

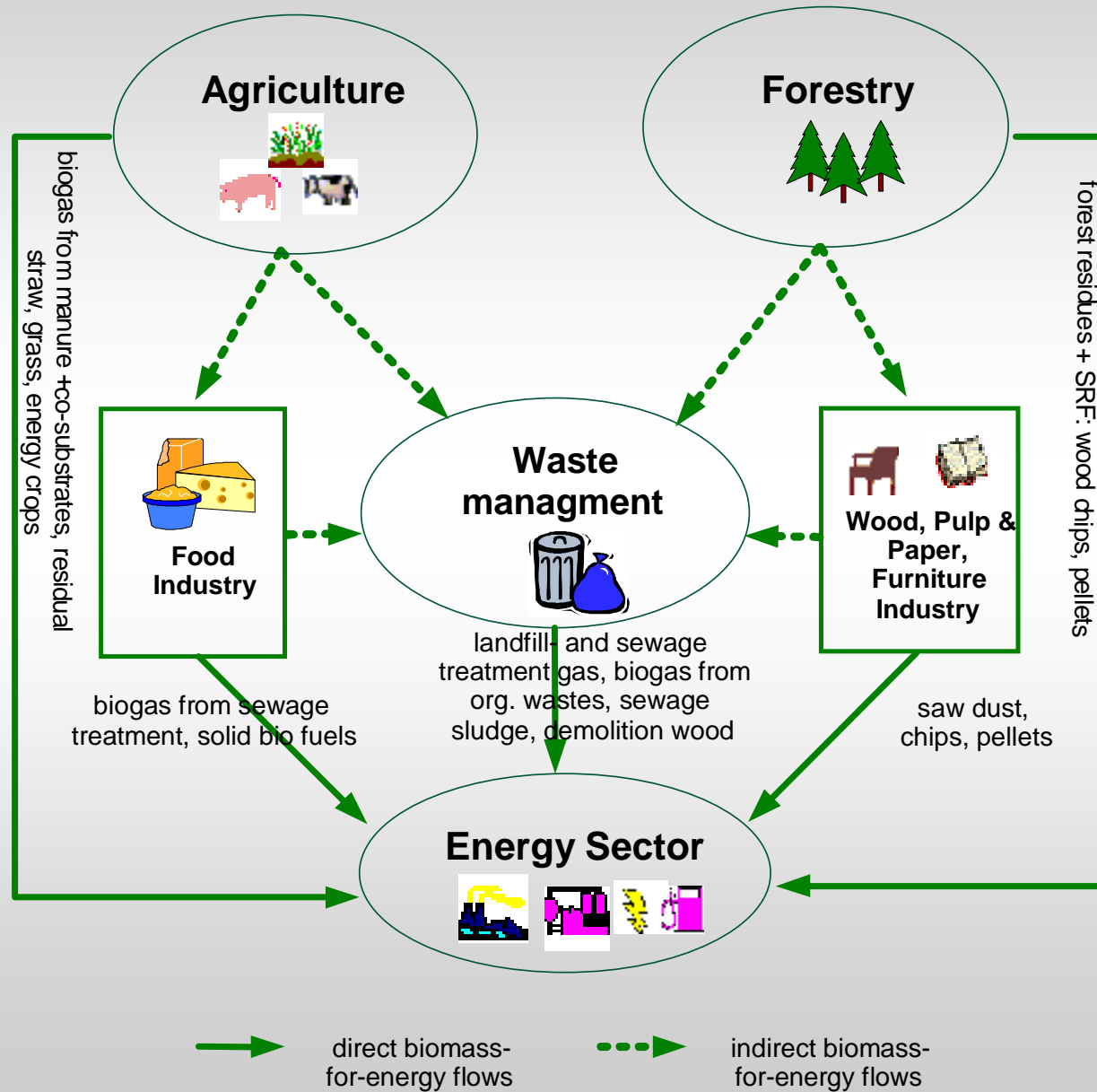
Sustainable Bioenergy Trade: Developing Environmental and Socioeconomic Standards

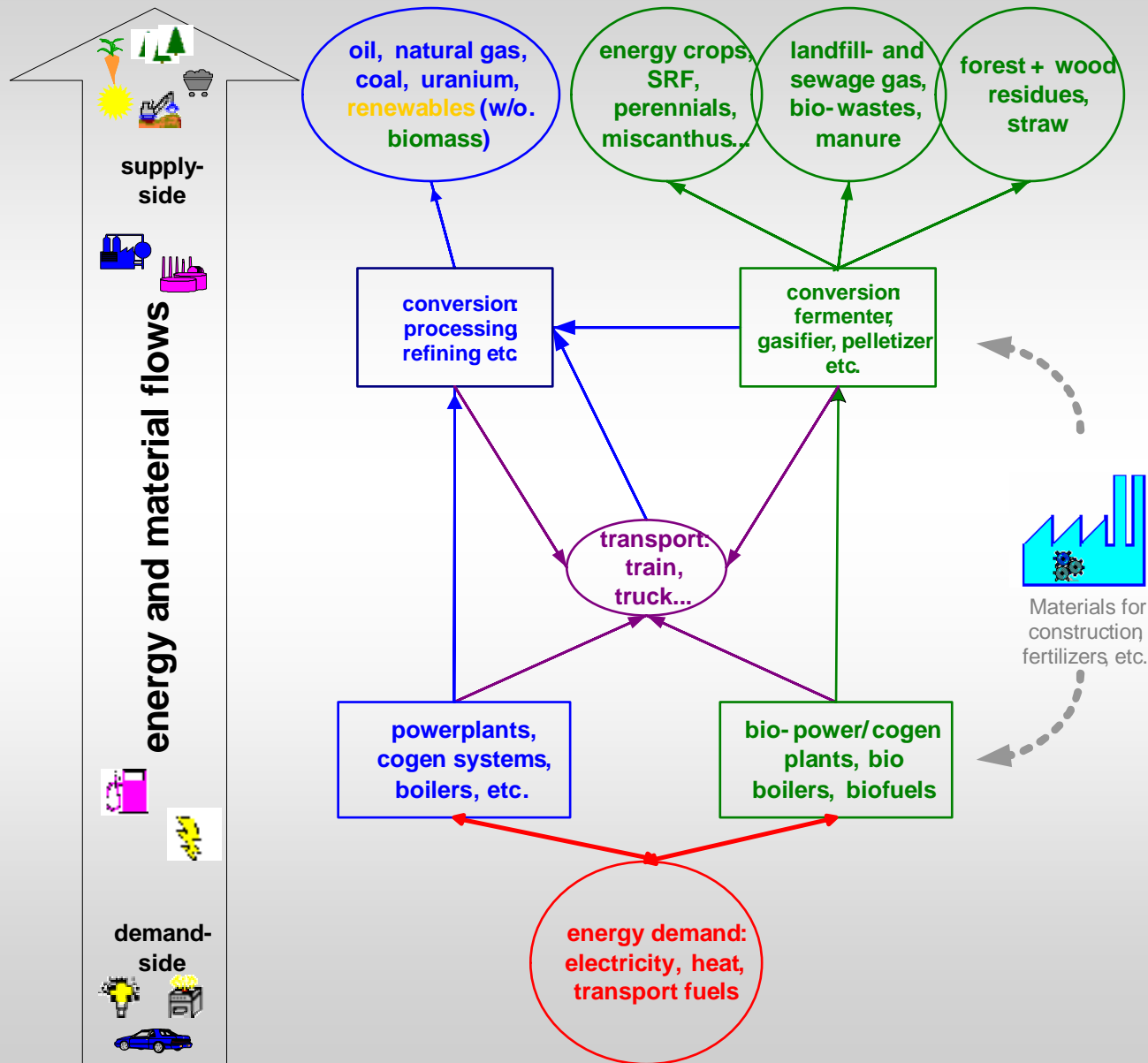
Uwe R. Fritsche







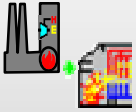

Coordinator, Energy & Climate Division

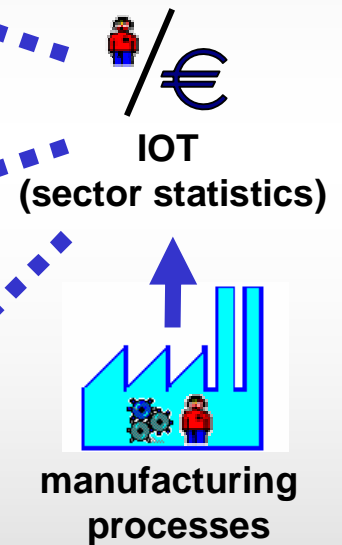
Öko-Institut, Darmstadt Office

presented at IEA Biofuels Seminar,
Paris, June 20-21, 2005





	Process	direct	indirect*
	farming/ harvest		€
	transport		
	processing, conversion		€
	transport		
	use		€



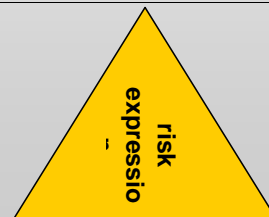
* = from invest costs; operating costs neglected

		costs 2010	2030	jobs	CO ₂ -eq.	SO ₂ -eq.
person transport		c/P*km		pers./bn P*km	g/P*km	
DIESEL-CAR	fossil diesel with tax	5,4	6,2	5	195,9	0,4
	dito, without tax	1,6	2,5			
	rapeseed oil	2,5	2,8	186	92,6	0,7
	rapeseed oil, organic	3,3	3,8	544	14,0	0,1
	sunflower oil	2,5	3,8	225	59,5	0,5
	sunflower oil, organic	3,3	3,8	623	37,5	0,3
	RME	4,8	5,5	193	42,4	0,7
	RME, organic	6,4	5,5	554	-37,1	0,0
	sunflower-ME	4,8	5,5	216	9,6	0,4
	sunflower-ME, organic	6,4	7,3	617	-12,6	0,2
	BtL-triticale	10,5	8,5	603	-4,0	0,7
BtL-triticale, organic	12,4	10,2	801	-73,8	0,2	
OTTO-CAR	fossil gasoline, with tax	7,9	9,1	6	230,4	0,3
	dito, without tax	2,4	3,7			
	Bio-EtOH, wheat	13,7	14,3	161	121,6	0,9
	Bio-EtOH, wheat organic	15,3	16,1	371	75,2	0,6
	Bio-EtOH, sugarbeets	13,8	14,6	161	128,8	1,0
	BtL-SRF poplar	9,0	7,6	1.554	-69,0	0,2
	BtL-miscanthus	9,1	7,7	277	-66,0	0,2
	BtL-wood residues	7,1	4,9	219	20,7	0,2
	biogas-cattle+pig manure	1,9	1,6	239	49,5	0,3
	biogas-manure+maize	4,8	4,5	205	62,5	0,4
biogas-manure+maize org.	6,1	5,9	302	51,4	0,3	

Biofuels with credits for upstream couple products (electricity, materials); excl. taxes!

Risk for nature/landscape	wheat	triticale	rape	sunflower	maize	sugarbeets
erosion	A	A	B	C	D	E
damage from compression	A	A	A	A	C	E
eutrophication	A	A	B	B	C	B
biocide impacts	A	A	C	A	C	A
ground water contamination	A	A	B	B	C	B
surface water contamination	A	A	B	C	C	C
loss of habitats/biodiversity	B	B	A	A	B	B
quantified aspects	relative valuation					
CO ₂ equivalent emissions	-	-	+	+/-	-	+/-
SO ₂ equivalent emissions	-	-	+	+/-	-	+
land use	-	-	+/-	+	-	+/-
	relative valuation					
nature + environment total	1	1	2	2	2-3	3

categories for nature/landscape	symbols for environmental aspects	total valuation
A	- = low	1 = favorable
B	+/- = moderate	2 = medium
C	+ = high	3 = unfavorable
D		
E	(relative within lines)	



- Conservation of natural ecosystems, e.g., **no clearing** of old-growth forests for cultivation of energy crops
- **10% of land** for nature conservation (biotope networks & corridors)
- Genetic + structural **diversity** within energy crop plantations
- Recirculation of nutrients; low/no fertilizer and pesticides
- Low irrigation in semi-dry and dry regions, no soil erosion.

- **multi-year “crops” (SRC/perennials)** in principle more favorable for nature conservation than annual crops → **priority !**
- residues from **“nature management”** need extraction anyway → **positive impacts**
- SRC/perennials help soil and erosion protection, also reduce N input
- **“wet route” annual crops** offer minimum (external) input and maximum output, less biocides/fertilizers, no tilling → **priority !**

- **Distribution of economic benefits from bioenergy → include regional/local people**
- **Integrate** landless people in bioenergy systems and subsequent local processing
- **Balance of income from potential exports vs. avoided imports from **domestic** use**
- **Indirect** effects from infrastructure (transport...) needs consideration
- **Participation of local people in decision-making**

Biofuel exports from DC *only if*

- food security is given

and

- biofuel production leads to higher environmental and socio-economic benefits than alternative land uses.

For 2nd condition, no adequate analyses for DC is available; operational/quantifiable concepts for „sustainability“ in DC missing.

- **Resources for local/national stakeholders to assess cost, environmental, and social sustainability of bioenergy → IEA, MDB, bilateral donors**
- **Research crops varieties + cultivation for**
 - closed material flows („wet routes“),
 - climate/soil conditions in DC
 - erosion reduction + carbon sequestration
- **Initiate good practise in cooperation with research institutions in developing countries; include bioenergy business**