Supplementary material Section I: Inventory data

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1. List of local food activities and processes considered

Table S1. Local agri-food activities considered in the scope.

Activity type	Activities considered	Allocation rules/ Processes considered	Not included in the scope
Production	Agricultural production	Farm gate	– Floriculture is not considered – Only major cultures are considered due to the high diversity in some horticultural farms producing more than thirty different varieties
Processing & retail industry	Supermarkets, bakeries, and food-specialized stores	Energy consumption	– Water and gaz consumption are not considered significant in the territory – Building constructions are not included as they would significantly increase the impact – No processing industries exist in the municipality
Transportation	Farmers transport, Consumer trips to shopping	Vehicle, maintenance, infrastructure, fuel	– Transport of imported food is considered in the consumption activity type
Consumption	Imported food	Production, transport, processing, packaging, cooking	– Locally produced and consumed food is deduced from the global consumption
Food waste	Food waste treatment	Treatment facility, transport, biowaste incineration	– The impact of domestic composting is considered negligable due to its minor impact as well as the avoided emissions it

				generates that compensate its impat (APESA, 2015)

2. List of activity descriptors, data sources and LCIs

Table S2. Data sources and background LCI databases used for each activity descriptor.

Activity type	Activity descriptors	Units	Data sources	LCI
Production	Annual production	t	Agricultural surfaces identification: RPG (2019) Farmers contact: Municipal agricultural board Volume produced: Farmers' interview	Agribalyse V3.0 (Colomb et al., 2015)
Processing & retail industry	Annual electricity consumption	MWh	Industry identification: SIRENE database: INSEE (2021) Annual consumption: Enedis Open data (Enedis, 2021) Energy sources and reduction: Retail managers interview	Ecoinvent 3 (Wernet et al., 2016) French market
Transportation	Annual farmers transport	Kgkm	Volume, distance, vehicle type: Farmers' interview	Ecoinvent 3 European freight
	Consumer trips to shopping	km	Distance, frequency: population survey	Ecoinvent 3 French car market
Consumption	Annual food consumption by local population	kg	Local food diets: INCA3 database (Anses, 2017)	Agribalyse V3.0
Food waste	Annual biowaste treatment	t	Local waste treatment facility	Ecoinvent 3 Specific treatment facilities

3. Mouans-Sartoux case study data

Table S3. Foreground data for Mouans-Sartoux case study including years 2017 and 2022.

Activity type	Activity descriptors	2017 value	2022 value	Extrapolation, and justification
Production	Annual production of vegetables: zucchini, tomato, leek, salad, melon, olives, onion, potatoes, squash, cauliflower, carrot	65 t (35 organic + 30 conventional)	65 t (55 organic + 10 conventional)	Quantities are adjusted to be equal to not consider annual climate differences. Only major cultures are considered.
	Annual production of goat cheese	0.6 t	0.6 t	
Processing & retail industry	Annual electricity consumption	1436 MWh	1330 MWh	In 2022, 120 MWh is obtained from photovoltaic production
Transportation	Annual farmers transport	2,988 kgkm	2,988 kgkm	No significant change took place in the 5-year period
	Consumer car trips to the shopping	2,204,480 km	1,755,360 km	Extrapolation of the survey data
Consumption	Annual fruits & vegetable consumption	1,500 t	1,680 t	The INCA (Anses, 2017) data for the southern French region are extrapolated to the municipality population of 9500 inhabitants
	Annual dairy & eggs consumption	950 t	936 t	
	Annual meat & fish consumption	542 t	434 t	
	Other consumption (ultra-processed food, beverages, ready-to-eat meals…)	10,300 t	7,210 t	
Food waste	Annual biowaste treatment	1410 t	1171 t	

4. Limits and uncertainty related to the data used

Territorial LCA requires important data collection. Publicly available data are available for most cases but their confrontation with the local observation proved to be imprecise. For instance, concerning agricultural land, some declared grazing surfaces were unoccupied and several small-scale farmers were not included in the database. Similarly, despite the SIRENE database being the most precise industry identification dataset, when the data were confronted with the actual local situation, 39 % of the stores and industries identified were either closed, non-existing or moved elsewhere. At the territorial scale used in this study, collecting more precise local data seemed thereby fundamental.

Related to the consumption / imported food production data, the INCA3 database is considered to be the most detailed food database in France. Yet the data used are related to the consumption of inhabitants of the entire Southern French region which might slightly differ from the local consumption. Yet for the purposes of this study, the extrapolation technique seemed to be sufficient.

Finally, the available LCI databases corresponded to processes detected in the territory (French market processes, French food products...). Yet there are several major limits related to the organic products Agribalyse dataset (Institut technique de l'agriculture biologique (ITAB), 2020; Nitschelm et al., 2020). Firstly, not all conventional products have their organic equivalent. Secondly, the samples used for database construction are not considered representative of the French market. Nevertheless, we decided to use the database for three reasons. First, it models the selected fruits and vegetable production in Southern France whose pedoclimatic context might be considered similar to the studied territory. Second, no other similar database is available for the chosen products. Finally, the database is used only for measuring the potential contribution of each action and not to conduct any specific conventional and organic farming comparison.

5. Supplemental references

Anses. (2017). *Étude individuelle nationale des consommations alimentaires 3 (INCA 3)*.

APESA, O. B. I. S. (2015). *Impact sanitaire et environnementaux du compostage domestique – Rapport. Partie B - 109 pages*. https://bilans-ges.ademe.fr/documentation/UPLOAD_DOC_FR/APESA,%20OLENTICA,%20BIO%20Intelligence%20Service.%202015.%20Impact%20sanitaire%20et%20environnementaux%20du%20compostage%20domestique%20%96%20Rapport.%20Partie%20B%20-%20109%20pages

Colomb, V., Ait-Amar, S., Basset-Mens C., Gac, A., Gaillard, G., Koch, P. , Mousset, J. , Salou, T. , Tailleur, A., & and Van Der Werf, H. M. (2015). *AGRIBALYSE®, the French LCI Database for agricultural products: high-quality data for producers and environmental labelling.*

Enedis. (2021). Enedis Open Data. In *Consommation et thermosensibilité électriques annuelles à la maille commune*. https://data.enedis.fr/explore/dataset/consommation-electrique-par-secteur-dactivite-commune/information/

INSEE. (2021). Database SIRENE. *Https://Www.Sirene.Fr/Sirene/Public/Creation-Fichier*.

Institut technique de l'agriculture biologique (ITAB). (2020). *Questions sur la pertinence des données Agribalyse 3.0 pour l'évaluation environnementale des produits agricoles et l'affichage environnemental des produits alimentaires*.

Nitschelm, L., Flipo, B., Auberger, J., Chambaut, H., Colomb, V., Gac, A., Dauguet, S., Espagnol, S., le Gall, C., Malnoe, C., Perrin, A., Ponchant, P., Renaud-Gentié, C., Roinsard, A., Sautereau, N., Tailleur, A., & van der Werf, H. (2020). *Transition towards organic and sustainable food systems USING LIFE CYCLE ASSESSMENT TO ASSESS AND IMPROVE THE ENVIRONMENTAL PERFORMANCE OF ORGANIC PRODUCTION SYSTEMS*.

RPG. (2019). Registre parcellaire graphique (RPG) : contours des parcelles et îlots culturaux et leur groupe de cultures majoritaire. In *https://www.data.gouv.fr/en/datasets/registre-parcellaire-graphique-rpg-contours-des-parcelles-et-ilots-culturaux-et-leur-groupe-de-cultures-majoritaire/*.

Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., & Weidema, B. (2016). The ecoinvent database version 3 (part I): overview and methodology. *International Journal of Life Cycle Assessment*, *21*(9), 1218–1230. https://doi.org/10.1007/s11367-016-1087-8