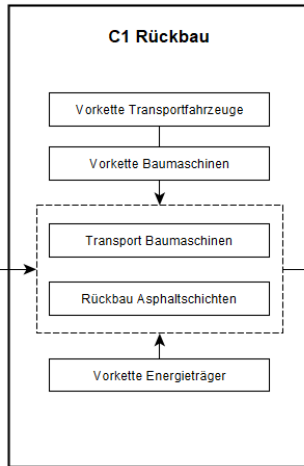
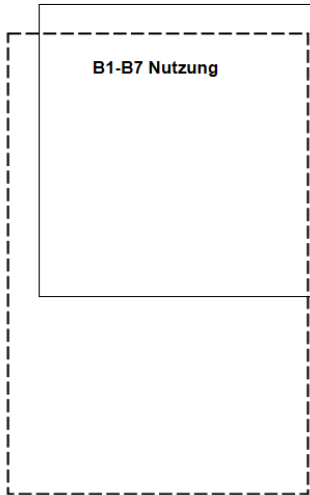
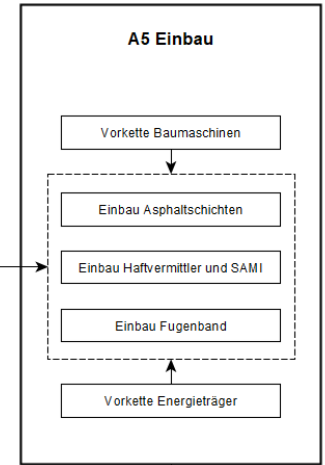
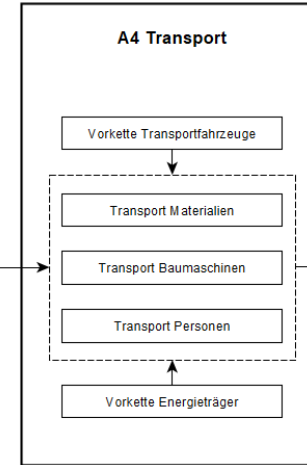
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B1-B7 Nut

### Einbau

3aumaschinen

phaltschichten

ermittler und SAMI

Fugenband

Energieträger

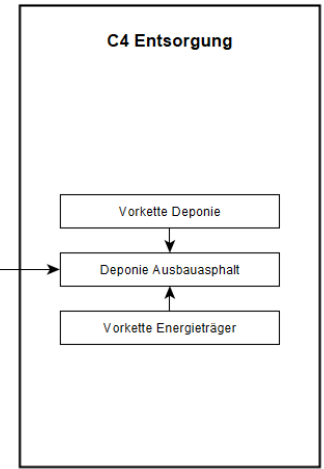
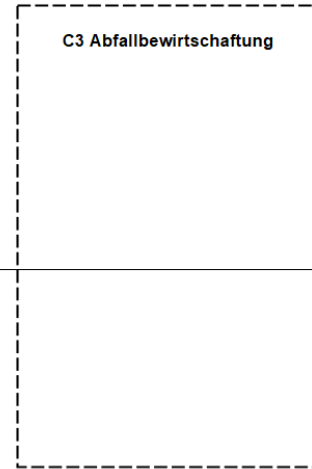
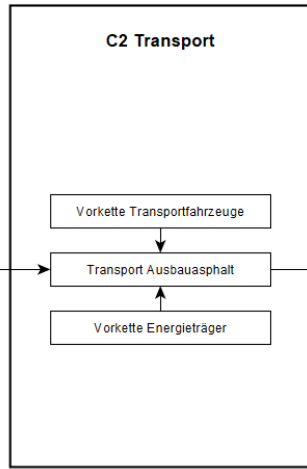
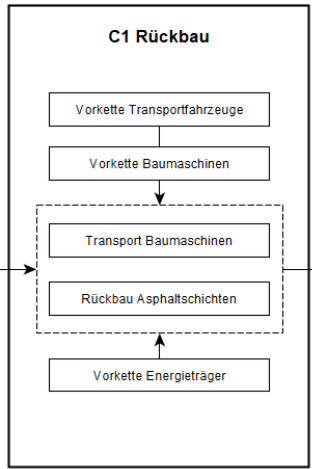
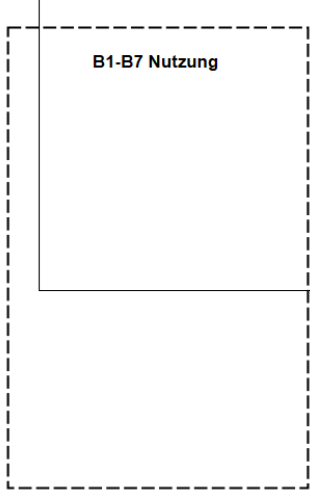
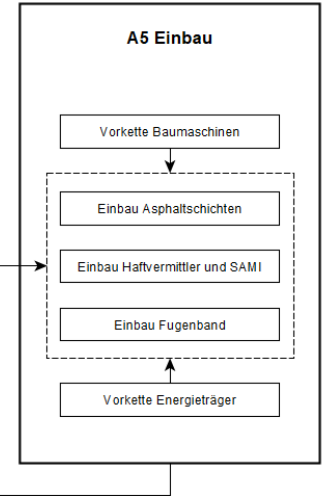
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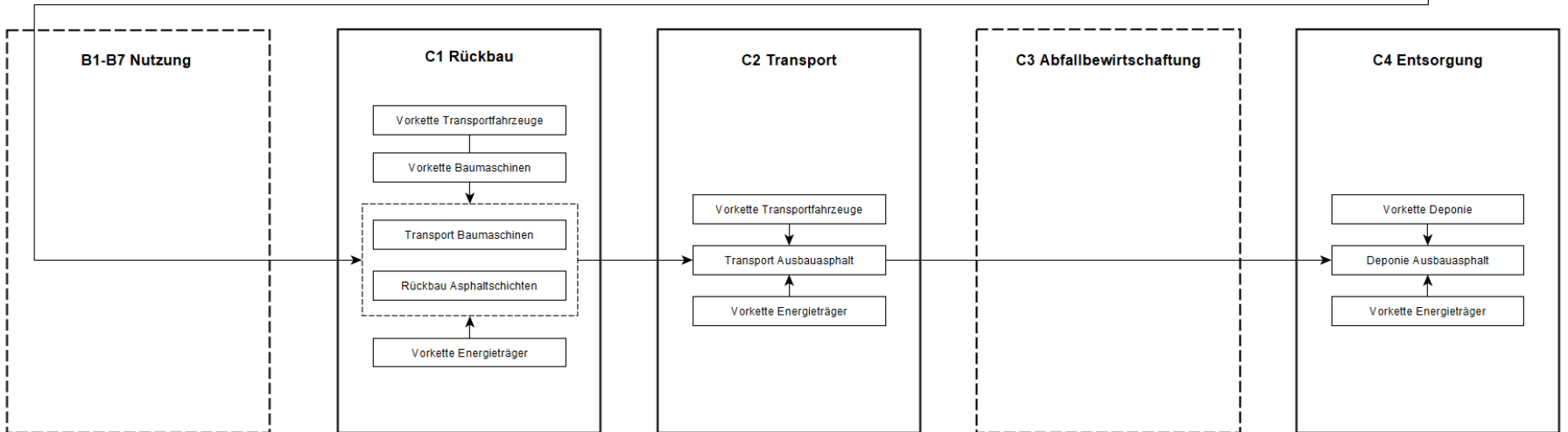
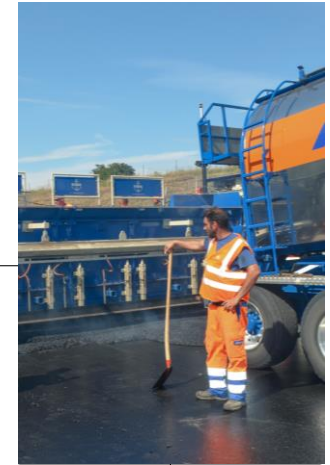
Ausbauasphalt

Energieträger







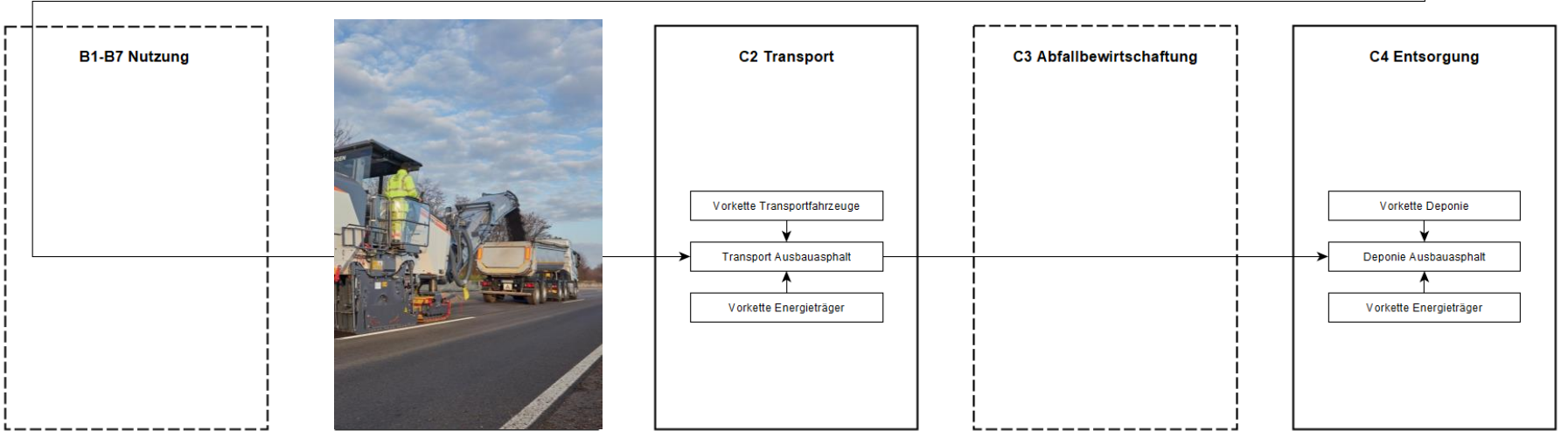


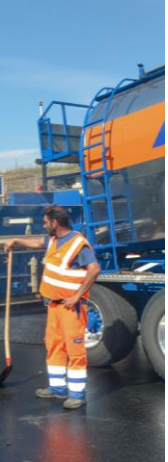




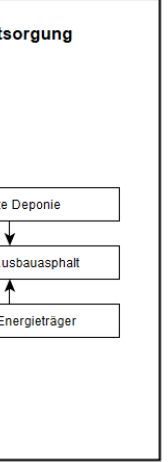
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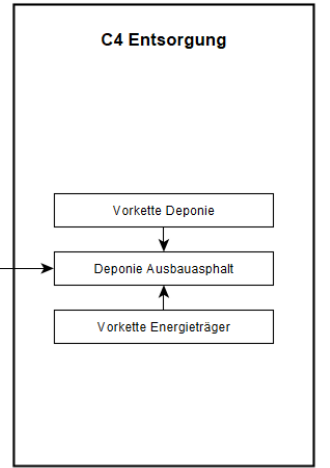
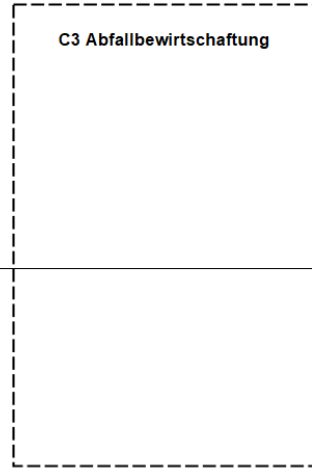
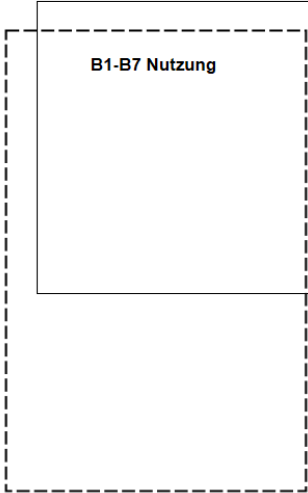
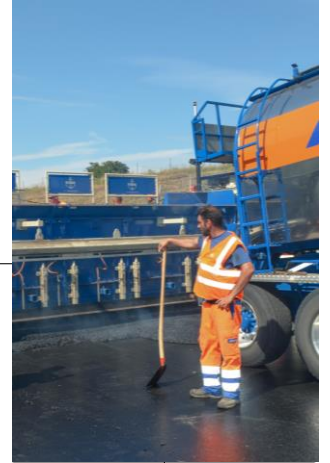


B1-B7 Nu



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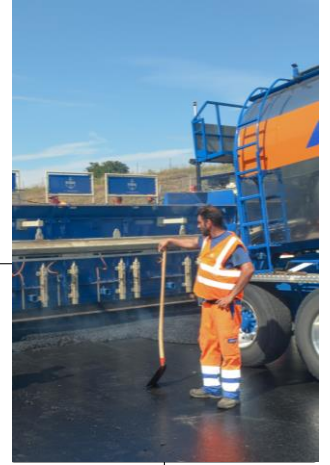






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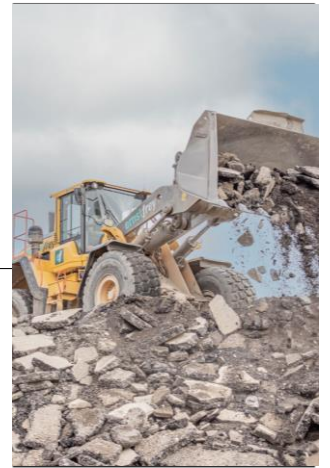




**B1-B7 Nutzung**



**C3 Abfallbewirtschaftung**





# SimaPro



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Eidgenössisches Departement für  
Umwelt, Verkehr, Energie und  
Kommunikation UVEK

**AESCHLIMANN**  
ASPHALT-ENGINEERING

**ei** ecoinvent

**WEIBEL**

B1-B7 Nutzung

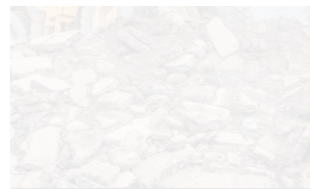
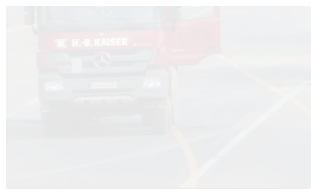
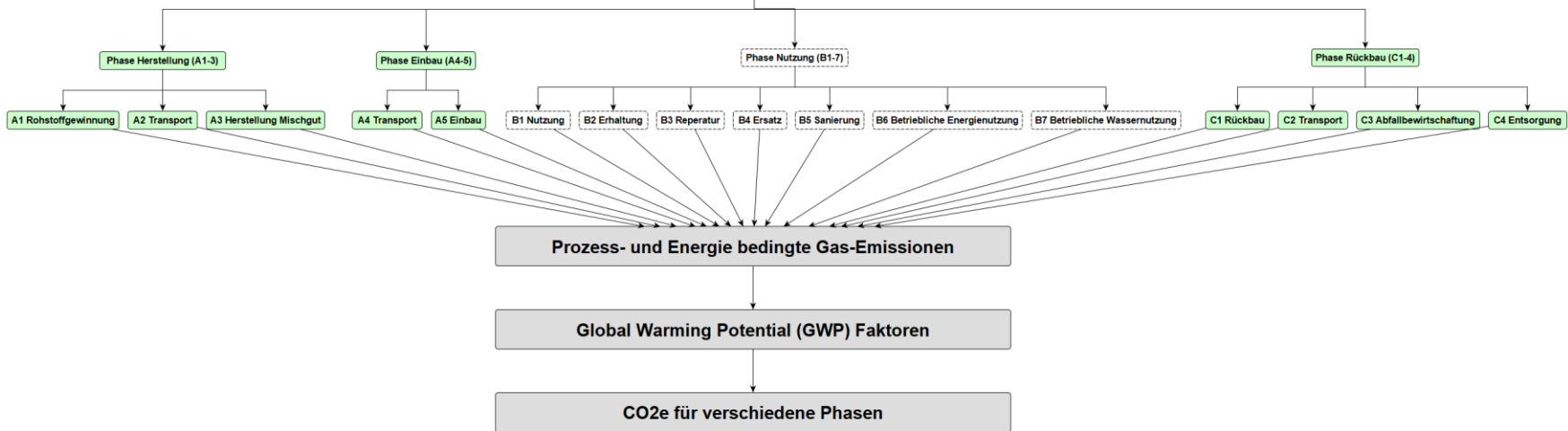
 **UTech**  
Umtec Technologie AG

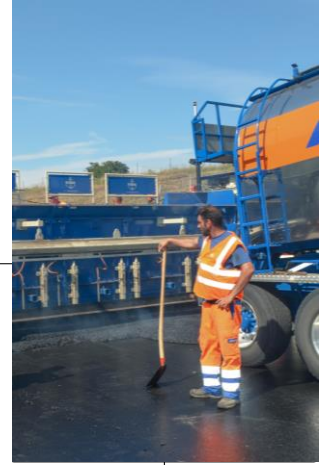
C3 Abfallbewirtschaftung





### Lebenszyklus Deckschicht Gussasphalt

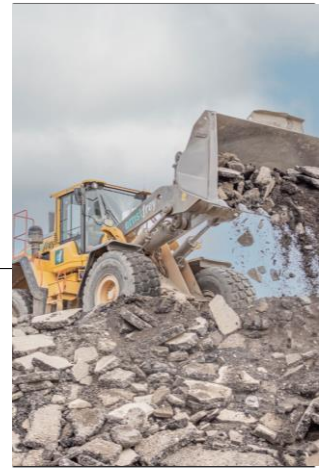




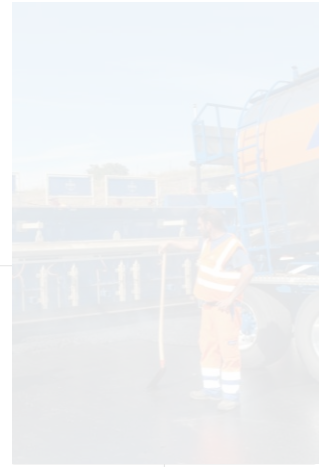
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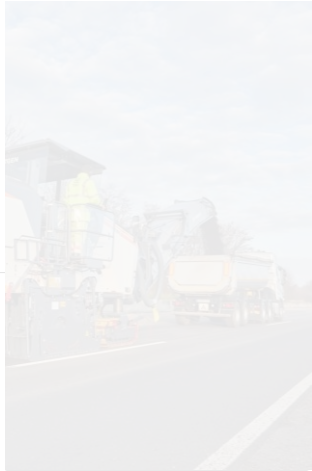
**C3 Abfallbewirtschaftung**





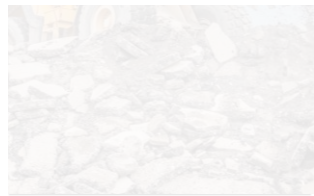
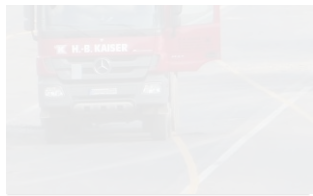


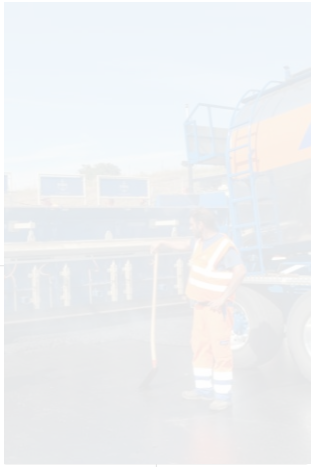
B1-B7 Nutzung



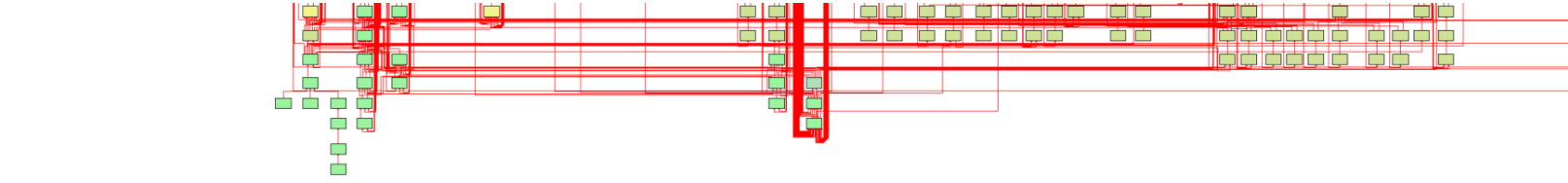
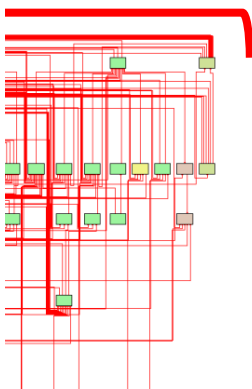
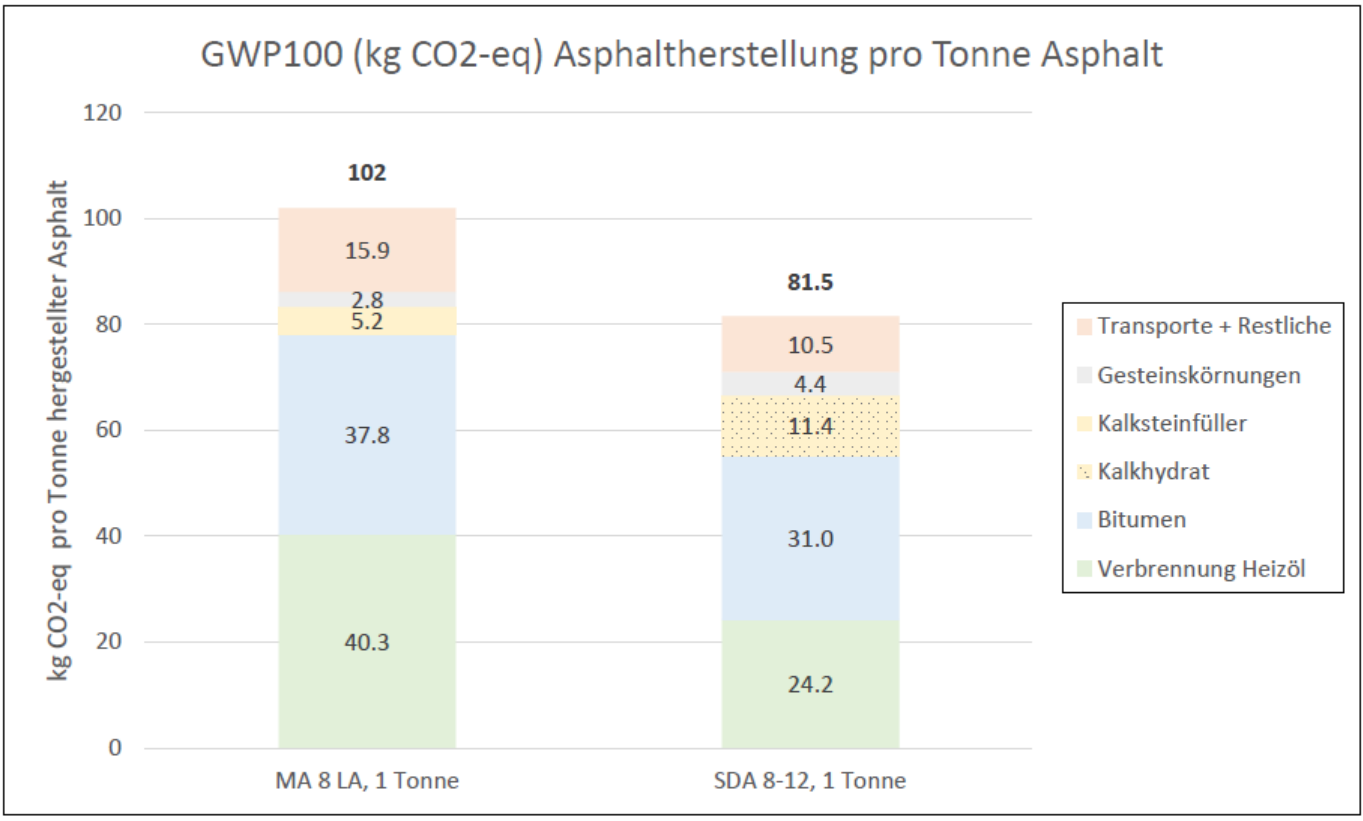
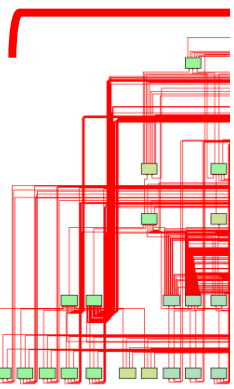
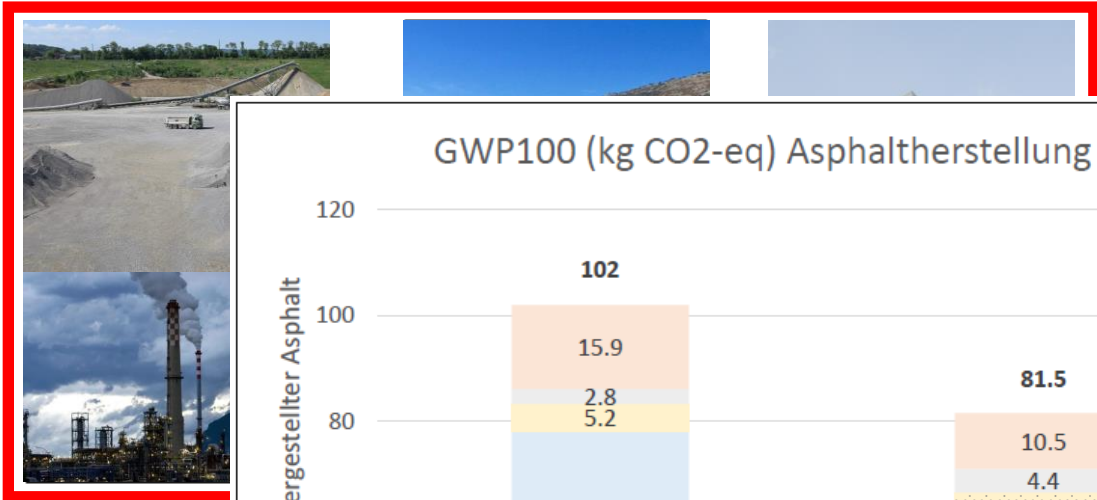
C3 Abfallbewirtschaftung

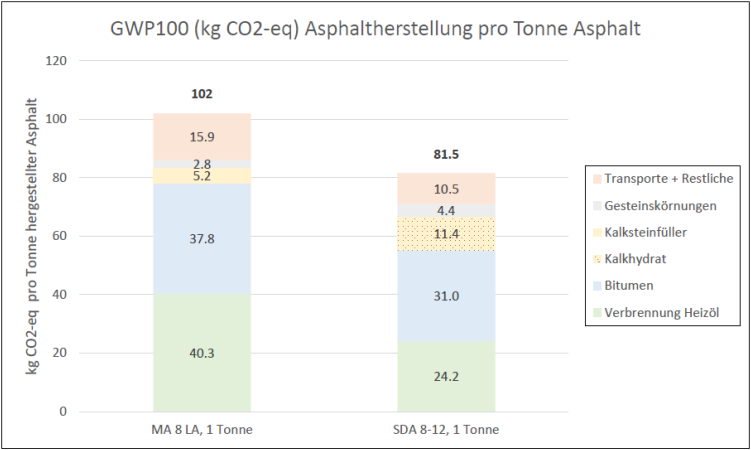


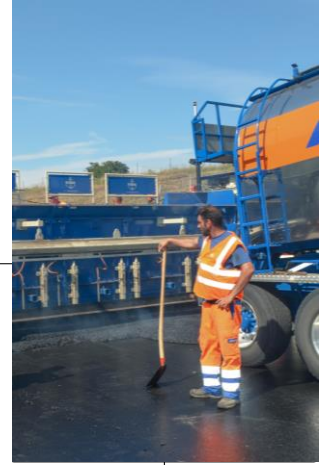








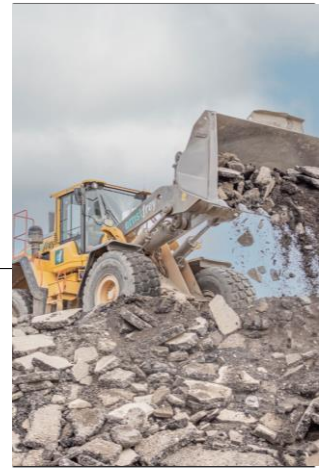




B1-B7 Nutzung



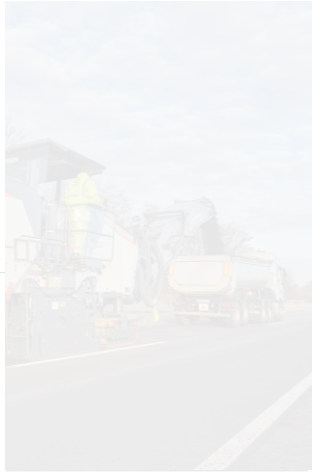
C3 Abfallbewirtschaftung





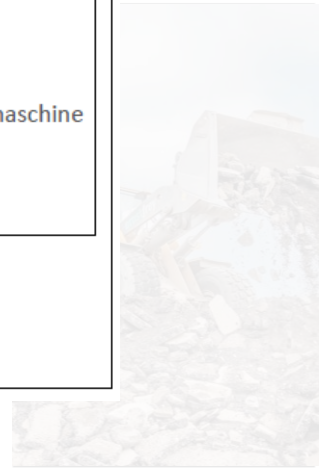
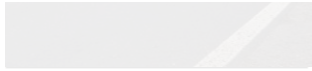
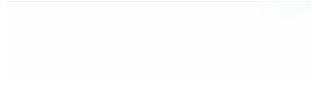
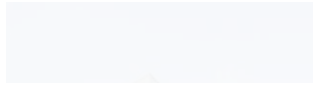
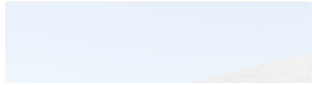


B1-B7 Nutzung

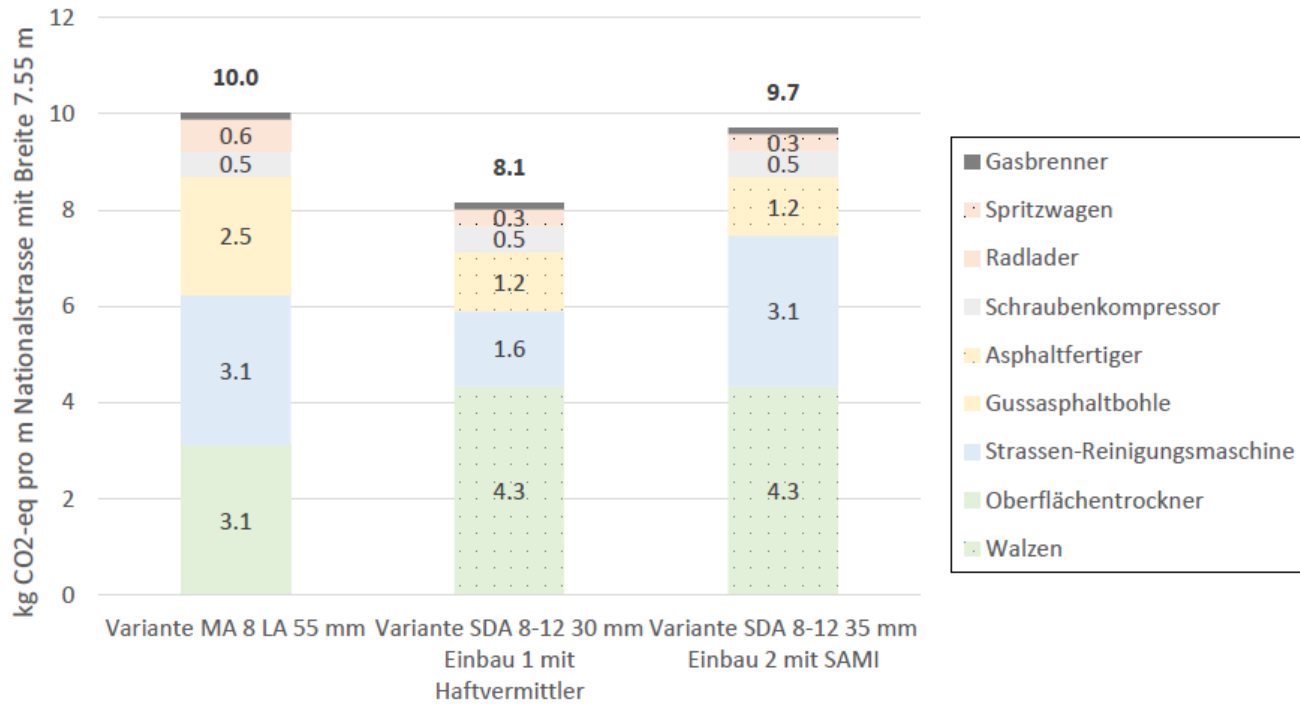


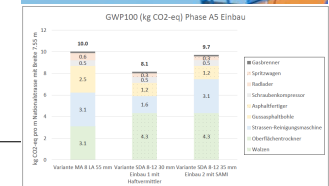
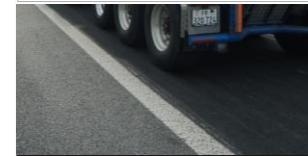
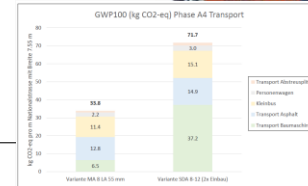
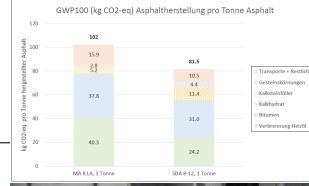
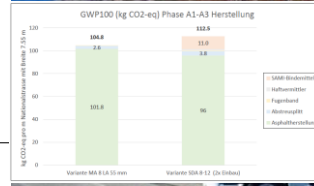
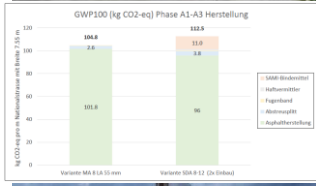
C3 Abfallwirtschaft



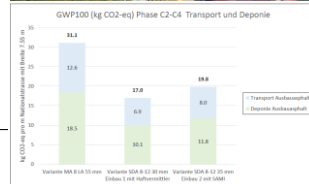
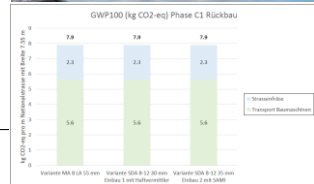


## GWP100 (kg CO2-eq) Phase A5 Einbau

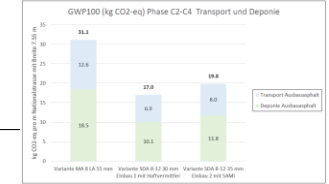
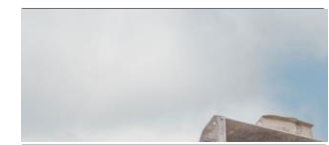




## B1-B7 Nutzung

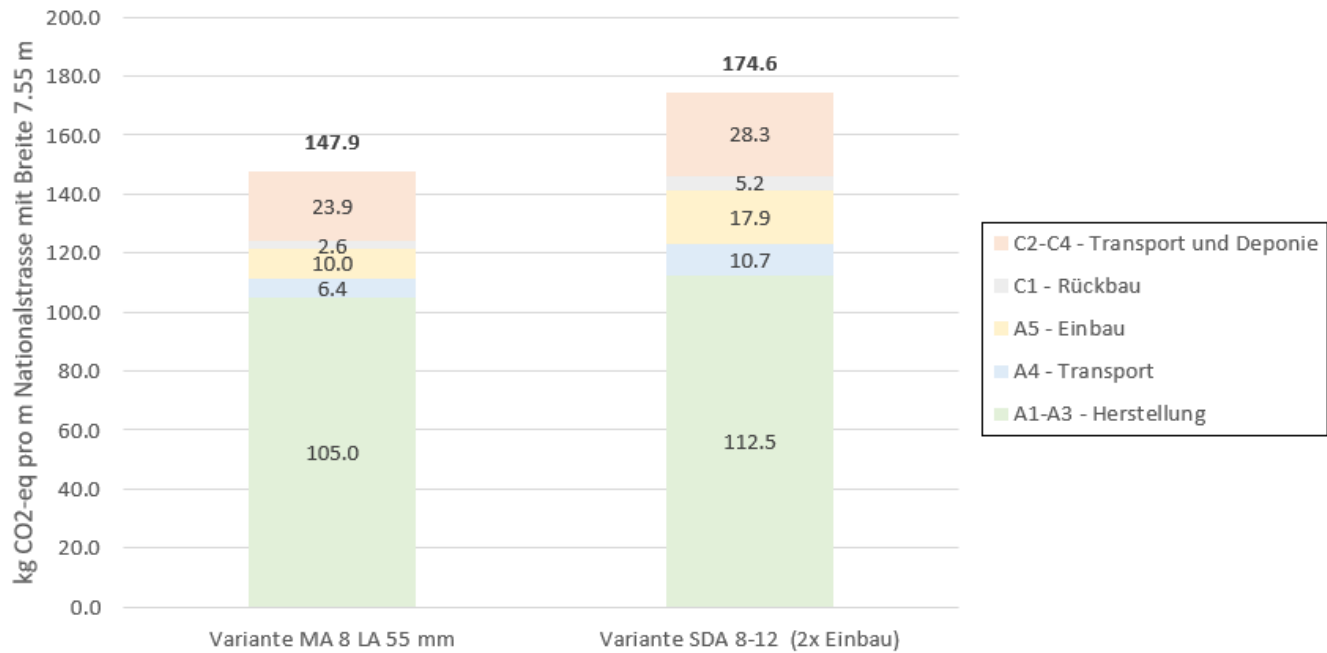


## C3 Abfallbewirtschaftung

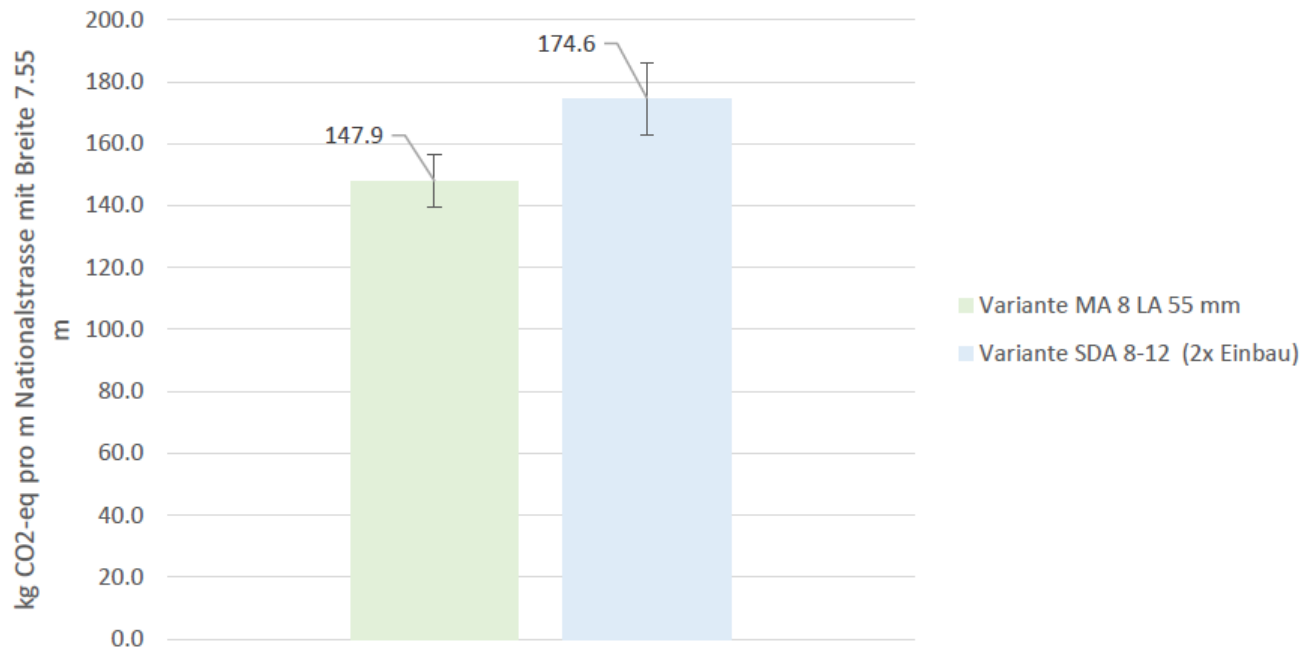




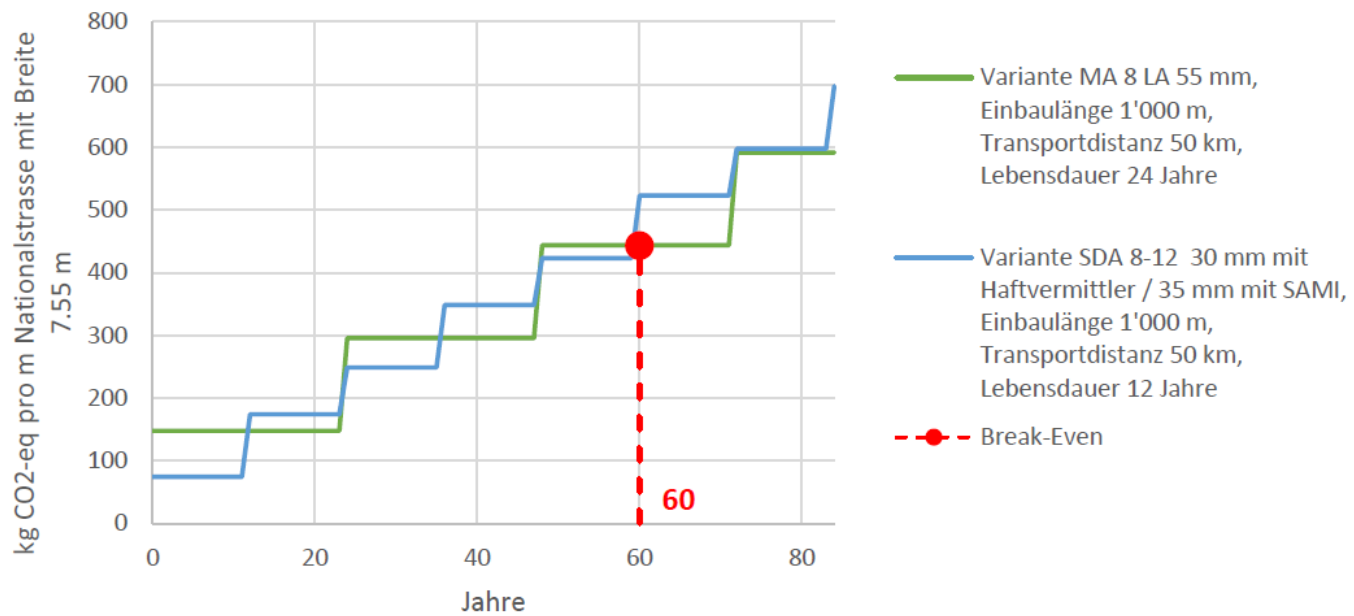
### GWP100 (kg CO2-eq), Einbaulänge 1000 m, Transportdist. 50 km



### GWP100 (kg CO2-eq), Einbaulänge 1000 m, Transportdist. 50 km

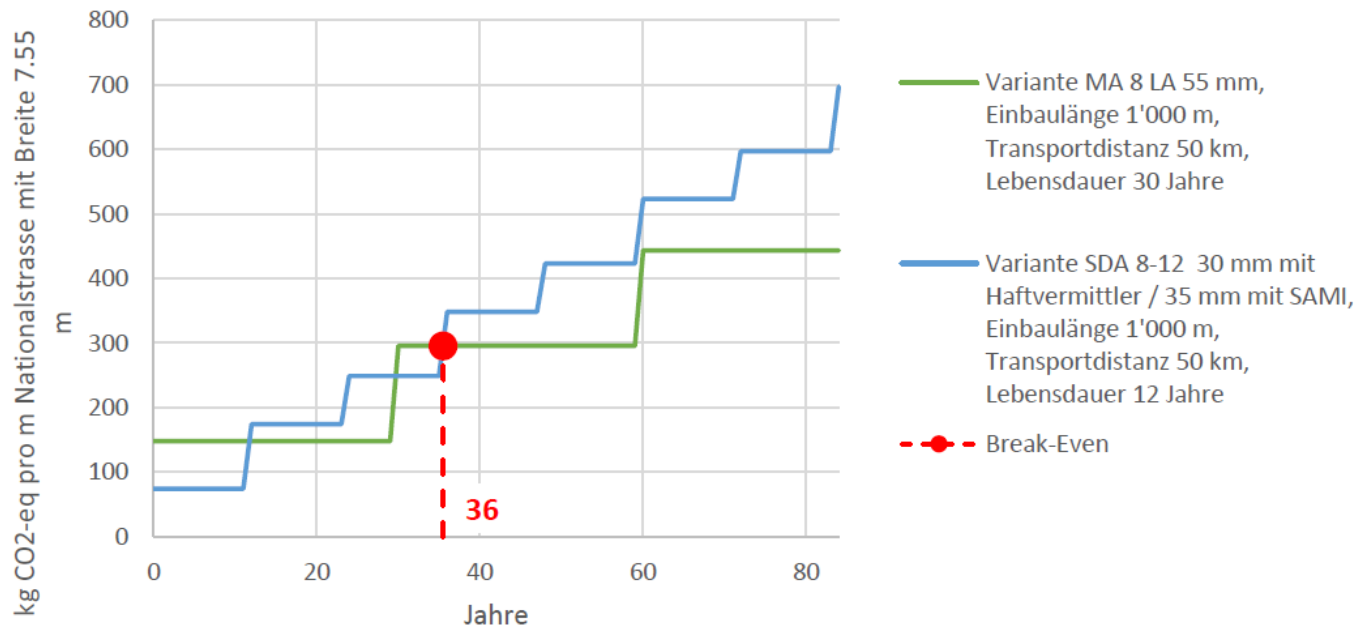


## GWP100 (kg CO<sub>2</sub>-eq), Langzeitbetrachtung, Szenario 1

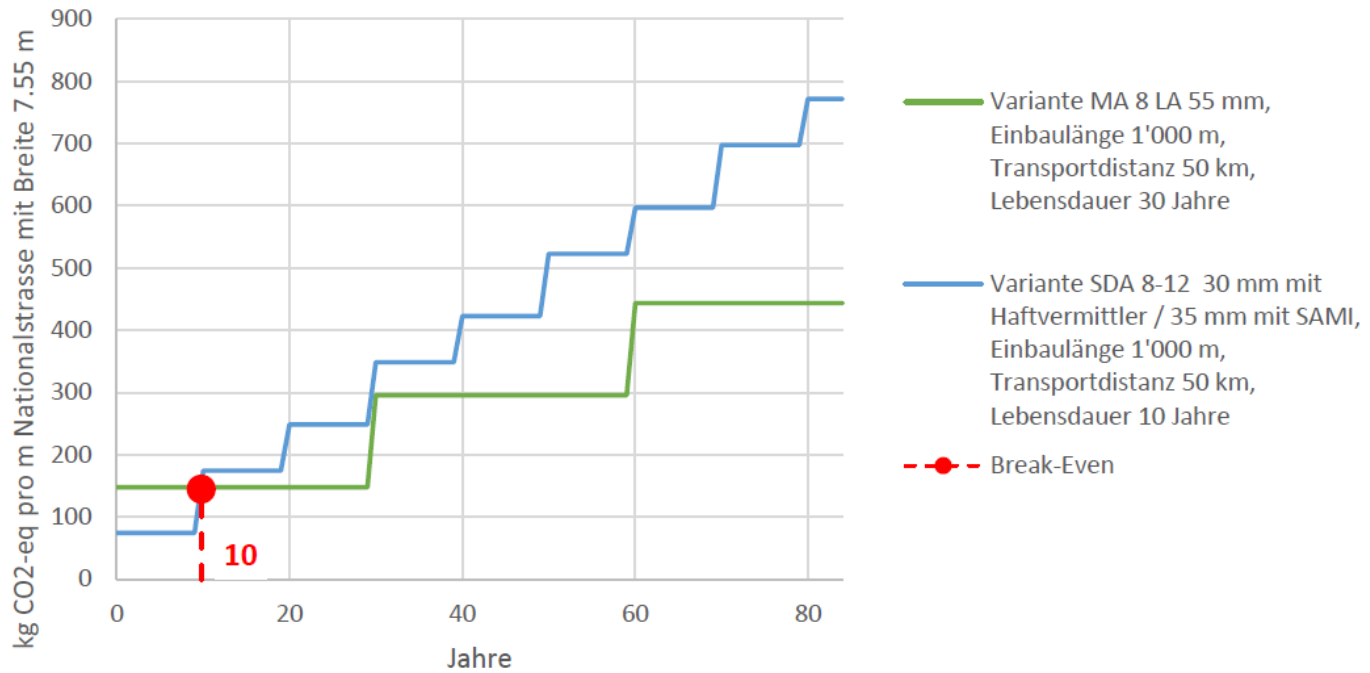




## GWP100 (kg CO<sub>2</sub>-eq), Langzeitbetrachtung, Szenario 2



### GWP100 (kg CO2-eq), Langzeitbetrachtung, Szenario 3



# Fazit

- Klare Empfehlung für Gussasphalt aus umwelttechnischer Sicht.
- Optimierung von Asphaltanlagen und Verbrennungsprozessen bei gleichzeitiger Reduzierung der Temperaturen (Warmasphalt, Niedertemperaturasphalt).
- Prüfung der Notwendigkeit von Kalkhydrat im SDA-Belag.
- Förderung von Wiederverwendung von Ausbauasphalt.
- Reduzierung der Transportdistanzen und Erhöhung der Dichte an Asphaltwerken mit Gussasphalt.
- Priorisierung grosser Einbaulängen.
- Sicherstellung von qualitativ hochwertigen und langlebigen Produkten.



# Schlussfolgerungen

- Erweiterung des Lebenszyklus mit der Phase «Nutzung» (B1-B7).
- Phase «Rückbau» (C1-C4) näher betrachten.
- Berücksichtigung der lärmindernden Wirkung von SDA und Gussasphalt – Stichwort: «Akustische Lebensdauer».
- Lebensdauer und Erhaltungsmaßnahmen mit den effektiven Erfahrungen des ASTRA (Bundesamt für Strassen/Schweiz) abgleichen.
- Ausführlicher Abgleich der Resultate mit der Literatur und mit Experten und iterative Optimierung LCA (Life-Cycle-Analyse).



Besten Dank für Ihre  
Aufmerksamkeit.