

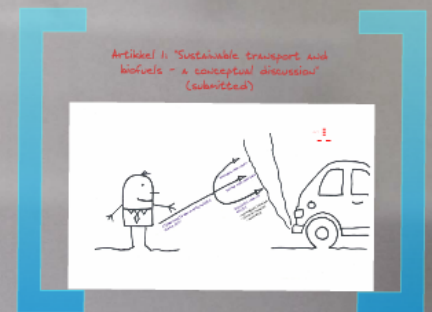
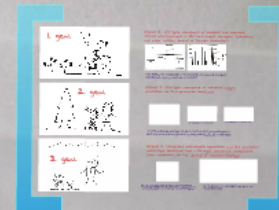
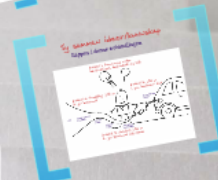
Livsløpsanalyse (LCA) av 1. til 3. generasjons biodrivstoff

Ph.d. avhandling av Geoffrey Gilpin,
Vestlandsforskning

Takk for din oppmerksomhet

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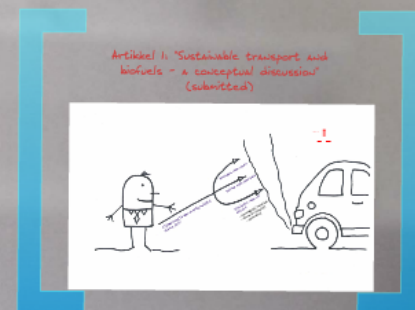
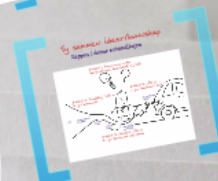
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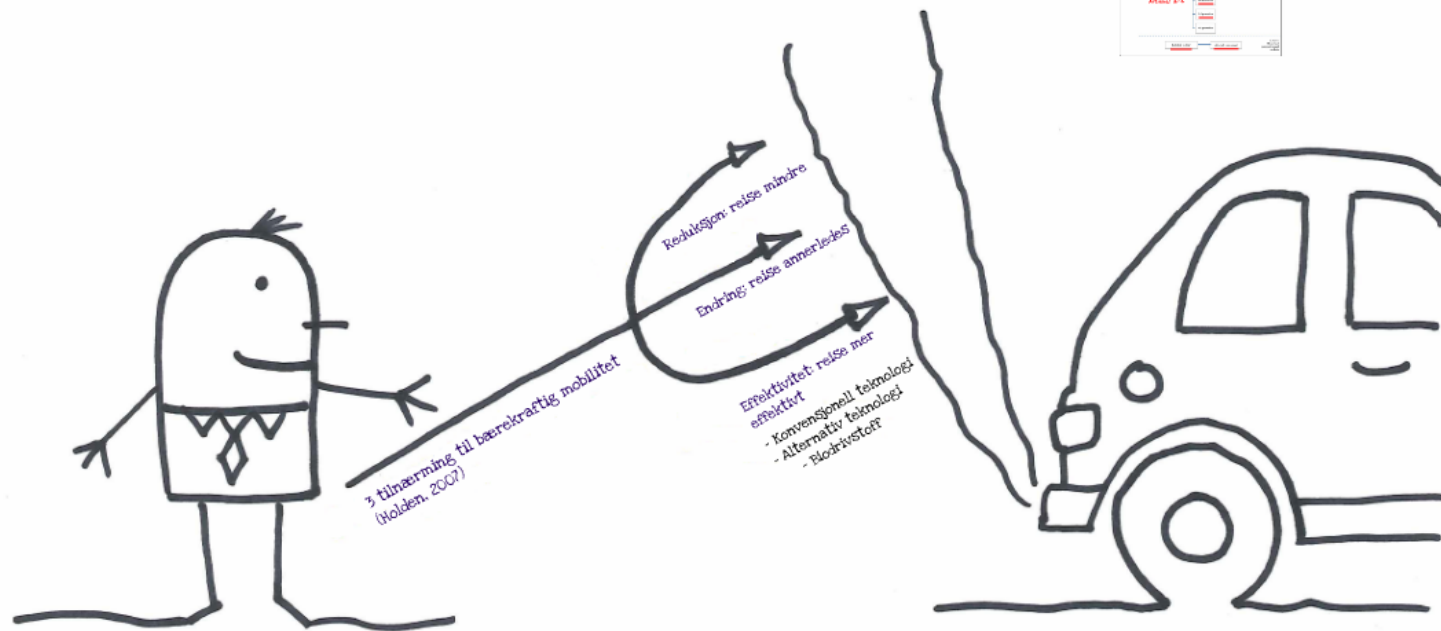
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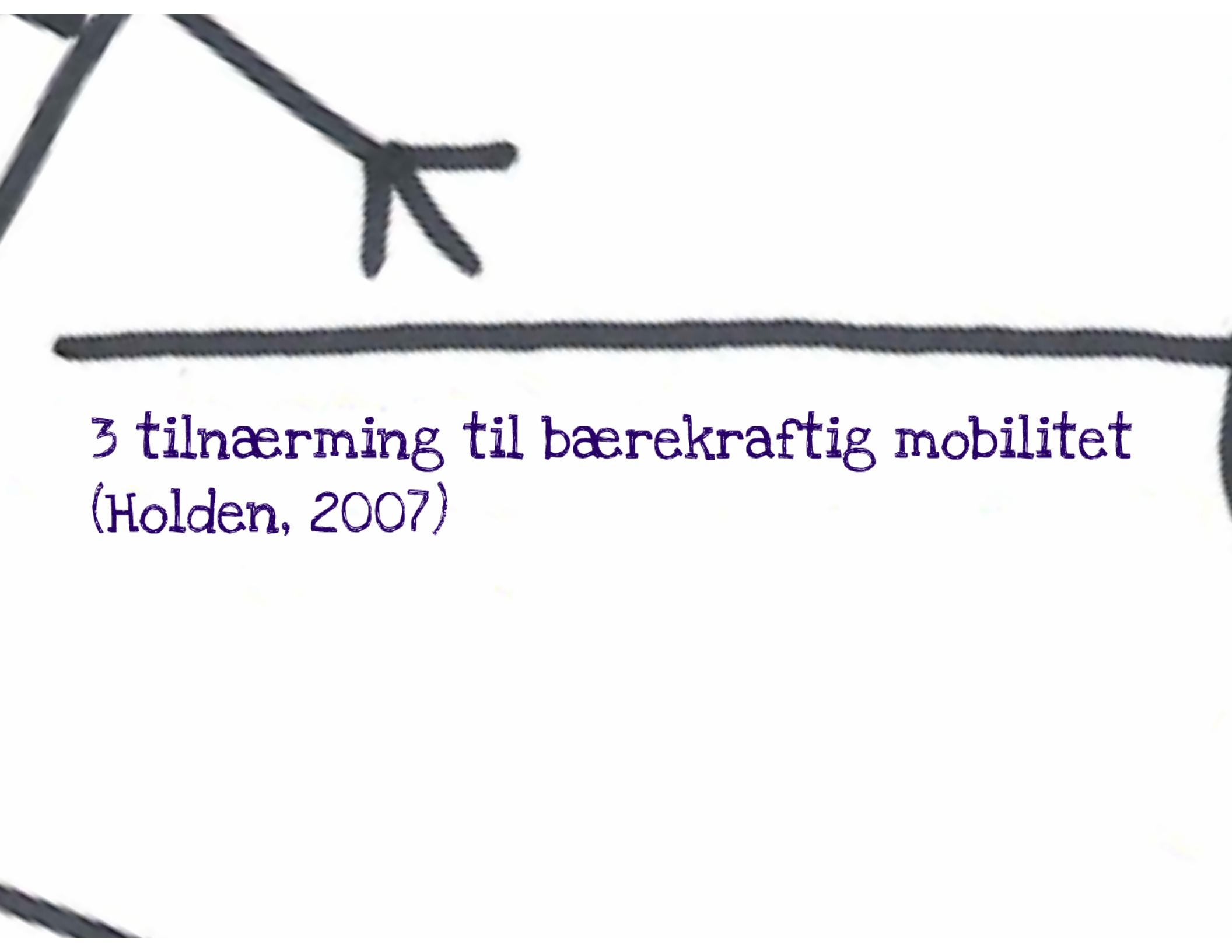
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Artikkel 1: "Sustainable transport and biofuels - A conceptual discussion" (submitted)



A hand-drawn sketch in dark ink. In the top left corner, there is a branch-like structure with three small, downward-pointing prongs. A thick, slightly wavy horizontal line spans across the upper middle of the page.

3 tilnærming til bærekraftig mobilitet
(Holden, 2007)

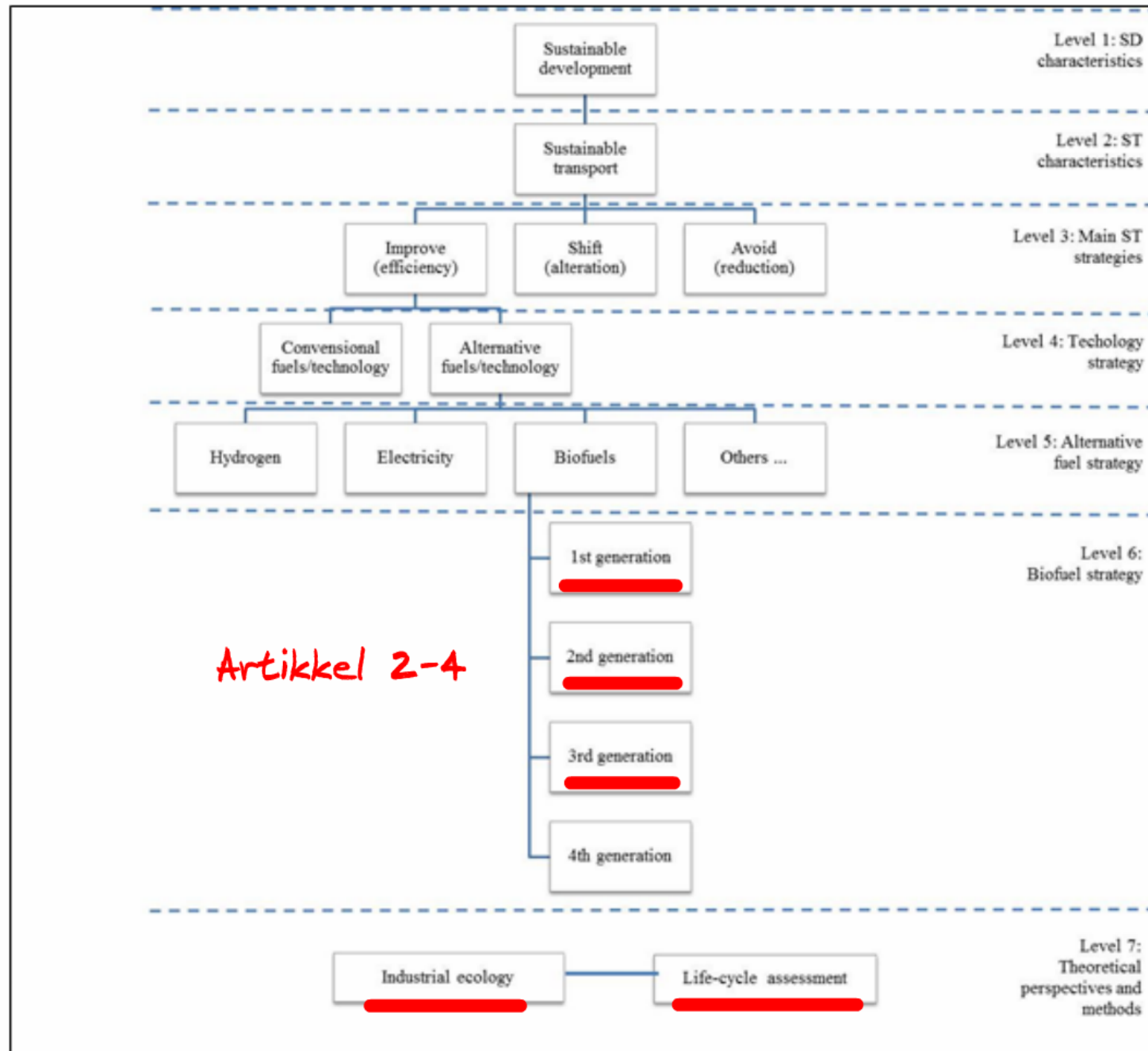
mobilitet

Reduksjon: reise mindre

Endring: reise annerledes

Effektivitet: reise mer effektivt

- Konvensjonell teknologi
- Alternativ teknologi
 - Biodrivstoff



1. gen.



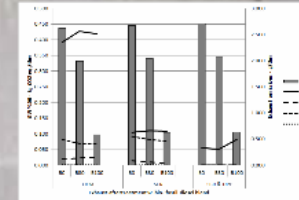
3. gen.

A simple line drawing of a character whose body is a book with a spine and pages. The character has a face with large round glasses and a snorkel in its mouth. It is standing on two legs with triangular feet. To the left of the character are some wavy lines representing seaweed or plants. Above the character are three small dots indicating a trail or path.

```

graph LR
    PE[Primary energy] -.-> RP[Raw production]
    RM[Raw materials] --> RP
    subgraph WTE [WTE]
        RP --> PD[Post distribution]
        RP --> VP[Vehicle production]
        VP --> VO[Vehicle operation]
        VO --> EOL[End of life]
        EOL --> WM[Waste management]
        WM --> L[Landfill]
    end
    EOL --> R[Recycle]
    R --> RM
    subgraph WFW [WFW]
        RP
        PD
        VP
        VO
        EOL
        WM
        L
    end

```



Artikkel 3. "Life-cycle assessment of industrial enzyme production for 2nd generation bioethanol"



Fig. 1. Forgroundprocessor, binding motif CMPIOC



Fig. 2 Bakgrunnsprosesser, bidrag mot GWPIC

Artikel 4. "Integrated multi-trophic aquaculture and 3rd generation macro-algae bioethanol from a life-cycle assessment perspective" (near completion, *aim Intl. Journal of Industrial Ecology*)



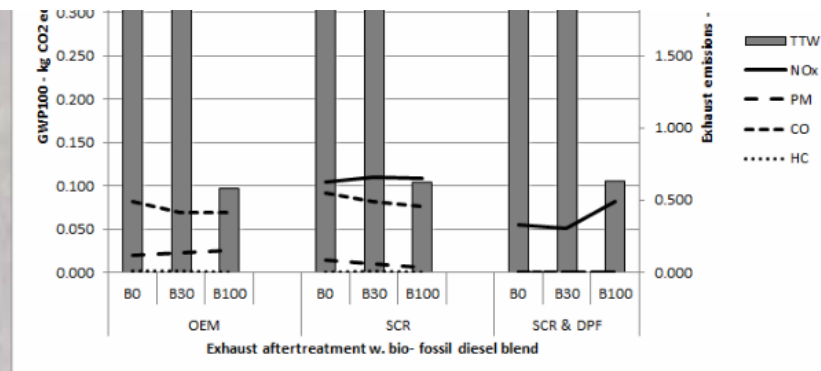
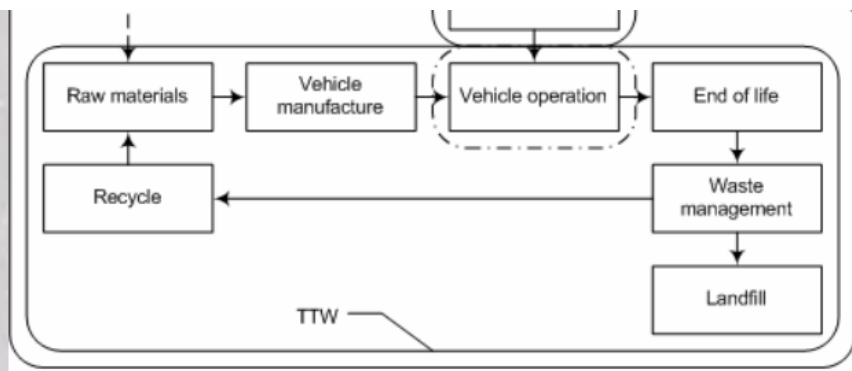
```

sequenceDiagram
    participant User
    participant Find
    participant FindDataControl as FindDataControl
    participant FindData as FindData
    participant FindDataControl2 as FindDataControl

    User->>Find: Find
    Find->>FindDataControl: FindDataControl
    FindDataControl->>FindData: FindData
    FindData-->>FindDataControl: FindDataControl
    FindDataControl-->>Find: FindDataControl
    
```

Figure 1: A UML sequence diagram for the 'Find' operation. The diagram shows interactions between 'User', 'Find', 'FindData', and 'FindDataControl' objects. The 'Find' object sends a 'FindDataControl' message to the 'FindDataControl' object. The 'FindDataControl' object then sends a 'FindData' message to the 'FindData' object. The 'FindData' object returns a 'FindDataControl' message to the 'FindDataControl' object. The 'FindDataControl' object then returns a 'FindDataControl' message to the 'Find' object. A note indicates that the 'FindDataControl' object is a 'FindDataControl' object.

Fig. 2 Integrated multi-tropic aquaculture system with combined biorefinery



Main finding: "the combination of environmental measures in transport embodies both Synergy and trade-off effects"

Artikkel 3. "Life-cycle Assessment of industrial enzyme production for 2nd generation bioethanol"

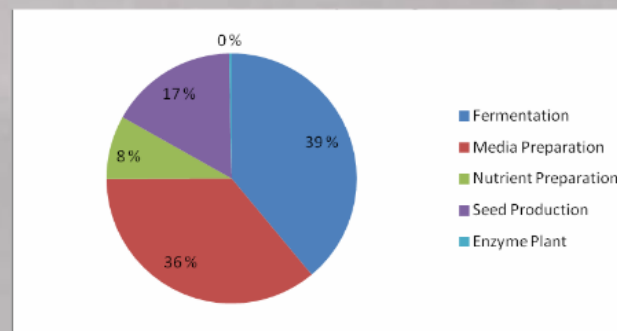
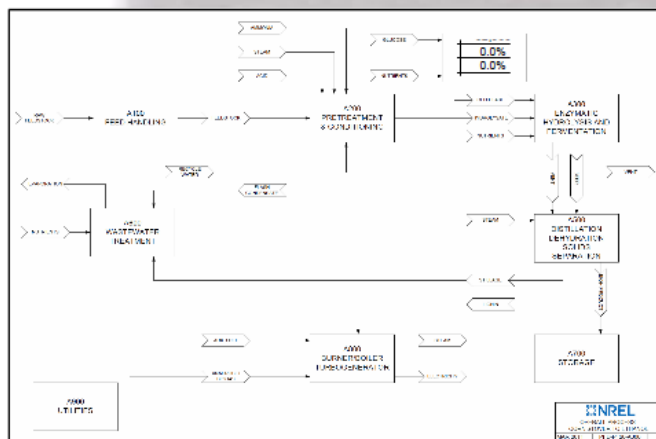


Fig. 1 ForgrunnspSesser, bidrag mot GWP100

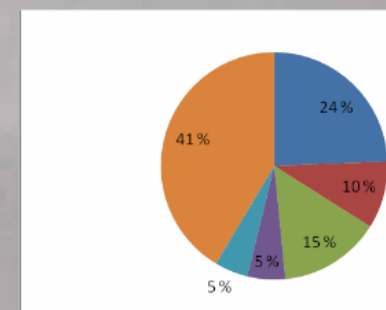
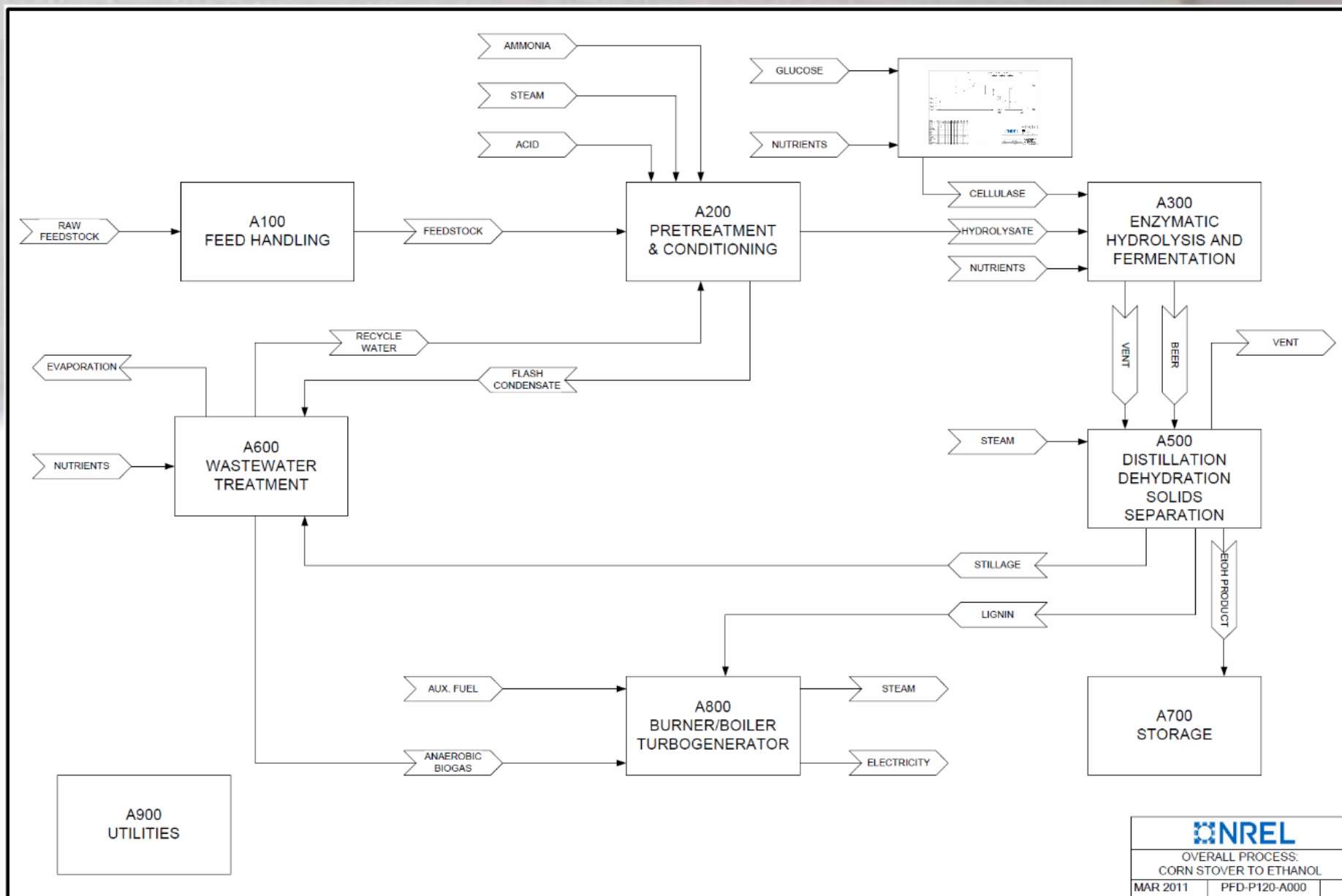


Fig. 2 BakgrunnspSesser,



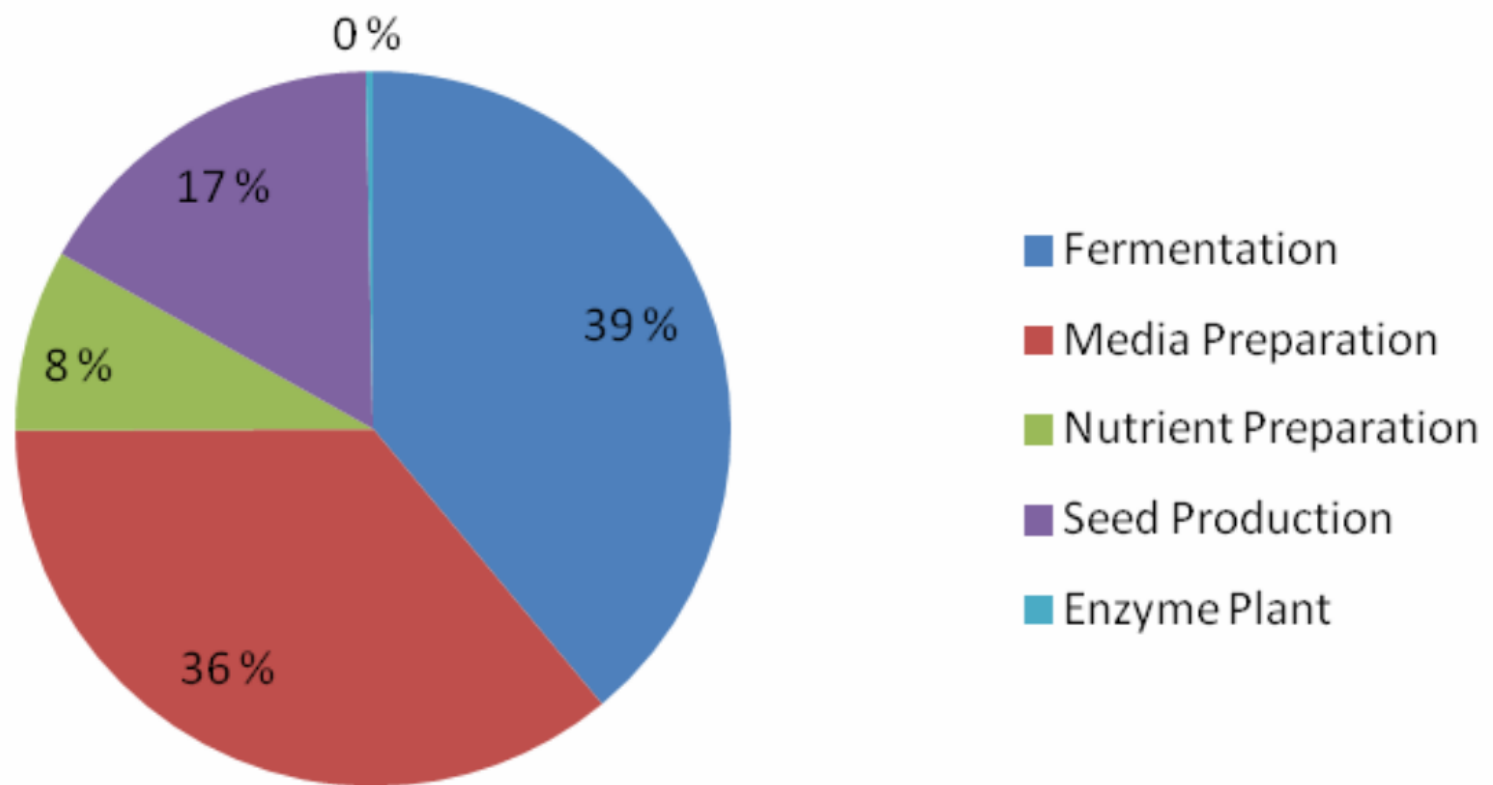


Fig. 1 ForgrunnSproSeSSer, bidrag mot GWP100

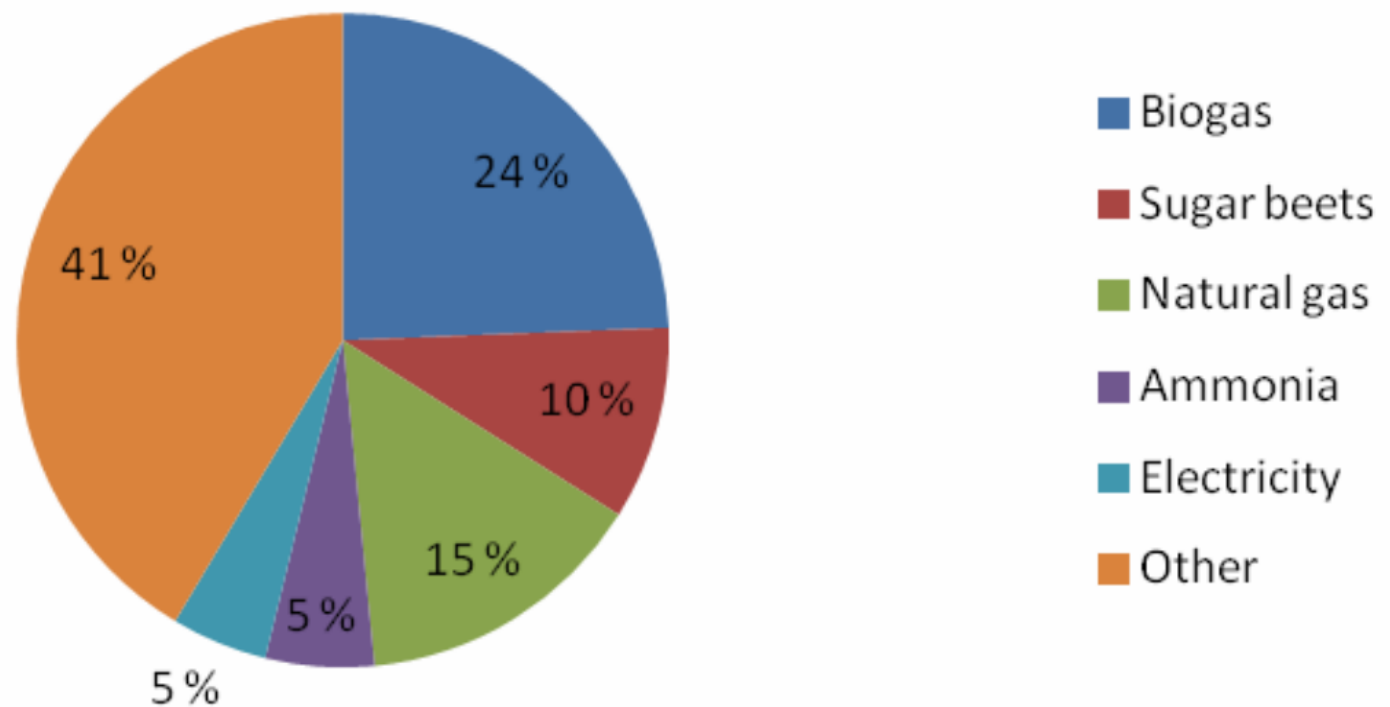


Fig. 2 BakgrunnSproSeSSer, bidrag mot GWP100

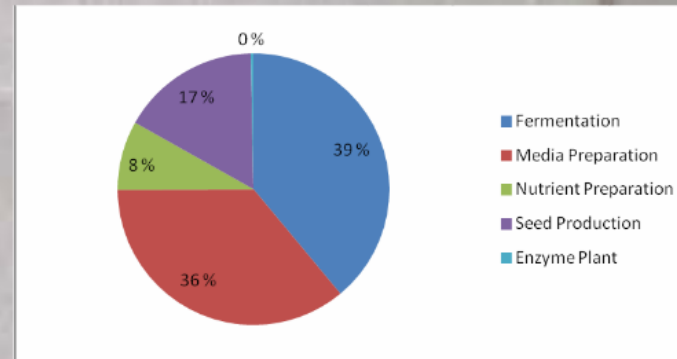
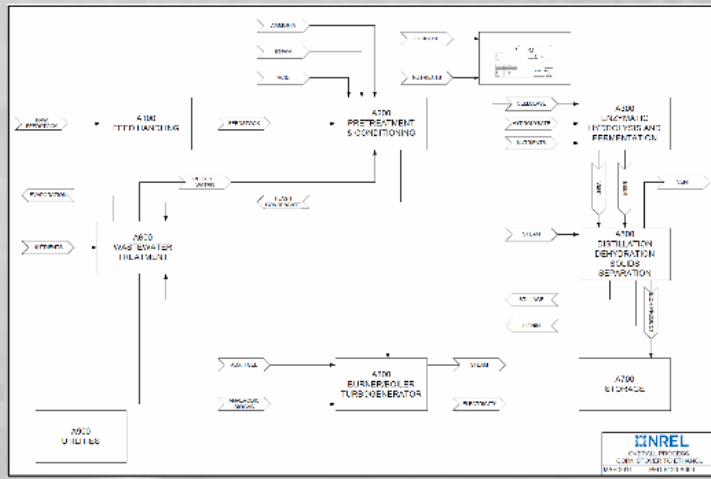


Fig. 1 ForgrunnSproSesser, bidrag mot GWP100

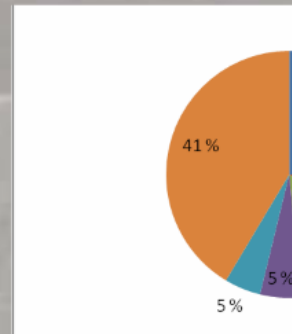
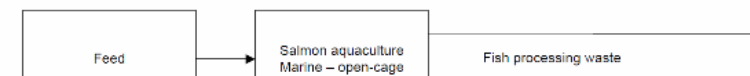


Fig. 2 BakgrunnSproSesser, bidrag mot GWP100

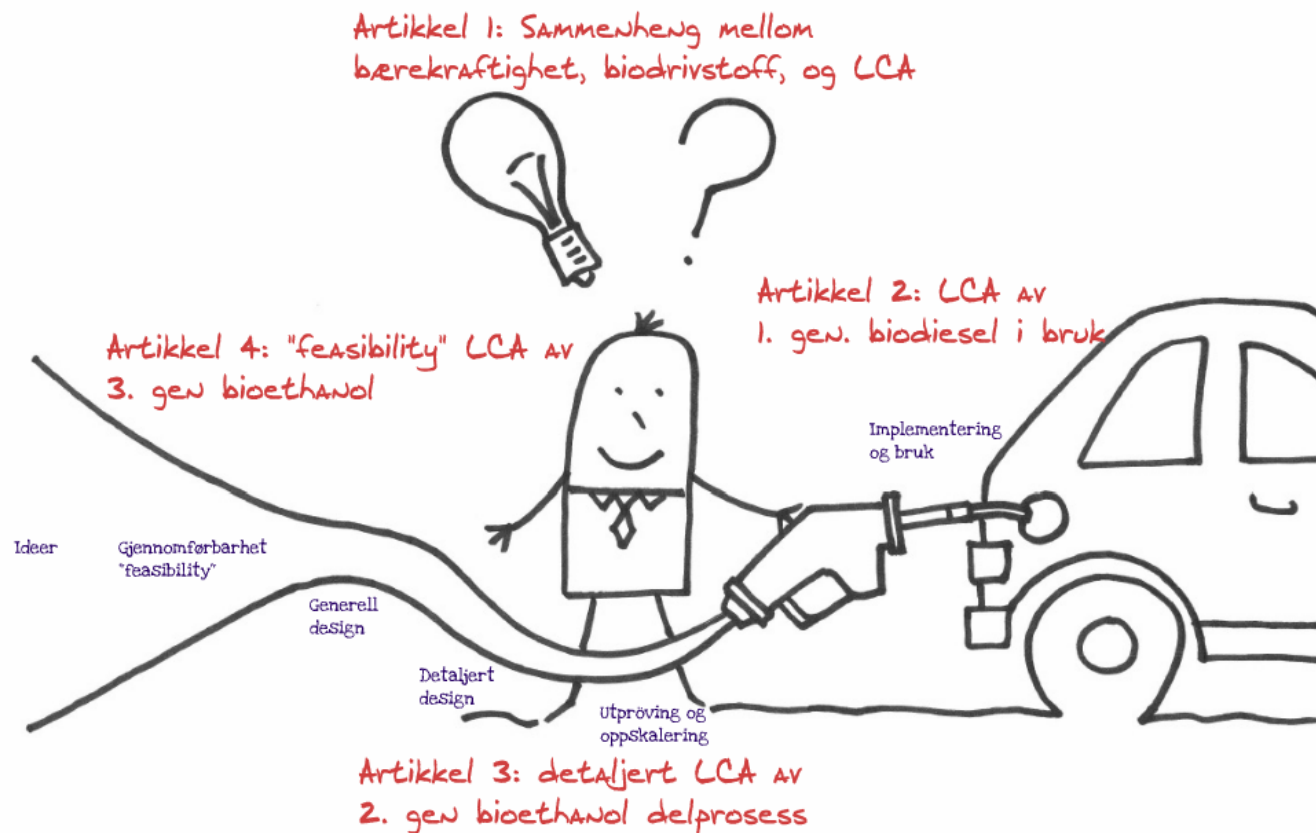
Hovedfunn: Enzymproduksjon kan bli en flaskehals i 2. gen. produksjon av bioethanol mht. høyt energiforbruk og manglende tilgang til vekstmedium.

Artikkel 4. "Integrated multi-trophic Aquaculture and 3 macro-algae bioethanol from a life-cycle Assessment pe (near completion, aim Intl. Journal of Industrial Ecology

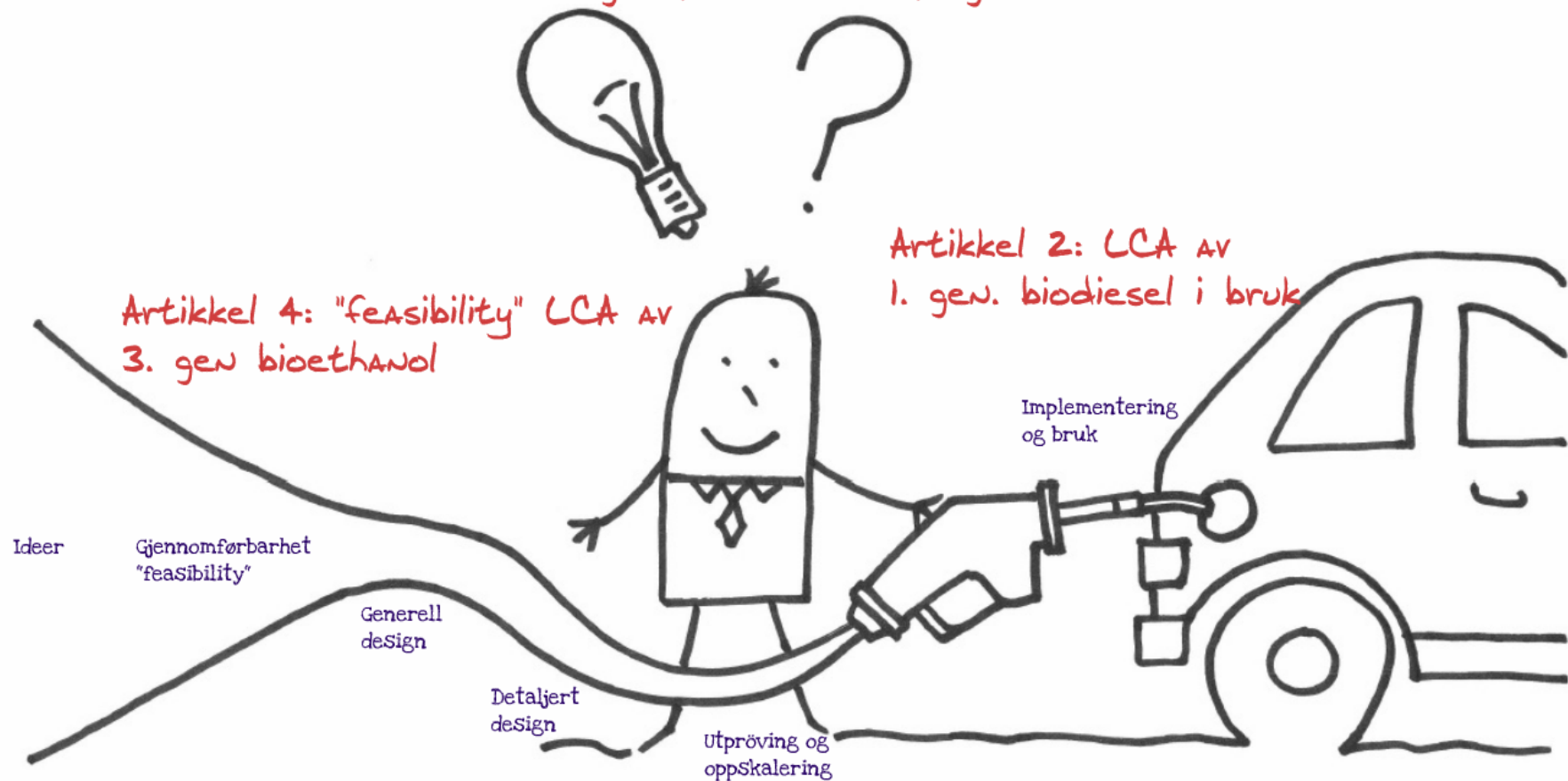


Sy sammen ideer/kunnskap

Kappen i denne avhandlingen



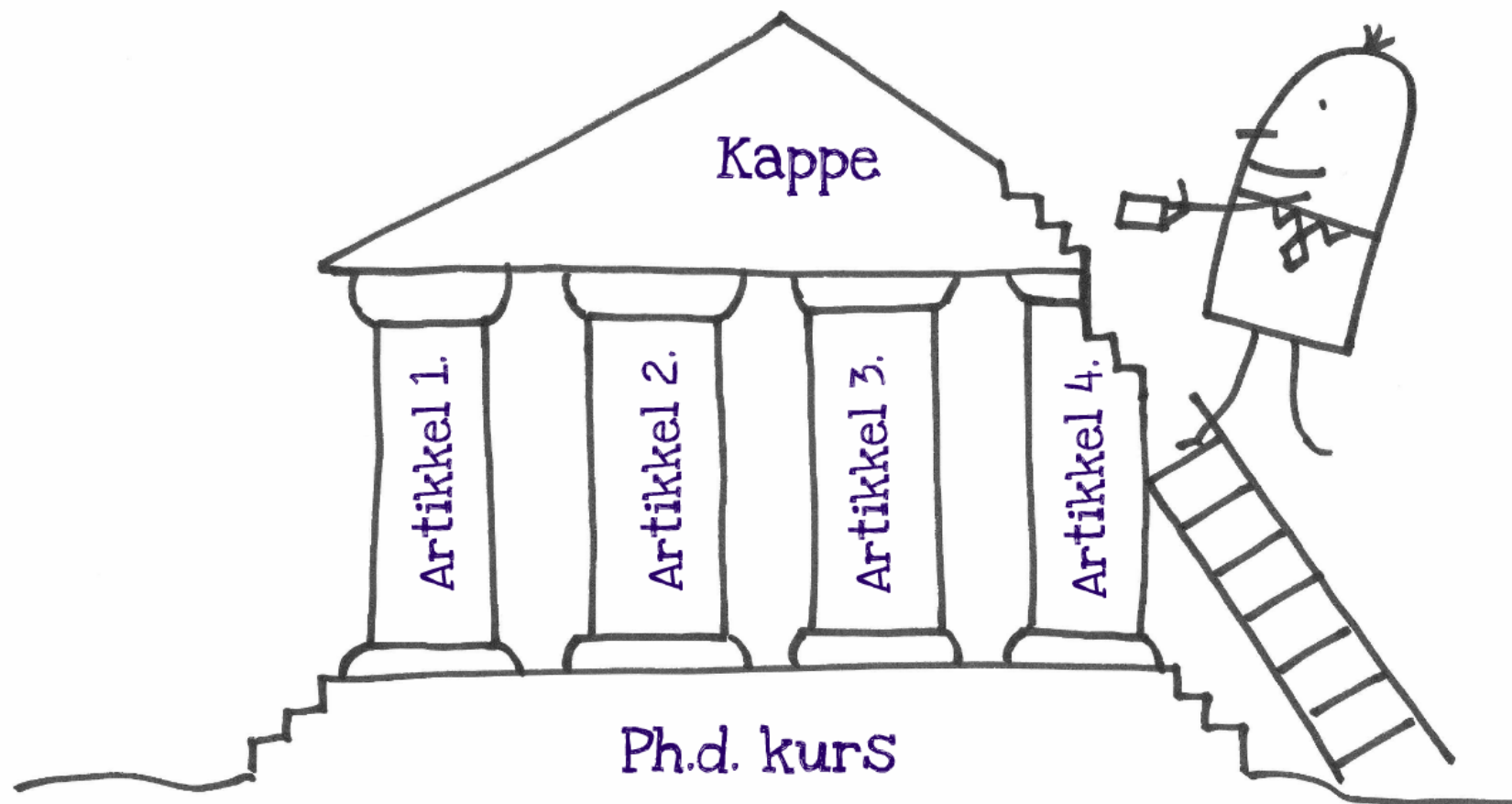
Artikkel 1: Sammenheng mellom
bærekraftighet, biodrivstoff, og LCA



Artikkel 2: LCA av
1. gen. biodiesel i bruk

Artikkel 4: "feasibility" LCA av
3. gen bioethanol

Artikkel 3: detaljert LCA av
2. gen bioethanol delprosess



- Contributed to International conferences w. published proceedings: Norway, and EU
- Participated in numerous EU & EEA "biofuel" projects, and proposals
- International Energy Agency - Alternative Motor Fuels Norwegian observer
- International Society of Industrial Ecology - Ph.D. Student board member



Ph.d. kurs

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