POINT REVIEW OF INDUSTRIAL TRANSITION OF ANDALUSIA

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Brussels, 09/12/2019

CONTENT

- Presentation of the industrial transition theme and objectives for Andalusia
- Work Schedule
- Provisional outline of the report
- Related priority areas in the RIS3 strategy
- Draft vision and targets
- SWOT analysis by headline function
- Appendix documents

Nexus of renewable energies, energy storage and its applications in logistics and transportation

→ map the affected orientation, resource mobilisation, production and consumption systems in Andalusia;

→ document existing planning arrangements and directions of deliberate change of various stakeholders in the affected systems that could later form the basis for a broadly-supported transition vision;

→ make concrete suggestions for the advancement of the transition and for managing its downsides by fostering alignment and coordination within government and between government and other stakeholders.

WORK SCHEDULE

- **September-October:** Preparation of the review, identification of actors and list of interviews, discussion of the methodology
- **October/November:** Preparation of chapter 1
- **8/11/2019** First round of interviews (already conducted)
- **November/beginning of December:** first draft of chapter 1 (Totti) and chapter 2 (Héloïse)
- **9/12/2019** Brussels meeting: presentation of preliminary findings and feedback
- **December/January**: revising chapters 1 and 2; exchanging with JRC and Andalusian government partners
- **January/February 2020**: Preparing draft chapters 3 and 4; exchanging with JRC and Andalusian government partners
- **February 2020:** Second round of interviews
- **February/March 2020:** Revising draft chapters 3 and 4
- **TBD:** Presentation of final findings
- **31/03/2020:** Delivery of final report

PROVISIONAL OUTLINE OF THE REPORT

Introduction

Background, rationale for the transition, long-term vision and targets

Understanding the current state of the system

Spanish context, andalusian economic landscape, andalucian infrastructural landscape, key actors in the system (orientation/planning, resource mobilisation, production, consumption), framework conditions

Envisioning the desirable future system

Recommendations

Leverage points (drivers and obstacles), governance of government, support coalitions, managing resistance to change, defining experiments, reforms, policies and instruments

References and data

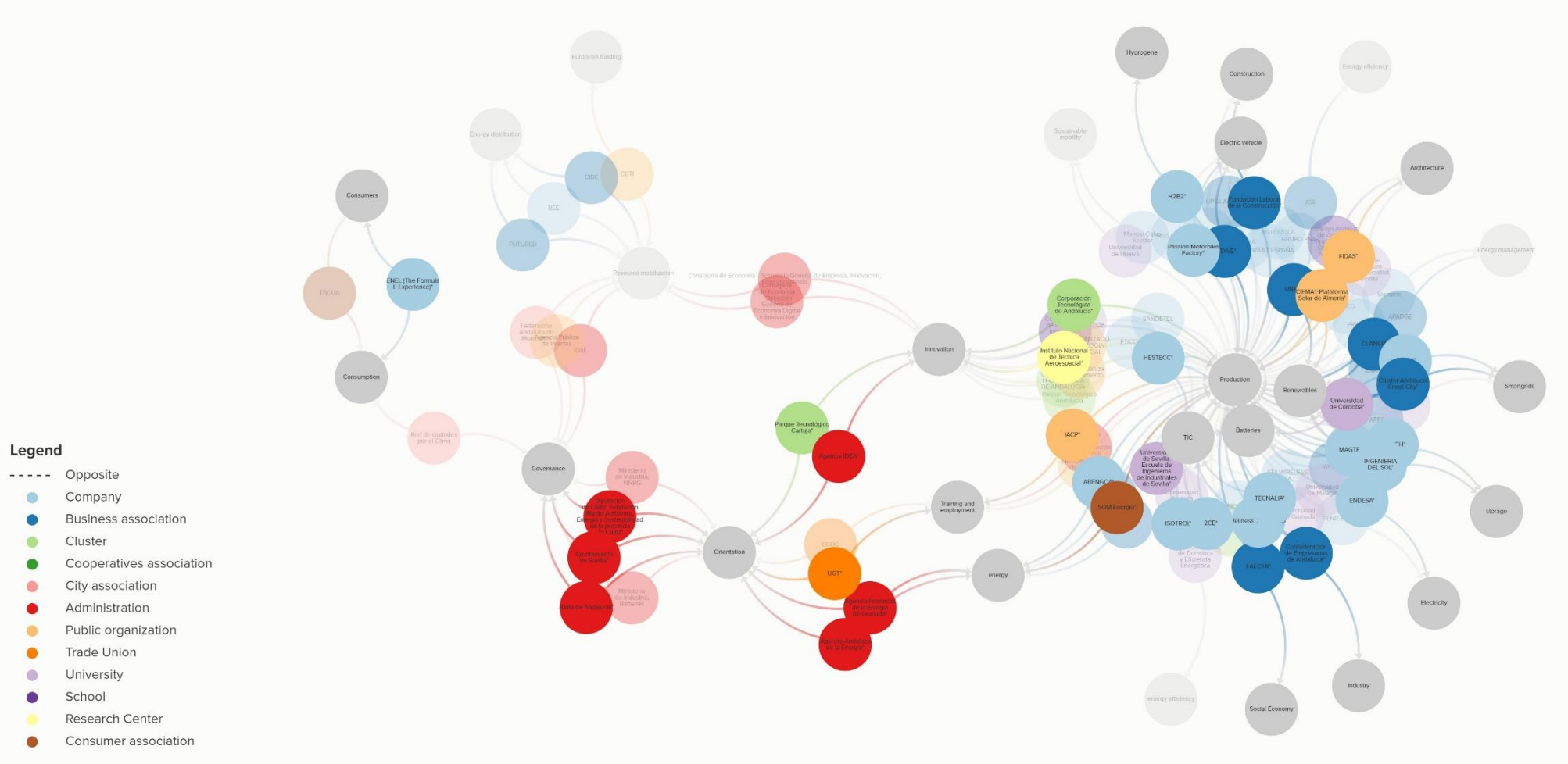
RELATED PRIORITY AREAS IN THE RIS3 STRATEGY

Promotion of Renewable Energies	Energy Efficiency - generation and integration systems of renewable energies. smart energy networks (smart grids): capture, transformation, transport and storage. high capacity energy storage systems. efficient energy management in production activities.
Transport and logistics	Innovative business activities on logistics and transport, particularly regarding the major productive sectors in Andalucía (agri-food, aeronautics, energy sectors); mobility and urban transport infrastructures.
Advanced Transport Systems and advance manufacturing	Development of Advanced Transport Systems, new materials and production processes for the transport industry, including autonomous systems (UAV, AGV); new developments in electric vehicles; advanced manufacturing technologies and systems for the transport industry.
Digital Economy	Incorporation of ICT infrastructure, development, and digital processes to strategic industries, business activities, civil society and for the development of e-government. This will include IoT, Big Data, Cloud Computing, etc.

DRAFT VISION AND TARGETS

	Key characteristics in 2040	Progress indicators	Targets by 2040 (TBD)
Orientation	Shared vision and commitment of key players across society.	Roadmap Regulation Urban planning	Signed, implemented
Resource mobilisation	Vibrant internationally connected ecosystem with industrial and R&I leaders	Regime investments (Public, Private) High growth firms (numbers, sales, employment) FDI	YoY positive trends
Production (knowledge, goods, services)	Andalusian companies and R&I partnerships have obtained global leadership in the following areas: -distributed intelligent renewable energy systems to produce, store and distribute electricity; -electric vehicles including its key components, in particular batteries. -Infrastructure for charging and maintenance of electric vehicles. -Logistics on inland, sea and air. -ICT as transversal technologies serving to connect energy, batteries and logistics.	CO2 emissions (Generation / Transport) Manufacturing added-value (created jobs, import-export) KIBS (created jobs, sales, exports) Renewable electricity sales (volume, share, installed capacity – generation, storage) EV mobility share of total fleet, by type, by kilometres EV logistics total fleet, by type EV kilometres Charging stations (coverage, numbers)	CO2 neutral YoY trends
Consumption (intermediate, final)	The Andalusian are well informed proactive consumers maintaining and utilising numerous minigrids and electric mobility and exercising conscious consumerism ensuring demand for low carbon businesses.	EV sharing kilometers EV private ownerships kilometers Microgrids Self-generation, consumption and grid sales of renewable energy	YoY trends

CURRENT ECOSYSTEM



Contrasted color shades: actors we have already met

POINT review industrial transition of Andalusia

SWOT ANALYSIS : ORIENTATION AND PLANNING

Strengths	Weaknesses
Strong actors involved and committed to energy transition (e.g. public actors, clusters, JRC) RIS3 as a driving framework	Lack of a driving company – catalyser & regional champion Lack of regulatory/investment framework for distributed electricity, electrification of mobility Lack of ambitious local business partnerships
Develop a catalyser in the renewables nexus sector Develop a vision of inclusive and sustainable development Clusters to act as a regional testbeds Regulatory sandboxes for minigrids and e-mobility pilots Create partnerships around a coherent industrial logic	Resistance to change Challenge of coordinating all actors around a coherent industrial development logic
Opportunities	Threats

SWOT ANALYSIS : RESOURCE MOBILIZATION

Strengths	Weaknesses
Natural renewable resources Strong network of public actors with high capacity for public procurement Leadership in the transition Experience in European projects and fundings High quality tertiary graduates in renewables / supply chain Pilots (Microgrids, Malaga, Cartuja)	Deficit of local financial investors and assets (banks, venture capital, etc) Barriers to private investment: regulation, rule of law, cost of capital Part of the population with weak or out of date vocational skills Lack of large-scale pilots Inertia due to current carbon-based electricity and mobility/transport
Attraction of national or international investments Rethink financing models by tapping into participatory, local finance (crowdlending) Create a resilient and diverse financial system Public procurement on innovations	Slowness of funding by project logic, i.e. delay for innovation development and scale up Dependence on European Union funding schemes and need to diversify portfolios of resources Brain drain of top talents
Opportunities	Threats

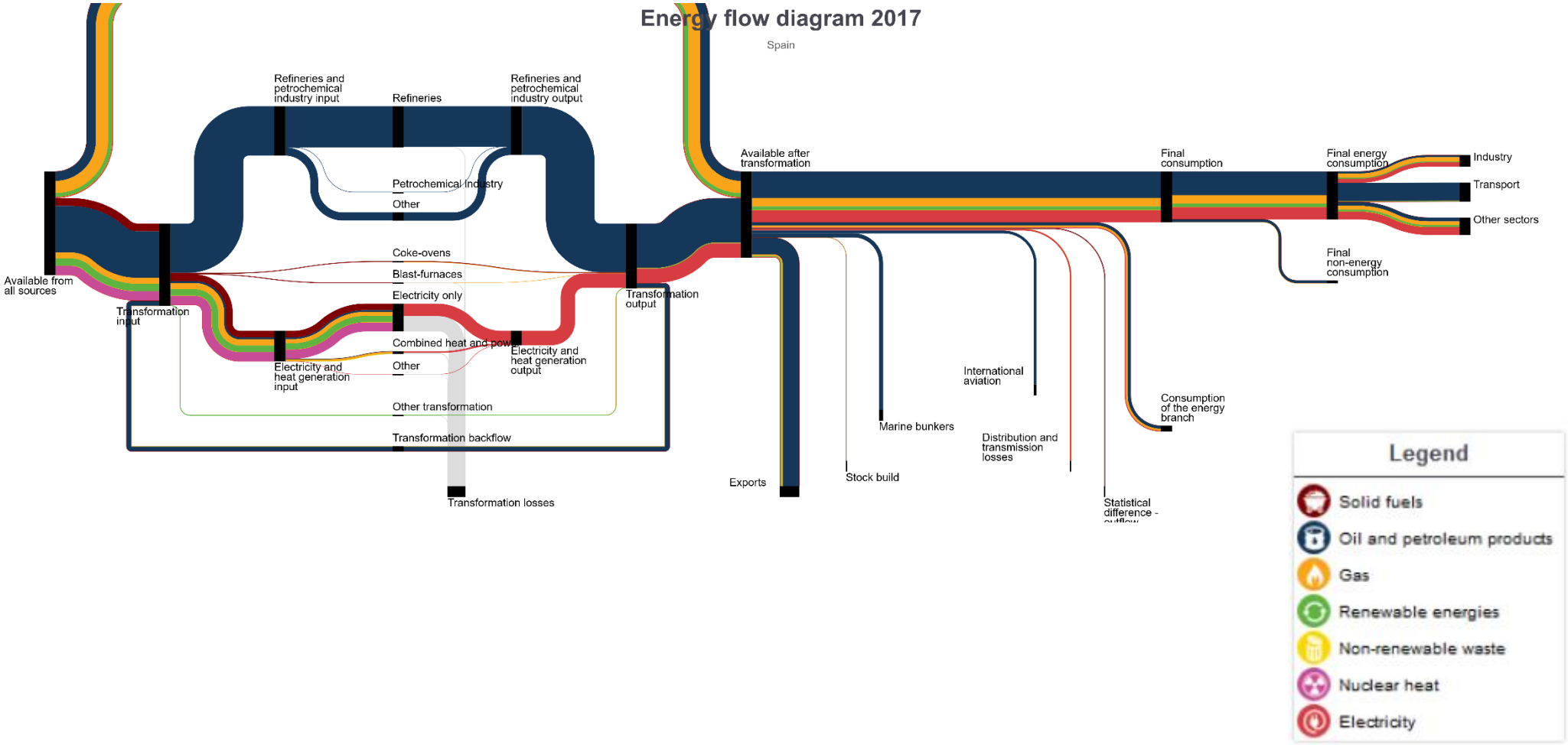
SWOT ANALYSIS : PRODUCTION (KNOWLEDGE, GOODS, SERVICES)

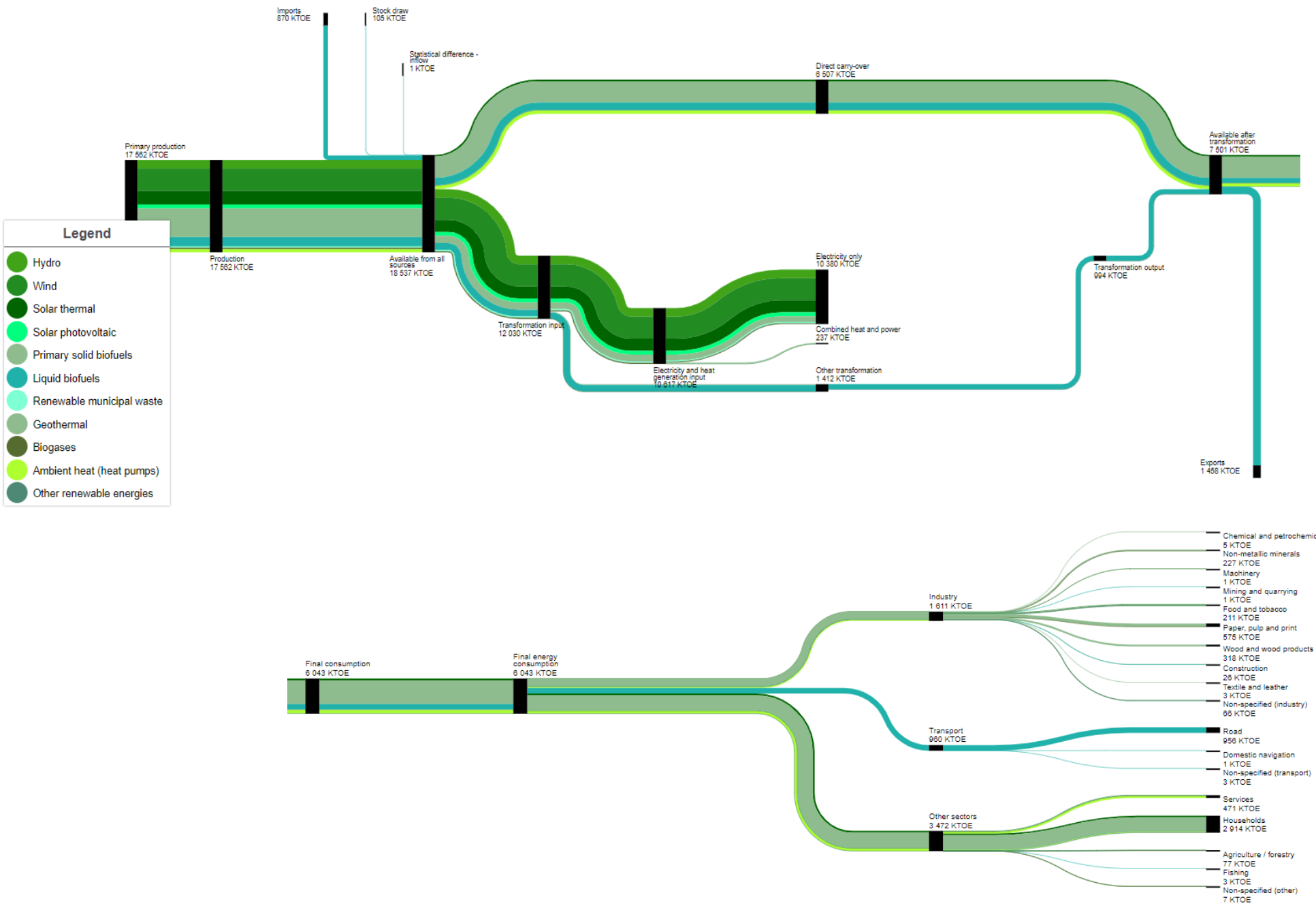
Strengths	Weaknesses
University and R&D base Strong R&I niches, e.g. thermal solar energy Highly innovative companies, with a broad portfolio (hydrogen, photovoltaic…) Diverse ecosystem, relatively organized Electricity distribution companies active in piloting smart solutions	NEETS ; labor misfits (notably, lack of technical labor) Lack of leading-edge Hi-Tech competencies and of global industry leader(s) High production costs (thermal solar, batteries) Regulation: obstacles to innovation on energy distribution, smart microgrids
Pool of employment Multi-stakeholder, cross sectoral collaborations Hybrid energy mix solution more resilient to climate, environmental and economic crises Electric mobility with renewables Smart and distributed grids, Intelligent energy storage, Future city concept Retraining less educated	Talent loss to more attractive countries or regions Economic exclusion & employment decline Loss of competitiveness on certain subsectors, e.g. batteries vs China High added-value activities captured in the by foreign dominated value chains
Opportunities	Threats

SWOT ANALYSIS : CONSUMPTION

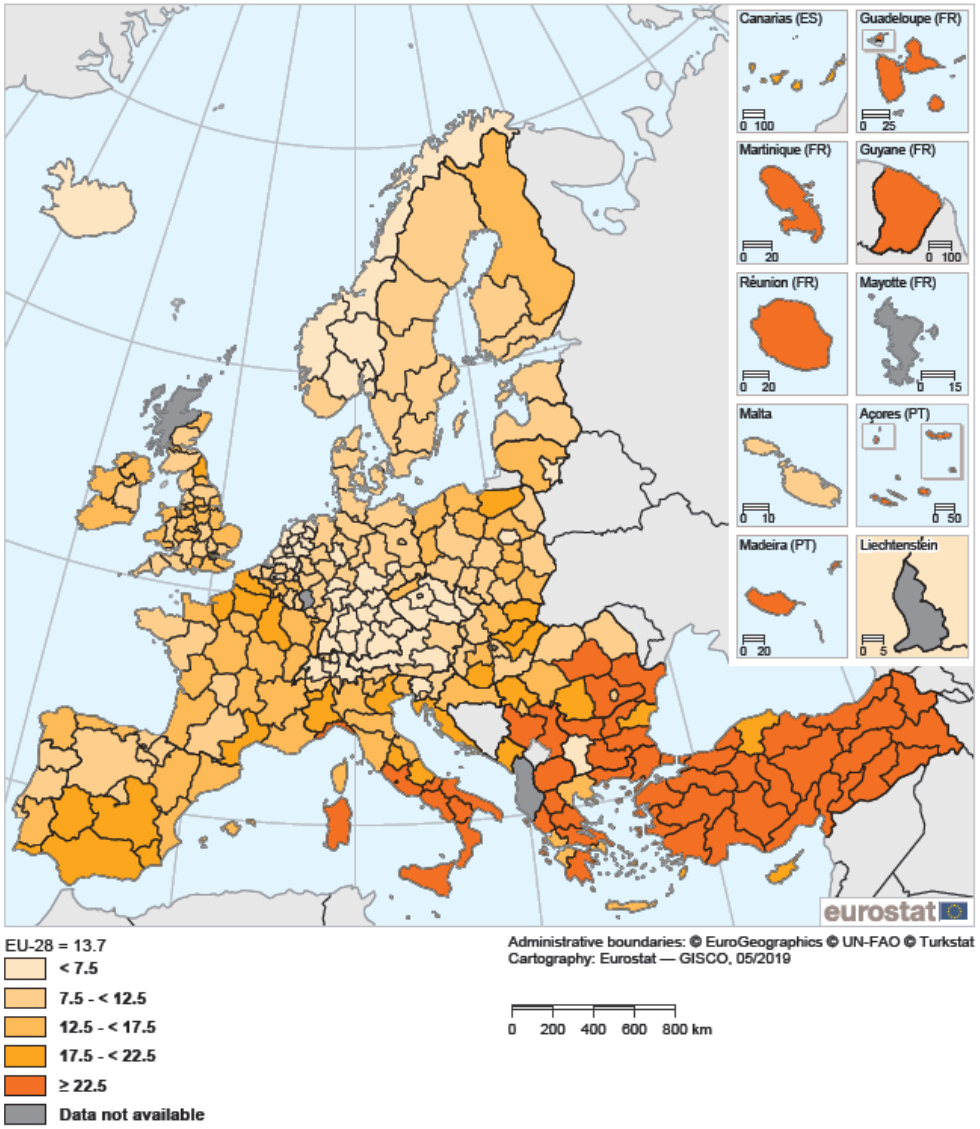
Strengths	Weaknesses
Willingness to use electric vehicles Household consumption of renewable energy Consumer initiatives	Relatively low buying power Relatively low involvement and representation of civil society despite the existence of active grassroot movement Lack of familiarity with microgrids and e-mobility Acculturation in carbon-based consumption patterns High private vehicle ownership
High private vehicle ownership Transform cities and relations to territories Implement participatory governance models of transition to co-construct transition Democratize photovoltaic	Geographical exclusion, i.e. territorial gaps or forgotten territories / social exclusion with winners and losers Lack of social accountability Resistance to change Poverty trap to inferior solutions driven by costs rather than quality or sustainability
Opportunities	Threats

CURRENT ENERGY SYSTEM




Imports
870 KTOE
Stock draw
105 KTOE
Statistical difference - inflow
1 KTOE
Direct carry-over
6 507 KTOE
Primary production
17 562 KTOE
Available after transformation
7 501 KTOE
Legend
Hydro
Wind
Solar thermal
Solar photovoltaic
Primary solid biofuels
Liquid biofuels
Renewable municipal waste
Geothermal
Biogases
Ambient heat (heat pumps)
Other renewable energies
Production
17 562 KTOE
Available from all sources
18 537 KTOE
Electricity only
10 380 KTOE
Transformation output
994 KTOE
Transformation input
12 030 KTOE
Combined heat and power
237 KTOE
Electricity and heat generation input
10 617 KTOE
Other transformation
1 412 KTOE
Exports
1 458 KTOE
Final consumption
6 043 KTOE
Final energy consumption
6 043 KTOE
Industry
1 611 KTOE
Chemical and petrochemical
5 KTOE
Non-metallic minerals
227 KTOE
Machinery
1 KTOE
Mining and quarrying
1 KTOE
Food and tobacco
211 KTOE
Paper, pulp and print
575 KTOE
Wood and wood products
318 KTOE
Construction
26 KTOE
Textile and leather
3 KTOE
Non-specified (industry)
66 KTOE
Transport
960 KTOE
Road
956 KTOE
Domestic navigation
1 KTOE
Non-specified (transport)
3 KTOE
Other sectors
3 472 KTOE
Services
471 KTOE
Households
2 914 KTOE
Agriculture / forestry
77 KTOE
Fishing
3 KTOE
Non-specified (other)
7 KTOE

NEETS % OF THE 18-24 Y OLD POPULATION



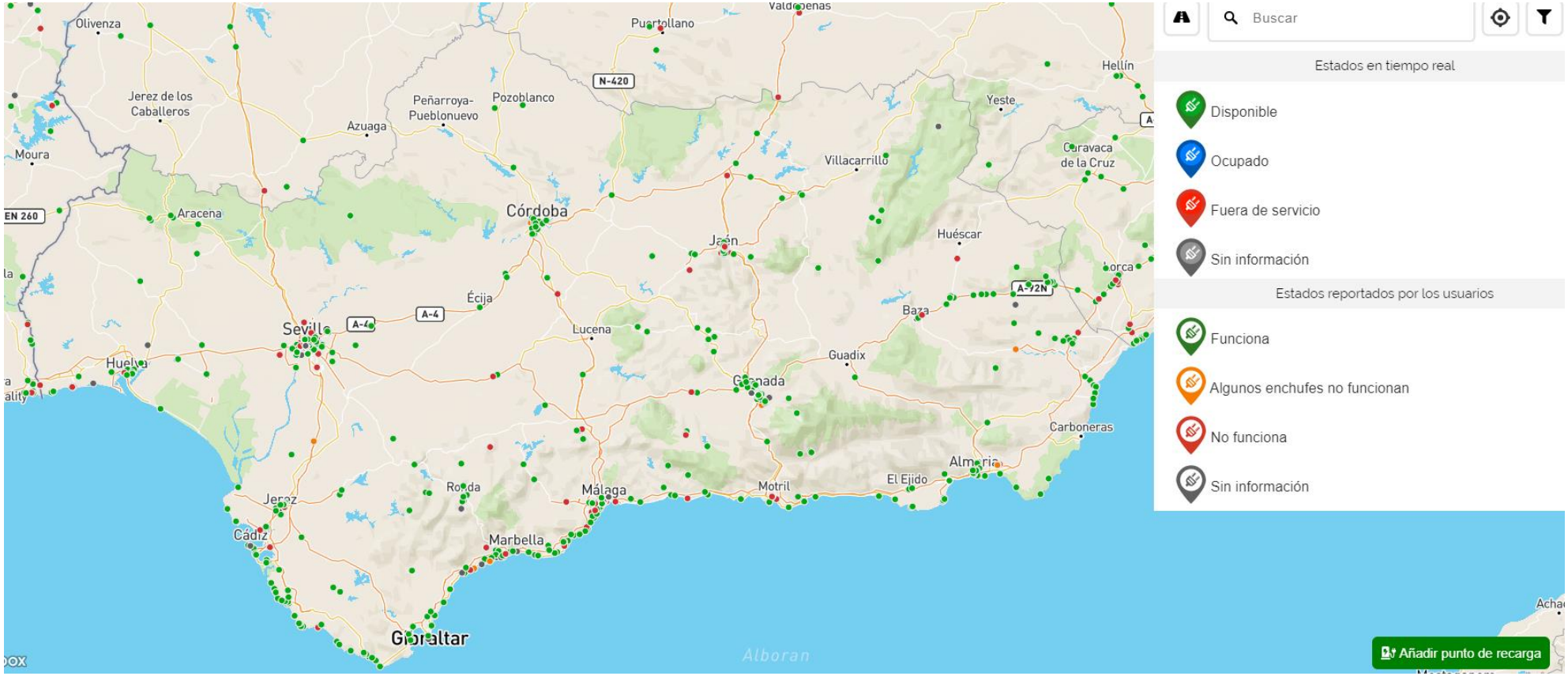
VEHICLES STOCK IN SPAIN / ANDALUSIA

Stock of vehicles by category and NUTS 2 regions [tran_r_vehst]	2013	2014	2015	2016	2017
Spain	27,617,785	27,590,727	27,883,710	28,451,448	29,142,244
Andalucía	**4,710,118**	**4,710,231**	**4,750,296**	**4,844,730**	**4,963,422**
Cataluña	4,203,445	4,175,860	4,227,665	4,310,967	4,336,545
Comunidad de Madrid	3,893,644	3,893,110	3,988,739	4,107,243	4,319,081
Comunidad Valenciana	2,907,286	2,898,385	2,924,136	2,974,686	3,043,970
Galicia	1,747,521	1,750,228	1,755,660	1,779,504	1,810,222
Castilla y León	1,572,377	1,571,177	1,572,034	1,592,134	1,617,597
Canarias (ES)	1,369,822	1,380,717	1,408,347	1,451,534	1,505,521
Castilla-la Mancha	1,313,849	1,310,648	1,314,208	1,342,098	1,373,112
País Vasco	1,165,952	1,163,379	1,170,162	1,184,271	1,200,838
Región de Murcia	860,275	862,199	871,049	892,365	916,806
Illes Balears	794,010	796,452	811,216	833,972	859,402
Aragón	743,280	743,531	745,481	757,646	771,115
Extremadura	703,650	704,472	707,973	720,611	735,481
Principado de Asturias	602,785	600,353	600,511	606,674	614,671
Comunidad Foral de Navarra	393,067	392,413	395,161	402,370	411,862
Cantabria	353,651	353,771	355,979	360,899	367,293
La Rioja	179,413	180,118	180,984	184,388	188,086
Ciudad Autónoma de Melilla (ES)	54,235	54,537	54,927	55,777	57,405
Ciudad Autónoma de Ceuta (ES)	49,405	49,146	49,182	49,579	49,815

NETWORKS OF TRANSPORTATION

Road, rail and navigable inland waterways networks by NUTS 2 regions	2013	2014	2015	2016	2017
Spain	14,981	15,051	15,338	15,445	15,523
Andalucía	**2,457**	**2,490**	**2,585**	**2,584**	**2,610**
Castilla y León	2,253	2,267	2,350	2,355	2,357
Castilla-la Mancha	1,816	1,812	1,812	1,815	1,815
Cataluña	1,445	1,454	1,448	1,456	1,461
Comunidad Valenciana	1,142	1,142	1,141	1,183	1,186
Galicia	1,015	1,031	1,080	1,105	1,105
Aragón	757	767	769	788	788
Comunidad de Madrid	777	783	783	771	771
Extremadura	694	700	700	703	703
Región de Murcia	569	569	572	573	596
País Vasco	533	474	488	496	496
Principado de Asturias	433	454	454	453	454
Comunidad Foral de Navarra	372	372	380	380	380
Canarias (ES)	233	239	246	253	271
Cantabria	227	227	255	255	255
La Rioja	165	176	181	181	181
Illes Balears	93	94	94	94	94
Ciudad Autónoma de Ceuta (ES)	0	0	0	0	0
Ciudad Autónoma de Melilla (ES)	0	0	0	0	0

MAP OF CHARGING POINTS IN ANDALUSIA



(https://www.electromaps.com/mapa)

EXAMPLE FOR THE ENERGY SECTOR

Example in one area (energy)

Hypothetical projection (not discussed with stakeholders)

To be developed further in Chapter 3

	TODAY		TARGET FOR 2040	
	Businesses	Employment	Businesses	Employment
Renewable energies	1720	43775	5894	150000
Biofuels	11	1332	38	4564
Wood pellets fabrication	11	125	38	428
Equipment fabricants	38	3601	130	12339
Electric and biodiesel generation plants	30	1273	103	4362
Infrastructures	0	50	0	171
Administration	0	310	0	1062
Construction and electric generation O&M plants	502	24392	1720	83582
Construction and thermic generation/biomass logistics generation O&M plants	1128	12692	3865	43491
Energy storage and efficiency	205	19178	534	50000
Fabrication of equipment and components	17	2680	44	6987
Distribution of equipment and components	25	1778	65	4636
Consulting in climatization, light and domotics	92	12736	240	33205
Electric vehicle and fleet management	14	476	37	1241
Energy services	57	1508	149	3932
Installation and maintenance	4198	50285	16697	200000
Electric installation (RBT)	2332	23819	9275	94736
Climatization (RITE)	1867	26466	7426	105264
Non renewable electricity generation	90	3568	28	1100
normal regime	4	2587	1	100
co-generation	86	981	87	1000
Oil refining	1	4569	0	0
Energy Transportation, distribution, commercialization	167	14977	225	20200
Electric energy	136	12594	183	20000
gaz	22	1191	2	100
Petroleum products	9	1193	1	100
total	6381	136352	23378	421300