

# Environmental sustainability in biomass supply: local to global issues

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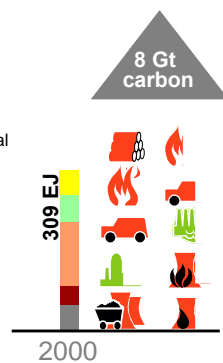


## Today's energy infrastructure

Source: WBCSD

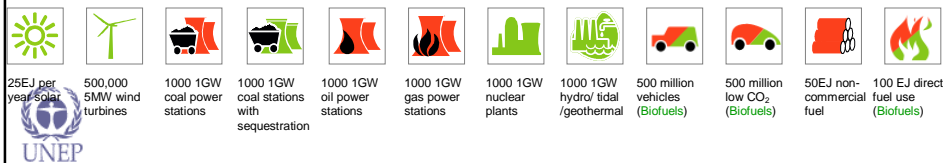
### Final Energy

- Electricity
- Gas
- Liquids
- Solids
- Non-commercial



- Direct burning of fuel 3-4 Gt
- 800 million vehicles 1+ Gt
- 700+ coal power stations 1.5 Gt
- Non-commercial biomass 1 Gt
- 800 gas or oil power stations 0.7 Gt
- Non emitting technologies 0 Gt

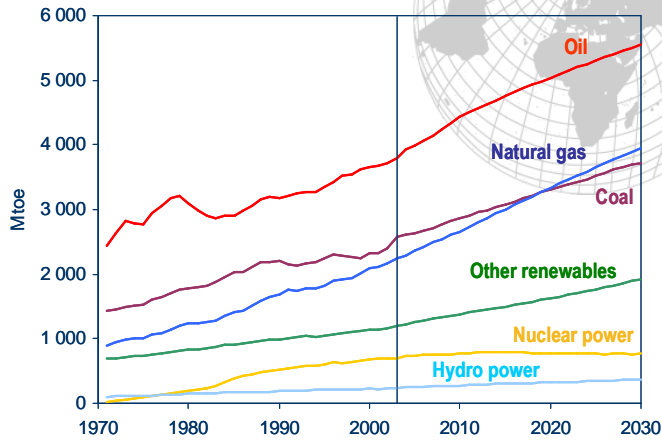
**8.0 Gt**



## World primary energy demand

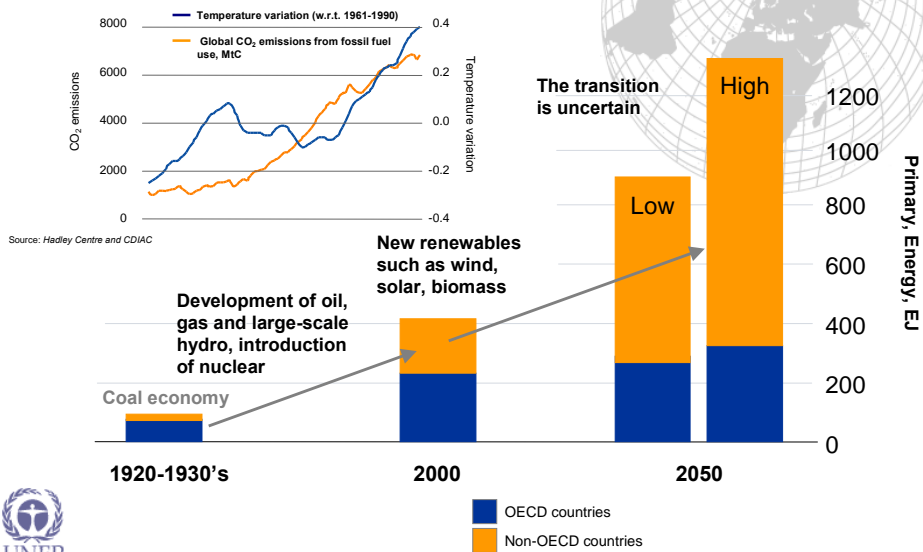
Source: IEA

**Oil, gas and coal together account for 83% of the growth in energy demand between now and 2030 in the IEA WEO Reference Scenario**



## How will our energy system develop?

Source: WBCSD

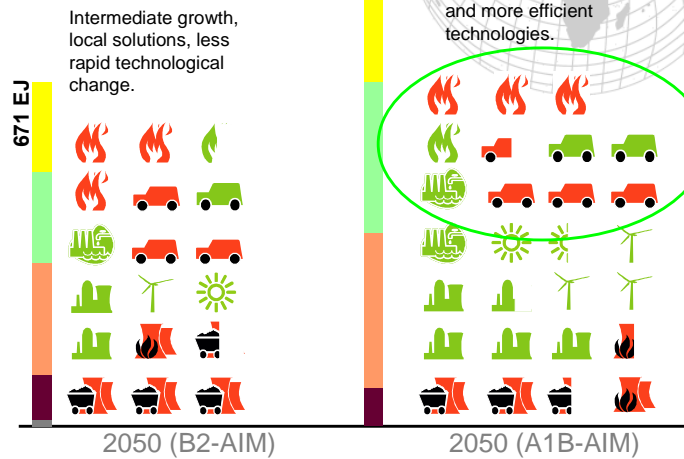


## Meeting future energy needs

Source: IPCC and WBCSD

### Final Energy

- Electricity
- Gas
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## There is no energy source without drawbacks ...

### Environmental risks of biofuel production

- Potential negative local impacts:
  - Biodiversity loss
  - Water depletion
  - Excessive use of chemical fertilizers and pesticides, eutrophication
  - Degraded soil
- Potential negative global impacts
  - Net GHG emissions can be positive (or perhaps not as favorable as anticipated in terms of emissions reduction)

### Social risks of biofuel production

- Increased food prices
- Conflict between local and international interests





## ***Example: palm oil production in Malaysia***



- High demand from Europe
- Linked to conversion of tropical rainforests
- Threat to indigenous people and endangered species of wildlife (orangutans, tigers, rhinos)



## ***What is required to ensure environmental sustainability?***



- Correct policies, institutional and legal frameworks in developing countries
- Enforcement of environmental laws and regulations
- Institutional capacity building and efforts that strengthen skills
- An internationally agreed system (certification or other assurance) to ensure sustainability of biomass intended for biofuels production
- Knowledge and technology transfer
- Near-term research involving developing countries



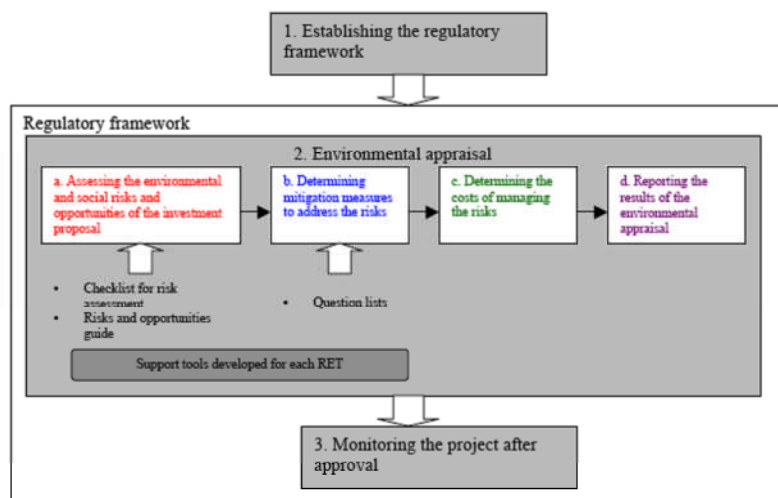
## What is UNEP doing?

Working with the private sector, NGOs and governments in developing:

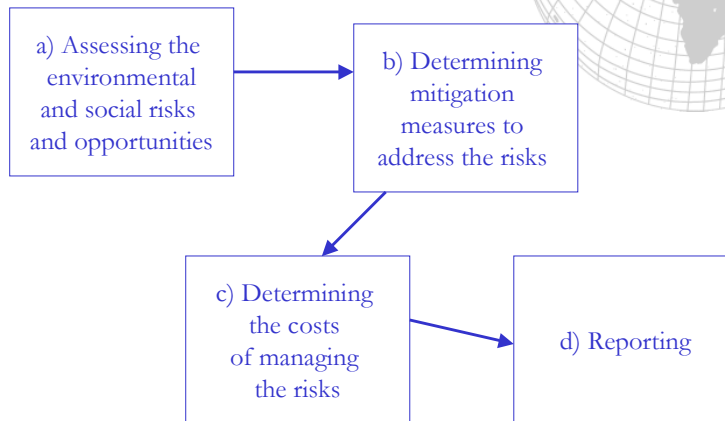
- Assessment schemes and sustainability criteria
- Development of sustainable business models for biofuels development in developing countries



## Environmental Due Diligence Risk assessment of biomass systems



## ***Environmental Due Diligence*** **Risk assessment of biomass systems based on energy crops**



## ***Environmental Due Diligence*** **Risk assessment of biomass systems based on energy crops**

### 1. Issues related to effluent emissions, site contamination, and use of hazardous materials

- Use of pesticides
- Use of chemical fertilisers
- Emissions of NO<sub>x</sub>, SO<sub>2</sub>, CO, particulates, VOCs, greenhouse gases
- Solid waste generation





***Environmental Due Diligence***  
**Risk assessment of biomass systems  
based on energy crops**

2. Issues related to the protection of biodiversity

- Land clearing and conversion of forests; habitat fragmentation
- Introduction of non-native species
- Use of genetically modified organisms
- Competitive pressures arising from water use



***Environmental Due Diligence***  
**Risk assessment of biomass systems  
based on energy crops**

3. Issues related to workers' health and safety

- Exposure to pesticides and other agricultural chemicals
- Risk of accidents in crop cultivation and harvesting
- Risk of industrial accidents in processing / conversion stages (fires, explosions, mechanical accidents)



## **Environmental Due Diligence** Risk assessment of biomass systems based on energy crops



### 4. Environmental issues sensitive to public opinion and pressure

- land use and land use change
- soil erosion or compaction
- water depletion
- loss of biodiversity
- visual impact of facilities
- noise
- traffic

[www.sefi.unep.org](http://www.sefi.unep.org)



## **Biomass certification effort with DaimlerChrysler**



- FSC** - Forest Stewardship Council
- PEFC** - Programme for the Endorsement of Forest Certification schemes
- CSA** - Canadian Standards Association's Sustainable Forest Management Standard
- SFI** - Sustainable Forestry Initiative
- RA** - Rainforest Alliance
- USF (KUL)** - Umweltsicherungssystem
- UTZ Kapeh** - Certification system for fair traded coffee; GAP guidelines
- EUREPGAP** - Euro-Retailer Produce Working Group
- IFOAM** - International Federation for Organization Agriculture Movements
- Naturland** - Naturland
- BIO** - Bio Siegel
- EUGENE** - European Green Electricity Network
- Green Gold** - certification system to trace biomass from sustainable production
- RSPO** - Roundtable on Sustainable Palm Oil
- Fairtrade** - certification of fair traded products



**Notes:**

- \* USF(KUL) documents were only available in German
- \*\* IFOAM Criterion are only available for purchase
- \*\*\* EUGENE applies to 'eligible sources' for biomass production such as dedicated energy crops or agricultural residues but the label does not provide specific criteria for biomass production (Lewandowski, Faaij, 2004, p.7).



## Summary of indicators for social criteria

No	Categories	FORESTRY						AGRICULTURE						BIOENERGY			TRADE	
		FSC	PEFC	CSA	SFI	RA	SOF	USF (RUL)	UTZ (KAPEH)	EUROP GAP	IFOAM**	Naturland	BIO	EUGENE**	Green Gold	RSPD	Fair Trade	
1	Labour conditions	X	X			X			X	X						X	X	
2	Protection of human safety & health	X	X			X			X	X						X	X	
3	Rights of indigenous people	X	X	X					X							X		
4	No discrimination against gender/race, etc		X			X			X							X	X	
5	Elimination of child labour use		X			X										X	X	
6	Protection of women and reproductive rights								X							X	X	
7	Access to resources ensuring adequate quality of life	X	X		X	X			X	X							X	
8	Food and energy supply safety								X					X				
9	Capacity building	X	X	X	X	X			X	X						X	X	
10	Combating poverty				X													
11	Democratic participation of multi-stakeholders		X													X	X	
12	Land ownership being equitable															X	X	
13	Community well-being	X			X	X			X								X	
14	Fair trade conditions								X								X	
15	Allow employees to unionize	X							X							X	X	
16	Promote educational benefits for employees and their families								X									
17	Provide healthcare access for employees								X									

Legend :

X - indicators used in each criteria by the different certification system

new updates as of 22/06/06



## Summary of indicators for economic criteria

No	Categories	FORESTRY						AGRICULTURE						BIOENERGY			TRADE	
		FSC	PEFC	CSA	SFI	RA	SOF	USF (RUL)	UTZ (KAPEH)	EUROP GAP	IFOAM**	Naturland	BIO	EUGENE**	Green Gold	RSPD	Fair Trade	
1	Viability of the business (business minimizes costs to ensure competitiveness and has adequate funding to sustain operations)	X	X												X	X	X	
2	Long-term commitments, contracts, management plans	X	X												X	X		
3	Strengthen and diversity of local economy	X		X					X									
4	Reliability of resources (guards against supply disruptions)	X	X						X						X			
5	Sustainable harvesting and yields (agricultural yields should be maintained on an economically viable and stable level)	X	X	X	X				X						X	X		
6	No blocking of other desirable developments	X		X														
7	wage regulations (ie. set minimum wages)															X		

Legend :

X - indicators used in each criteria by the different certification system

new updates as of 22/06/06



## Summary of indicators for ecological criteria

No	Categories	FORESTRY					AGRICULTURE						BIOENERGY			TRADE	
		FSC	PEFC	CSA	SFI	RA	SOF	USF (RUL) <sup>1</sup>	UTZ KAPEH	EUREP GAP	IFOAM <sup>11</sup>	Naturland	BIO	EUGENE <sup>12</sup>	Green Gold	RSP0	Fair Trade
1	Protection of the atmosphere		x		x	x			x	x					x		
2	Preservation of existing sensitive ecosystems	x	x	x	x	x			x	x					x	x	x
3	Conservation of biodiversity	x	x	x	x	x			x	x					x		x
4	Conservation and improvement of soil fertility - avoidance of soil erosion	x	x	x	x	x			x	x		x			x	x	x
5	Conservation of ground and surface water	x	x	x	x	x			x	x		x			x	x	x
6	Combating deforestation	x	x	x	x	x			x						x	x	
7	Combating desertification and drought	x				x									x		
8	Improve or preserve landscape	x	x	x	x	x			x	x					x	x	x
9	Conservation of non-renewable resources		x												x		x
10	Waste management and minimisation	x	x			x			x	x		x				x	x
11	Proper use of agrochemicals	x	x		x	x			x	x		x	x		x	x	x
12	Reduce pollution and emissions								x	x					x	x	
13	Prohibit or record genetically modified plants	x	x			x			x	x			x		x		x
14	Pest management control system					x			x						x	x	

Legend :

X - indicators used in each criteria by the different certification system

new updates as of 22/06/06



## Summary of indicators for general criteria

No	Categories	FORESTRY					AGRICULTURE						BIOENERGY			TRADE	
		FSC	PEFC	CSA	SFI	RA	SOF	USF (RUL) <sup>1</sup>	UTZ KAPEH	EUREP GAP	IFOAM <sup>11</sup>	Naturland	BIO	EUGENE <sup>12</sup>	Green Gold	RSP0	Fair Trade
1	Compliance with laws and international agreements		x	x	x	x			x								x
2	Traceability of products from source	x	x						x	x					x		
3	Avoidance of leakage effects																
4	Strengthening the role of NGOs		x	x		x											
5	Improvement of local conditions	x			x	x			x						x	x	
6	Transparency in practice and process	x	x	x											x	x	x
7	Social and environmental impact assessments undertaken before new projects started	x		x	x	x				x					x	x	x
8	Regular updates and internal inspection	x	x		x	x			x	x					x		x

Legend :

X - indicators used in each criteria by the different certification system



## ***Final thoughts***

- There is a large economic potential for biofuels but some cause for concern about the environmental and social consequences if these are not given sufficient attention.
- Competitive biomass technology combinations are within reach for the world market but expansion needs consistent policies and some market support measures.
- Biofuels have a bright future, but some degree of policy coordination amongst agriculture, trade, climate, energy and development is needed if the potential is to be realized.

