

Workshop on Capacity Development for Mainstreaming Energy SDGs, Targets and Indicators into Statistical Programmes in Selected LA Countries

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UNSD Energy Statistics



Energy Balances – Applications (derived indicators)

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Energy indicators – economic dimension

Economic dimension:

- → Overall Use: Energy use per capita
 - → Overall Productivity: Energy use per unit of GDP
 - → Supply Efficiency: Efficiency of energy conversion and distribution
 - → Production: Reserves (/resources)-to-production ratio
 - \rightarrow End Use:
 - → Industrial energy intensities
 - → Agricultural energy intensities
 - → Service/ commercial energy intensities
 - → Household energy intensities
 - → Transport energy intensities
 - → Diversification (Fuel Mix):
 - → Fuel shares in energy and electricity
 - \rightarrow Non-carbon energy share in energy and electricity
 - \rightarrow Renewable energy share in energy and electricity

→ Imports: Net energy import dependency

Energy Indicators for Sustainable Development: Guidelines and Methodologies



	Overall u	se/	Ecuador Terajoules	Electricity Electricité	Total energy Energie totale
> Extra	a info (not found ir	$\frac{1}{2}$	2 Production of primary energy Imports Exports	011 31100 3143 -30	216508 816172
	se per capita; GD	P fc₅	Marine / aviation bunkers Stock changes Total energy supply	34207	
ECO1: Energy use per capita Brief Definition	Energy use in terms of total primary energy supply (TPES, total final consumption (TFC) and final electricity use per capita	8 9 10		38282	-84368
Units	Energy: tonnes of oil equivalent (toe) per capita Electricity: kilowatt-hours (kWh) per capita	11 12 13	2 Oil refineries		4249 . 222
Alternative Definitions	None	14	Electric power plants	38282	-78252
Agenda 21	Chapter 4: Consumption and production patterns	15	01		
		17 18 19	 Net transfers Energy industries own use Losses in transport and distributio Cons. for non-energy uses 	-10822 n -11844	
ECO2: Energy use per unit of	GDP		Statistical differences	-889	
Brief Definition	Ratio of total primary energy supply (TPES), total final consumption (TFC) and electricity use to gross domestic product (GDP)			50713 15901 	
Units	Energy: tonnes of oil equivalent (toe) per US dollar Electricity: kilowatt-hours (kWh) per US dollar	25 26 27			
Alternative Definitions	Sectoral energy intensities	28	8 Road		180082
Agenda 21	Chapter 4: Consumption and production patterns	29			· <u>.</u>
		30 31 32 33 34 35 36	Inland and coastal waterways By other modes of transportation By households and other consume Households Agriculture		2 119254 98141 3887



Supply Efficiency: Efficiency of energy conversion and distribution

ECO3: Efficiency of energy conversion and distribution

Brief Definition	Efficiency of energy conversion and distribution, including fossil fuel efficiency for electricity generation, efficiency of oil refining and losses occurring during electricity transmission and distribution, and gas transportation and distribution
Units	Percentage
Alternative Definitions	None
Agenda 21	Chapter 4: Consumption and production patterns



Efficiency of electricity generation and transmission & distribution

		-	nama												
				Panama											
		Tera	ajoules									Térajoul	les		
Energy sources and products \rightarrow	Hard coal.	Coal products					100 5				Deiman	rerujou			← Sources et produits d'énergie
	brown coal	and peat	Primary oil	Light oil products	Heavy oil products	Other oil products	LPG, refinery gas, ethane	Natural gas	Manufactured	Electricity	Primary biomass/	Charcoal	Heat	Total energy	← Sources et produits denergie
	and peat	products	-			products		Natural gas	gases	Liccurcity	waste	Charcoar	ricat	iotar energy	
	Houille, lignite		Pétrole brut,	Produits	Produits	Autres produits	GPL, gaz de		0		Biomasse	Ohashaa da			
	et tourbe		LGN, autres	pétroliers	pétroliers	pétroliers	raffinerie,	Gaz naturel	Gaz manufacturés	Electricité	primaire/	Charbon de bois	Chaleur	Energie totale	
Production and utilisation ↓ 2011		tourbe	hydrocarbures	légers	lourds		éthane		manufactures		déchets	DOIS		-	Production et utilisation
1 Production of primary energy															2011
2 Imports	6946	2228		46370	153477	5025	7190			14753	16574			31327	
3 Exports	0340	2220		40370	100477	-40				259					2 Importations
4 Marine / aviation bunkers				-17155	-100509		-			-29				117664	3 Exportations 4 Soutes
5 Stock changes				3005	22273										5 Variations des stocks
6 Total energy supply	6946	2228		32220	75241					14983	16574				6 Approv. totaux en énergie
7 Transformation	-6946				-30100					13534	-2599	148		25964	
8 Briquetting plants										10001	2000				8 Usines de briguettes
9 Coke ovens															9 Cokeries
10 Gas works															10 Usines de gaz
11 Blast furnaces															11 Hauts fourneaux
12 Oil refineries															12 Raffineries de pétrole
13 NGL plants and gas blending				· · ·							X				13 Usines de LGN et mélange de gaz
14 Electric power plants	-6946				-30100					13534	-2221			25734	
15 Heating plants 16 Other transformation						· · ·					070				15 Centrales thermiques
17 Net transfers	-											148		231	16 Autre transformation 17 Transferts nets
18 Energy industries own use										ä					18 Consom. propre de l'ind. énergétique
19 Losses in transport and distribution		\								-3896					
20 Cons. for non-energy uses										1 -200) "				20 Utilis, à fins non énergétiques
21 Statistical differences	Ö			3617	-2448	-44	43			1 407	-5	ö			21 Ecarts statistiques
22 Final energy consumption		2228		28603	47588	2738	7190		/	24102	13980	148		11 6576	22 Consommation d'énergie finale
23 By industry and construction		1 2220		2378	20200					2376	3573				23 Industries et construction
24 Iron and steel industry		\								· /					24 Industrie sidérurgique
25 Chemical industry															25 Industrie chimique
26 Other industry and construction		2228		2378	20200				/ / %	2376	3573			85576	
27 By transport		\		25650	25499		47	7	///-						27 Transports
28 Road		\		25650	25499				/// "					51149	
29 Rail 30 Air		\						/ 7	/// "						29 Transports ferroviaires 30 Transports aériens
30 Air 31 Inland and coastal waterways		\							/ / "						31 Transports fluviaux cabotage
31 Inland and coastal waterways 32 By other modes of transportation		t t				40	47	///	· / · ·						
33 By households and other consumers				575	1889		5014	///"	/ "	21726	10408	148			33 Ménages et autres consom.
34 Households			\	88	1003	4	4919	// "	_ / _ ¨	7560	10408	89		23063	
35 Agriculture			·∖ "	44	516				/					560	35 Agriculture
36 Other consumers			\	448	1373		85	/		14166		59		16140	36 Autres consommateurs
									4						

Transmission & Positive: electricity distribution losses generated from Negative: fuel burned to officiency can be assessed generate electricity



Efficiency of oil refining

		(Cub	а				
			erajoules												
									Térajou	les					
Energy sources and products →	Hard coal,	Coal products		Light oil	Heavy oil	Other oil	LPG, refinery		Manufactured		Primary				← Sources et produits d'énergie
	brown coal	and peat	Primary oil	products	products	products	gas, ethane	Natural gas	gases	Electricity	biomass/	Charcoal	Heat	Total energy	
	and peat	products	Pétrole brut.	Produits					gases		waste				
	Houille, lignite	Produits de		pétroliers	Produits pétroliers	Autres produits	GPL, gaz de		Gaz		Biomasse	Charbon de		L	
Production and utilisation 1	et tourbe	charbon et de	bydrocarbures	légers	lourds	pétroliers	raffinerie, éthane	Gaz naturel	manufacturés	Electricité	primaire/	bois	Chaleur	Energie totale	
2011		tourbe	Invorocarbures	legers	lourds		einane				déchets			<u> </u>	↓ Production et utilisation
1 Production of primary energy			. 127408								10005				2011
2 Imports	59	8		42945	85574	643	4399	39801		356	42835				1 Production d'énergie primaire
3 Exports		-												341694	2 Importations 3 Exportations
4 Marine / aviation bunkers				*-5909	*-1290									* 7100	4 Soutes
5 Stock changes								-							5 Variations des stocks
6 Total energy supply	59			37036	84284	643		3980		356	42835				6 Approv. totaux en énergie
7 Transformation		*-8	5 *-317927	49061	53073	5413	4048		. 3976			1564		*-170708	
8 Briquetting plants															8 Usines de briquettes
9 Coke ovens															9 Cokeries
10 Gas works			0						. 3852					3852	10 Usines de gaz
11 Blast furnaces		*-8		40004	440040	5440	1010		. *124						11 Hauts fourneaux
12 Oil refineries			*-209893	49061	146312	5413	4048							*-5058	12 Raffineries de pétrole
13 NGL plants and gas blending 14 Electric power plants		· · · ·	*-108034		*-93239										13 Usines de LGN et mélange de gaz
15 Heating plants		· · · ·	106034		-93239					63576	*-30502				14 Centrales électriques
16 Other transformation		· · ·									*-2905	1564			15 Centrales thermiques 16 Autre transformation
17 Net transfers											-2905	1504			17 Transferts nets
18 Energy industries own use							-1683			-3409					18 Consom, propre de l'ind, énergétique
19 Losses in transport and distribution										-10033					19 Pertes trans et distrib
20 Cons. for non-energy uses					N N	-4904									20 Utilis. à fins non énergétiques
21 Statistical differences	0			50134	-1650	925		5189) 0	-13446	-2874	-30		9667	21 Ecarts statistiques
22 Final energy consumption	59		0 *17470	*35963	139007	228		34612				1593		3 4490	22 Consommation d'énergie finale
23 By industry and construction	59			5111	106580	228	378	34573		17212	1215			1 3319	23 Industries et construction
24 Iron and steel industry			0						. *124						
25 Chemical industry		· · · ·													25 Industrie chimique
26 Other industry and construction 27 By transport	59	1	*17470	5111	106580 8643	228	378	34573	3 370					83195	
27 By transport 28 Road		· · ·		*20482 *11740	8643					914				20202	27 Transports 28 Transports routiers
28 Road 29 Rail		·		-11740	6043					914				914	
30 Air		1		6528				-		314				6500	
31 Inland and coastal waterways		·		0520											31 Transports fluviaux cabotage
32 By other modes of transportation		1		2215	- 3									2215	32 Autres modes de transport
33 By households and other consumers				10370	23784		4967	39				1593			33 Ménages et autres consom.
34 Households		1		5896	3010		3169		. 2691	24764	609	590		40730	34 Ménages
35 Agriculture		1		266	6480					1148					
36 Other consumers				4208	14294		1797	39	791	19897	9601	1003		51631	36 Autres consommateurs

Refinery row <u>fi</u> Refineryuoutput summary of inputs and outputs fuel (refinery gas) efficiency can be assessed

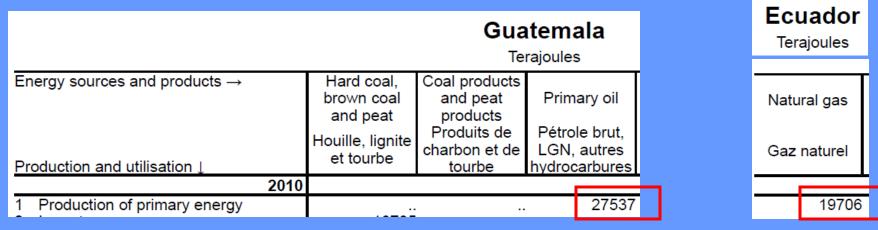


Production: Reserves (/resources)to-production ratio

Extra info (not found in the balance): reserves and resources of primary fossil fuels.

ECO5: Resources-to-production ratio

ECO4: Reserves-to-production	i ratio	
Brief Definition	Ratio of energy reserves remaining at the end of a year to the production of energy in that year. Also, lifetime of proven energy reserves or the production life index	Ratio of the energy resources remaining at the end of a year to the production of energy in that year Also, lifetime of proven energy resources years
Units	years	Total resources
Alternative Definitions	Total reserves	Depletion rate of resources
	Depletion rate of reserves	Chapter 4: Consumption and production patterns
Agenda 21	Chapter 4: Consumption and production patterns	





End-use intensities

ECO6: Industrial energy inte	ensities	al energy in	tensities					
Brief Definition	Energy use per unit of value adda sector and by selected energy-int			Final energy u added	ise per unit of agricultural value			
Units	Energy: tonnes of oil equivalent Electricity: kilowatt-hours (kWh)				s of oil equivalent (toe) per US dollar owatt-hours (kWh) per US dollar			
Alternative Definition	Energy use per unit of physical o		tion		r unit of agricultural output			
<u></u>	ECO8: Service/commercial en	ergy intensities			sumption and production patterns			
Agenda 21	Brief Definition	Final energy use per unit o value added or per floor ar		d commercial				
ECO9: Household energy	intensities		· ·	energy and er US dollar				
Brief Definition	or household or unit of fl energy use by residential		quare metr	purchasing re of floor				
Units	Tonnes of oil kilowatt-hou household or	finition		-	of freight-kilometre (km) f passenger-km travelled by			
	kWh of electi floor area; kV toe and kWh kWh for wate		-	onnes of oil be per passer	equivalent (toe) per tonne-km nger-km			
	consumption Alternation	ive Definitions		average fuel consumption for all modes per er-km or tonne-km				
Alternative Definitions	None							
Agenda 21	Chapter 4: C Agenda 2	<u></u>	Consumption and production patterns					



End-use intensities

Possible additional data (not in the balances):

- Agricultural, commercial, industrial value added;
- Commercial or residential floor area;
- Population or number of households;
- Freight-kilometre hauled; passenger-km transported.
- Info from the balance: final energy/electricity consumption per sector

End-use intensities

					_	
		Costa Rica	1	Electricity		Total energy
		Terajoules				
		2011		Electricité		Energie totale
1	Production of	f primary energy		31785		63158
	Imports	princip energy		1018		104718
2 3	Exports			-1151		-3469
4	Marine / avia					
5	Stock change			24052		-987
6	Total energy			31652		163420
7	Transformat			3608		-7007
8 9	Briquetting					
9 10	Coke over Gas works					
11	Blast furna	-				 *-1173
12						-1173
13		s and gas blending				00
14		ower plants		3608		-5698
15						
16		sformation				-97
	Net transfers			-327		28
		stries own use		-327		-893
		nsport and distribution n-energy uses		-3010		-3816 -1697
	Statistical d			-106		-649
		consumption		31223		150683
23	By industry a	ind construction		6544		34817
24		teel industry				1272
25				1333		2063
26		ustry and construction		5212		31481
	By transport					71672
28 29						64381 51
29 30						7156
31		coastal waterways				84
32		nodes of transportation				01
		ds and other consumers		24679		44195
34	Household	ds		12188		26420
35				1120		2763
36	Other con	sumers		11371		15011

Final consumption breakdown by sector is available from the energy balance. Detailed data on this breakdown makes for more accurate indicators.



Diversification (Fuel Mix):

<u>ECO11:</u> Fi	Fuel shares in energy and electricity												
Brief Defin Units		of energy f (TPES), tot	upply in terms of shares imary energy supply mption (TFC) and generating capacity and electricity										
Alternativ Agenda 21	Brief Definit Units		energy supply and generatin	The share of non-carbon energy sources in primary energy supply (TPES) and in electricity generation and generating capacity le energy share in energy and electricity									
	Alternative] Agenda 21	Brief Definition		The share of renewable en energy supply (TPES), tota (TFC) and electricity gene capacity (excluding non-co	al final consumption ration and generating								
		Units		Percentage									
		Alternative Defin	itions	None									
		Agenda 21		Chapter 4: Changing consumption and production patterns									



Diversification (Fuel Mix):

- Total Energy Supply (TPES) and Total Final Consumption (TFC) rows as shown before in this presentation
- For these indicators, a more detailed energy balance (disaggregation by products) allows a better analysis:
 - So that different electricity sources can be identified;
 - Renewables (and wastes) can be distinguished from non-renewables;
 - Non-carbon (nuclear + renewables) can be distinguished from carbon energy;
 - Current UNSD balance does not allow some of these indicators to be derived, but the forthcoming one (based on IRES recommendations) will allow.



Ex. of product disaggregation: Costa Rica

Cuadro No. 1 MATRIZ DEL BALANCE NACIONAL DE ENERGÍA PERÍODO 2011

(Terajulios)

Etch and a second													(loid	ijune	,,,									-							
Elaborado por: Ing. Arturo Molina Soto	СМ		F 33.6643				Energía P		050	501	DIO.	SOL	T-1-1	014	cv	LPG	GR	00	NCO		WE.	JF	gía Sec DO		IF380	FO	540	0.05	011		Total	T
ing. Arturo monna soto	CM	LE	RV(*)	BG	cc	ORV	PT	HE	GEO	EOL	BIG	SOL	Total primarias	ск	CV.	LPG	GR	GS	NFP	AVG	KE	JF	00	GO	1-380	FO	EAS	ASF	он	EE	secundarias	Total
Transferencias					-								primarias			-				-	-	-										
							-15									0	8 984	-8 949	30	0		0	-181	247		-3 950	157	-142	-23		44	44
Producción		17 163	15 132	8 6 1 3	407	6 112		36 625	56 954	1 492	7	2	127 375		32	59	1 185	198	0	0	100	18	2 249	0	589	1 891	0	65	632	35 393	42 409	127 375
Importación	229						7 465						7 694	2 445		5 448	7 986	21 726	0	58	0	8 043	39 976		0	8 832	0	1 492	0	1 018	97 025	104 718
Exportación													0			0	0	0	0	7	•	0	749	0	1 033	0	0	0	529	1 151	3 469	3 469
Variación de Inventario							-1 027	63					-964			71	356	-109	1	17	2	-221	160	0	50	-354	0	46	20		40	-924
No aprovechada			0					10 421	13 907		4		24 332				0	0	0	0	0	0	0	0	0	0	0	0	0		0	24 332
Oferta Interna	229	17 163	15 132	8 613	407	6 112	6 422	26 268	43 046	1 492	4	2	109 758	2 445	32	5 578	18 511	12 865	31	68	102	7 841	41 455	248	3 475	6 4 1 9	157	1 461	100	35 261	136 049	203 412
Total Transformado	0	-129	-992	-883	0	-109	-6 391	-26 268	-43 046	-1 492	-1	-2	-78 322	0	0	0	0	0	0	0	0	0	-3 575	0	-2	-1 764	0	0	0	0	-8 314	-44 858
																									975							
Carboneras		-129											-129		32																32	-97
Refinerias							-6 391						-6 391			59	1 185	198	0	0	100	18	2 249		589	1 891	0	65			6 352	-39
Centrales Eléctricas Sector	0	0	0	0	0	0	0	-20 747	-38 075	-286	0	-2	-59 109	0	0	0	0	0	0	0	0	0	-3 575	0	-2	-1 764	0	0	0	28 212	28 212	-39 212
Público																									975							
Central Hidroeléctrica								-20 747					-20 747																	20 990	20 990	244
Centrales Termoeléctricas													0										-3 575	0	-2	-1 764		0		3 108	3 108	-5 206
5																									975							
Centrales Geotérmicas									-38 075				-38 075																	3 826	3 826	-34 249
Centrales Eólicas										-286			-286																	286	286	0
Central Solar												-2	-2																	2	2	0
Centrales Eléctricas Sector	0	0	-992	-883	0	-109	0	-5 521	-4 972	-1 206	-1		-12 692	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7 181	7 181	-5 511
Privado Central Hidroeléctrica						-		5.504		-			5.504										-	-						4.004	4.004	007
Centrales Geotérmicas						<u> </u>		-5 521			<u> </u>		-5 521		<u> </u>		-							-						4 694	4 694	-827
(Miravalles III)									-4 972				-4 972																	781	781	-4 191
Centrales Blomasa			-992	-883		-109					-1		-993																	500	500	-493
Centrales Eólicas										-1 206	-		-1 206																	1 206	1 206	0
Destlierias										1.200			0																632	1200	632	632
Consumo propio		-	0	-	-	-	-		-	+	+	-	0		+	0		+	+	-	+		0	0	566	0	0	0		327	893	893
Pérdidas			0		-	-					0		0		<u> </u>	·							,	, v	300	<u> </u>		•		3 816	3 816	3 816
Aluste	0	0	0	0		0	31	0	0	0	0	0	31	0	0	35	-562	-335	3.0	12	-62	404	34	-6	-66	-122	0	-51	-5	-106	-827	-795
	0	0		0	407	0	31	U	10	0	3	U		2 445						56	164		37 846		-00		0					
Consumo final total	229	17 034	14139	7 729	407	6003					3			2 440	32	5 542	19 073	13 201		00	104	7 437	37 840	203	U	4 777	157	1 512	105	31 223	123 852	155 257
Consumo final (no energ.)	0	0	1 554			1 554					<u> </u>		1 554						28			0					157	1 512	105		1 802	3 356
Consumo final (energético)	229	17 034	12 585	7 729	407	4 449					3		29 851	2 445		5 542	19 073	13 201		56		7 436	37 846	-	_	4 777				31 223		151 901
Residencial		12 051									3		12 054		32	2 021	0	0		0	128	0	0	0		0				12 188	14 369	26 423
1. Urbano		2 140											2 140		27	1 0 2 6	0	0		0		0	0	0		0				8 006	9 088	11 228
2. Rural		9 911									3		9 914		6	995	0	0		0	99	0	0	0		0				4 182	5 281	15 195
Servicios		932	I	1		T				I	T		932			779	9	13	I	2	0	45	397	0		4				4 067	5 317	6 249
Comercial										1			0			42	2	1	1	0	0	1	220	0		0				3 332	3 598	3 598
Público				1		1			1	t	1		0			0	0	0	t	5	0	0	66	0		143			<u>†</u>	3 738	3 951	3 951
Transporte	-	-	+	+	-	+	<u> </u>			+	+	-	0		+	333	18 802	13 186	+	-	_	7 101	32 195		-	0	-		<u> </u>		71 665	71 665
Terrestre													0			333	18 802	13 180				0	32 195			0					64 432	64 432
1. Privado													0			333		13 180								0					30 162	04 432 30 162
1.a Automóviles													0			0	15 774	12 140				0	2 242	0		0						
													-			-	10 873			0	-	-		-		0					21 098	21 098
1.b Jeep													0			0	1 594	1 417		0		0	1 694	0		0					4 705	4 705
1.c Microbús familiar													0			0	494	337		0	-	0	537	0		0					1 368	1 368
1.d Motos													0			0	2 814	177		0		0	0	0		0					2 991	2 991
2. Público													0			333	1 092	363		0		0	5 588	0		0					7 376	7 376
2.a Microbús													0			0	0	0		0		0	1 408			0					1 408	1 408
2.b Autobus													0			0	0	0			-	0	4 070			0					4 070	4 070
2.c Taxis													0			333	1 092	363		0	-	0	111	0		0					1 899	1 899
3. Carga													0			0	1 317	442		0	0	0	20 503	0		0					22 262	22 262
3.a Liviana													0			0	1 317	442		0	0	0	10 655	0		0					12 4 14	12 414
3.b Pesada													0			0	0	0		0	0	0	9 848	0		0					9 848	9 848
4. Equipo especial													0			0	192	20		0	0	0	3 7 2 7	0		0					3 940	3 940
5. Otros													0			0	427	214		0	0	0	0	0		0					641	641
6. Ferrocarril													0			0	0	0		0	0	0	51	0		0					51	51
Maritimo													0			0	0	0		0	0	0	84	0		0					84	84



Net energy import dependency

	<u>ECO15:</u> N	et energy i	mport dep	pendency				
	Brief Defin	ition		supply "	TPES) in h as oil ar	a given y		ry energy l and by fuel cts, gas, coal
			F azil rajoules					
Energy sources and products → Production and utilisation ↓	Hard coal, brown coal and peat Houille, lignit et tourbe	charbon et de	Primary oil Pétrole brut,	Light cíl products Produits petroliers légers	Heavy bil products Produits pétroliers lourds	Other oil products Autres produits pétroliers	LPG, refinery gas, ethane GPL, gaz de raffinerie, éthane	on patterns
	2010			legers	lourus		Cthane	
Production of primary energy Imports Exports	1007 4858(4512075 726799 -1354784	327018 -42354	 342742 -208925			
 4 Marine / aviation bunkers 5 Stock changes 6 Total energy supply 	71: 5937			82202 -7761 794700	-167660 -60 -33904) -614	80930	
7 Transformation	-43204	10 280632	-3907942	1125644	1977920	360984	462389	
						Brésil Térajoules		

					JIES						
Natural gas	Manufactured gases	Electricity	Primary biomass/ waste	Charcoal	ŀ	leat		Total energy	Ļ	Sources et pro	duits d'énergie
Gaz naturel	Gaz manufacturés	Electricité	Biomasse primaire/ déchets	Charbon de bois	Ch	aleu	r	Energie totale		Production et ut	tilisation
									20	10	
580681		1511960	3322134					10027570	1	Production d'é	nergie primaire
489800		129262	1608	3	D			2821076	2	Importations	Ŭ,
		-4525	-40897		D			-1663202	3	Exportations	
								-249863		Soutes	
			-33661						5	Variations des	
1070481		1636697	3249185	3				10943191	6	Approv. totau	ix en éneraie
-307963	62774	344912	-728802	21656	0			-544932	7	Transformation	on



>Thank you for your attention!

¡Gracias por su atención!