Labeling of green energy with the help of LCA key parameter models

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Liberalization of the electric power market

- Basic questions as seen by environmentally aware customers:
  - May I trust “green” power?
  - What kind of electric power is contained in “green” power and where from does it come?
  - What’s the cost of “good” green power?

What the consumer wants

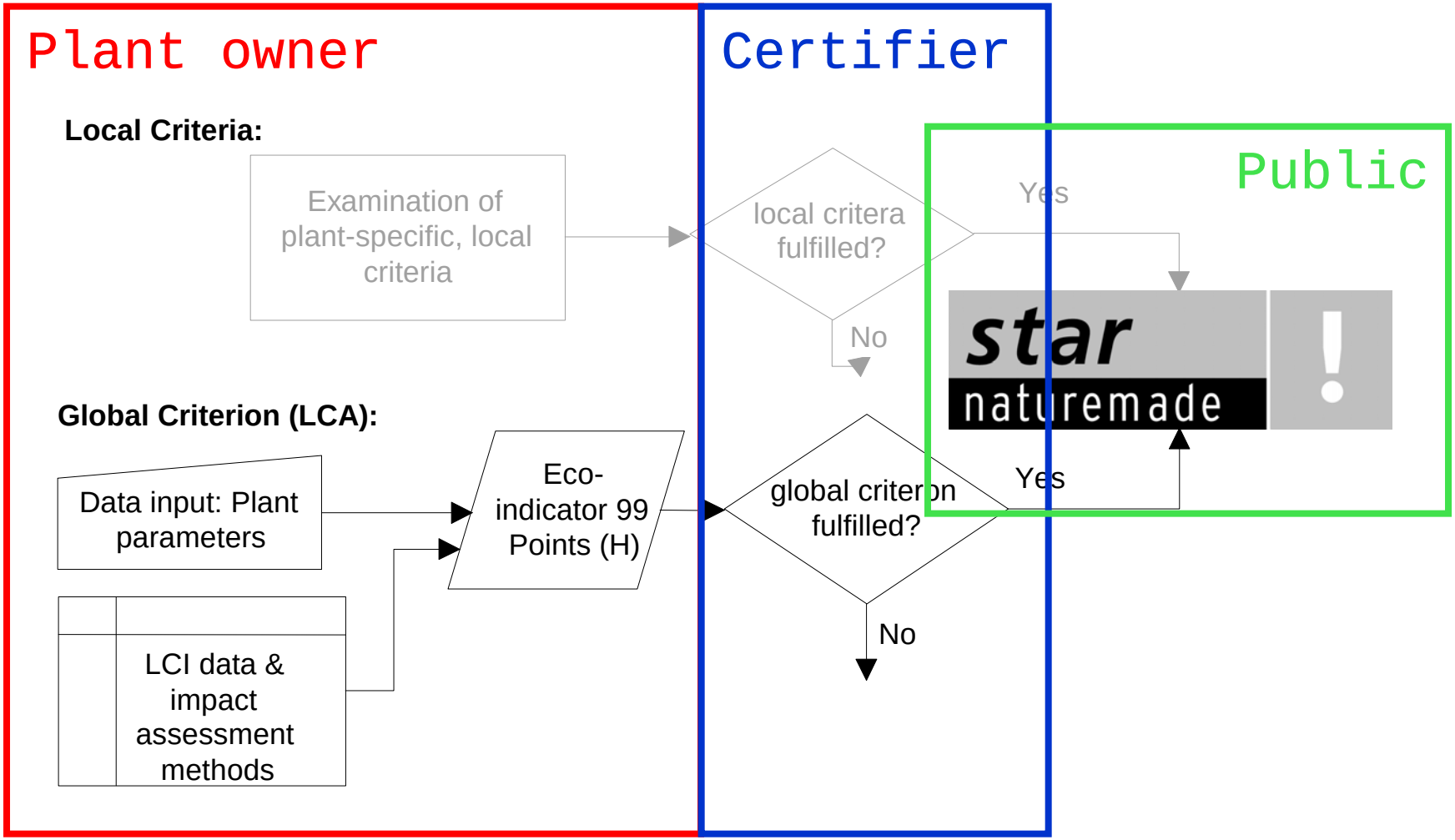
- A standard product
- A simple product
- A trustworthy product
- Transparency
- Reliability
- …

➢ A strong and credible quality label is necessary for safeguarding the quality

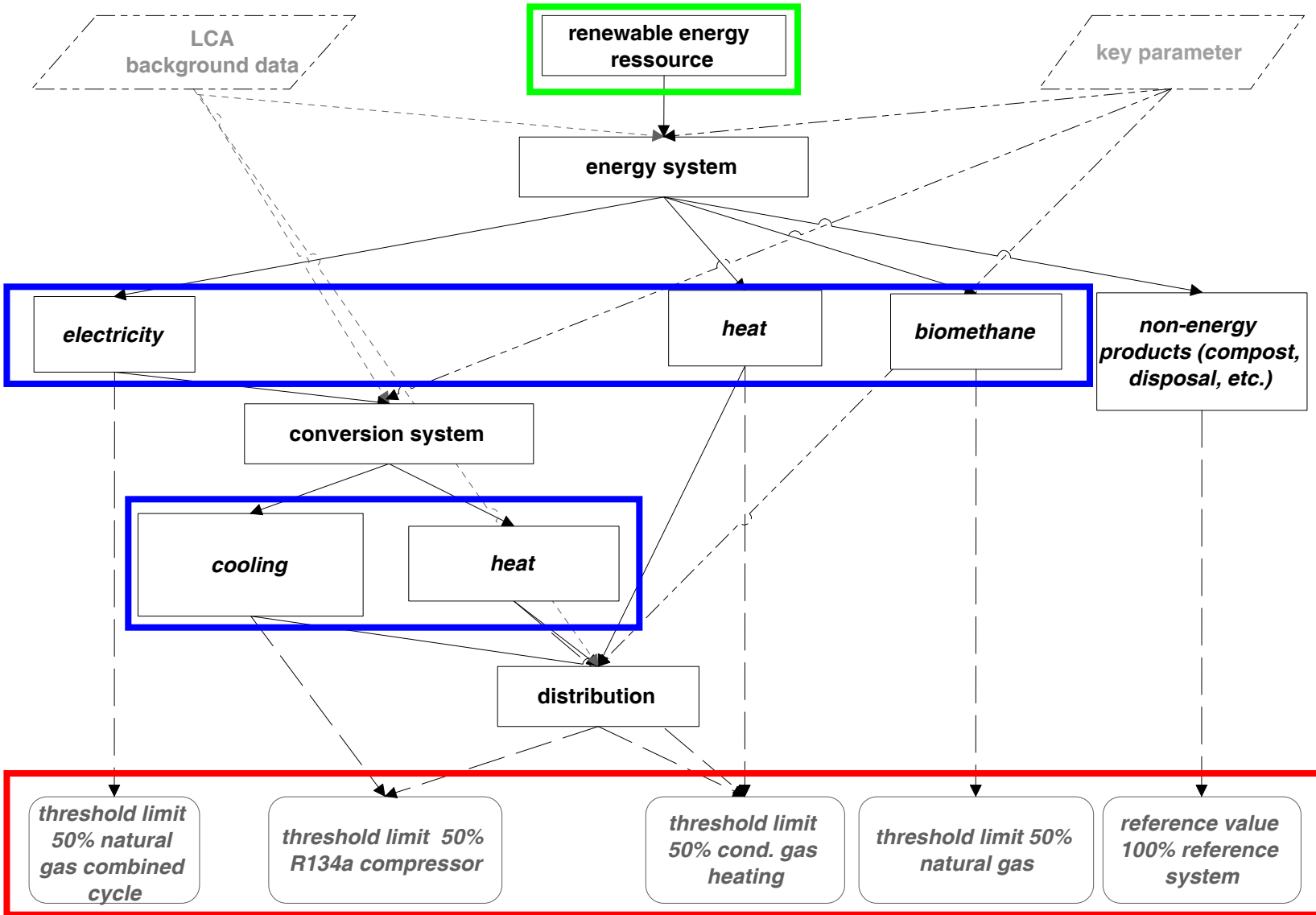
The solution: naturemade

- Label introduced in 2000
- Certification for both
  - production plants and
  - energy products
- Two stage quality label
  - for ecologically produced power (star)
  - and for power from renewable sources (basic)
- How can LCA contribute to this kind of question?

naturemade star Criteria



The labelled system



Global Criterion

- One threshold for all renewable energy resources
- Identification of key parameters based on detailed LCA per type of power plant
- Modelling key parameter based LCA in Excel for self-declaration by the power plant owner
- Impact assessment with Eco-indicator 99 (H/A)

Global criterion

- Threshold limit for all energy products (50% of a conventional system with natural gas)
- Reference value for all by-products with 100% of alternative system
- Environmental impacts of the system are lower than the sum of threshold limits and reference values (test value)

Threshold limits

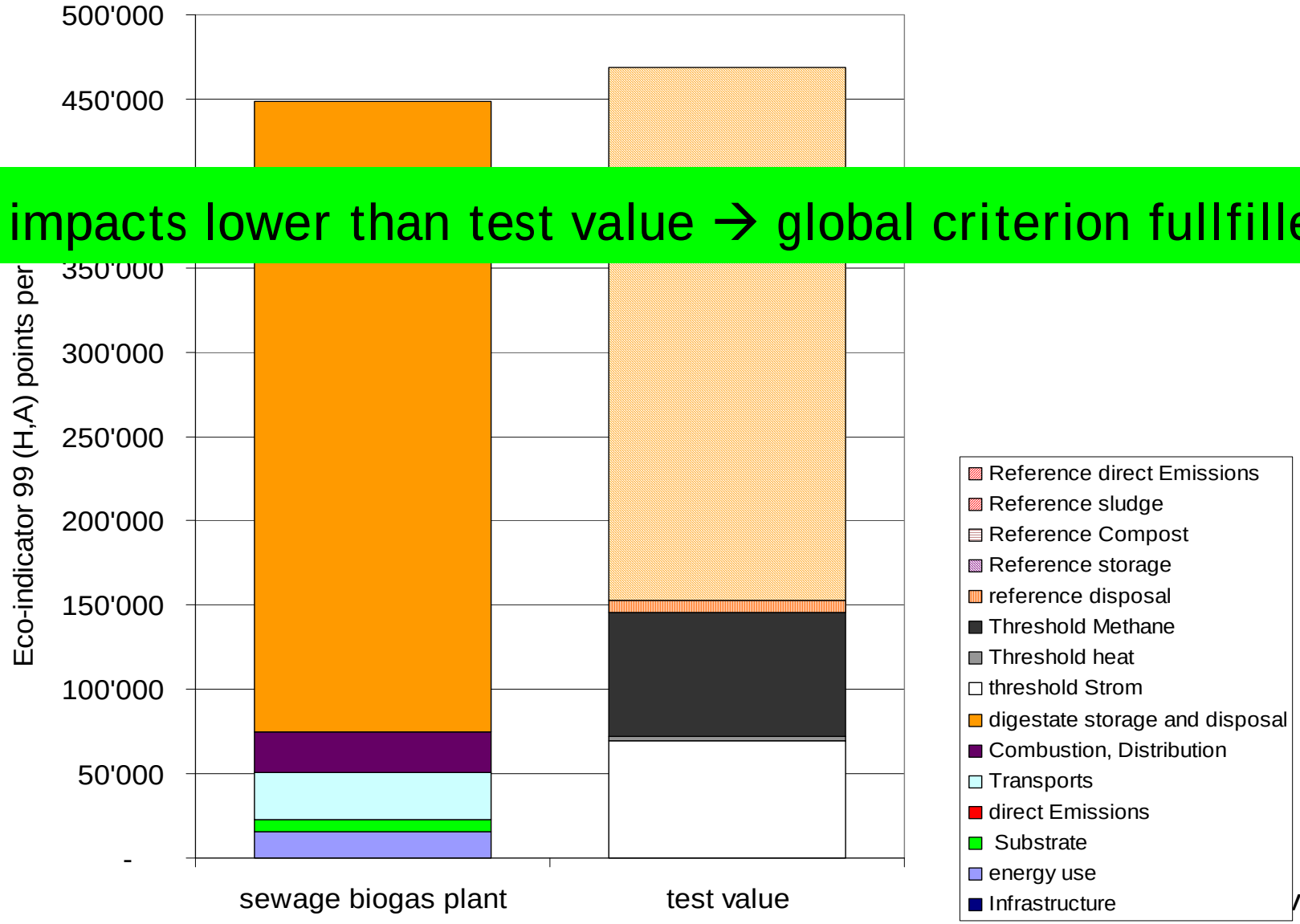
- Electricity: 50% natural gas steam and power plant
- Heat: 50% of modern gas heating
- Biomethane: 50% natural gas plus CO_2-emissions
- Cooling: to be discussed in detail

Key parameter model

naturemade Star Prüfung: Energieprodukte aus Biogasanlagen

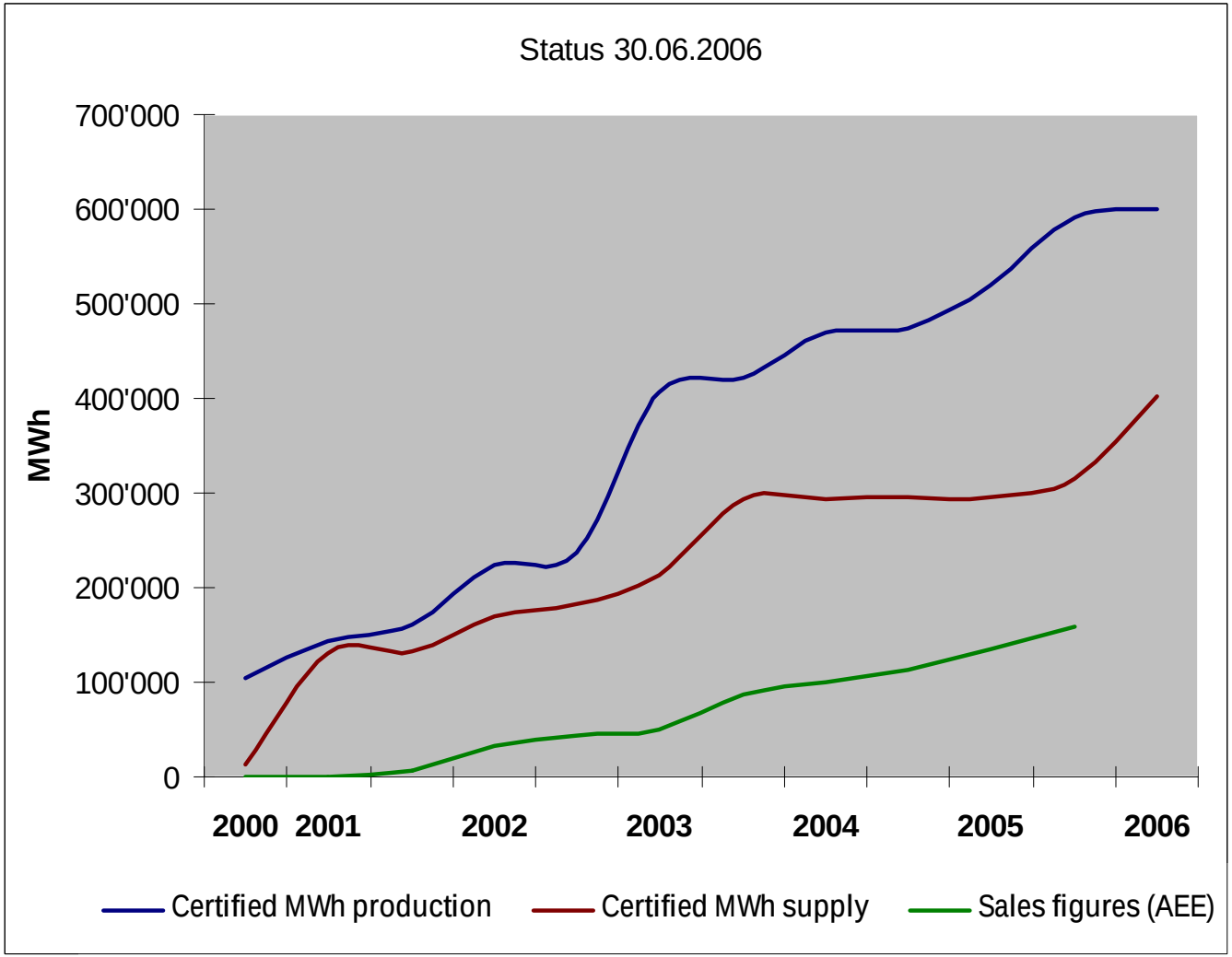
Eingabe:	Deutsch			
Anlagenname und Referenzzeitraum	**ARA 2007**			
Anlagentyp und Fermentergrösse	Kläranlage		400 m3	
Inputs			Finanzieller Ertrag (plus) bzw. Aufwand (minus) für die Anlage	
Landwirtschaft, Umrechnung aus Tierbestand auf Extrablatt		124 t FM		
Substrate für die Anlage (Eingabe auf Extra Blatt)		25'348 t FM	251'020 CHF	-10'000 CHF
Klärschlamm und andere Substrate die verbrannt werden müssen		239'875 t FM	0 CHF	0 CHF
Gesamtinputmenge für Anlage		265'347 t FM	241'020 CHF	
Energieeigenverbrauch der Anlage (Systemgrenzen beachten)		3'449'300 kWh		
Netzstromverbrauch für die Anlage	3'449'300 kWh			
Heizölverbrauch der Anlage	0 kWh			
Zündölverbrauch (10 kWh/kg)	0 kWh			
Dieselverbrauch (12 kWh/kg)	0 kWh			
Erdgasverbrauch für Anlage	0 kWh			
Outputs				
Gesamtproduktion Biogas pro Jahr, Brutto (10 kWh/m3)	30'000'000 kWh	3'000'000 m3		
Biogas Verluste und Abblasen	0 kWh			
Biomethan in Erdgasqualität, verkauft	12'000'000 kWh			
Typ BHKW	Magermotor			
Biogas verbrannt in Fackel, Heizung, BHKW	18'000'000 kWh			
Total Biogasproduktion, Brutto	30'000'000 kWh			
Stromproduktion: Verkauf und Eigennutzung ausserhalb der Anlage	5'090'106 kWh			
Fernwärmeproduktion: Verkauf, Verteilverluste	305'100 kWh	5%		
Wärmeproduktion: Verkauf, Eigennutzung ausserhalb der Anlage	0 kWh			
Wärmeverkauf, total	305'100 kWh			
Behandlung, Gärgut, fest	Entwässerung, Faulschlamm	279'511 t FM		
Behandlung, Gärgut, flüssig	Offenes Gärgutlager/Nachgärung	0 t FM		
Einfache Distanz Anlage - Ausbringung/Entsorgung				508'080 tkm
Verwendung feste Gärrückstände	Verbrennung, Zementwerk	25'404 t FM	-100 CHF	20 km
Verwendung flüssige Gärrückstände	Landwirtschaft, Schleppschlauch	0 t FM	0 CHF	4 km
		25'404 t FM	-100 CHF	
Resultate:	ARA 2007	0		
EI'99-aggregated, Hierarchist	4.49E+05	4.69E+05		96%
Globales naturemade Star Kriterium erfüllt				

Result declaration



- Total impacts lower than test value → global criterion fullfilled

Actual status of electricity certification naturemade star



Conclusions

- Key parameter models are a valuable tool for an efficient plant specific evaluation and comparison of different technologies
- The same model will be used for electricity, heat, biomethane and cooling
- Local criteria are indispensable to support the labelling and ensure environmental quality of labelled energy

More information

http://www.esu-services.ch/cms/index.php?id=naturemade

www.naturemade.org

ESU-services
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Annexe

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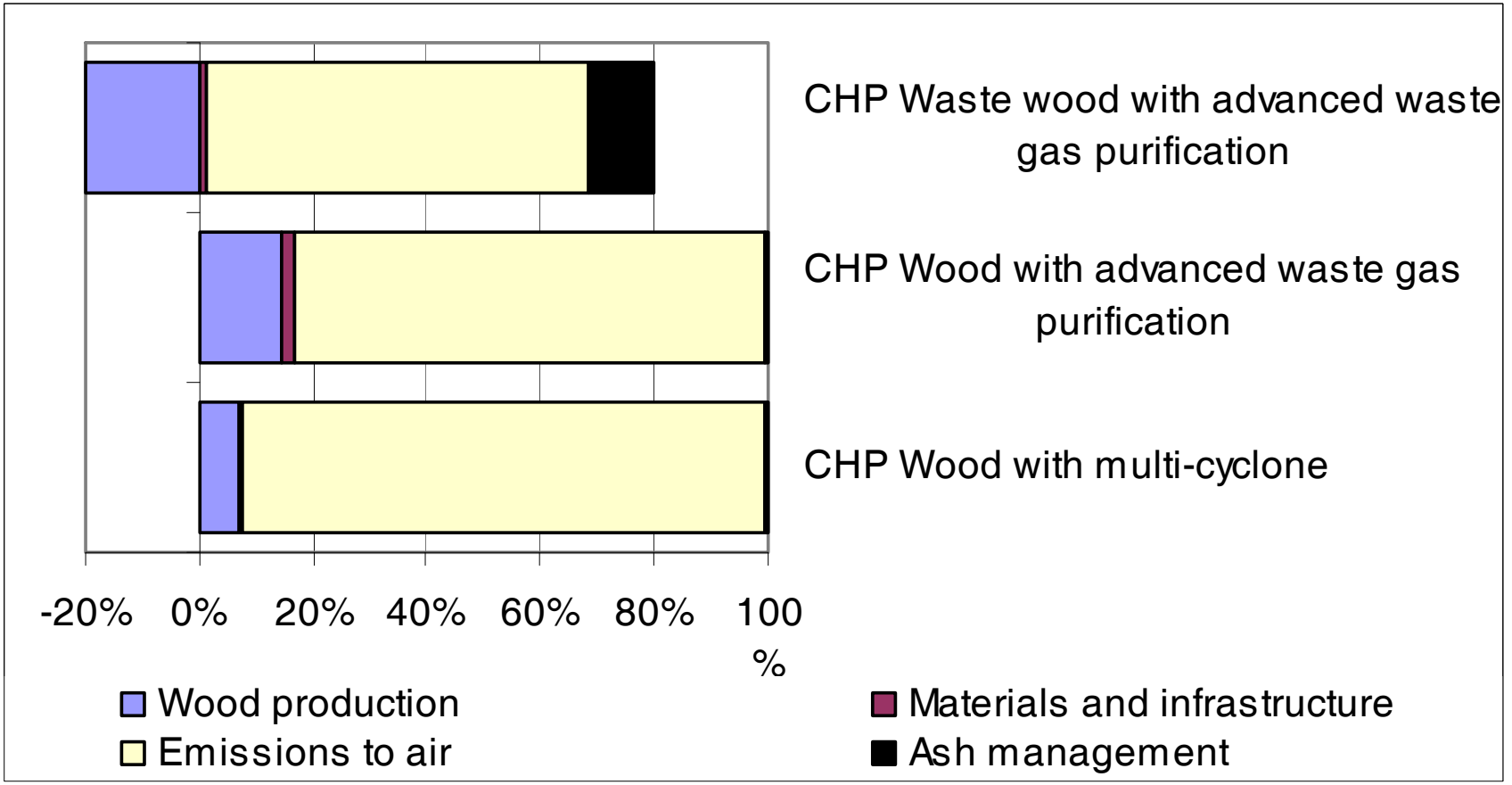
Detailed LCA for wood-fired power plants

- Detailed inventory for three Swiss plants
- Cradle to grave
  (from forestry to disposal of ashes)
- Assessment with Eco-indicator 99 (H/A) and other impact assessment methods
- Analysis of most important stages as entries to the inventory

Contribution of different stages
expressed in eco-indicator 99 (H/A)



Impact Assessment

- One score impact assessment is necessary in order to compare result with a test value
- Shortcomings of Eco-indicator 99 are relevant for some systems, e.g. nutrients in compost from biogas plant
- Local criteria cover specific problems of new systems not considered in LCA
  (e.g. fish-ladders, visual impact of wind power, etc.)