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Biomass potentials: Sustainability issues

Towards a European Trade Strategy for Sustainable Solid Biomass Imports to the EU"
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Sustainable Energy Week

In collaboration with IINAS

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Approach on sustainability:

- guidelines for assessing the sustainability risks per type of biomass resource in every focus region
- list of relevant indicators at project level for all biomass, processes and end-uses
- social, economic, environmental as well as political and institutional considerations

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Technical potential of lignocellulosic biomass

- General data
  - Legislation related to bioenergy
  - Data on main feedstocks used or with potential for biomass trade
    - Production volumes
    - Planted areas
    - Harvested areas
    - Irrigated areas
    - Yield – National average
  - Data on main biomass currently exported
    - Production volume
    - Quantity exported
    - Price

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Cont.

- Biodiversity
  - Legal/policy/governance related data
  - Geographic/land use data
  - Biological/physical data
- Land use
  - Land area under specific classes
    - Area of land under each specified class
    - Definition used in each country for that type of land class
- Socio-economic
  - working conditions
  - land tenure/rights
  - Food insecurity issues
  - ILO conventions

- Standards and Certification

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Summary of countries technical potential

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Country	Population million	GDP USD	Agricultural land (1000 has)	Forest land	Feedstock	Specific crops' residues	Potential	Sustainability issues	Policies
Brazil	202.65	$3.073 trillion	275605	515133.2	FR; AR; FP, NFP	Sugar cane bagasse, rice, maize, cassava. Forestry residues (eucalyptus and pine)	H	Considerations on forest management and some social issues	In place but enforcement needed
Colombia	48.32	$378.1 billion	42617.6	60297	AR, FR	Palm oil residues, sugar cane bagasse and residues, coffee residues	H	Considerations on logistics, transport and some social issues	In place but enforcement needed
Kenya	39.42	$61.83 billion	27430	3445	AR, FR, FP	Maize, coffee, sisal, rice, others. Forestry residues	L	Considerations on logistics	In place but enforcement needed
Indonesia	25.36	$856.1 billion	56500	93062	FP	Palm oil residues	M/H	Deforestation	In place but enforcement needed
United States	318.9	$16 800 trillion	408706.5	304787.6	FR, FP, FP	Timber from FP, forestry products, and mill residues	H	Considerations on local uses in the future	In place
Ukraine	44.29	$337.4 billion	41297	9757	FR, PR, AR	Cereals crops residues, forestry residues and forest products	M/H	Considerations on the current situation in the East	In place but policy needs to be implemented

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SWOT GUIDELINES

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Six principles:

1) Biomass availability;
    a. Sustainable availability
    b. Exportable availability
2) Biomass mobilisation and security of supply
3) Biomass cost
    a. Cost to road side
    b. Collection & pre-treatment cost up to harbour
    c. Transport cost long distance
4) Environmental sustainability
5) Social sustainability
6) Governance

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SWOT principle	Indicator/ criterion	Strength	Weakness	Opportunity	Threat
Environmental issues (air, water, biodiversity and soil) are not negatively affected	Feedstock production does not affect negatively local environmental conditions	Feedstock production complies with local regulations and best practices as well as international conventions and agreements	Lack of measures to review compliance of this	Implementation of best practices in absence of enforcement or compliance	Feedstock production leads to negative impacts on environmental issues. Increased production may have cumulative negative impacts
Life cycle GHG emissions incl. direct LUC	GHG LCA assessment in agreement with IPCC guidelines along the supply chain	The feedstock production and supply chains shows savings in GHG in comparison with fossil alternatives	The feedstock production and supply chains shows no savings in GHG in comparison with fossil alternatives	The feedstock production and supply chains shows improved savings in GHG in comparison with fossil alternatives	The feedstock production and supply chains are negative for GHG in comparison with fossil alternatives

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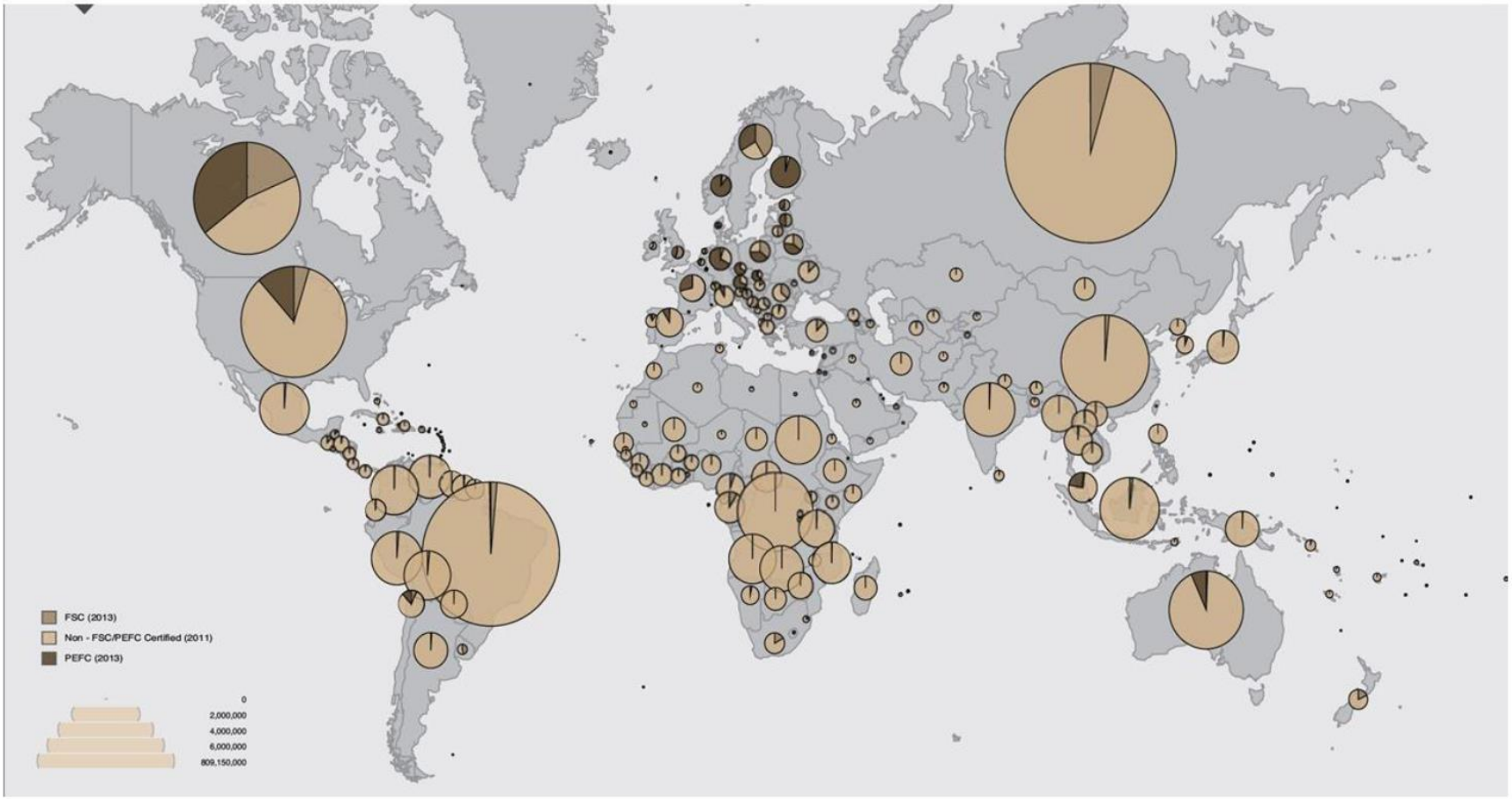
Review of certification



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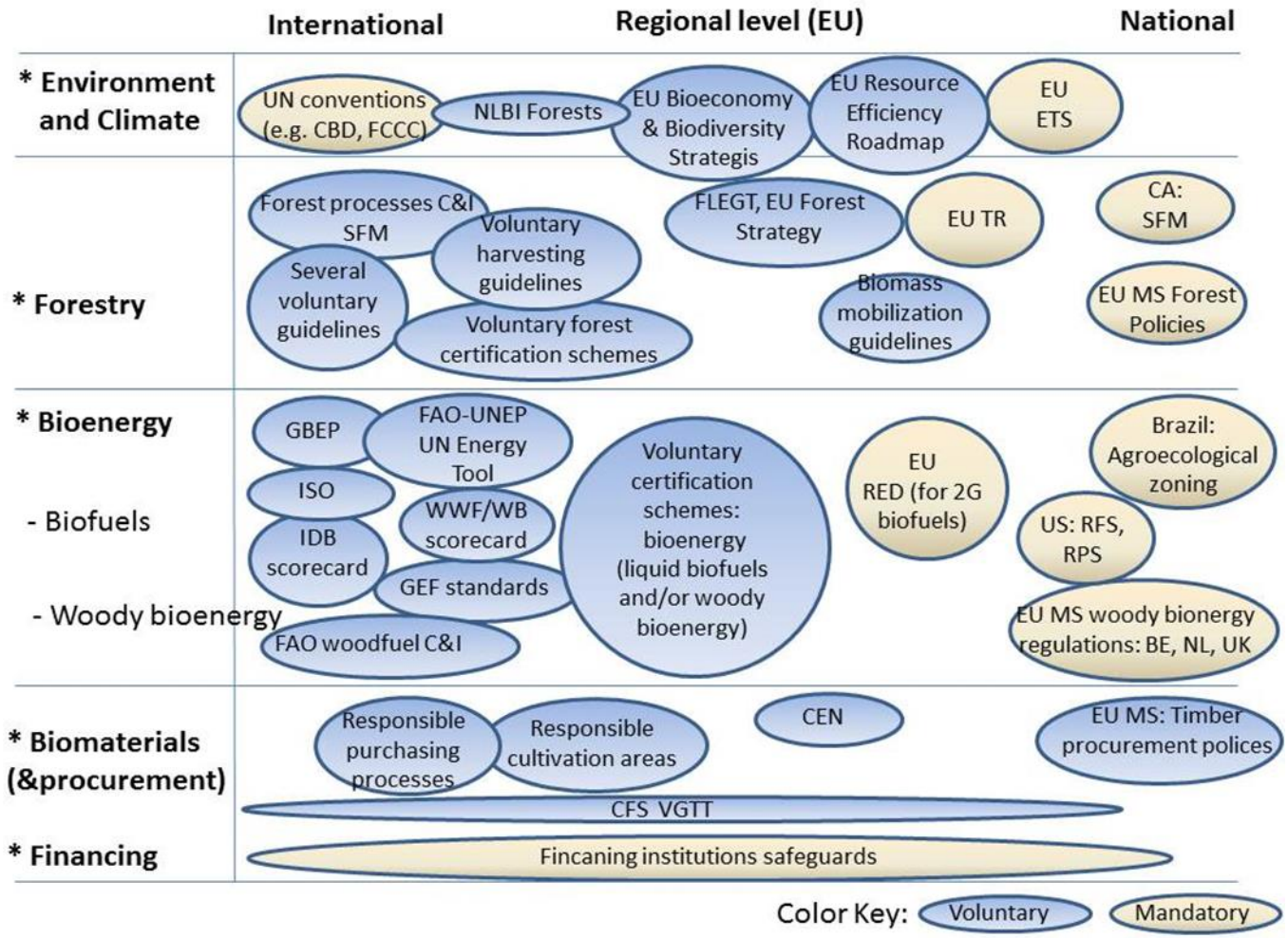
Sustainability systems



(IINAS, EFI, JR (2014a) and S2BIOM)

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ISO/PC 13065:2015 Sustainability criteria for bioenergy

- Standardization in the field of sustainability criteria for production, supply chain and application of bioenergy. This includes terminology and aspects related to the sustainability (e.g. environmental, social and economic) of bioenergy.

- https://www.iso.org/obp/ui/#iso:std:iso:13065:ed-1:v1:en

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Sustainability criteria and indicators

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Umbrella approach
(12 criteria; 27 indicators)

(S2BIOM)

Environmental	1. Resource Efficiency	Land Use Efficiency
		Secondary Resource Efficiency
		Energy Efficiency
		Functionality (Output service quality)
	2. Mitigate Climate Change	GHG(CO_2eq) LCA, including LUC
		Other GHG emissions
	3. Biodiversity	Protected areas and land with significant biodiversity values
		Biodiversity conservation and management
	4. Soil	Erosion
		Soil Organic C
		Soil Nutrient Balance
	5. Water	Water availability and regional water stress
		Water use efficiency
		Water quality
	6. Air	SO_2 equivalents
		PM_{10}

Social	7. Participation and transparency	Effective participatory processes
		Information transparency
	8. Secure tenure of land	Land tenure assurance
	9. Employment and labor conditions	Full direct jobs equivalents along the full value chain
		Full direct jobs equivalent in the biomass consuming region (or country)
		Human and Labor Rights
		Ocupational safety and health for workers
	10. Health risks	Risks to public health
	11.Food, fuelwood and other products	Food, fuelwood and other products supply security
Economic	12. Production costs	Current levelized life-cycle cost
		Future levelized life-cycle cost

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Types of indicators

- **Minimum requirements**: indicators with thresholds or qualitative attributes

- **Reporting indicators**:
  - Comparative to non-renewable reference
  - Comparative to other biomass
  - Descriptive

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S2Biom: Environmental C&I

(IINAS)

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Criterion	Indicator		Level of ambition							
			Basic				Advanced			
	#	Indicator	Minimum requirement	Comparative (non-renewable reference)	Comparative (biomass reference)	Descriptive	Minimum requirement	Comparative (non-renewable reference)	Comparative (biomass reference)	Descriptive
1. Resource use	1.1	Land use efficiency			✓		✓			
	1.2	Secondary resource efficiency			✓		✓			
	1.3	Energy efficiency		✓			✓			
	1.4	Functionality (Output service quality)						✓	✓	
2. Climate Change	2.1	Life cycle-based CO_2eq including direct land use change	✓				✓			
	2.2	Other GHG emissions		✓	✓		✓			
3. Biodiversity	3.1	Protected areas and land with significant biodiversity values	✓				✓			
	3.2	Biodiversity conservation and management			✓		✓			
4. Soil	4.1	Erosion			✓		✓			
	4.2	Soil Organic Carbon			✓		✓			
	4.3	Soil nutrient balance			✓		✓			
5. Water	5.1	Water availability and regional water stress		✓			✓		✓	
	5.2	Water use efficiency						✓	✓	
	5.3	Water quality		✓				✓	✓	
6. Air	6.1	SO_2 equivalents		✓	✓		✓			
	6.2	PM_{10}		✓	✓		✓			

S2Biom: Social & Economic C&I (IINAS)

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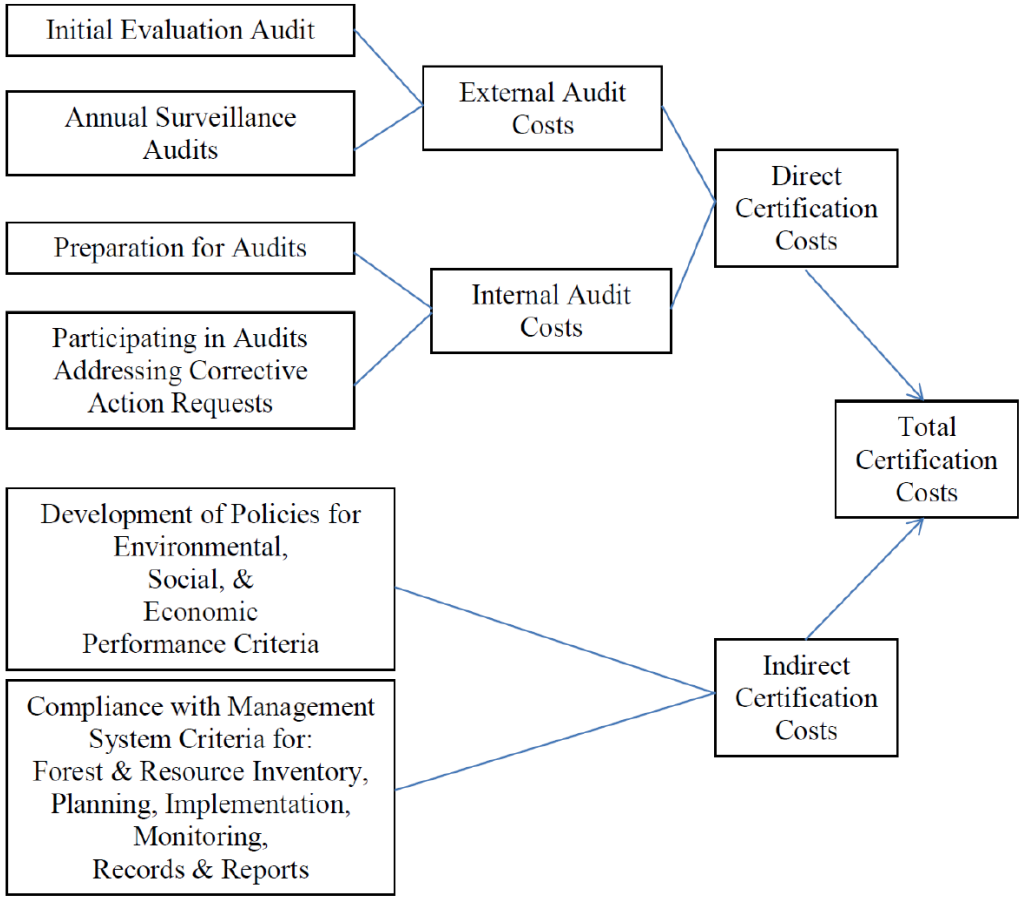
Theme	Criterion	Indicator #	Indicator	Level of ambition: Basic – Minimum requirement	Basic – Comparative (non-renewable reference)	Basic – Comparative (biomass reference)	Basic – Descriptive	Advanced – Minimum requirement	Advanced – Comparative (non-renewable reference)	Advanced – Comparative (biomass reference)	Advanced – Descriptive
Social	7. Participation and transparency	7.1	Effective participatory processes								✓
		7.2	Information transparency								✓
	8. Land tenure	8.1	Land Tenure assurance			✓		✓			
	9. Employment and labor rights	9.1	Full direct jobs equivalents along the full value chain		✓	✓			✓	✓	
		9.2	Full direct jobs equivalent in the biomass consuming region (or country)		✓	✓			✓	✓	
		9.3	Human and Labor Rights	✓				✓			
		9.4	Occupational safety and health for workers	✓				✓			
	10. Health risks	10.1	Risks to public health								✓
	11.Food, fuelwood and other products	11.1	Food, fuelwood and other products supply security			✓		✓			
Economic	12. Production costs	12.1	Current levelized life-cycle cost		✓	✓			✓	✓	
		12.2	Future levelized life-cycle costs						✓	✓	

Costs associated to certification



(FSC US, ny)

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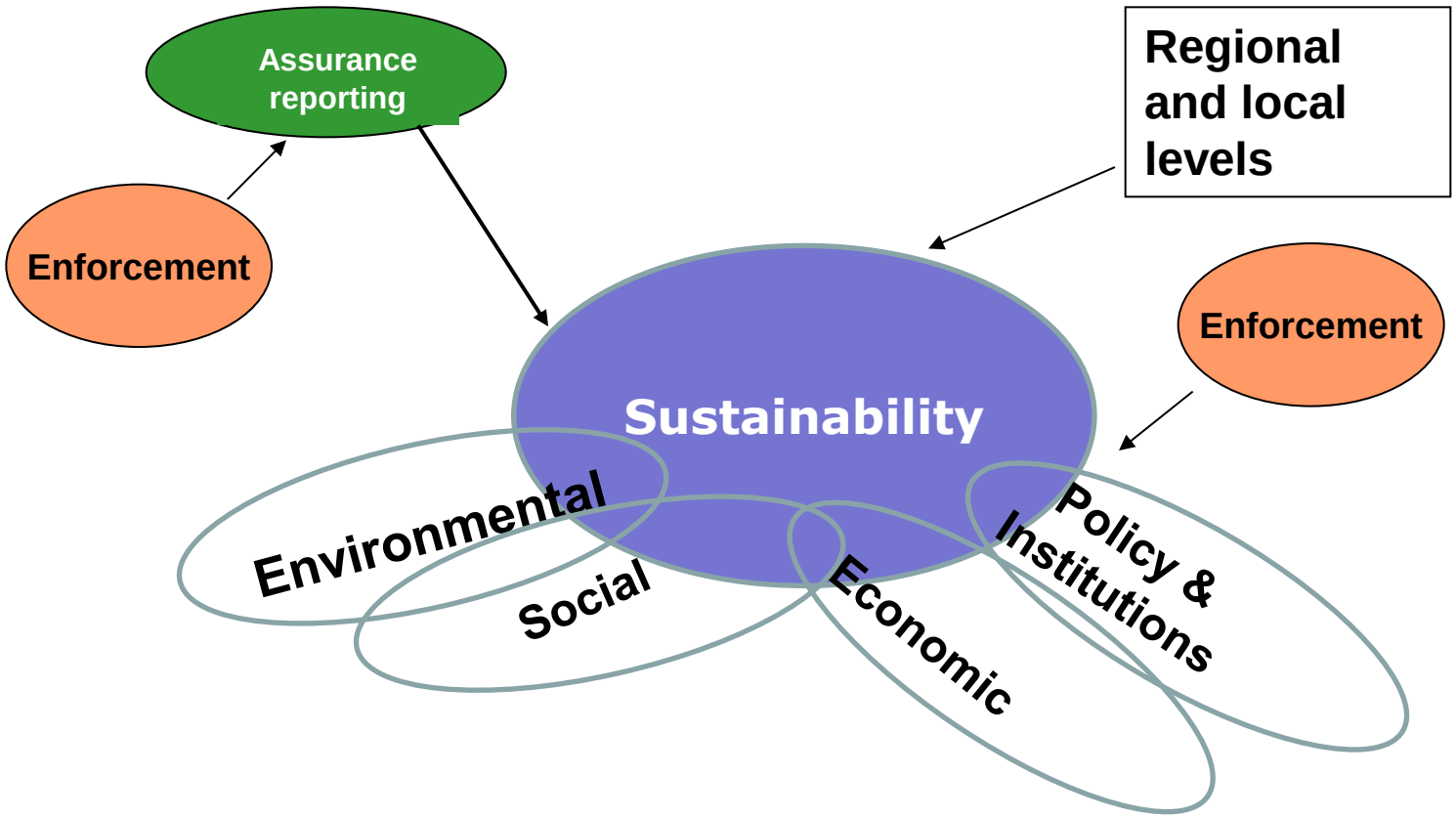
FRAMEWORK



(Diaz-Chavez, 2003, 2006)

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Remarks: Essentials on the concept of sustainability

- A challenge to conventional thinking and practice
- concerning long as well as short-term well-being
- comprehensive (all issues in decision-making)
- recognition of links and interdependences
- an open-ended process, not a state
- links between means and ends
- global and context dependent

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Thank you

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