Departamento de
Economía Aplicada II

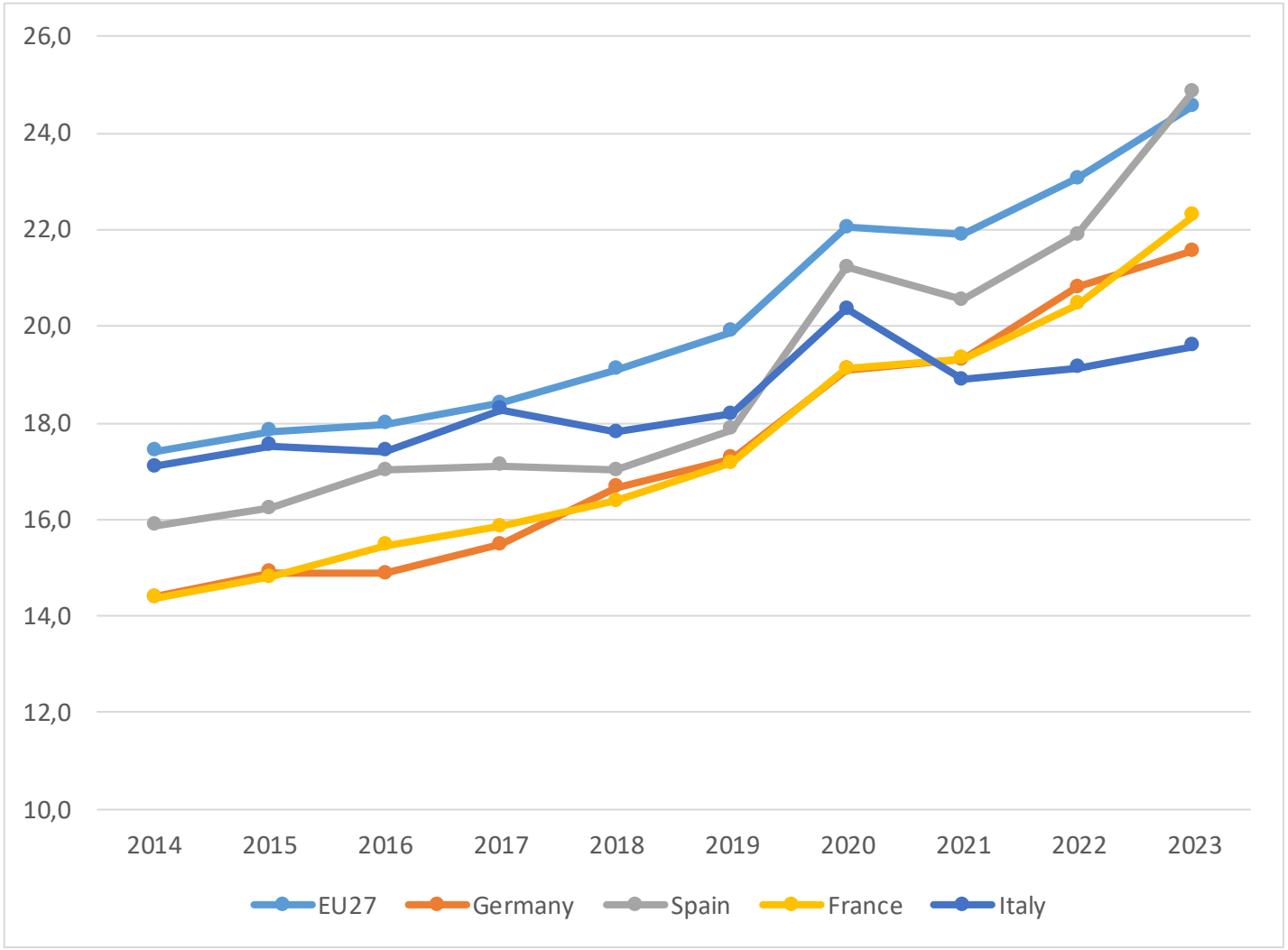
IEAL
Instituto Universitario de
Estudios sobre América Latina

Sustainability of agricultural and energy production

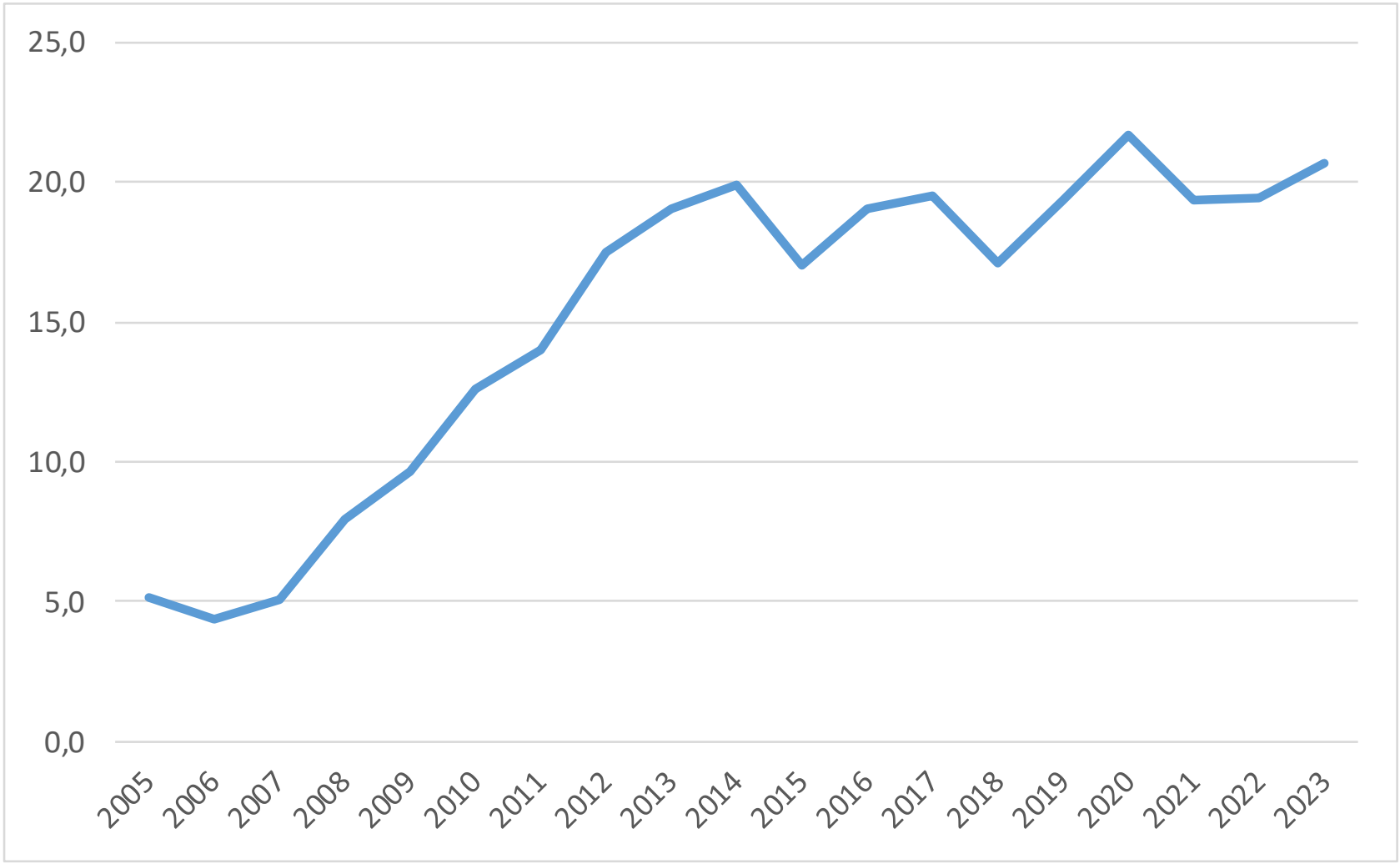
The case of energy generation from olive biomass in Andalusia.

Prof. Daniel Coq-Huelva

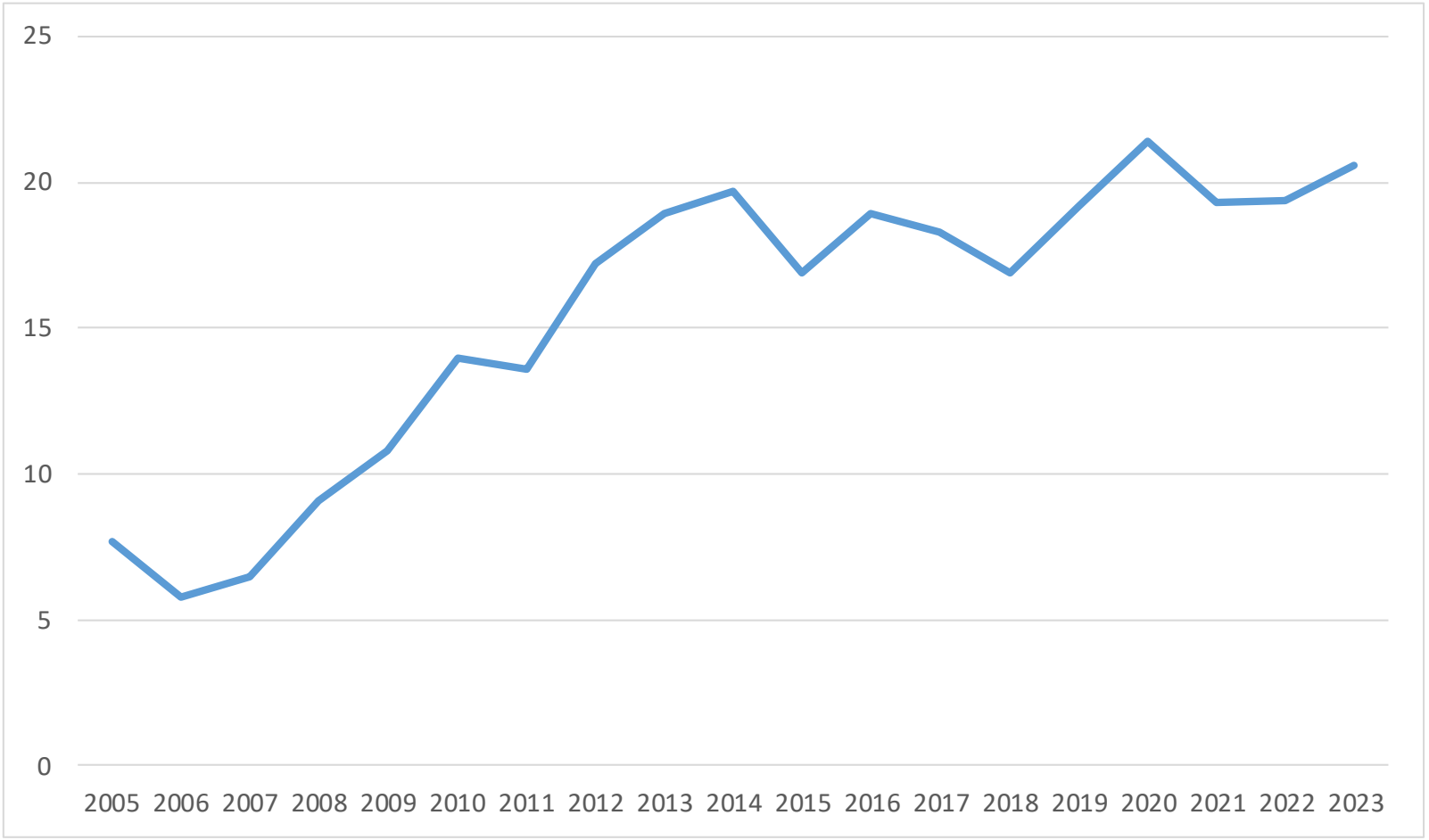
The transformation of the energy model: Share of renewables in total energy



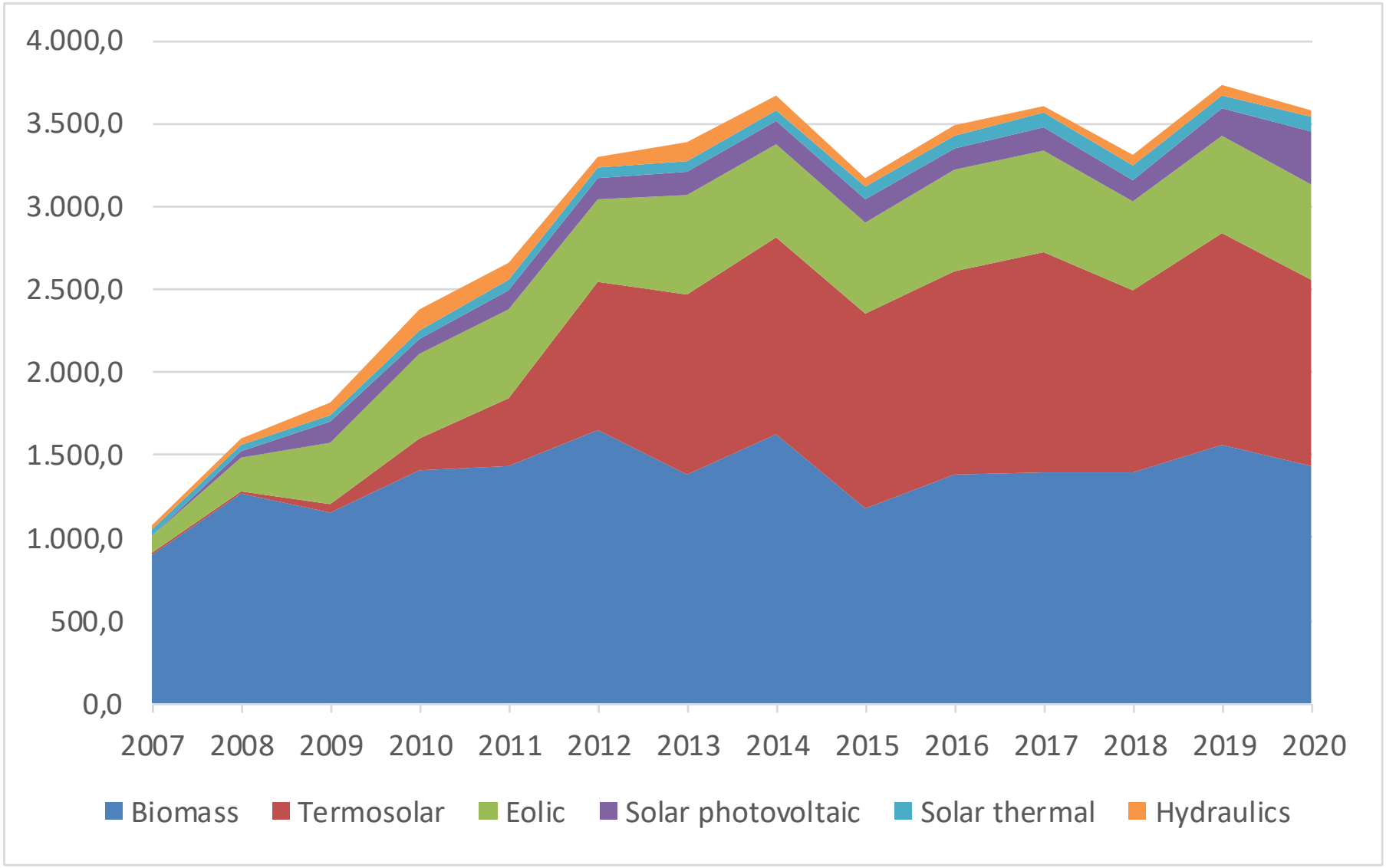
Participation of renewable energy in the primary consumption in Andalusia

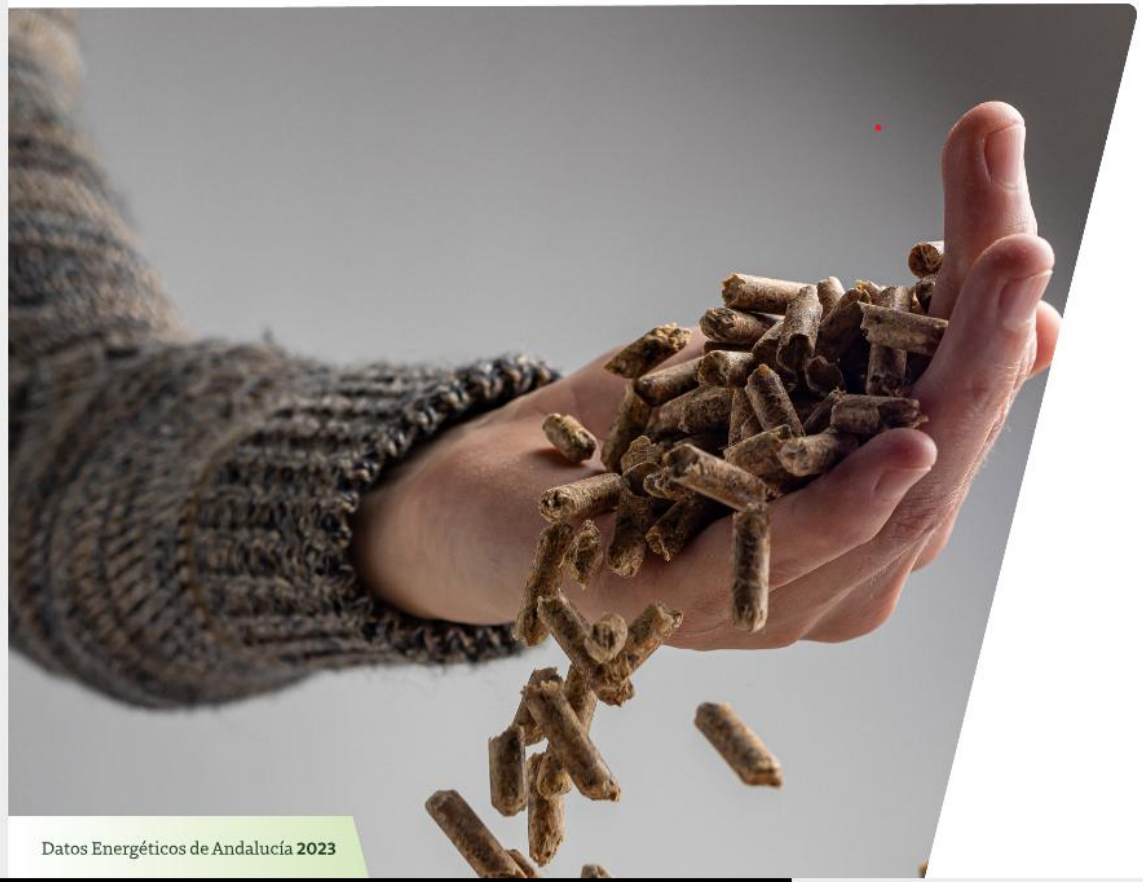


Degree of self-sufficiency in Andalusia

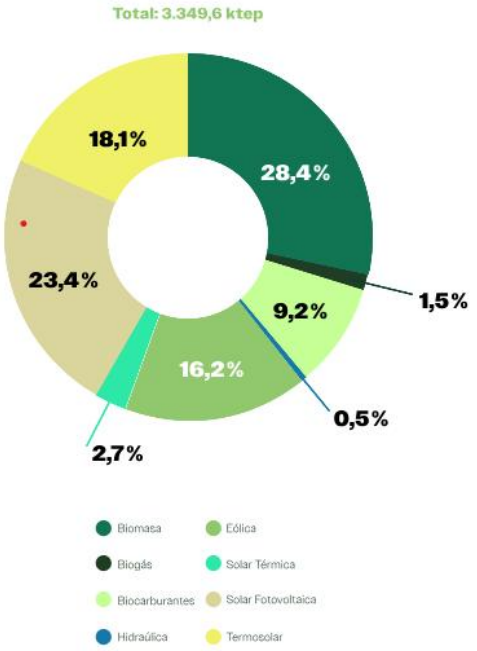


Renewable energy in Andalusia



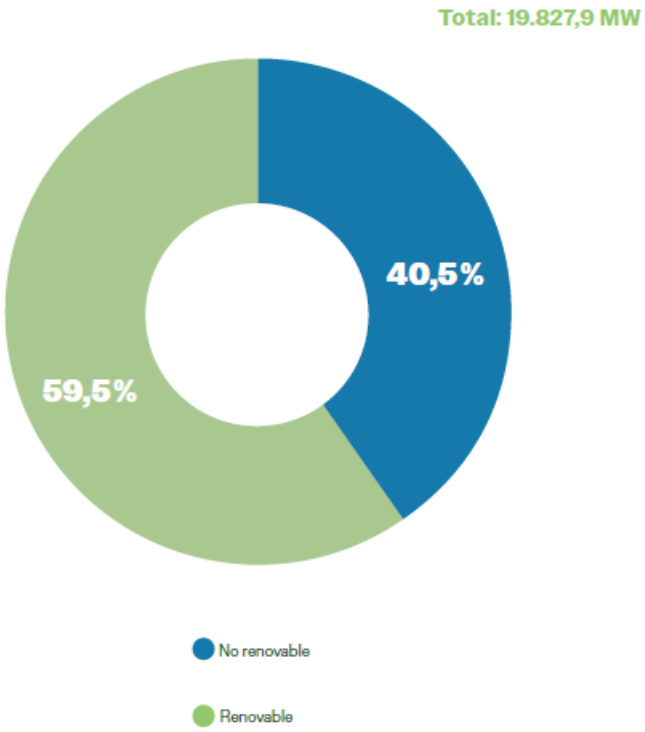


Estructura del consumo primario de energías renovables en 2023

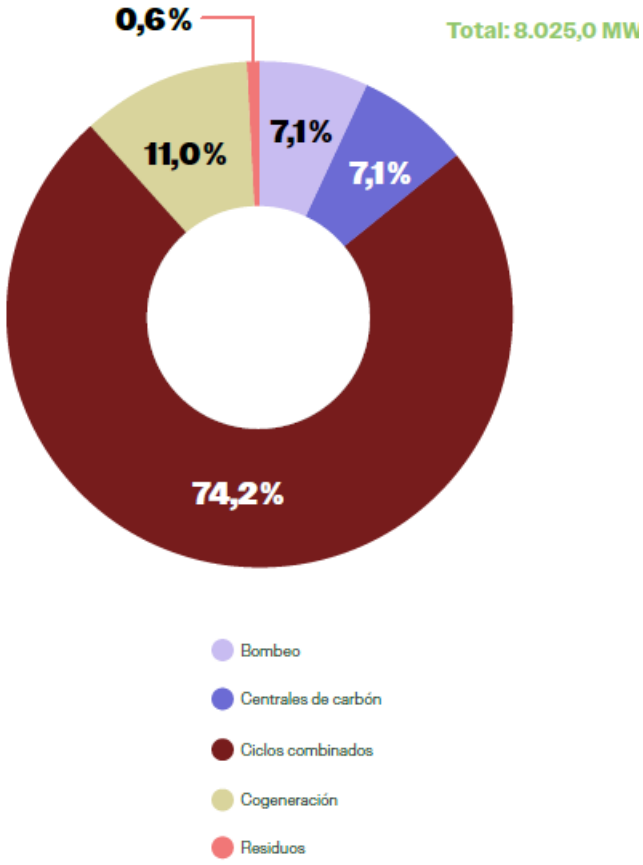


https://www.juntadeandalucia.es/sites/default/files/2025-03/Datos_Energeticos_Andalucia_2023.pdf

Estructura de la potencia instalada en 2023

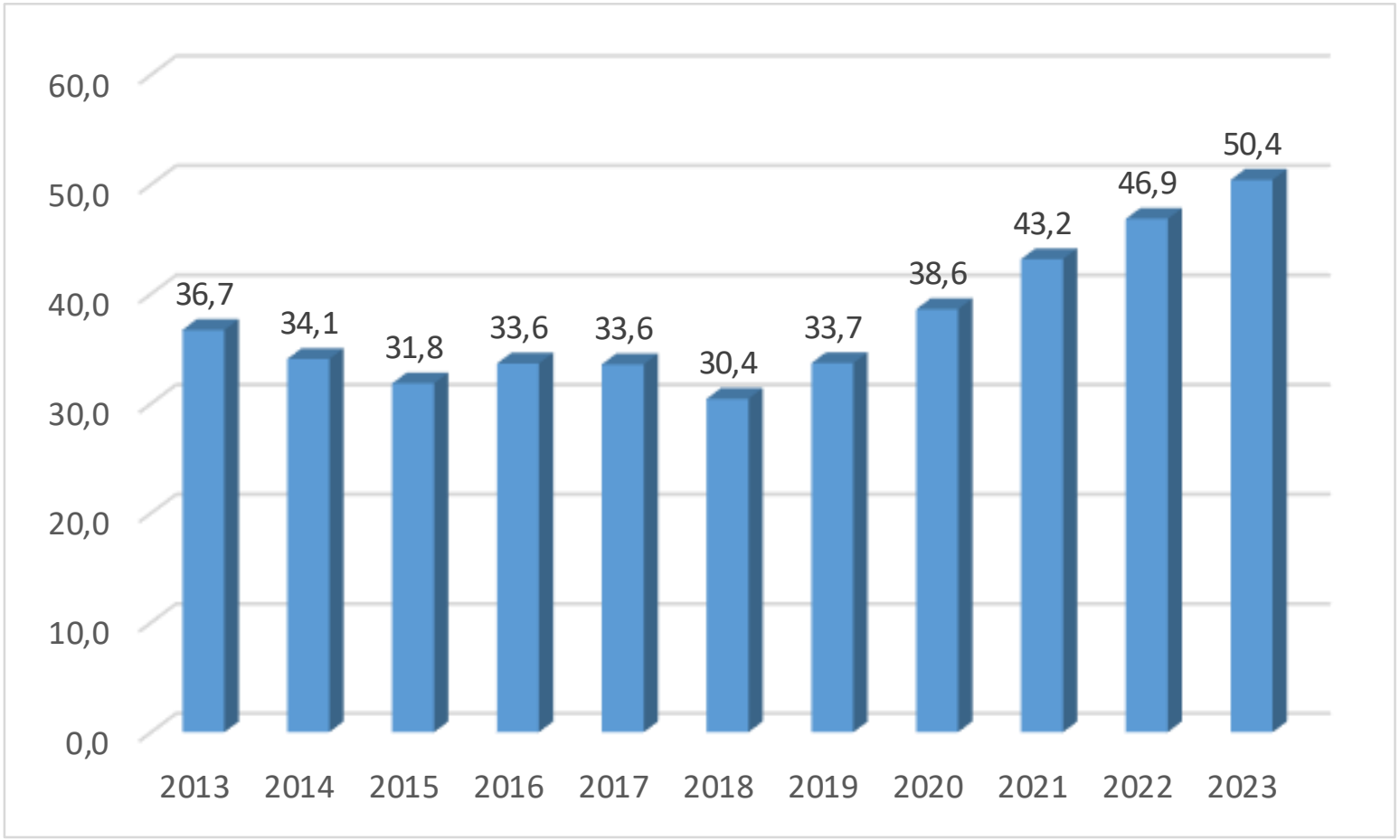


Estructura de la potencia instalada no renovable en 2023



https://www.juntadeandalucia.es/sites/default/files/2025-03/Datos_Energeticos_Andalucia_2023.pdf

The transformation of the energy model:
Share of renewables in electric energy in Andalusia



Olive oil in Andalusia

Spain is the world's leading producer of olive oil, with a market share of around 30%.

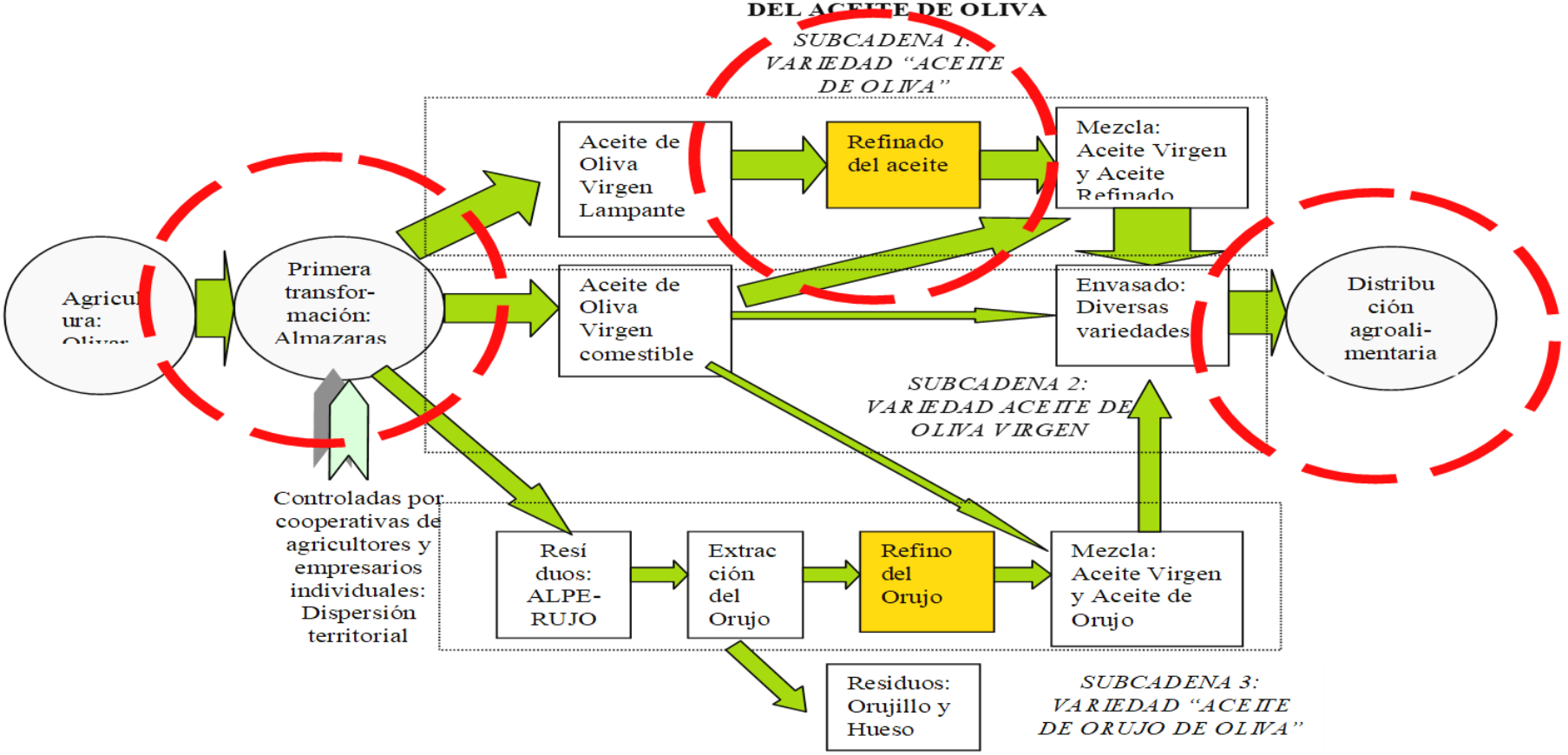
Around 80% of Spanish olive oil is produced in Andalusia (although its share in the territory is smaller), which therefore represents around 25% of the olive oil produced worldwide.

Olive oil in Andalusia

The olive oil value chain is extraordinarily complex, both because of the diversity of farms and agrosystems, and because of the existence of different industrial establishments (oil mills, refineries, extractors, etc.).

In the first part of the organization of the value chain and in some industrial segments, farmers' cooperatives play a very relevant role.

GRÁFICO 1: EXPOSICIÓN SINTÉTICA DE LA CADENA DE VALOR DEL ACEITE DE OLIVA



Olive oil residues

As a consequence of the whole process of olive cultivation and olive oil production, three main types of waste are produced:

- **Olive Tree Prunning Biomass (OTPB)**
- **Olive Pomace Residues (OPR)**
- **Olive Leaves (OL)**

Olive Pomace Residues are also extremely damaging from an environmental point of view and its uncontrolled discharge was a major environmental problem until mid 1980s

The exploitation of these types of wastes is complex, due to their different composition, power density, spatial concentration, granulometry, etc.

https://agrogadeo.es/triturado-de-restos-de-poda/

https://www.google.es/imgres?imgurl=https%3A%2F%2Fcdn.wallapop.com%2Fimages%2F10420%2F7p%2F3i%2F__%2Fc1042
0p4654179 53%2Fi1249046450.jpg%3FpictureSize%3DW640&imgrefurl=https%3A%2F%2Fes.wallapop.com%2Fitem%2Fse-
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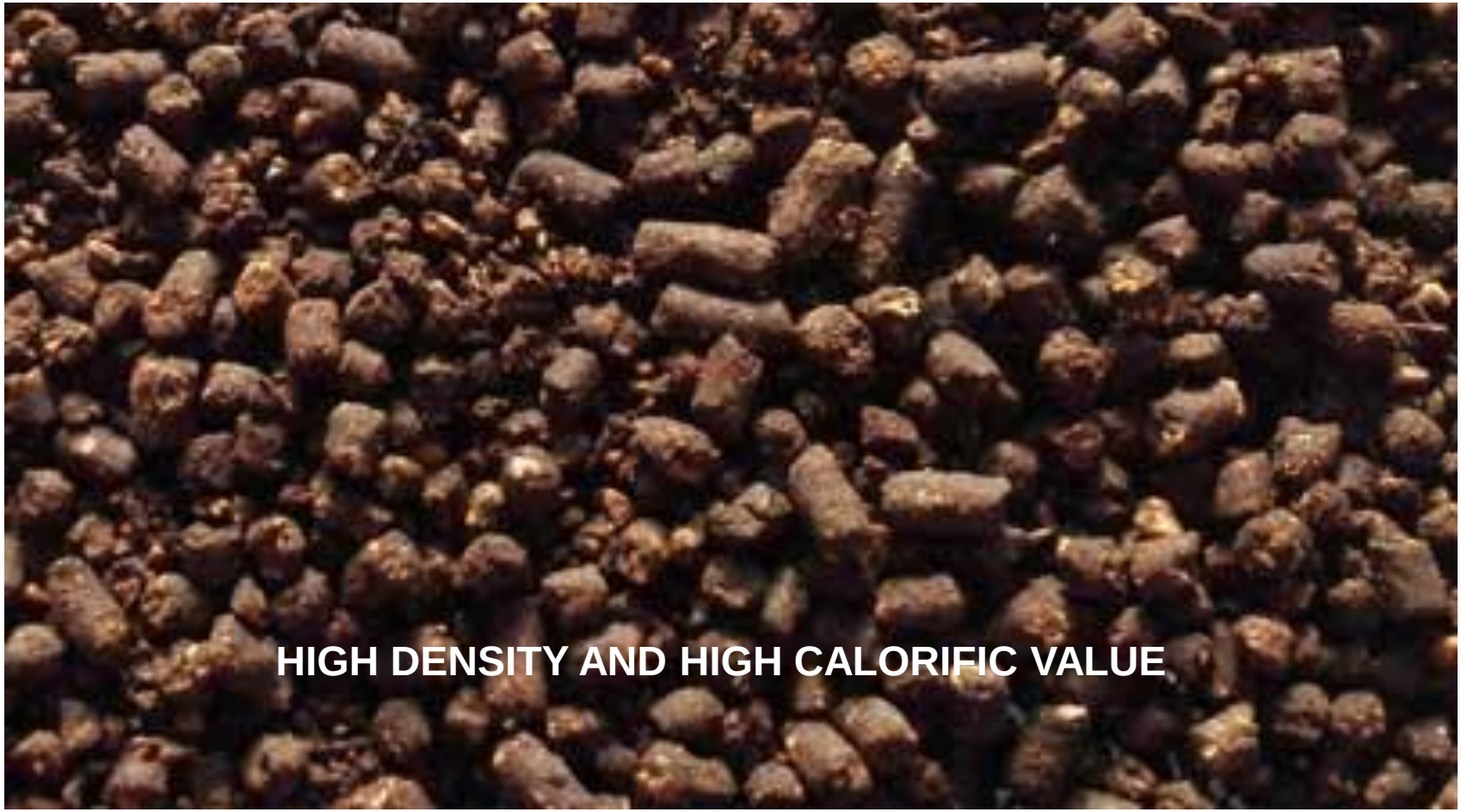
0AAAAAEBE

Olive tree prunning biomass (OTPB): Branches

Olive tree prunning biomass (OTPB): Trunks

Olive tree prunning biomass (OTPB): Pomace (“orujillo”)

https://olihueso.es/Inicio/otros-productos/



Olive tree prunning biomass (OTPB): Olive leaves

http://www.compostandociencia.com/2016/02/materiales-para-compostar-hojas-de-olivo/

Olive energy biomass value chain

All this has forced the construction of a value chain parallel to that of olive oil itself, characterized by a great complexity derived from:

- **The different levels of density, calorific value and price of the different by-products:**

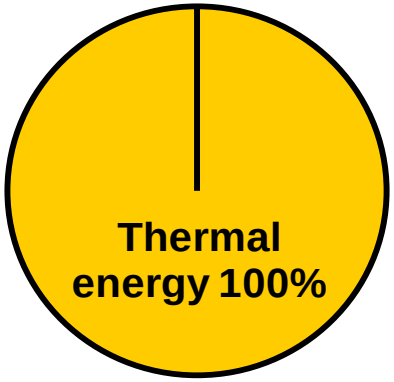
- **The fact that the treatment of some by-products requires, in some cases, significant levels of energy consumption, which can only be obtained from the energy contained in the by-products themselves (closing of energy cycles).**

Olive energy biomass value chain (II)

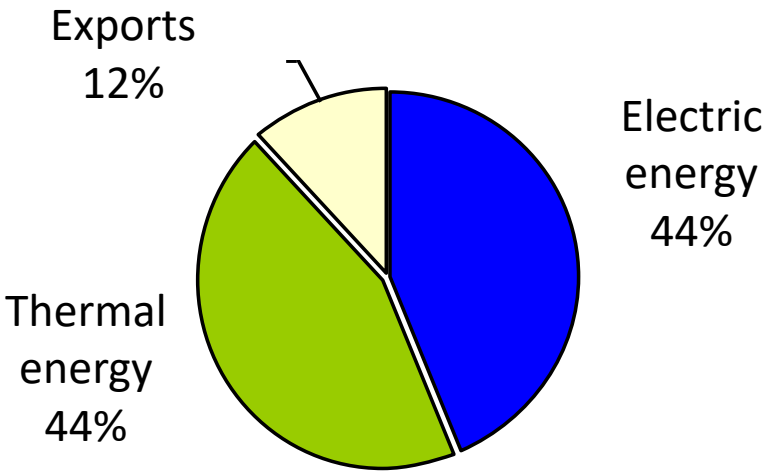
- **The different location, granulometry and transport needs of the different by-products.**

All this explains that the effective levels of exploitation of the different by-products are very different.

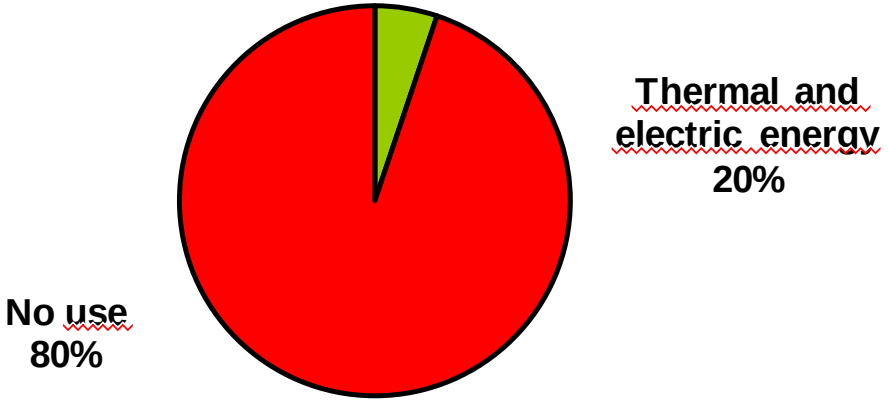
Olive Pomace Residues (OPR): Olive stones



Olive Pomace Residues (OPR): Pomace



Olive Pomace Residues (OPR): Prunnings



Olive energy biomass value chain (III)

However, estimates on the potential of the different by-products to generate energy show that Olive Tree Pruning Biomass (OTPB) represents 60% of the total energy potential and Olive Pomace Residues (OPR) only the remaining 40%.

Thus, there is almost complete exploitation of industrial waste and a relatively low level of exploitation of agricultural waste

This is explained in the first place by the need to treat industrial wastes, which are highly polluting

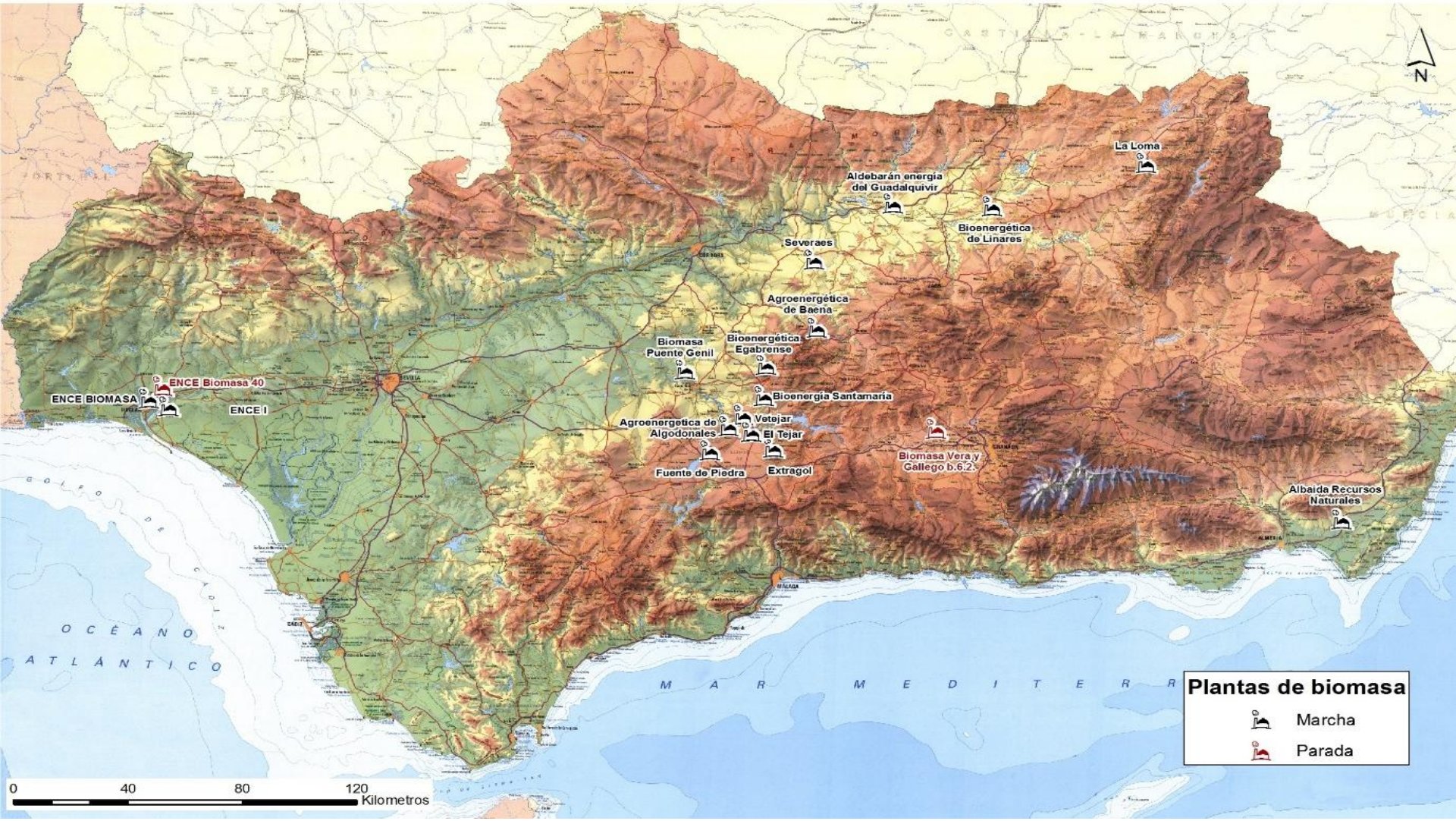
Olive energy biomass value chain (IV)

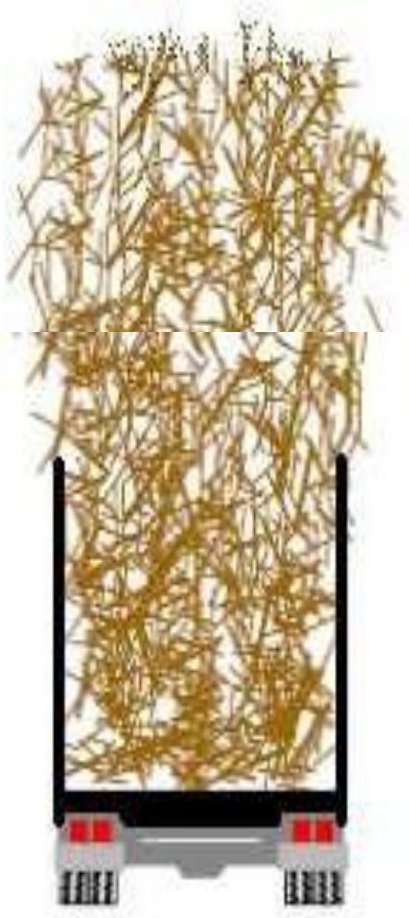
Although their treatment implies an important logistical effort (80% of the crushed olive is transformed into pomace), the products finally obtained are located in very specific places (mills and pomace extractors)

This facilitates transport and strongly conditions the location of the energy generation plants

Sustainable transitions in urban and rural context

Energy sustainable transition. The case of olive oil in Andalusia





BRANCHES

PRUNING
SHREDDING

TRUNKS

https://biomasadelasubbetica.es/quienes-somos/


CALLE 1

https://biomasadelasubbetica.es/quienes-somos/

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Thank you