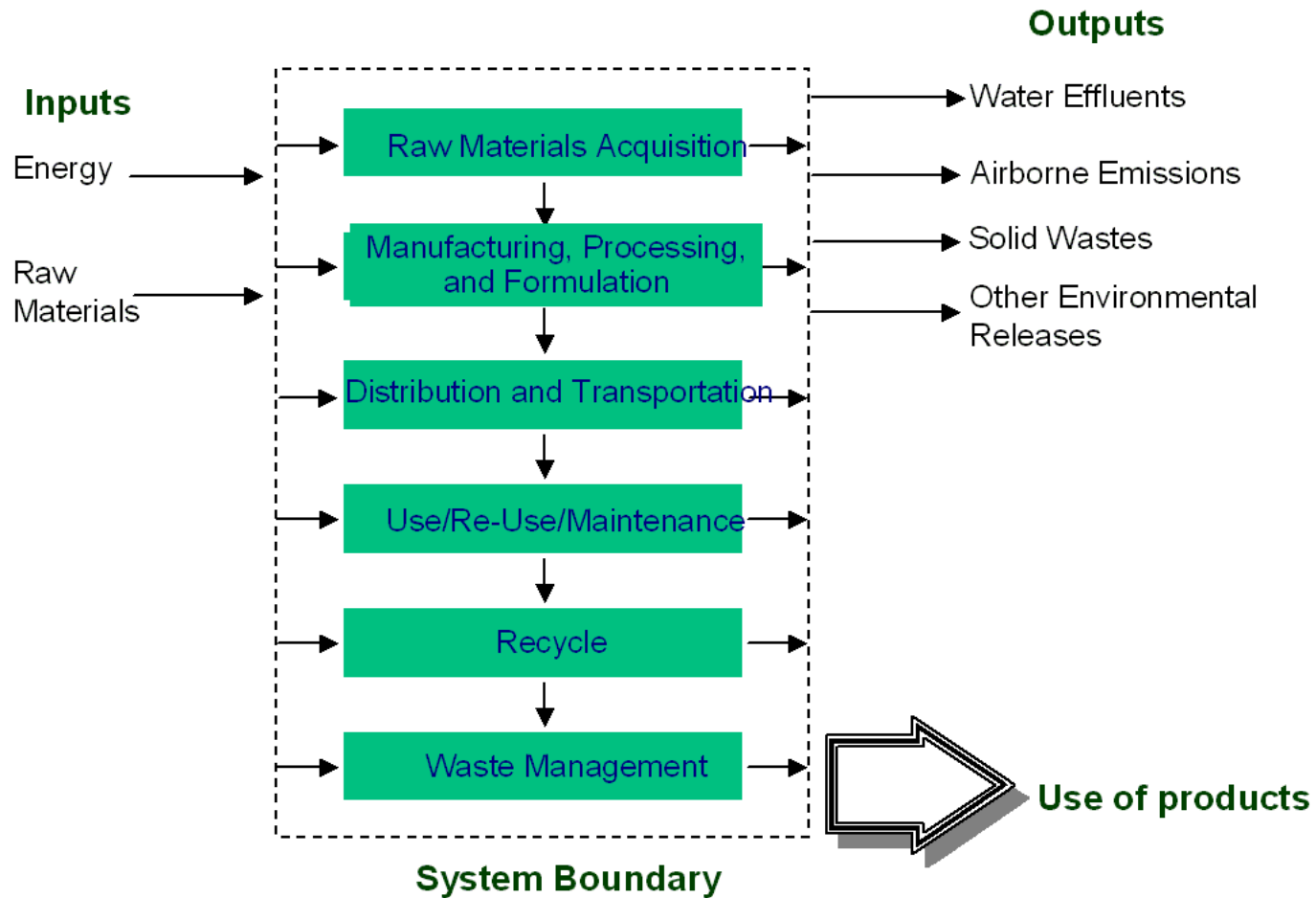


Greenhouse Gas Emission Models

- assessing the potential environmental aspects associated with a product by:
 - ***compiling*** an inventory of relevant inputs and outputs
 - ***evaluating*** the potential CO₂ equivalent impacts associated with those inputs and outputs

Life Cycle Stages



Benefits Of Life Cycle Analysis

- Helps decision makers select options that provide the lowest environmental impact
- LCA inventory process helps to narrow in on the area where the biggest reductions in environmental emissions can be made
- Can be used to reduce production costs

Limitations of LCA

- Can be time and resource intensive
 - Availability and accuracy of data can influence the results
- Most LCA's won't determine which product works the best or is the most cost effective
- LCA's need to be used as one component of the decision making process assessing the trade-offs with cost and performance

Life Cycle Models, Initial Screening

➤ 37 Models identified

ASPEN Plus	EIE-Athena	LEM
BEES	EIO-LCA	MIET
BESS	EMPA	PEMS
The Boustead Model	EPS 2000	PIA
CMLCA	EUKLID	Regis
CUMPAN	GaBi	SimaPro
DAYCENT	GEMIS	SPINE
Eco-Indicator 99	GHGenius	TEAM
Ecoinvent	GREET	TRACI
ECO-it	IVAM LCA	UMBERTO
ECOPRO	KCL-ECO	WISARD
EcoScan	LCAiT	
EDIP	LCAPIX	

GHGenius results for Biodiesel

General fuel -->	Petrol diesel	Biodiesel	Biodiesel	Biodiesel	Biodiesel	Biodiesel	Biodiesel
Fuel specification -->	0.001% S	CanD100	SoyD100	PalmD100	TallowD100	YG100	FishD100
	g CO ₂ /km	g CO ₂ /km	g CO ₂ /km	g CO ₂ /km	g CO ₂ /km	g CO ₂ /km	g CO ₂ /km
Vehicle operation	1,112.6	1,097.0	1,097.0	1,097.0	1,097.0	1,097.0	1,097.0
C in end-use fuel from CO ₂ in air	0.0	-1,069.4	-1,069.4	-1,069.4	-1,069.4	-1,069.4	-1,069.4
Net Vehicle operation	1,112.6	27.5	27.5	27.5	27.5	27.5	27.5
Fuel dispensing	1.8	2.0	2.0	2.0	2.0	2.0	2.0
Fuel storage and distribution	7.2	14.8	14.8	14.8	14.8	14.8	14.8
Fuel production	132.6	104.2	184.2	60.0	573.1	123.4	1,014.3
Feedstock transport	15.8	13.8	31.7	47.3	56.3	21.9	28.1
Feedstock and fertilizer production	128.0	334.4	307.7	97.2	0.0	0.0	854.8
Land use changes and cultivation	0.4	97.6	642.1	217.7	0.0	0.0	0.0
CH ₄ and CO ₂ leaks and flares	31.0	0.0	0.0	0.0	0.0	0.0	0.0
Emissions displaced by co-products	-1.7	-408.8	-932.6	-257.9	-624.4	-249.9	-865.4
Sub total (fuelcycle)	1,427.8	185.6	277.4	208.7	49.3	-60.3	1,076.1
Vehicle assembly and transport	8.9	8.9	8.9	8.9	8.9	8.9	8.9
Materials in vehicles (incl. storage)& lube oil	31.5	31.5	31.5	31.5	31.5	31.5	31.5
Grand total	1,468.1	226.0	317.8	249.1	89.7	-19.9	1,116.5