



Department of Economic and Social Affairs
Statistics

AGENDA

**Workshop on the Strategic Framework
for the African Bioenergy Data Management**

24-26 April 2023 | Lomé, Togo

SESSION 1: BIOFUELS IN AFRICA

PLACE OF BIOMASS IN AFRICA

AFREC

JEAN-YVES GARNIER

The best way to have a 'pretty good' idea of the place of biomass in Africa is to look at authoritative sources.

We have selected three main sources:



The African Energy Commission

The United Nations Statistics Division

The International Energy Agency



Aggregated Balance

	Oil	Oil products	Coal	Natural Gas	Hydroelectrici..
Production					346 Mtoe
Primary supply	242359		5616	244857	7502
Imports	16553	98349	45272	15048	
Exports (-)	-122383	-73425	-496	-109156	-6
International Aviation Bunkers (-)		-4793			
International Marine Bunkers (-)		-3397			
Stock changes : draw (+), build (-)	409	1726	-1010		
TOTAL PRIMARY ENERGY SUPPLY ..	136941	18460	49382	150749	7502
Differences and Transfers					
Transfers : Origin (-) and Destinat..	-25202	27644			

	Blast furnaces		7242		
	Charcoal production plants		-34		-61398
	Transformation not elsewhere s..		2103	-8	247
Own Use and Losses	Energy Sector Own Use	1264	351	1537	10299
	Losses	1974	273	5729	1063
Final consumption	Final Consumption	13	148117	2995	63158
			16597	2647	18530
	Transport	13	101497		1901
	Households		17159	1	28765
			1556	296	3718
	Agriculture, forestry and fishing		5266	52	188

273 Mtoe

215 Mtoe



		Coal	Oil	Natural	of which: Renewables		
Production							
Americas		6 186 133	13 603 213	8 2	106 952	854 336	15 696 578
Asia		477 679	6 205 682	409	-	7 406 323	179 110
Europe		-1 944 791	-12 090 521	-3 112 221	-	-17 292 023	-11 037
Oceania		-	-221 209	-	-	-221 209	-
	International marine bunkers	-	-209 292	-	-	-209 292	-
	International aviation bunkers	-	-43 096	-	-	-43 862	-2
	Stock changes	-763	-	-	-2	-	-
	Total energy supply	4 718 258	7 244 778	5 576 187	15 017 986	106 952	854 336
	Statistical differences	23 014	109 369	189 337	-10 665	-22 658	288 397
	Transfers and recycled products	-	38 913	-	-	-	38 913
	Transformation	-3 331 307	-410 964	-2 988 850	-2 702 644	-106 952	2 188 791
	Electricity CHP & Heat Plants	-3 051 212	-478 978	-2 868 090	-54 582	-106 952	2 188 791
	Electricity plants	-3 050 969	-478 978	-2 865 691	-49 525	-106 952	2 184 461
	CHP plants	-243	-	-2 399	-5 057	-	4 329
	Heat plants	-	-	-	-	-	-3 369
	Coke ovens	-4 919	-	-	-	-	-4 919
	Briquetting plants	10	-	-	-	-	10
	Liquefaction plants	-224 707	183 168	-120 760	-	-	-162 299
	Gas works	-26 567	-	-	-	-	-26 567
	Blast furnaces	-23 913	-	-	-	-	-23 913
	NGL & gas blending	-	28 033	-	-	-	28 033

14849 TJ

354 Mtoe

		Coal	Oil	Natural	of which: Renewables		
Total Final Consumption							
1996	1997	1998					
1999	2000	2001					
2002	2003	2004					
2005	2006	2007					
2008	2009	2010					
2011	2012	2013					
2014	2015	2016					
2017	2018	2019					
2020							
	Oil refineries	-	-143 316	-	-	-	-143 316
	Other transformation	-	129	-	-2 648 062	-	-2 647 933
	Energy industries own use	-642 434	-112 414	-624 491	-222	-184 937	-1 564 498
	Losses	-1 962	-32 640	-17 707	-1 375	-447 358	-501 043
	Total	719 540	6 618 304	1 755 801	-	2 433 490	23 851 545
		683 532	6 273 622	1 341 707	-	2 433 490	23 056 096
		532 424	646 926	70 707	-	915 633	3 511 762
		108 683	3 305	-	-	83 270	306 443
		39 389	3 716	-	-	42 483	154 930
		70 687	3 613	-	-	112 199	187 960
		128 624	89 375	167 660	-	43 168	435 297
		21	992	787	-	890	2 690
	Machinery	119	642	733	-	3 963	5 457
	Mining and quarrying	11 351	122 296	1 237	86	146 261	281 230
	Food and tobacco	4 899	12 762	36 810	50 221	29 127	133 820
	Paper, pulp and printing	2 965	1 137	3 118	-	6 037	13 257
	Wood and wood products	829	467	55	451	2 938	4 739
	Textile and leather	85	4 048	5 398	2 622	7 968	20 123
	Construction	11 977	24 744	192	32	4 226	41 172

12324 TJ

294 Mtoe

		150 985	1 004 628	547 700	-	1 499 988	14 856 342
		8 786	179 629	-	-	89 723	360 296
		43 671	70 046	-	-	440 018	1 024 788
		95 727	610 548	4 226	-	872 283	12 891 736
		2 801	144 405	28 033	-	97 965	579 523
		36 008	344 682	414 750	-	-	795 449

Households

10815 TJ

258 Mtoe

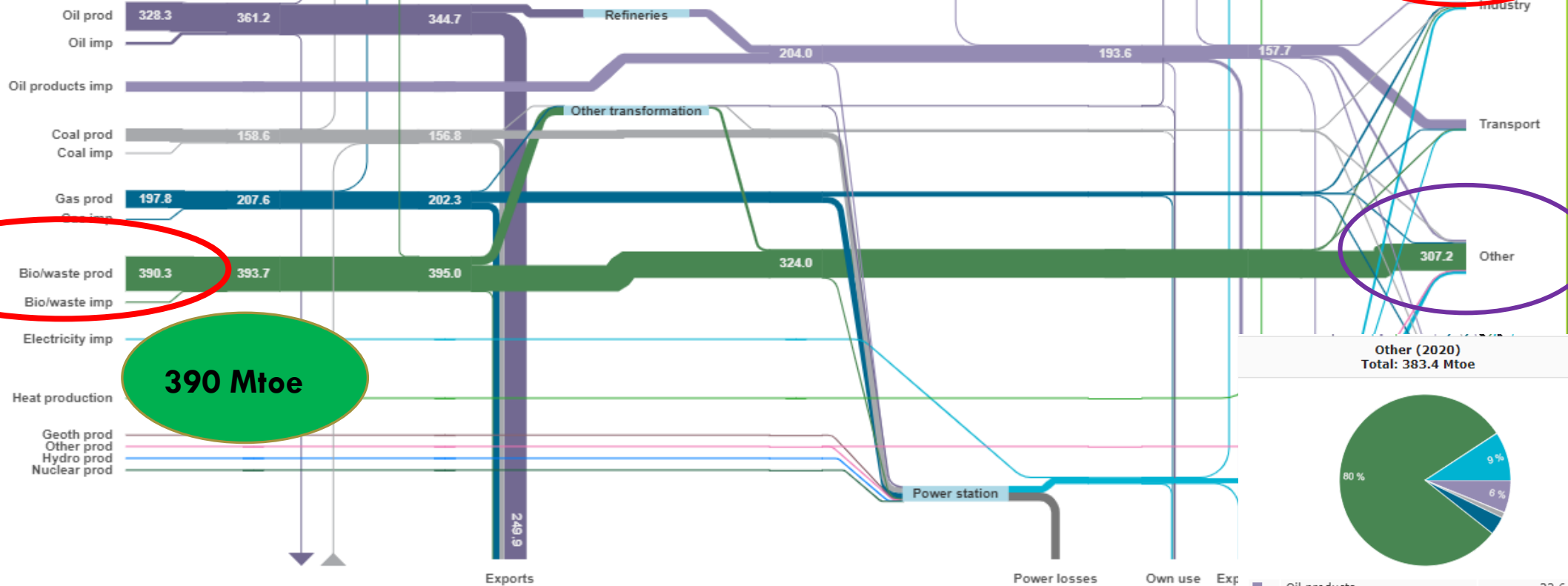
Africa

BALANCE (2020)

Millions of tonnes of oil equivalent



Production and imports
(1 261.7 Mtoe)

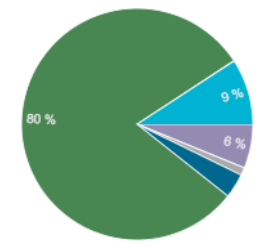


Total final consumption
(598.4 Mtoe)

390 Mtoe

307 Mtoe

Other (2020)
Total: 383.4 Mtoe



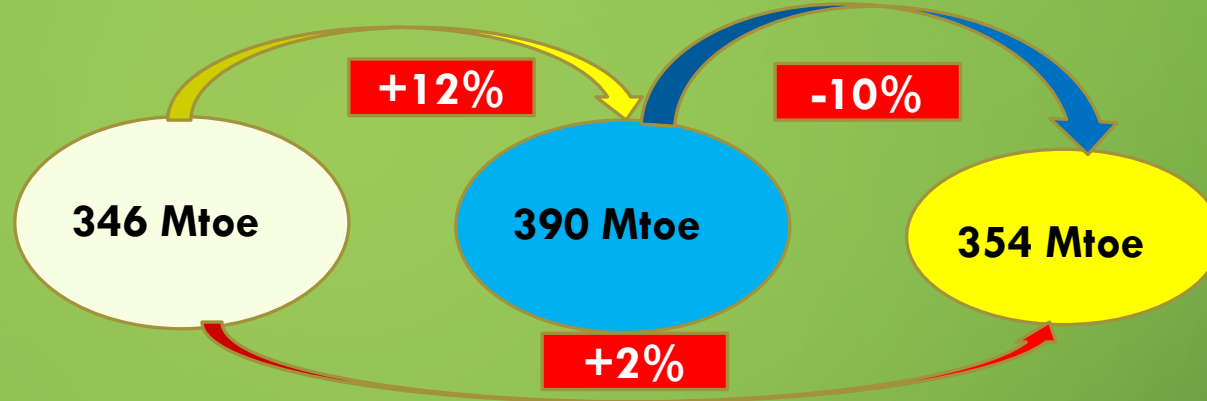
Oil products	23.6 Mtoe
Oil	0.0 Mtoe
Coal	4.1 Mtoe
Natural gas	15.1 Mtoe
Biofuels and waste	307.2 Mtoe
Solar/other/wind	0.2 Mtoe
Electricity	35.2 Mtoe

Country List Colour Legend Time Graph Move Flows Pie Chart Glossary Help Print Mode

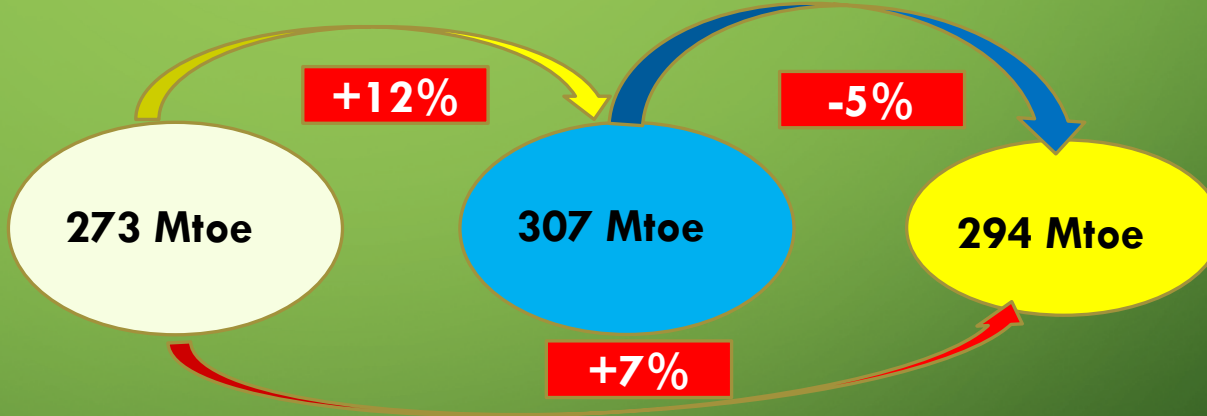
1.92x 1973 1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2009



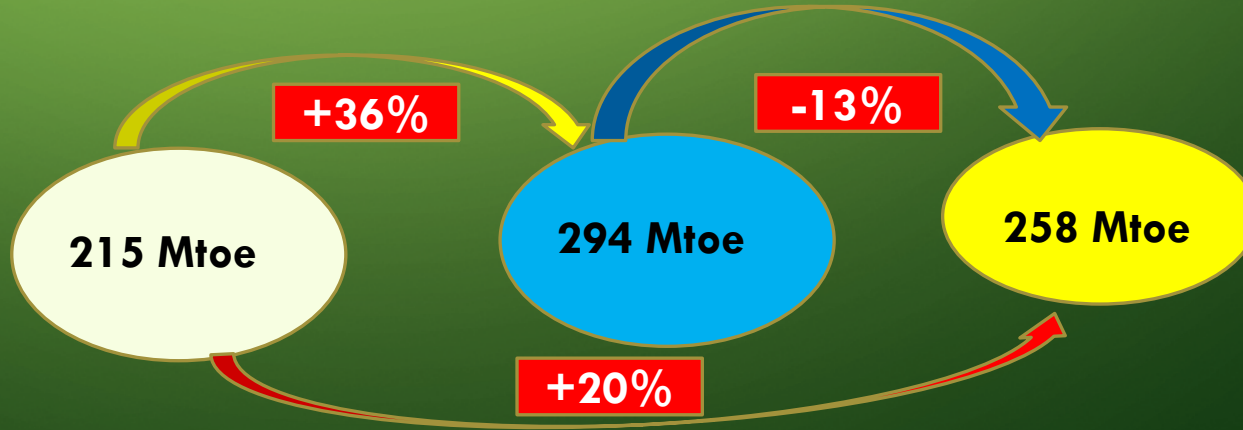
Production



Final Consumption



Households



Why such a gap between official data?



Is this because of a difference in definitions?



Is this because of a difference in sources in countries?



Or is biomass very different from other fuels in terms of data collecting and reporting?

Can the difference between numbers be explained by a difference in definitions?

5 Biofuels

Fuels derived directly or indirectly from biomass.

Remark: Fuels produced from animal fats, by-products and value indirectly from the plants eaten by the animals.

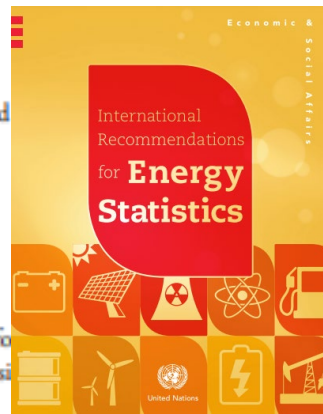
51 Solid biofuels

Solid fuels derived from biomass.

511 Fuelwood, wood residues and by-products

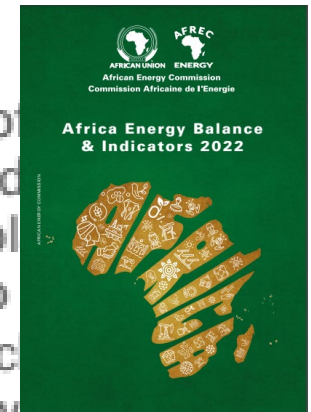
Fuelwood or firewood (in log, brushwood, pellet or chip from managed forests or isolated trees. Also included are wood residues if the original composition of wood is retained.

Remark: Charcoal and black liquor are excluded.



Biofuels and waste

Biofuels and waste comprises solid biofuels, biogases, industrial waste and waste. Biofuels are defined as any plant material used directly as fuel or converted into charcoal) or electricity and/or heat. Included are wood, vegetal waste (including wood waste



Except for a few little wording issues, definitions are quite similar. This is not a surprise because they have been quite active in the International Recommendations on Energy Statistics (IRES) process.

The difference cannot therefore come from definitions.

5111

Wood
composi
diam

5119

This
pellet

512

The f

513

Excr

Rem
plant

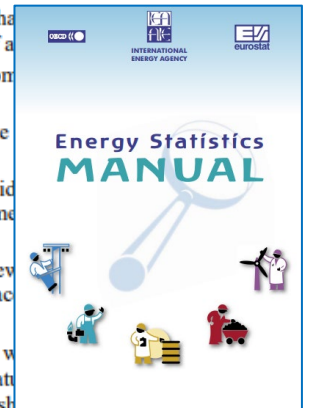
may be used as fuel for heat production

illation and pyrolysis of wood and other

or firewood (in log, brushwood, pellet or isolated trees. Also included are wood residues if the original composition of wood is retained. Charcoal and black liquor should be reported on a net calorific value

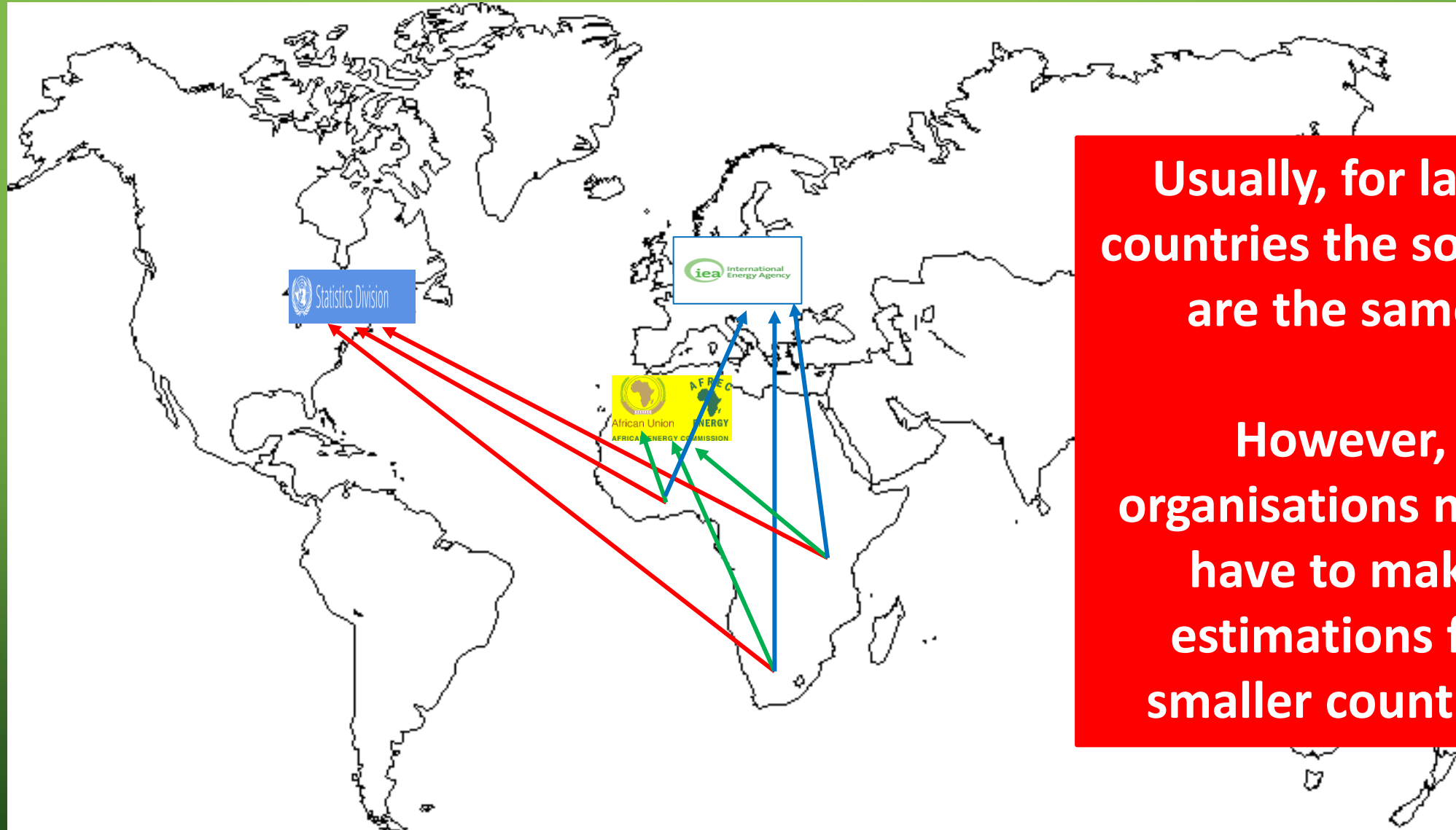
product which has been obtained from the manufacture of a product after juice

and fish residues after aerobic fermentation



- **Other vegetal materials and residuals.** Biofuels not specified elsewhere: vegetable husks, ground nut shells, pruning brushwood, olive pomace from the maintenance, cropping and processing of plants.
- **Industrial waste (renewable):** Solid renewable portion of industrial waste from specific installations for meaningful energy purposes (for example natural fibres or natural fibres in textile wastes). The quantity of fuel used should be reported on a net calorific value basis.

It could also be a difference in the country focal points: statistics office, ministry



Usually, for large countries the sources are the same.

However, organisations might have to make estimations for smaller countries

Cote d'Ivoire: Aggregated Energy Balance

Thousand Tonnes of Oil Equivalent (ktoe)	Coal and Coal Products	Crude oil	Oil products	Natural Gas	Biofuel and waste	Hydro	Solar	Wind	Electricity	Total of all energy sources
Production	-	1 890.8	-	1 860.7	6 691.0	299.3	-	-	-	10 741.8
Imports (+)	-	3 674.4	435.4	-	-	-	-	-	8.0	4 117.9
Exports (-)	-	-1 885.2	-1 742.7	-	-	-	-	-	-107.3	-3 735.1
International Marine Bunkers (-)	-	-	-99.7	-	-	-	-	-	-	-99.7
International Aviation Bunkers (-)	-	-	-181.2	-	-	-	-	-	-	-181.2
Stock Changes (+ draw, - build)	-	287.9	55.7	-	-	-	-	-	-	343.6
TOTAL PRIMARY ENERGY SUPPLY	-	3 968.0	-1 532.4	1 860.7	6 691.0	299.3	-	-	-99.2	11 187.4
Transfers : Origin (-) and Destination (+)	-	-	-0.0	-	-	-	-	-	-	-0.0
Statistical Difference	-	-40.0	32.5	-8.3	-	-	-	-	16.9	-72.9
TRANSFORMATION Inputs (-) and Outputs (+)	-	-4 008.0	4 030.9	1 500.5	-2 125.1	299.3	-	-	916.7	-2 991.3
Electricity plants	-	-	-5.1	1 500.5	-	299.3	-	-	912.5	-897.4
CHP Plants	-	-	-	-	-39.9	-	-	-	4.1	-35.8
Heat Plants	-	-	-	-	-	-	-	-	-	-
Coke ovens	-	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-	-
Oil Refineries	-	-4 008.0	4 036.0	-	-	-	-	-	-	28.0
Coal-to-liquids plants	-	-	-	-	-	-	-	-	-	-
Gas-to-liquids plants	-	-	-	-	-	-	-	-	-	-
Charcoal production plants	-	-	-	-	-2 086.2	-	-	-	-	-2 086.2
Transformation not elsewhere specified	-	-	-	-	-	-	-	-	-	-
Energy Sector Own Use	-	-	-	9.6	-	-	-	-	2.0	95.6
Losses	-	-	-	-	-	-	-	-	144.8	144.8
FINAL CONSUMPTION	-	-	2 466.0	343.9	4 564.9	-	-	-	653.7	8 028.5
Industry	-	-	118.9	343.9	4.9	-	-	-	184.2	652.0
Transport	-	-	1 792.4	-	-	-	-	-	-	1 792.4
Households	-	-	401.1	-	4 070.1	-	-	-	239.3	4 711.3
Commercial and public services	-	-	19.8	-	489.1	-	-	-	200.0	702.9
Agriculture, Forestry and Fishing	-	-	35.9	-	-	-	-	-	18.7	54.1
Non-specified (HH, Com. & PS., Agri.)	-	-	-	-	-	-	-	-	12.0	12.0
Non-Energy Use	-	-	103.7	-	-	-	-	-	-	103.7

If it is not an issue of definitions or sources, what then could explain the difference in quantities reported by various organisations?



Production



Imports/Exports



Consumption Industry



Consumption Transport

Cote d'Ivoire: Aggregated Energy Balance

Thousand Tonnes of Oil Equivalent (ktoe)	Coal and Coal Products	Crude oil	Oil products	Natural Gas						
Production	-	1 860.7	-	1 860.7	-	-	-	-	-	
Imports (+)	-	3 674.4	435.2	-	-	-	-	-	-	
Exports (-)	-	-1 885.2	-1 742.2	-	-	-	-	-	-	
International Marine Bunkers (-)	-	-	-99.7	-	-	-	-	-	-	
International Aviation Bunkers (-)	-	-	-181.2	-	-	-	-	-	-	
Stock Changes (+ draw, - build)	-	287.9	55.7	-	-	-	-	-	-	
TOTAL PRIMARY ENERGY SUPPLY	-	3 968.0	-1 532.4	1 860.7	6 691.0	299.3	-	-	-99.2	11 187.4
Transfers : Origin (-) and Destination (+)	-	-	-0.0	-	-	-	-	-	-	-0.0
Statistical Difference	-	-40.0	32.5	-82.3	-	-	-	-	16.9	-72.9
TRANSFORMATION Inputs (-) and Outputs (+)	-	-4 008.0	4 030.9	1 505.5	-2 126.1	-299.3	-	-	-	-
Electricity plants	-	-	-5.1	1 505.5	-	-299.3	-	-	-	-
CHP Plants	-	-	-	-	-39.9	-	-	-	-	-
Heat Plants	-	-	-	-	-	-	-	-	-	-
Coke ovens	-	-	-	-	-	-	-	-	-	-
Blast furnaces	-	-	-	-	-	-	-	-	-	-
Oil Refineries	-	-4 008.0	4 036.0	-	-	-	-	-	-	-
Coal-to-liquids plants	-	-	-	-	-	-	-	-	-	-
Gas-to-liquids plants	-	-	-	-	-	-	-	-	-	-
Charcoal production plants	-	-	-	-	-2 086.2	-	-	-	-	-
Transformation not elsewhere specified	-	-	-	-	-	-	-	-	-	-
Energy Sector Own Use	-	-	-	93.6	-	-	-	-	-	-
Losses	-	-	-	-	-	-	-	-	144.8	144.8
FINAL CONSUMPTION	-	-	2 466.0	343.9	4 564.9	-	-	-	-	-
Industry	-	-	118.9	343.9	4.9	-	-	-	-	-
Transport	-	-	1 792.4	-	-	-	-	-	-	-
Households	-	-	401.1	-	4 070.8	-	-	-	-	-
Commercial and public services	-	-	19.8	-	48.1	-	-	-	-	-
Agriculture, Forestry and Fishing	-	-	35.9	-	-	-	-	-	-	-
Non-specified (HH, Com. & PS., Agri.)	-	-	-	-	-	-	-	-	-	-
Non-Energy Use	-	-	103.7	-	-	-	-	-	-	-



Stock changes



Transformation



Consumption Households

All these flows are well measured because either marketed, traded, strategic, etc.

Production/Hydro

Aggregated Energy Balance

Unit Equivalent	Coal and Coal Products	Crude oil	Oil products	Natural Gas	Biofuels and waste	Hydro	Solar	Wind	Electricity	Total of all energy sources
	-	1 890.8	-	1 860.7	6 691.0	299.3	-	-	-	10 771.8
	-	3 674.4	435.4	-	-	-	-	-	8.0	4 117.9
	-	-1 885.2	-1 742.7	-	-	-	-	-	-107.3	-3 735.1
Bunkers (-)	-	-	-99.7	-	-	-	-	-	-	-99.7
Bunkers (-)	-	-	-181.2	-	-	-	-	-	-	-181.2
Losses (- build)	-	287.9	55.7	-	-	-	-	-	-	343.6
TOTAL PRIMARY ENERGY SUPPLY	-	3 968.0	-1 532.4	1 860.7	6 691.0	299.3	-	-	-99.2	11 187.4
Transfers : Origin (-) and Destination (+)	-	-	-0.0	-	-	-	-	-	-	-0.0
Statistical Difference	-	-40.0	32.5	-82.3	-	-	-	-	16.9	-72.9
TRANSFORMATION Inputs (-) and Outputs (+)	-	4 008.0	4 030.9	-1 505.5	-2 125.1	-299.3	-	-	912.5	-2 991.3
Electricity plants	-	-	-5.1	-1 505.5	-	-299.3	-	-	912.5	-
	-	-	-	-	-39.9	-	-	-	4.1	-
	-	-	-	-	-	-	-	-	-	-2 086.2
	-	-	-	93.6	-	-	-	-	2.0	95.6
	-	-	-	-	-	-	-	-	144.8	144.8
Industry	-	-	-	-	-	-	-	-	653.7	8 025.5
Transport	-	-	-	-	-	-	-	-	184.2	652.0
Households	-	-	-	-	-	-	-	-	239.3	4 711.3
Commercial and public services	-	-	-	-	-	-	-	-	200.0	702.9
Agriculture, Forestry and Fishing	-	-	-	-	-	-	-	-	18.7	54.1
Non-specified (HH, Com. & PS., Agri.)	-	-	-	-	-	-	-	-	12.0	12.0
Non-Energy Use	-	-	-	-	-	-	-	-	-	103.7

Same as for oil flows, all these flows are well identified because produced, traded, distributed and marketed.

Imports/Exports



Formation



Consumption Industry



Consumption Households



Consumption Other

Integrated Energy Balance

Equivalent	Coal and Coal Products	Crude oil	Oil products	Nature Gas	Biofuels and Hydro	Solar
	-	1 890.8	-	1 860.7	6 691.0	-
Exports (-)		3 674.4	435.4			
International Marine Bunkers (-)		-1 885.2	-1 742.7			
			-99.7			-99.7
			-181.2			-181.2

A large part of production is autocollected

A large part is estimated

As a consequence, a very large part of biomass production, transformation and consumption is usually estimated

A large

ultly in

But what is the situation for biomass reporting?

A large part of consumption is autocollected and not marketed



				-2 086.2	
	93.6				
	3 43.9	4 564.9			
	3 43.9	4.9			
		4 070.8			
		489.1			

A large part is estimated

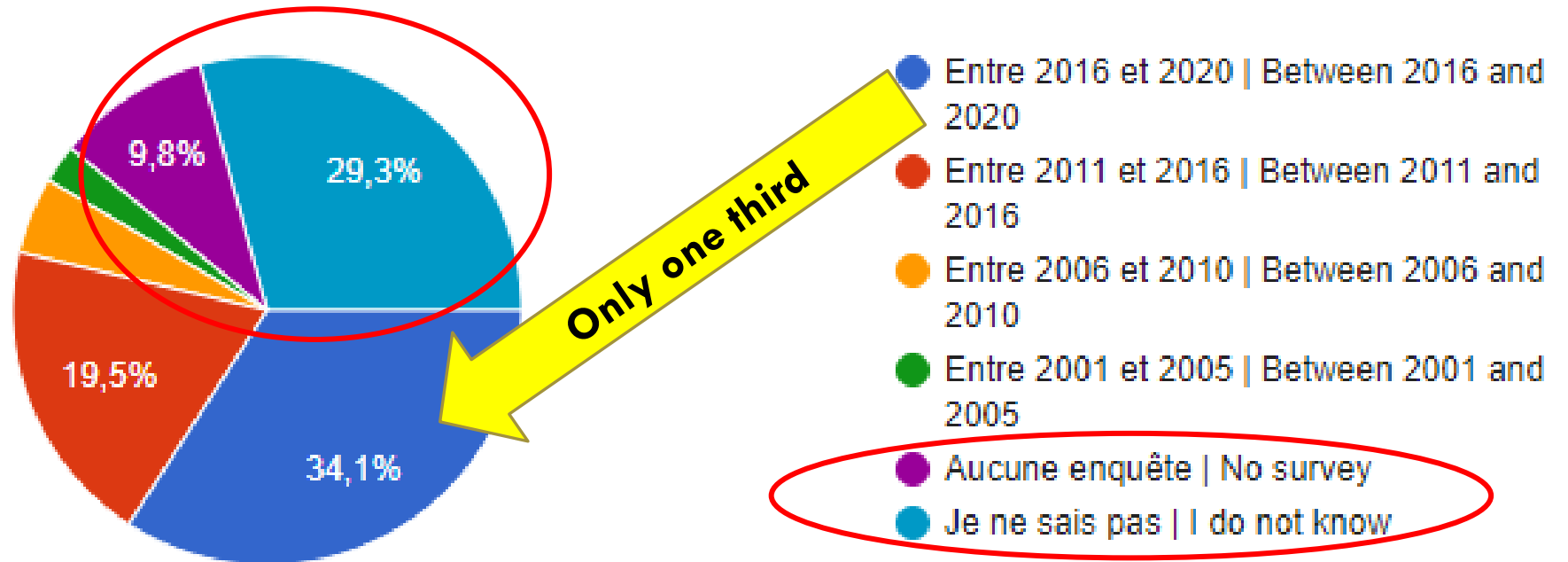


Results from an AFREC survey on all African countries in 2020

Question 1

Année de la dernière enquête de la consommation d'énergie des ménages dans votre pays |
Year of the last household energy consumption survey in your country:

41 réponses



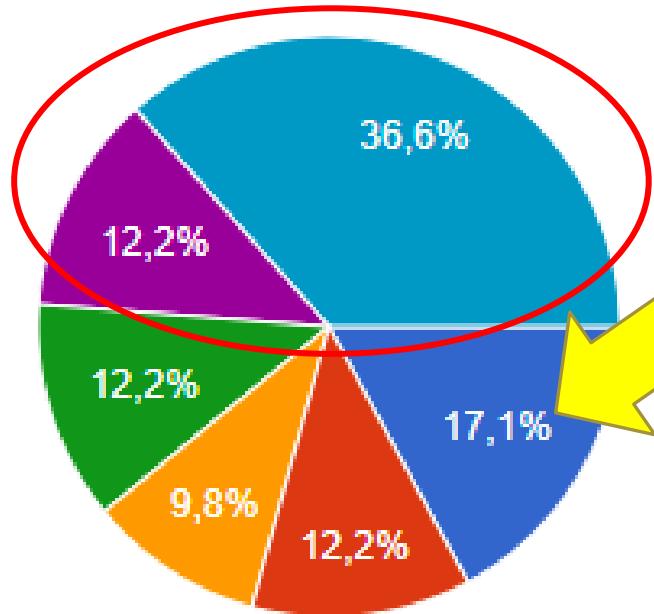
Note: 9,8% + 29,3% = 39,1% of 'no survey' and 'I do not know'

Question 2

Année de la dernière étude/enquête sur la disponibilité de la ressource en bioénergie dans votre pays | Year of the last study / survey on the availability of the bioenergy resource in your country

41 réponses

Note: 12,2% + 36,6% = 48,8% of 'no survey' and 'I do not know'



Only one sixth...

- Entre 2016 et 2020 | Between 2016 and 2020
- Entre 2011 et 2016 | Between 2011 and 2016
- Entre 2006 et 2010 | Between 2006 and 2010
- Entre 2001 et 2005 | Between 2001 and 2005
- Aucune étude/enquête | No study/surv...
- Je ne sais pas | I do not know

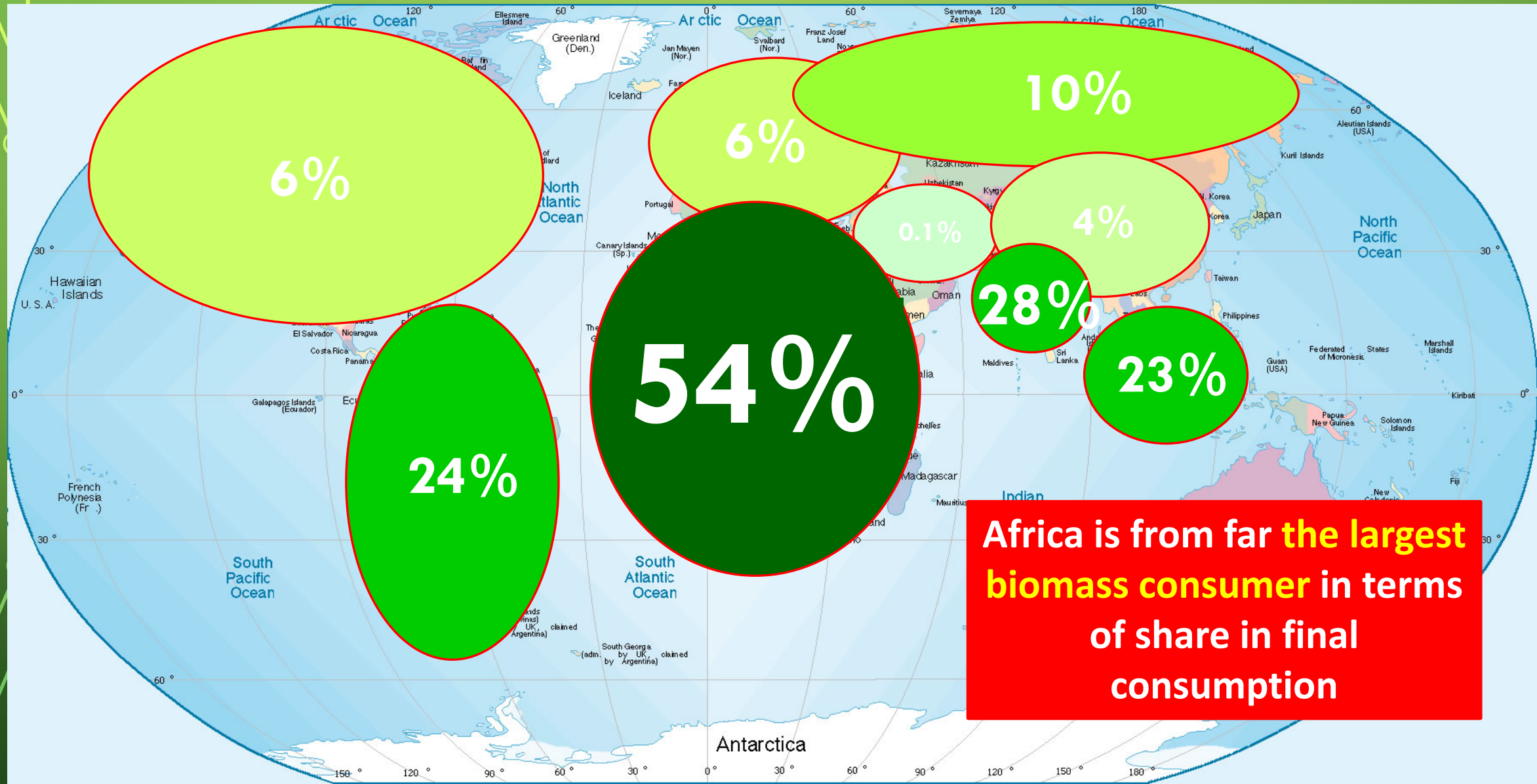
DONNÉES DE BIOMASSE DE LA RDC

One example of the need for estimations when no data available

	PRODUCTION	Consommation résidentiel	Input transfo bois en charbon de bois	Output bois en charbon de bois	Consommation résidentielle	PRODUCTION	ATTIEN
ANNÉE	BOIS DE FEU (kt)	BOIS DE FEU (kt)	Efficiency: 10% (weight)	Charbon de bois (kt)	Charbon de bois (kt)	Plus	Plus (classe)
2019	87 104,16	44 817,09	42 287,06	4 228,71	4 228,71	-	-
2020	331,259	962,987	43 368,3	4 336,83	4 336,83	-	-

All charcoal for households. None for others?

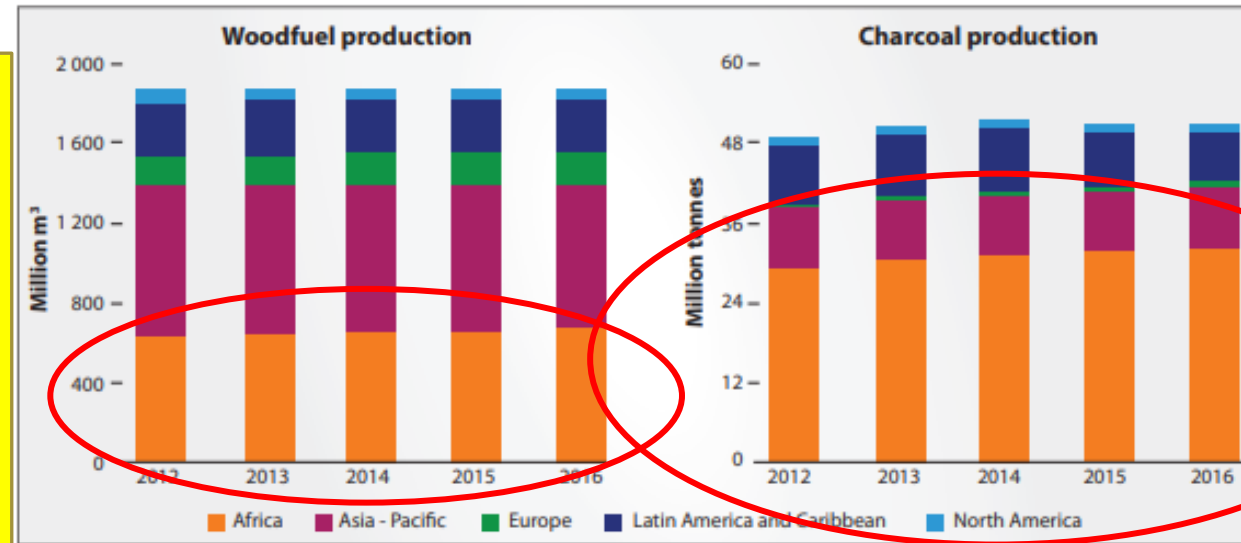
Based on what has been said, what is the **place** of biomass in final consumption



Africa is from far the largest biomass consumer in terms of share in final consumption

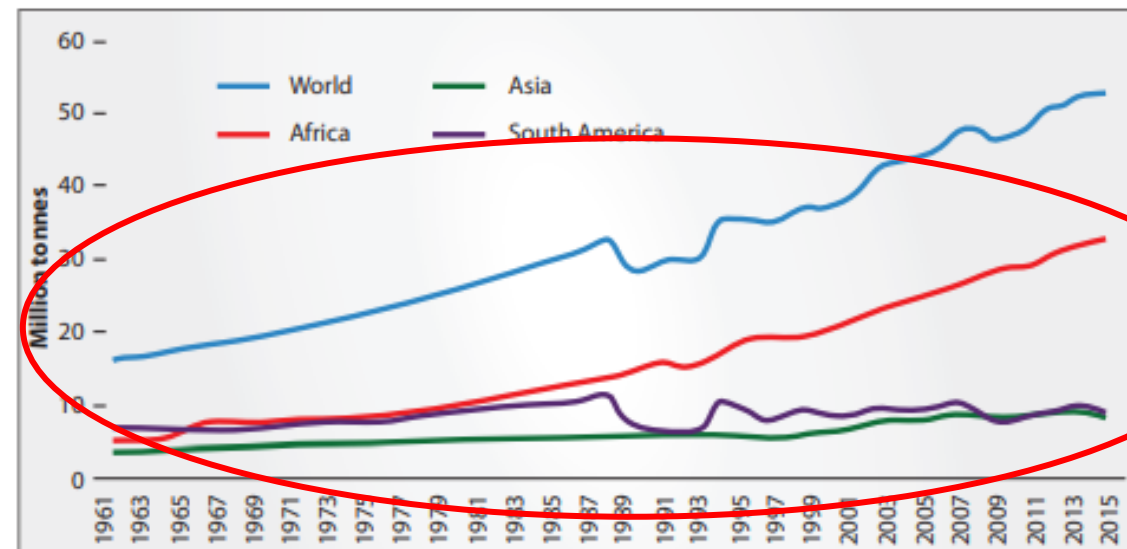
Production of fuelwood is less in Africa ONLY because the population in Africa is much less than in Asia-Pacific with Cina, India, ASEAN, etc.

Figure 1-7: Woodfuel and Charcoal production, 2016



Source: FAO

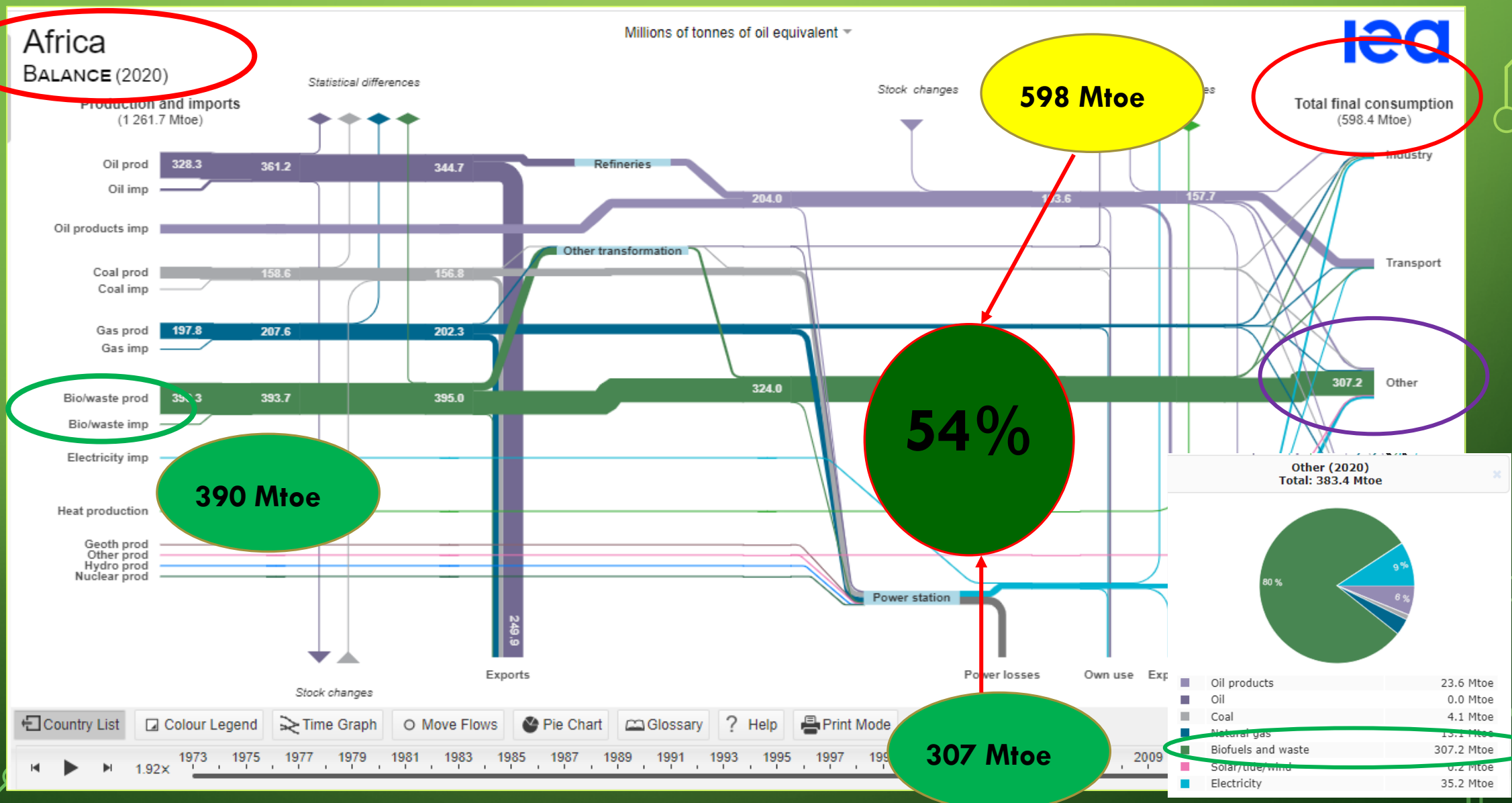
Figure 1-5: World charcoal production worldwide and by region (Africa, Asia and South America), 1961-2015



Source: (FAO, 2016c); (FAO, 2017c)

But despite much less population, AFREC is from far the largest of charcoal production in the world. And it is growing, growing...

Let's have a closer look at the place of biomass in the energy balance of Africa



What about the shares of energy by sector in total final energy consumption

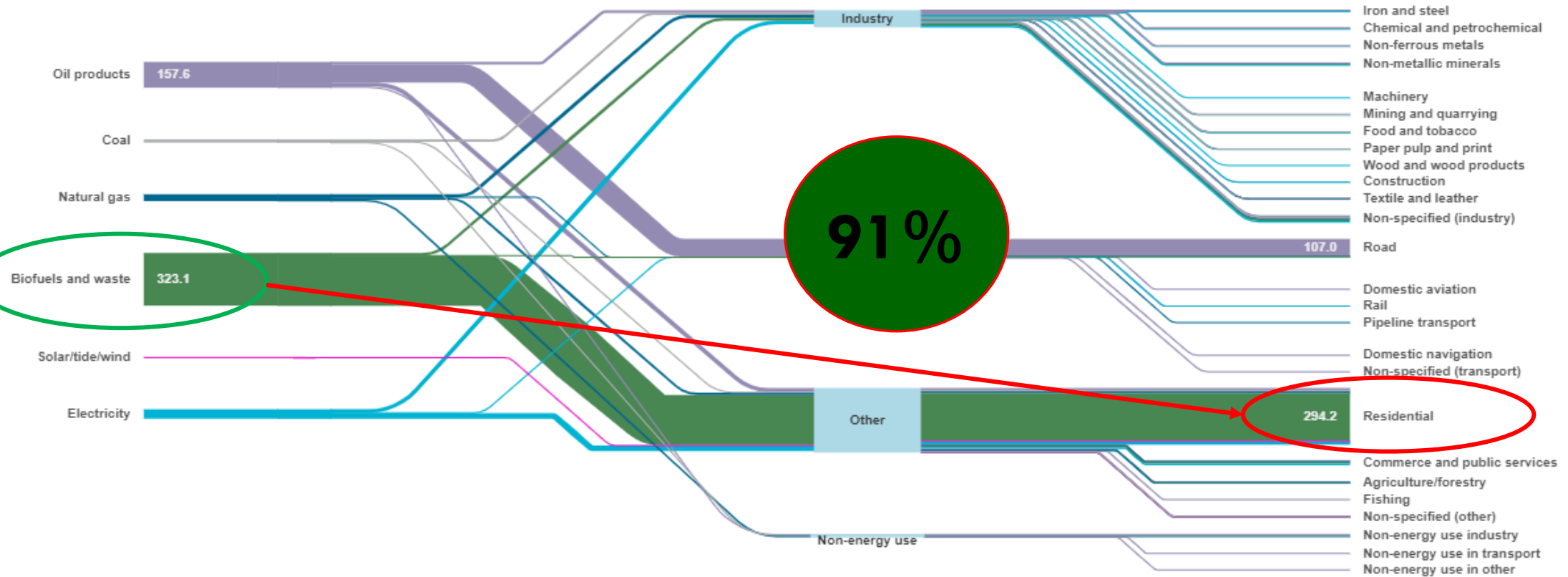
Africa FINAL CONSUMPTION (2020)

Total final consumption
(598.3 Mtoe)

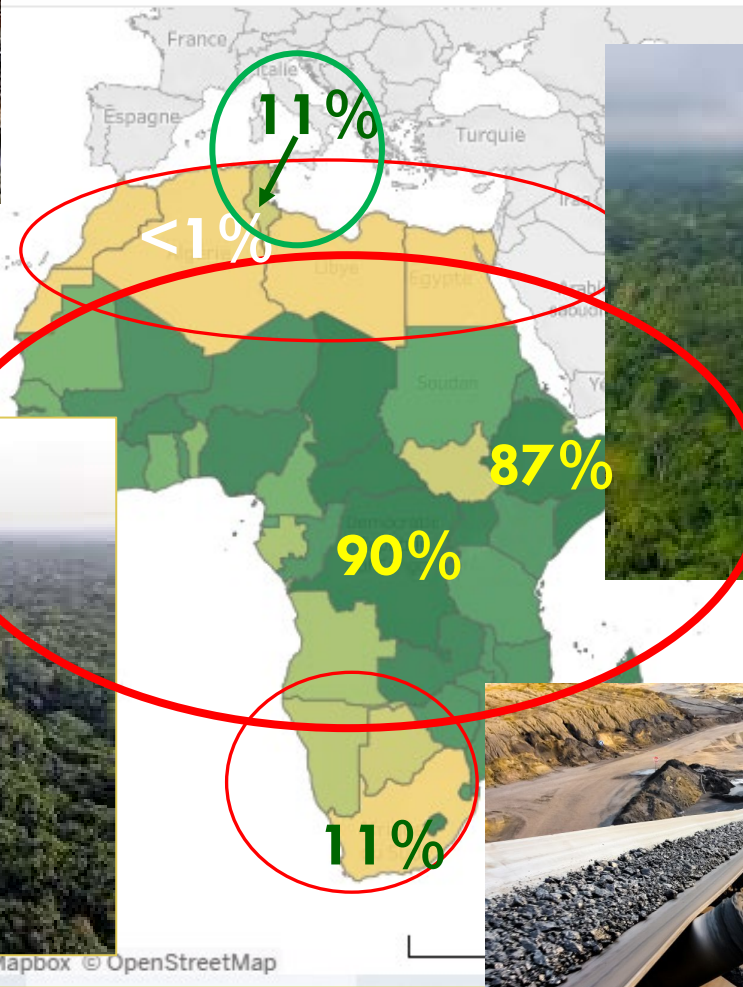
Millions of tonnes of oil equivalent



Consumption by sector



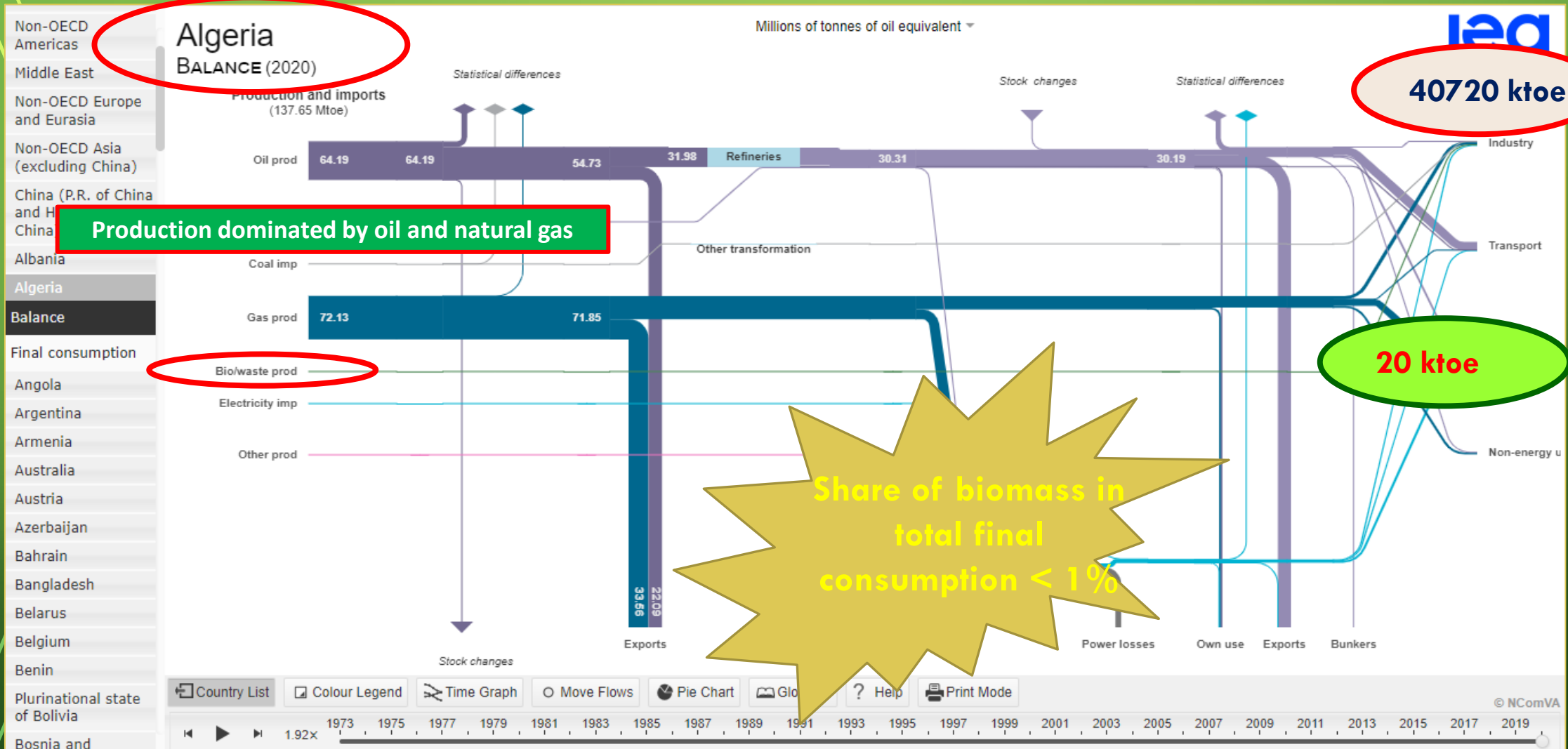
In fact, there is not ONE Africa biomass but SEVERAL...



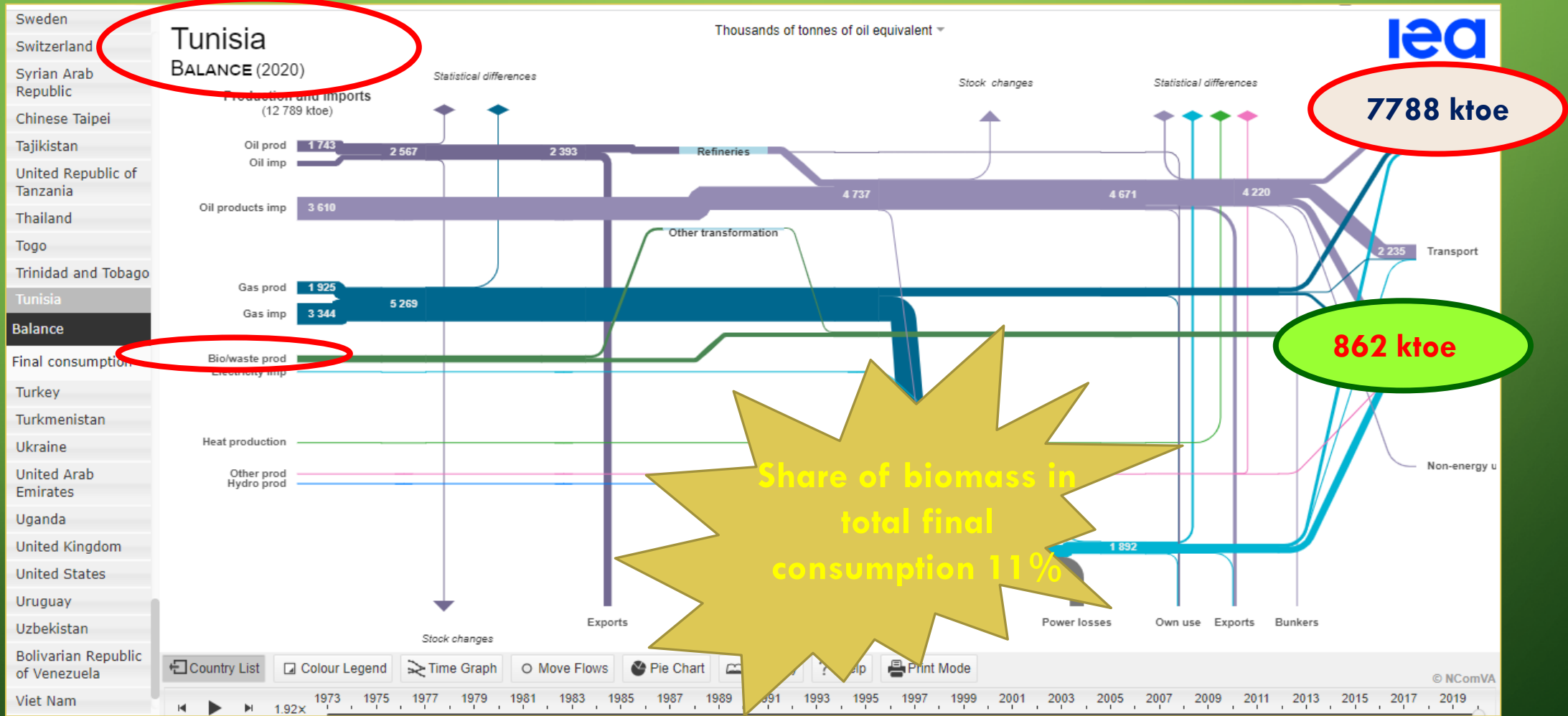
There are at least three main regions in terms of share of biomass in final consumption



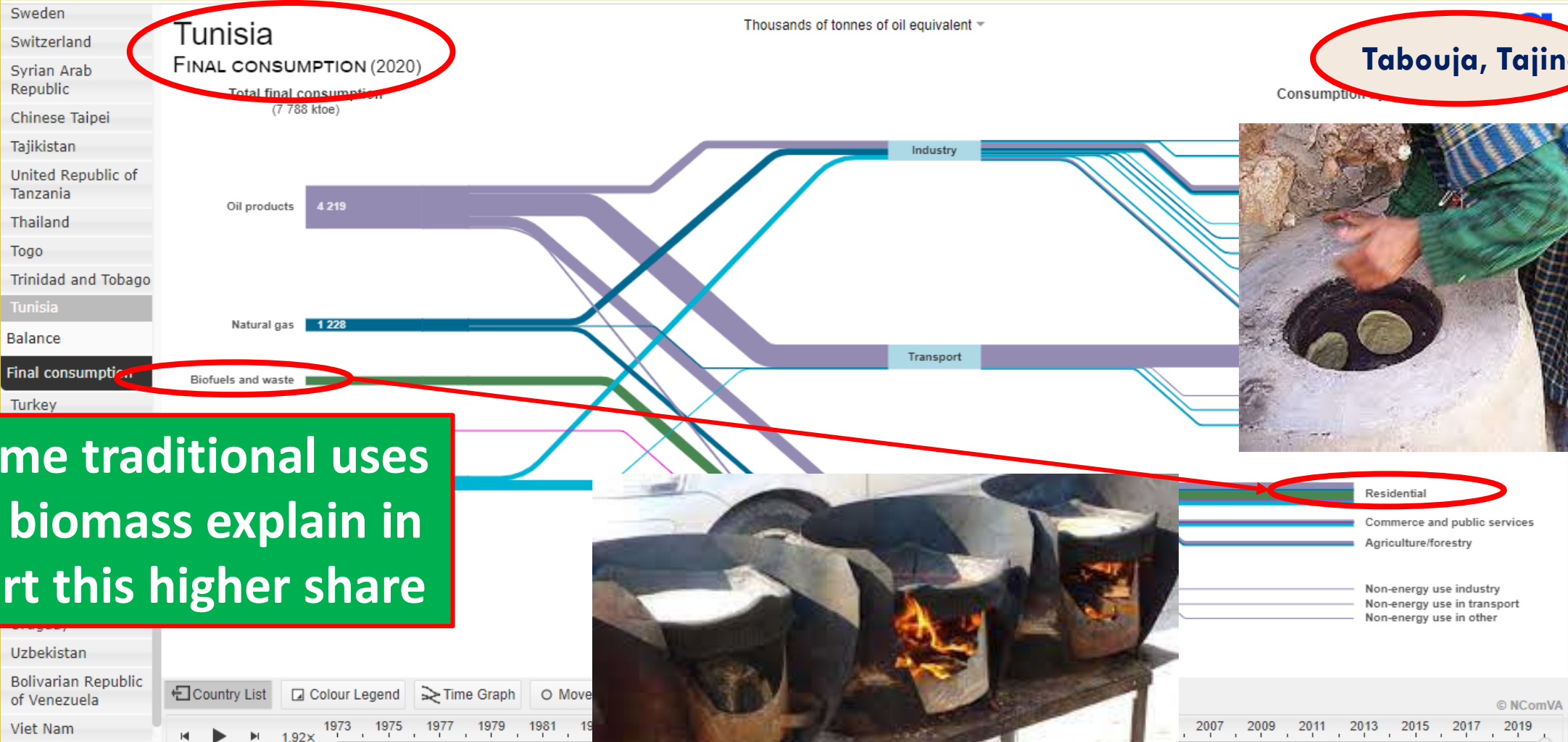
Let's have a look at the energy balance and consumption of some countries



Tunisia could be considered as an exception in the North of Africa



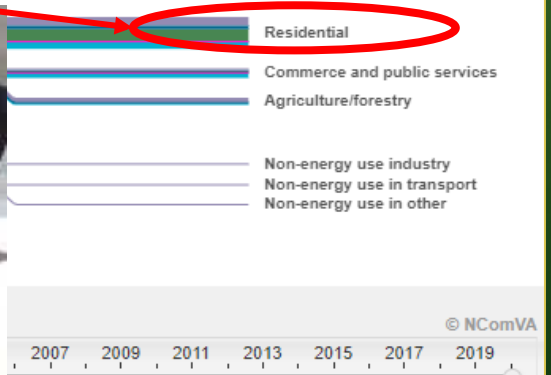
Tunisia could be considered as an exception in the North of Africa



Tabouja, Tajine



Some traditional uses of biomass explain in part this higher share



Central African countries present very high rate of biomass

Colombia
Republic of the Congo
Costa Rica
Cote d'Ivoire

Democratic Republic of the Congo

BALANCE (2020)

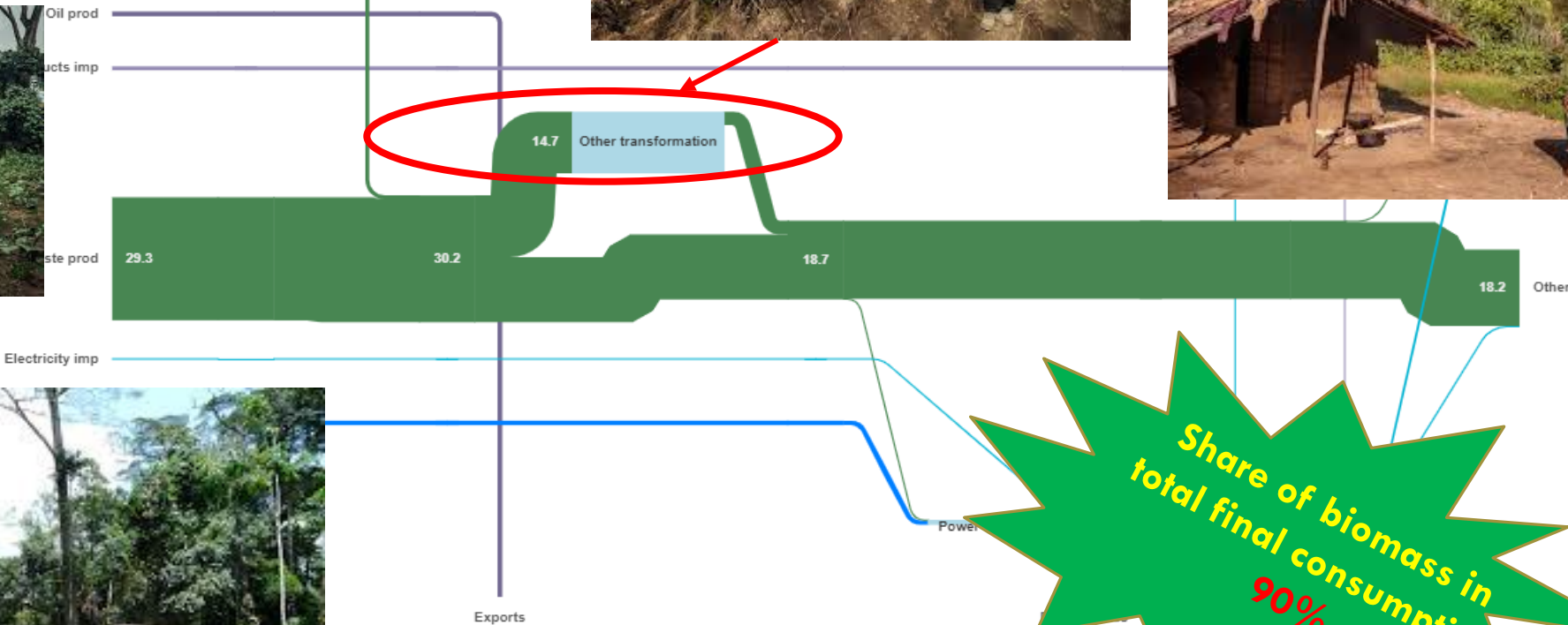
Statistical differences

Production and imports
(32.4 Mtoe)



Congo
Balance

Final consumption



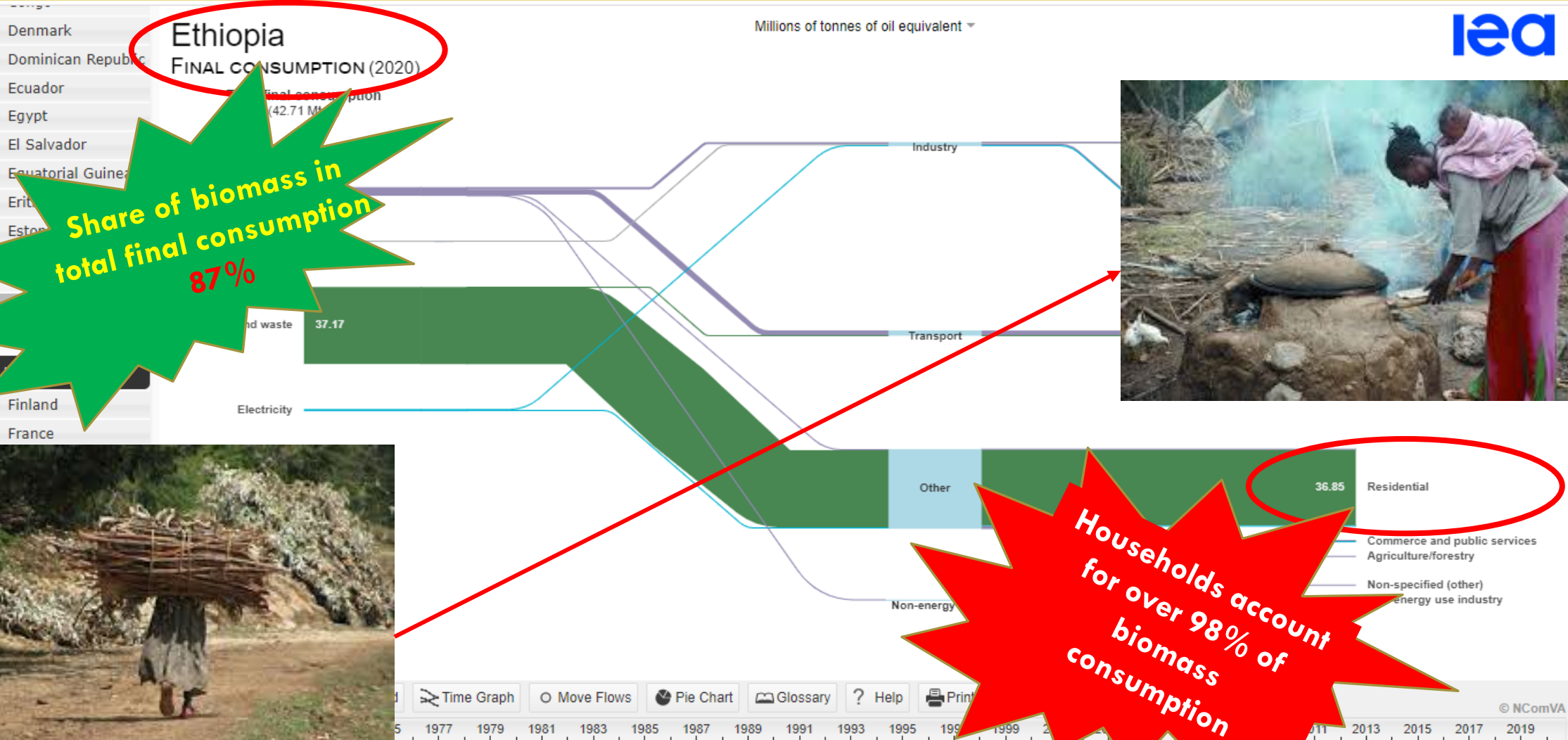
Share of biomass in total final consumption 90%

Graph Move Flows Pie Chart Glossary Help Print Mode

1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019

© NComVA

And the situation of one East African country: Ethiopia.



Share of biomass in total final consumption
87%



Households account for over 98% of biomass consumption

ONE QUESTION

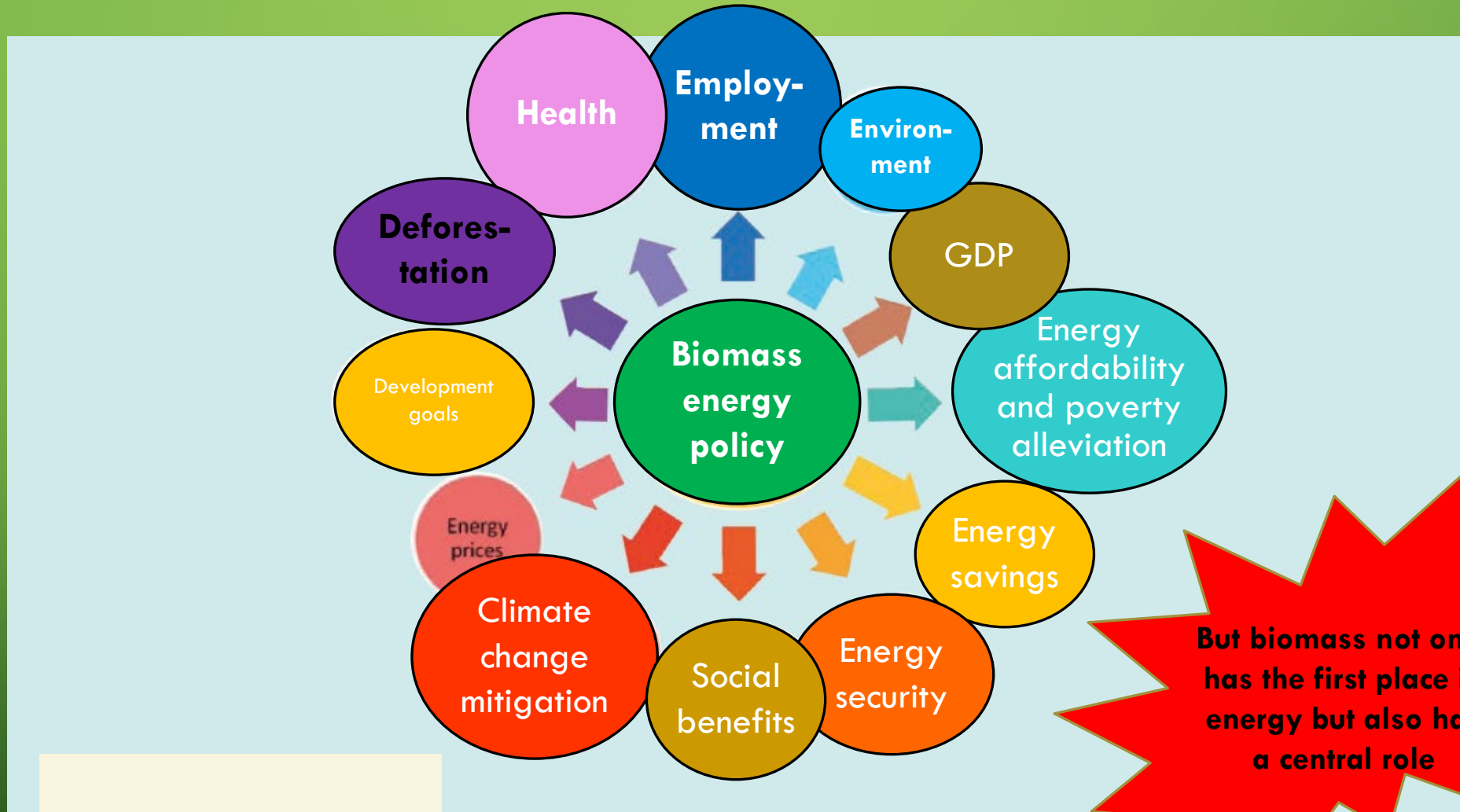
IS IT GOOD OR BAD TO HAVE THE FIRST PLACE IN TERMS OF SHARE OF BIOMASS CONSUMPTION IN THE ENERGY MIX?



One could argue that there is nothing wrong to use biomass IF AND ONLY IF it does not have a negative impact on environment, health, and many other socio-economic sectors.

The flower of energy efficiency

The central role of biomass energy policy



But biomass not only has the first place in energy but also has a central role

ONE QUESTION

IS IT GOOD OR BAD TO HAVE THE FIRST PLACE IN TERMS OF SHARE OF BIOMASS CONSUMPTION IN THE ENERGY MIX?

➔ One could argue that there is nothing wrong to use biomass IF AND ONLY IF it does not have a negative impact on environment, health, and many other socio-economic sectors.

➔ This will be examined at the next Session

➔ On the other hand, the larger the share of biomass is, the less access to modern energy there is (including electrification programme) And the smaller the share of biomass is, the more access to modern energy there is.

➔ But what modern energy types and for what end uses, at what prices and at what conditions for people and the country

TO SUM UP

- ➔ There are major concerns on the quality of biomass data
- ➔ **Almost all biomass flows are not easy to cover with accuracy: auto-collection of biomass, not marketed, difficulty to access charcoal producers, etc.**
- ➔ Based on best data and estimation, biomass is from far (54%) the largest fuel consumed in Africa
- ➔ **However, there is not ONE Africa in terms of biomass but SEVERAL**
- ➔ Even if the scale is not the same, for most countries, the consumption of biomass has an impact on various sectors of the economy
- ➔ **This is what we will see in the next sessions.**

THANK YOU