

7t Think Tank: Reducing Vienna's Material Footprint Through Sustainable Food Systems

A Sufficiency Toolkit for Consumer Goods (Food) in the City of Vienna

Challenge 3 – Sufficiency Toolkit: Practical Solutions to Keep Material Footprints Below 7t per Capita

1. The Problem: Food as a Driver of Material Overshoot

Austria's material footprint stands at approximately 23 tons per capita per year, with Vienna's city-level footprint lower at approximately 14 tons due to urban density and its service-based economy (Circular Vienna 2024, p. 8). Both far exceed the 7-tonne per capita target set by Vienna's own circular economy strategy. Vienna has committed to reducing its per capita footprint by 30% by 2030, 40% by 2040, and 50% by 2050 (Circular Vienna 2024, p. 8). Food is the second-largest contributor to this overshoot: it accounts for approximately 20% of the EU's material footprint by mass (European Environment Agency 2024), translating to approximately 4.6 tons per capita per year at the national level. Because food supply chains are national rather than city-specific, we apply the national figure for food-sector calculations throughout this brief. This approach is conservative: applying the national food footprint (4.6t) to Vienna's lower overall footprint (14t) implies food accounts for approximately 33% of Vienna's material footprint, suggesting food is an even more important reduction lever for Vienna than for the EU as a whole. Crucially, this mass-based figure understates food's true burden. When assessed across all environmental impact categories (climate, water, land use, biodiversity), food is responsible for approximately 49% of the EU's total consumption footprint, making it the single largest driver of consumption-related environmental damage (European Commission JRC 2023).

Within food, animal products are overwhelmingly dominant: 75% of Austria's food land footprint (de Schutter and Bruckner 2016), 76% of Austria's food carbon footprint (Frey and Bruckner 2021), and over two-thirds of food's composite environmental footprint (European Commission JRC 2023). The type of food consumed matters far more than how it is produced: the GHG contribution of an omnivorous diet is approximately three times that of a vegan diet, and the difference between diet types exceeds the difference between organic and conventional production (Kraxner et al. 2024). This is not merely an efficiency problem. What is needed is a shift from an efficiency paradigm to a sufficiency paradigm, reducing overall demand for resource-intensive foods rather than producing them more cleanly, requiring both top-down policy instruments and bottom-up empowerment tools (Rudolf and Schmidt 2025; Morgane 2025). For additional supporting data on land footprint, carbon footprint, and dietary shift potentials, see Appendix D.

2. The Economic Model: Doughnut Economics and Sufficiency

This project is guided by Doughnut Economics (Raworth 2017), which proposes that economies should operate within a "safe and just space" where social needs are met without exceeding ecological limits, adopted by over 50 cities already (Doughnut Economics Action Lab 2024). The sustainability literature distinguishes three complementary strategies: efficiency (improving resource use per unit of production), sufficiency (reducing overall demand for resource-intensive goods), and consistency (transforming production systems toward ecological compatibility) (Rudolf and Schmidt 2025). Efficiency alone is insufficient; sufficiency strategies that reduce aggregate demand for resource-intensive foods are essential (Rudolf and Schmidt 2025). Dietary shifts constitute a sufficiency strategy when they represent an absolute reduction in material throughput rather than marginal product substitution.

We reject the framing that places the burden solely on individual consumers. The responsibility for systemic change lies primarily with producers, supply chains, and public institutions. Our approach empowers individuals with transparent information and accessible alternatives, while simultaneously advocating for structural policy changes at the municipal level. This dual approach, bottom-up empowerment combined with top-down institutional reform, is consistent with both the Doughnut framework and recent research on food systems transformation (Morgane 2025; Feigin et al. 2025).

3. Vienna's Existing Food Policy Landscape

Vienna has a robust foundation of food-related policy that our proposal builds upon:

- **Food Action Plan ("Wien isst G.U.T.")** (2020): Eight action areas including green procurement, organic production, and food waste reduction. Vienna provides approximately 100,000 hot meals daily through

public institutions. The associated ÖkoKauf+ programme sets binding sustainability standards for all municipal food and catering services (Food Action Cities 2024).

- **Vienna Food Policy Council (Ernährungsrat Wien):** Civil-society body with ~50 members and four working groups. Vienna is also a Milan Urban Food Policy Pact signatory. Notably, the Council currently lacks dedicated digital tools for citizen engagement (Ernährungsrat Wien 2024), a gap our toolkit addresses.
- **National Action Plan for Sustainable Public Procurement (naBe):** Federal binding criteria with organic procurement targets reaching 55% by 2030. Approximately 450,000 people eat daily in public-sector canteens across Austria (BMLUK 2024).

Vienna also operates complementary programs (“Natürlich gut essen” sustainable gastronomy, SUM-Food urban-rural supply chains, WeltTellerFeld educational space) and a growing food cooperative sector: MILA, a Vienna-based cooperative supermarket with over 1,400 members, alongside Morgenrot and Um’s Eck (Hameter 2025; Food Action Cities 2024). Our gap analysis reveals that Vienna currently lacks: (a) a consumer-facing digital tool for food material footprint transparency, (b) material footprint scoring within procurement frameworks, and (c) financial or spatial support for food cooperatives. Our toolkit targets precisely these gaps.

4. Proposed Solution: The Vienna Food Footprint Toolkit

We propose a two-level solution that combines a consumer-facing digital tool with municipal policy recommendations. The primary sector focus is Consumer Goods (food), with Public Infrastructure (community kitchens, food cooperatives, institutional catering) as a critical supporting lever.

4.1 The App: “Your Food Footprint”

We have developed a prototype digital application (see Appendix A for screenshots) designed to empower Vienna residents to understand and reduce their food-related material footprint. The app includes five core features:

- **Home Dashboard:** Tracks the user’s personal food material footprint against Vienna’s target, with gamification (Impact Points, tiered achievements) and a “Vienna Impact” card showing aggregate city-wide reduction if individual actions scale. A social sharing feature lets users post milestones, reframing online culture toward sustainability achievements and leveraging peer influence.
- **Product Scanner:** Barcode scanning reveals a product’s Material Footprint Index (MFI, 0-100 scale) plus CO₂, water, land use, and material demand indicators, drawing on Eurostat, Statistik Austria, and peer-reviewed LCA databases.
- **Smart Food Swap:** Suggests lower-impact alternatives when a high-footprint product is scanned, e.g., Beef Burger (MFI 90) vs. Lentil Burger (MFI 25), a 72% reduction.
- **Vienna Food Map:** Interactive map of nearby sustainable food options: farmers markets, food cooperatives (e.g., MILA), and zero-waste shops, connecting the digital experience to Vienna’s physical food infrastructure.
- **Policy Impact Simulator:** Models city-wide scenarios by adjusting participation rate and diet shift frequency, projecting material footprint reductions under three scenarios (see Section 5).

4.2 Key Sufficiency Policy Tools

The app alone is not sufficient. It must be embedded within a broader policy framework. We propose three complementary policy tools for municipal implementation:

Tool 1: Consumer Transparency and Empowerment (the App): The digital tool described in Section 4.1, to be developed in partnership with the City of Vienna. It makes the invisible material footprint of food visible and actionable, framing choices as empowerment rather than obligation.

Tool 2: Municipal Procurement Reform for Plant-Forward Public Catering: Vienna serves approximately 100,000 meals daily through schools, hospitals, and care facilities (Food Action Cities 2024). We propose expanding ÖkoKauf+ and naBe criteria to include material footprint targets for institutional menus: at least 50% plant-forward options, material footprint criteria alongside existing organic and animal welfare standards, and annual material footprint reporting. Public procurement is a high-impact lever operating at institutional scale: Austria’s public-sector canteens serve 450,000 meals daily, representing over €330 million annually (BMLUK 2024). This ensures the burden of change does not rest on consumers alone.

Tool 3: Community Food Infrastructure Support: Vienna’s food cooperatives (MILA, Morgenrot, Um’s Eck) demonstrate that alternative food distribution models are viable, with producers actively seeking cooperative partnerships (Hameter 2025). However, cooperatives currently receive no municipal subsidies and struggle to find affordable space (Hameter 2025). We propose: subsidized space or reduced licensing fees for cooperatives and CSA schemes; a “Vienna Food Cooperative Starter Kit” (ranging from handbooks and mentorship to shared digital platforms and bulk purchasing networks, see Appendix C); and integration of cooperative locations into the app’s Vienna Food Map. Community-level infrastructure has stronger sufficiency effects than top-down regulation alone, shifting consumption norms at the household level (Morgane 2025; Feigin et al. 2025).

5. Impact Scenario: Quantified Material Footprint Reduction

5.1 Model Inputs

Parameter	Value	Source
Austria material footprint	~23 t/capita/year (Austria); ~14 t/capita/year (Vienna)	Circular Vienna 2024, p. 8
Food share of material footprint	20%	European Environment Agency 2024
Animal products share of food footprint	75% (land) / 76% (carbon)	de Schutter and Bruckner 2016; Frey and Bruckner 2021
Vienna population	~2,000,000	Statistik Austria

For additional supporting data (dietary shift potentials, land and carbon footprint breakdowns, GHG comparisons), see Appendix D.

5.2 Methodology

We model the impact of partial dietary shifts, specifically, replacing a number of high-footprint (meat/animal-heavy) meals per week with low-footprint (plant-based) alternatives. From the inputs above, the food material footprint is ~4.6t/capita/year (23×0.20), of which 3.45t is attributable to animal products (4.6×0.75). This allocation uses land and carbon footprint shares as a proxy for material footprint share: animal products account for 75% of Austria’s food land footprint (de Schutter and Bruckner 2016) and 76% of Austria’s food carbon footprint (Frey and Bruckner 2021). Because animal agriculture is resource-intensive across all environmental indicators — land, carbon, water, and upstream material inputs (feed, fertiliser, transport) - we treat the 75% figure as a reasonable approximation for material footprint allocation, while acknowledging this is a simplification. Based on average Austrian meat consumption of approximately 800g per week (de Schutter and Bruckner 2016), we estimate approximately 7 meals per week contain significant animal protein content.

Replacing 2 animal-heavy meals per week with plant-based alternatives reduces animal product consumption by approximately 29% (2 out of 7). The gross reduction in animal-based footprint is therefore $29\% \times 3.45 \approx 1.00\text{t/capita/year}$. However, replacement plant-based meals are not footprint-free. A systematic review of 210 dietary scenarios across 63 studies found that vegan diets achieve a median GHG reduction of 45%, and that reductions are broadly proportional to the magnitude of animal-based food restriction (Aleksandrowicz et al. 2016). Using this as an upper-bound net replacement ratio (i.e., plant-based replacements carry roughly 25% of the footprint of the animal meal they replace): $1.00 \times 0.75 \approx 0.75$ tons net per-person reduction per year. Replacing 3 meals per week (43% reduction) yields approximately 1.11 t per year by the same method. These figures are consistent with the WWF healthy-diet scenario, which models a comparable dietary shift and finds a 28% reduction in land footprint and 22% in GHG emissions (de Schutter and Bruckner 2016). Note: our model applies GHG-derived reduction ratios to a mass-based material footprint. This is a methodological simplification; however, because the upstream material demand of animal products (feed crops, fertiliser, water, land) is the primary driver of both their mass-based and impact-based footprints, the direction and approximate magnitude of reduction are robust even if the precise figure carries uncertainty. Our estimates are further conservative because Vienna's consumption-based material footprint (14t) may undercount upstream material flows that are difficult to allocate at the city level: a Viennese person eating beef drives the same material extraction (feed, fertiliser, land) in Lower Austria, Brazil, or Argentina as any other Austrian consumer.

5.3 Three Scenarios for Vienna

Scenario	Participation	Meals shifted/week	People involved	Reduction per person	City-wide reduction
Conservative	10%	2	200,000	0.75 t/year	~150,000 t/year
Moderate	25%	2	500,000	0.75 t/year	~375,000 t/year
Ambitious	50%	3	1,000,000	1.11 t/year	~1,110,000 t/year

5.4 What This Means

Under the moderate scenario, Vienna's per capita material footprint would decrease by approximately 0.19 tons (375,000 / 2,000,000). If Vienna also shifts its 100,000 daily public meals (school, hospital, and care-home canteens) toward plant-forward menus, reducing animal product content by 50%, an additional ~15,000 tons/year is achievable (100,000 meals/day x 0.6 kg savings x 250 days), bringing the combined moderate scenario to approximately 390,000 tons/year, or 0.20 tons per capita.

Vienna's material footprint must decrease from approximately 14 tons to 7 tons per capita. Food-sector dietary shifts at the ambitious level would contribute approximately 0.55 tons, or about 7.9% of this required reduction. Several considerations put this in perspective:

1. Our model is deliberately conservative. The WWF healthy-diet scenario (meat from 800g to 377g per week) achieves a 28% reduction in food land footprint and 22% in GHG emissions (de Schutter and Bruckner 2016). Our 2-3 meal replacement model captures only a fraction of this potential.
2. Material footprint by mass understates the true impact. Food accounts for approximately 20% of material footprint by mass, but approximately 49% of the EU's total consumption footprint across all environmental impact categories (European Commission JRC 2023).
3. These estimates exclude supply-chain restructuring effects. Research shows that when 40% of the population shifts diets, production systems restructure and environmental benefits approach those of universal adoption (Morgane 2025).
4. Dietary shifts deliver co-benefits beyond material footprint: up to 80% reduction in land use, up to 70% in GHG emissions, and improved public health outcomes (Aleksandrowicz et al. 2016; Feigin et al. 2025).

6. Scalability: A Model for Other European Cities

This toolkit is designed to be replicable across any European city with public catering infrastructure. Several existing networks could serve as dissemination channels: CLEVERFOOD (Horizon Europe, 2023-2026), a Eurocities-coordinated network funding urban food system transformation plans (Eurocities 2024); the Milan Urban Food Policy Pact, signed by over 200 cities including Vienna (Food Action Cities 2024); and the Doughnut Economics Action Lab, adopted by over 50 cities globally (DEAL 2024). The app's architecture supports localization, the procurement framework builds on EU-wide standards (naBe, EU Green Public Procurement criteria), and the cooperative model has proven replicable across Austria (Hameter 2025).

7. Conclusion

Vienna has both the institutional infrastructure and the political ambition to lead on food-related material footprint reduction. Our proposal, the Vienna Food Footprint Toolkit, combines a consumer-facing digital tool with municipal procurement reform and community food infrastructure support. Grounded in Doughnut Economics and the principle of sufficiency, it empowers citizens without burdening them, reforms institutions where leverage is greatest, and builds community infrastructure that makes sustainable choices the easy default.

The evidence is clear: dietary shifts toward plant-based foods represent one of the most impactful individual-level actions for reducing material footprint (Feigin et al. 2025; Aleksandrowicz et al. 2016), and when combined with institutional procurement reform, the effects are both significant and scalable. Our quantified impact scenario shows that even moderate participation rates can achieve meaningful reductions, approximately 390,000 tons of material footprint reduction annually for Vienna alone.

Bibliography

- Aleksandrowicz, Lukasz, Rosemary Green, Edward J. M. Joy, Pete Smith, and Andy Haines. 2016. "The Impacts of Dietary Change on Greenhouse Gas Emissions, Land Use, Water Use, and Health: A Systematic Review." *PLOS ONE* 11 (11): e0165797. <https://doi.org/10.1371/journal.pone.0165797>.
- BMLUK (Federal Ministry of Agriculture, Forestry, Regions and Water Management). 2024. "Federal and Provincial Governments Switch to Regional Procurement." <https://www.bmluk.gv.at/en/topics/food/federal-and-provincial-governments-switch-to-regional-procurement.html>.
- Circular Vienna. 2024. *Circular Vienna: The Strategy to Save Resources in Our City (Short Version)*. City of Vienna. <https://www.wien.gv.at/spezial/kreislaufwirtschaft-strategie-en/>.
- de Schutter, Liesbeth, and Martin Bruckner. 2016. *Food Consumption, Land Use and Land Use Change Emissions: Second Study on Environmental Effects of Austria's Food Consumption*. Technical Report. Vienna: WWF Austria and WU Vienna University of Economics and Business. https://www.wwf.at/wp-content/cms_documents/wwf-ernaehrungsstudie_langfassung.pdf.
- Doughnut Economics Action Lab (DEAL). 2024. "Doughnut in Local Governments: A Global Overview." <https://doughnuteconomics.org/stories/doughnut-in-local-governments-a-global-overview>.
- Ernährungsrat Wien (Vienna Food Policy Council). 2024. "Ernährungsrat Wien." Urgenci Community Supported Agriculture Network. <https://hub.urgenci.net/beacons/ernaehrungsrat-wien/>.
- Eurocities. 2024. "CLEVERFOOD: Connected Labs for Empowering Versatile Engagement in Radical Food System Transformation." <https://eurocities.eu/projects/cleverfood/>.
- European Commission Joint Research Centre (JRC). 2023. "Consumption Footprint Platform: Farm to Fork - Evolution of the Environmental Impacts of Food Consumption (2010–2023)." European Platform on Life Cycle Assessment (EPLCA). <https://eplca.jrc.ec.europa.eu/ConsumptionFootprintPlatform.html>.
- European Environment Agency. 2024. "From Data to Decisions: Material Footprints in European Policy Making." October 9. <https://www.eea.europa.eu/en/analysis/publications/material-footprints-in-european-policy-making>.
- Feigin, Svetlana V., David O. Wiebers, Daniel T. Blumstein, et al. 2025. "Solving Climate Change Requires Changing Our Food Systems." *Oxford Open Climate Change* 5 (1): kgae024. <https://doi.org/10.1093/oxfclm/kgae024>.
- Food Action Cities. 2024. "Innovative Food Action Plan: Elevating Quality and Sustainability - Vienna, Austria." <https://foodactioncities.org/case-studies/innovative-food-action-plan-elevating-quality-and-sustainability-vienna-austria/>.
- Frey, Verena, and Martin Bruckner. 2021. "The Global Carbon Footprint of Austria's Consumption of Agricultural (Food and Non-Food) Products." *Ecological Economic Papers* No. 41/2021. WU Vienna University of Economics and Business. <https://doi.org/10.57938/7cd7ee70-111e-4784-80e9-84965bf2a371>.
- Hameter, Margherita Luisa (MILA Food Cooperative). 2025. Interview conducted by project team. Vienna, March 2025.
- Kraxner, Florian, Werner Zollitsch, Charlotte Kottusch, et al. 2024. "Kapitel 5. Mitigation des Klimawandels." In *APCC Special Report: Landnutzung und Klimawandel in Österreich*, edited by Robert Jandl, Ulrike Tappeiner, Cecilie Birgitte Foldal, and Karlheinz Erb. Springer. https://doi.org/10.1007/978-3-662-67864-0_7.
- Morgane, Guillaume Aurore. 2025. "Empowering Dietary Shifts in Food Systems Transformation: From an Efficiency to a Sufficiency Paradigm." PhD dissertation, KU Leuven, Faculty of Engineering Technology. Defended April 4, 2025.
- NetZeroCities. 2024. "The NetZeroCities Project: Accelerating Europe's Urban Climate Ambition." <https://netzerocities.eu/the-netzerocities-project/>.
- Raworth, Kate. 2017. *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*. London: Random House Business Books.

Rudolf, Claudia, and Mario Schmidt. 2025. "Efficiency, Sufficiency and Consistency in Sustainable Development: Conceptual Analysis and Implications." *Ecological Economics* 227: 108387.
<https://doi.org/10.1016/j.ecolecon.2024.108387>.

Statistik Austria. 2025. "Population at Beginning of Year/Quarter."
<https://www.statistik.at/en/statistics/population-and-society/population/population-stock/population-at-beginning-of-year/quarter>.

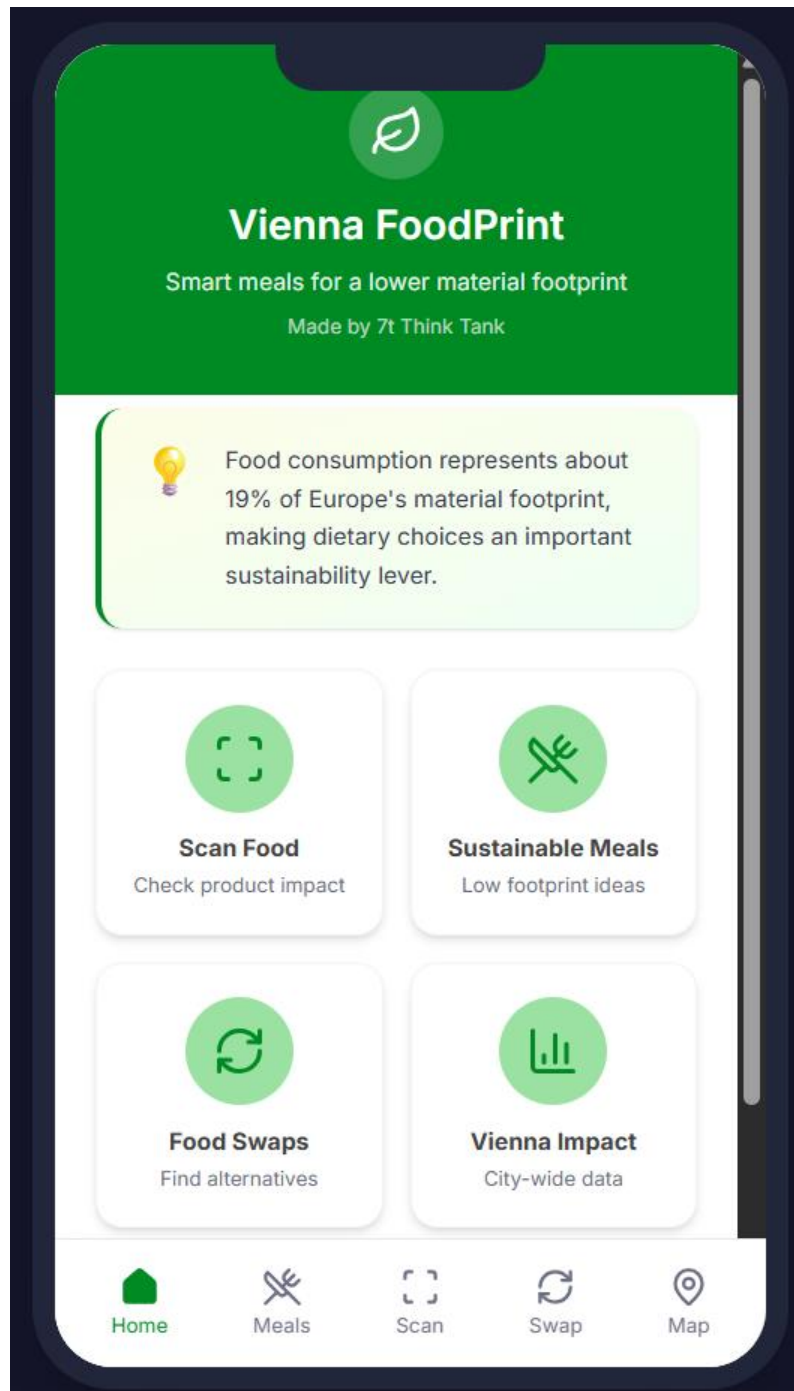
Appendix A: App Prototype

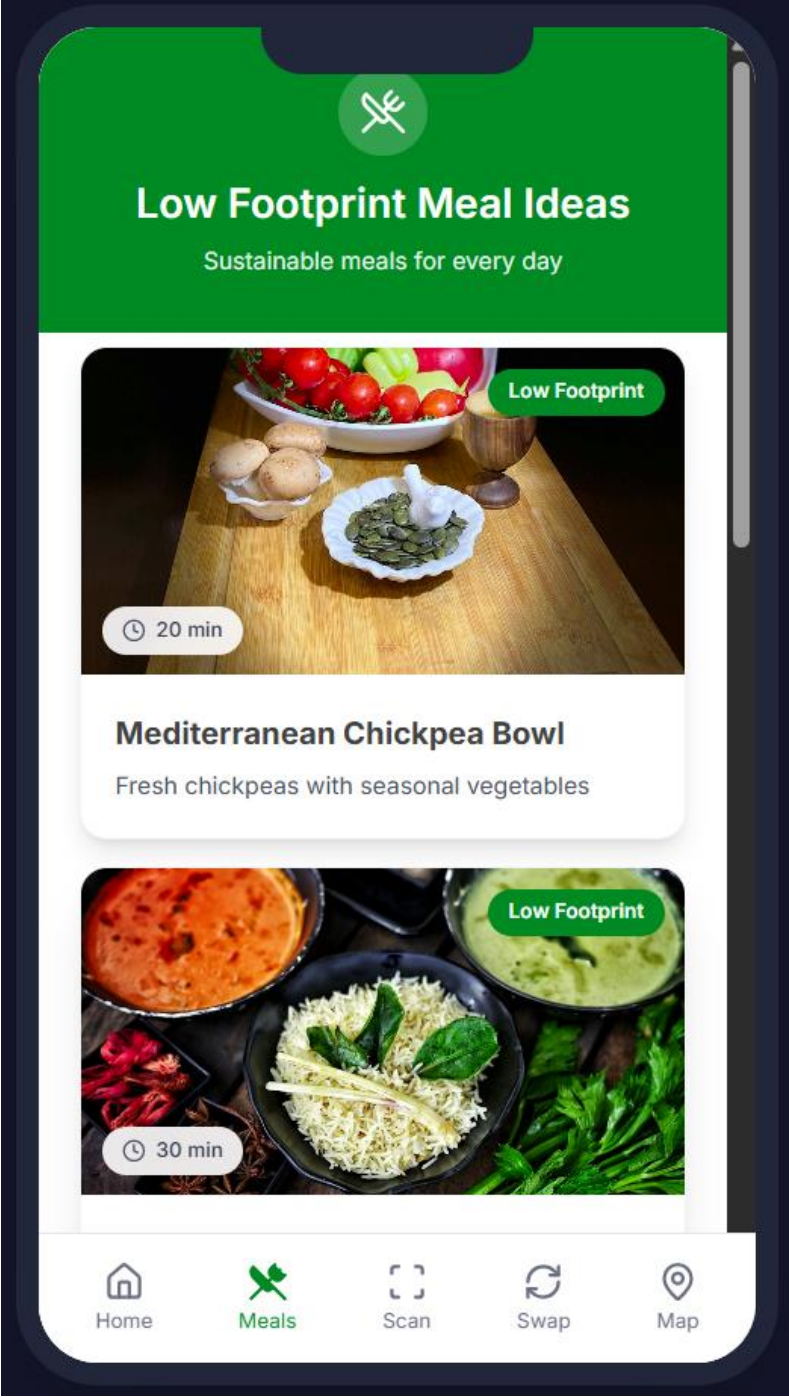
Interactive prototype available at: <https://id-panic-23110695.figma.site/>

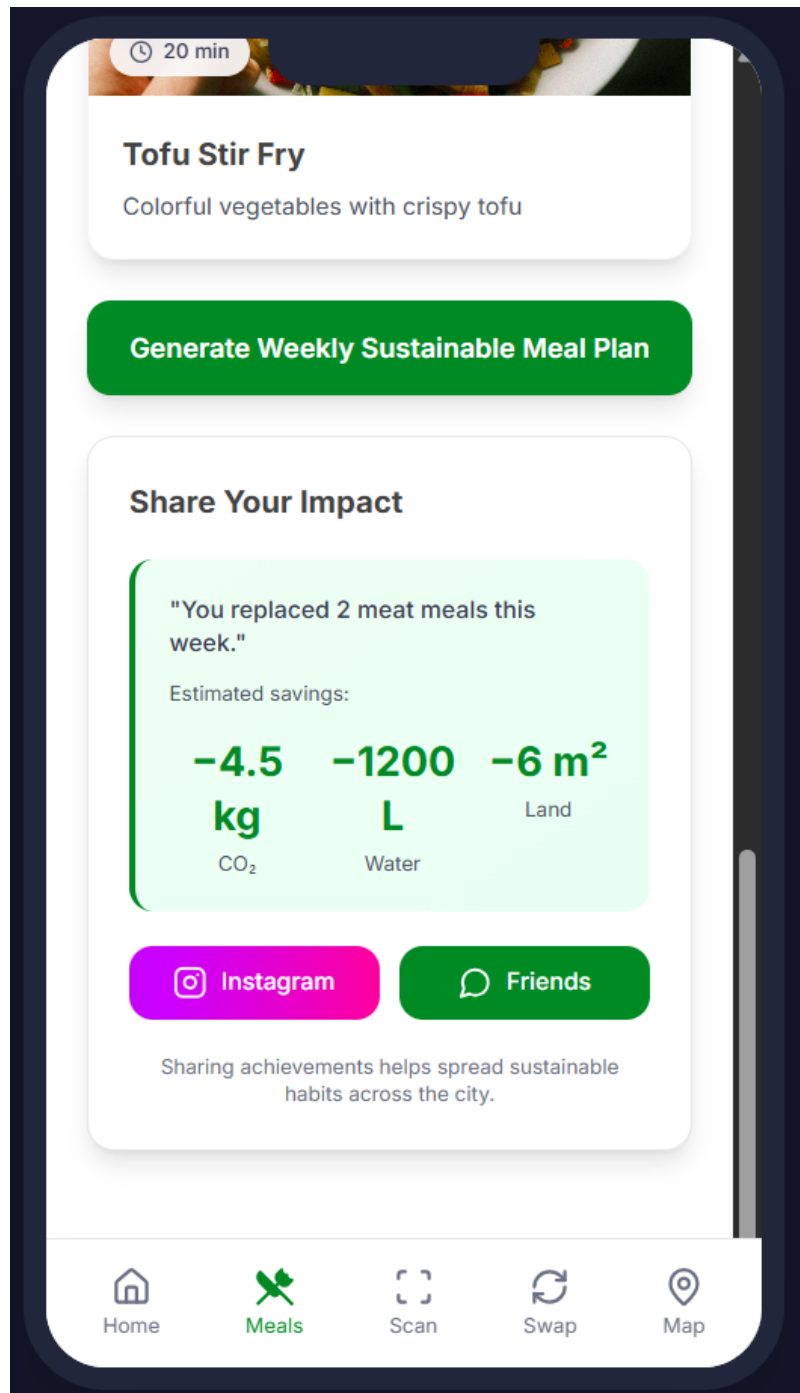
View video of prototype in action: <https://fazilebrahimi1.github.io/vienna-foodprint-app/>

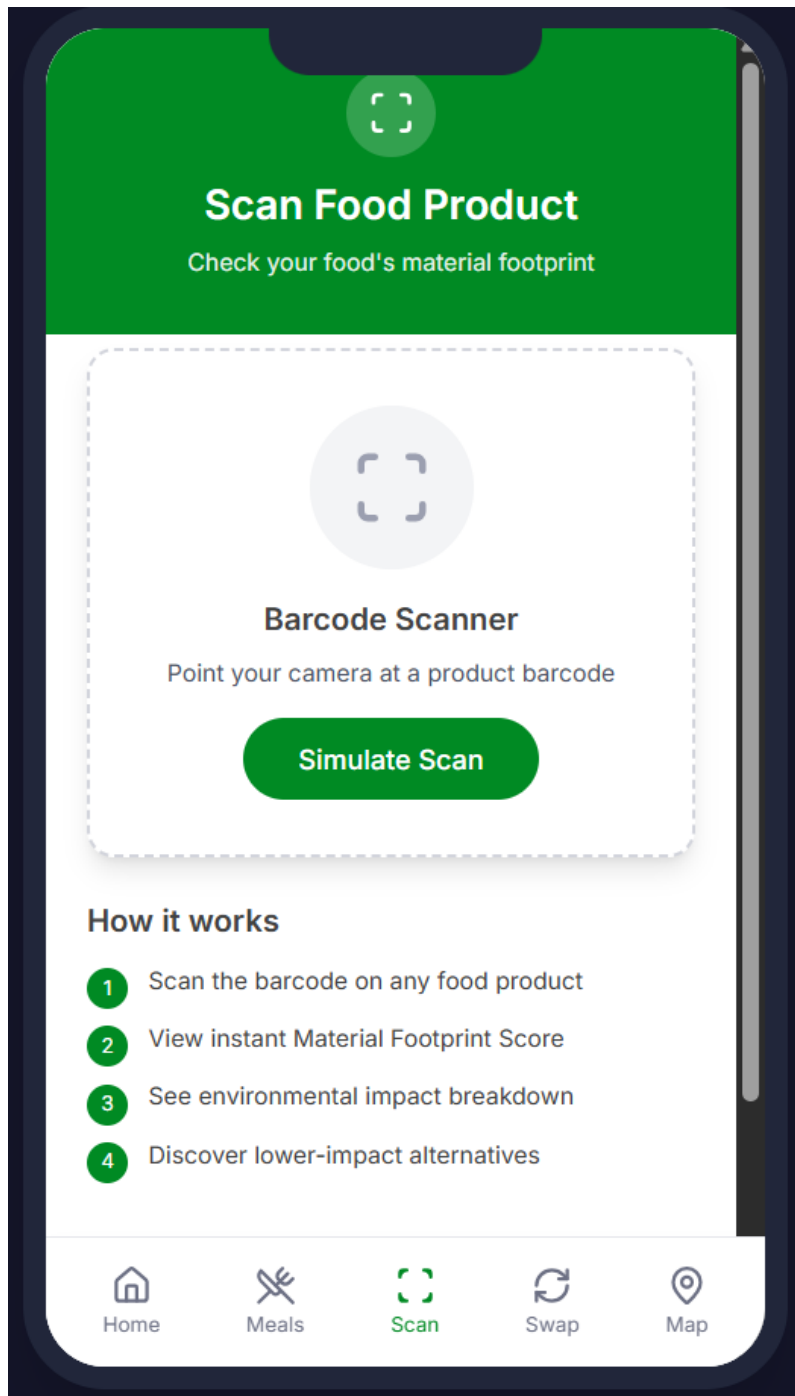
The prototype includes five screens: Home (dashboard), Meals, Scan (product barcode scanner), Swap (food alternative comparison), and Map (Vienna sustainable food locations).

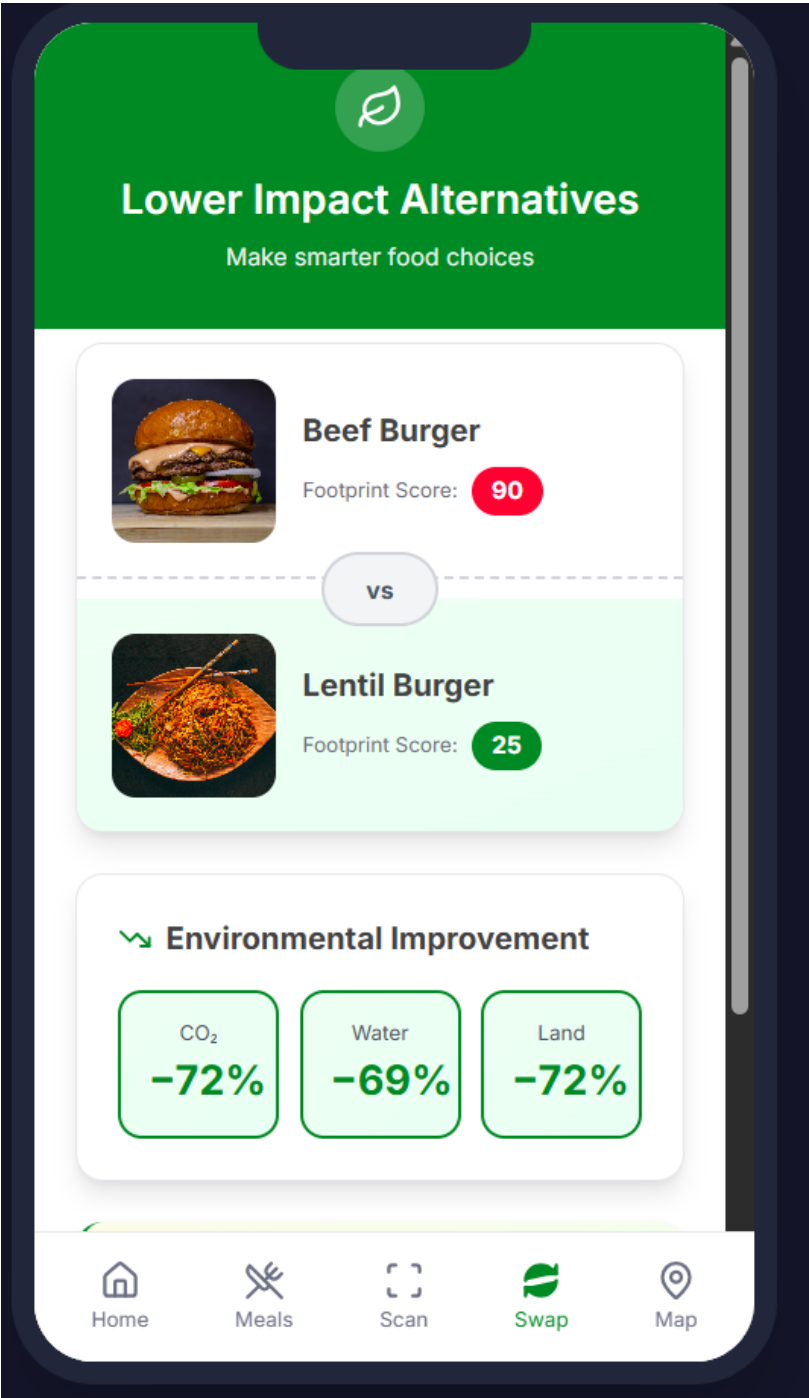
See screenshots below:

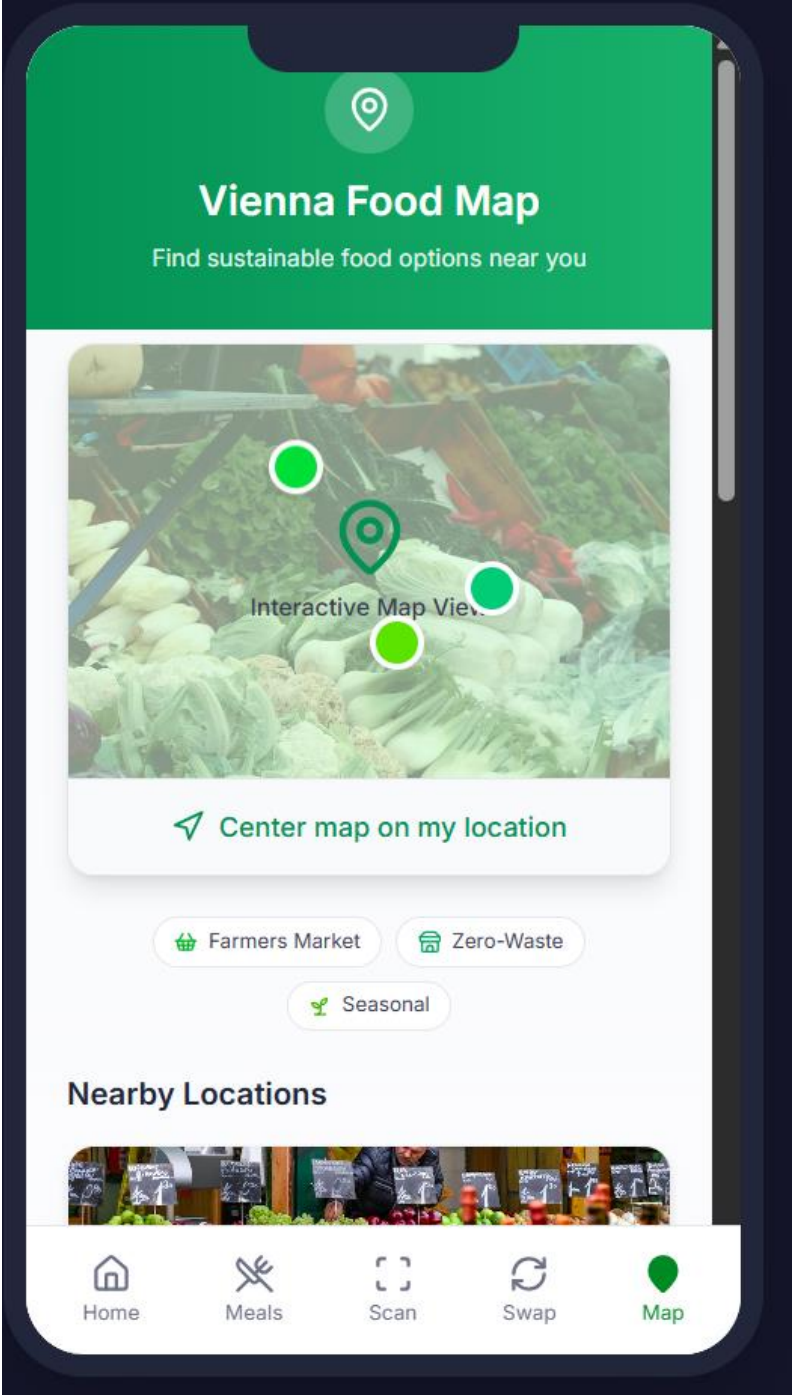












Appendix B: Data Sources for the App

- [Eurostat Material Flow Accounts](#)
- [Statistik Austria Material Flow Accounts and Agriculture and Forestry data](#)
- [AGRIBALYSE environmental lifecycle food database](#): LCA-based environmental indicators for 2,500+ food products across 16 impact categories
- [Vienna population statistics](#)
- [FAO Food Balances database \(FAOSTAT\)](#): Country-level food supply and consumption data from 2010 onwards, covering production, imports, exports, and per capita consumption quantities for all food commodities
- [EU Consumption Footprint Platform \(JRC/EPLCA\)](#): Life Cycle Assessment-based framework quantifying environmental impacts of EU food consumption across 16 impact categories for 45 representative food products, with data at EU and Member State level from 2010-2023

Appendix C: Vienna Food Cooperative Starter Kit: Components by Investment Level

Tier 1: Knowledge Resources (low cost, quick to produce) - Step-by-step handbook covering legal setup (Austrian Genossenschaft registration), governance templates (bylaws, one-member-one-vote structure), supplier onboarding checklists, and pricing model examples drawn from MILA and Morgenrot - Financial model template with startup costs, break-even calculator, and membership fee structures - Regulatory compliance checklist: food safety (Lebensmittelsicherheits- und Verbraucherschutzgesetz), hygiene requirements, insurance

Tier 2: Mentorship and Network (medium cost, high impact) - Buddy system pairing each new cooperative with an established one (MILA, Morgenrot, Um's Eck) for 6-12 months of guided setup - Shared supplier network allowing new cooperatives to access established producer relationships rather than starting from scratch - Quarterly meetups hosted through the Ernährungsrat Wien's existing "Upscaling and Coordination of Sustainable Food Networks" working group

Tier 3: Practical Infrastructure (higher cost, city involvement) - Standardized space fit-out guide (shelving, refrigeration, POS system specifications) with city-subsidized lease templates for cooperative retail space - Shared digital platform for inventory management, ordering, and member administration, potentially integrated with the app's Vienna Food Map - Branding toolkit with logo templates, social media starter pack, and a "Vienna Food Cooperative Network" quality badge

Tier 4: Systemic Integration (highest impact, longer-term) - Automatic listing of new cooperatives on the app's Vienna Food Map upon registration, providing immediate visibility to app users - Producer matchmaking registry where regional producers can signal interest and new cooperatives can find suppliers (building on the finding that producers actively approach MILA to distribute their products) - Cooperative-of-cooperatives purchasing network enabling bulk ordering across multiple neighborhood cooperatives, reducing per-unit costs and strengthening collective bargaining power

Appendix D: Supporting Data Summary

Parameter	Value	Source
Austria material footprint range	23 t/capita/year	Circular Vienna 2024, p. 8
Vienna material footprint range	14 t/capita/year	Circular Vienna 2024, p. 8
Vienna reduction targets	30% by 2030, 40% by 2040, 50% by 2050	Circular Vienna 2024, p. 8
Dietary shift reduction potential	Median -22% GHG, -28% land; vegan median -45% GHG	Aleksandrowicz et al. 2016
Omnivore vs. vegan GHG ratio	3:1	Kraxner et al. 2024
Plant-based diets land/water reduction	Up to 80%	Feigin et al. 2025
Austria food Land Footprint	3.1 million hectares (75% animal)	de Schutter and Bruckner 2016
~40% of food land footprint outside Austria	Import dependency	de Schutter and Bruckner 2016
Meat: 9% of food volume, 43% of emissions	Disproportionality ratio	de Schutter and Bruckner 2016
Healthy diet GHG reduction (direct)	22%	de Schutter and Bruckner 2016
Food share of Austria's carbon footprint	25-30% (29-33 Mt CO ₂ e/year)	de Schutter and Bruckner 2016
Food share of EU consumption footprint	~49% (composite LCA)	European Commission JRC 2023
Animal products: 76% of food carbon footprint	Austria-specific	Frey and Bruckner 2021