

Harmonizing Sustainability Approaches in the Food Industry: Processing, Packaging, and Industry 4.0

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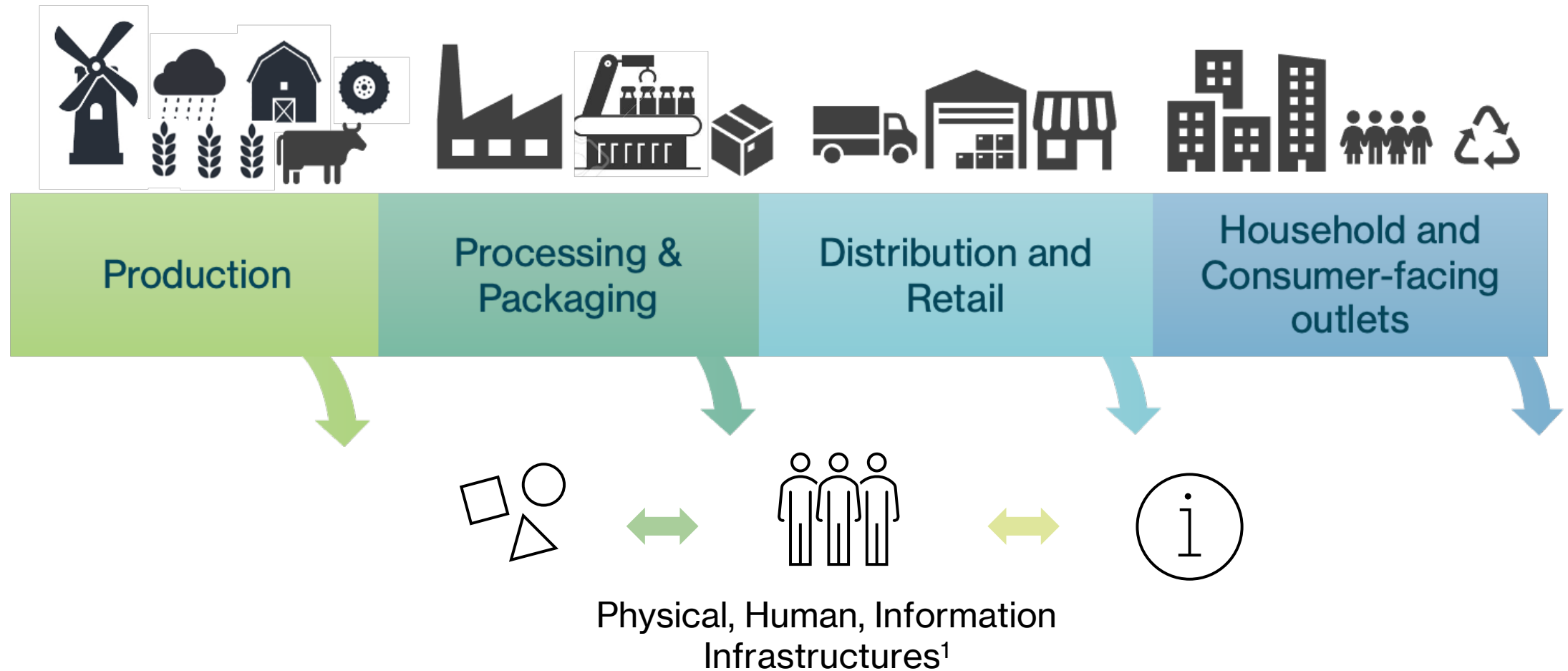


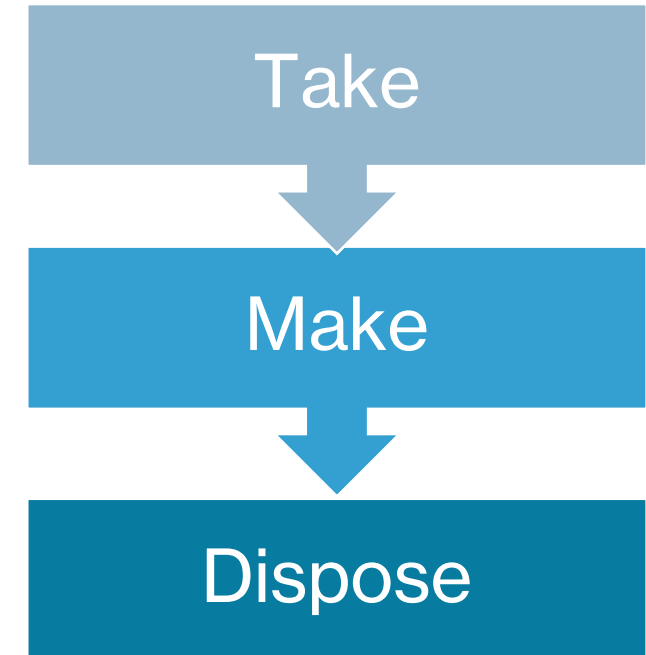
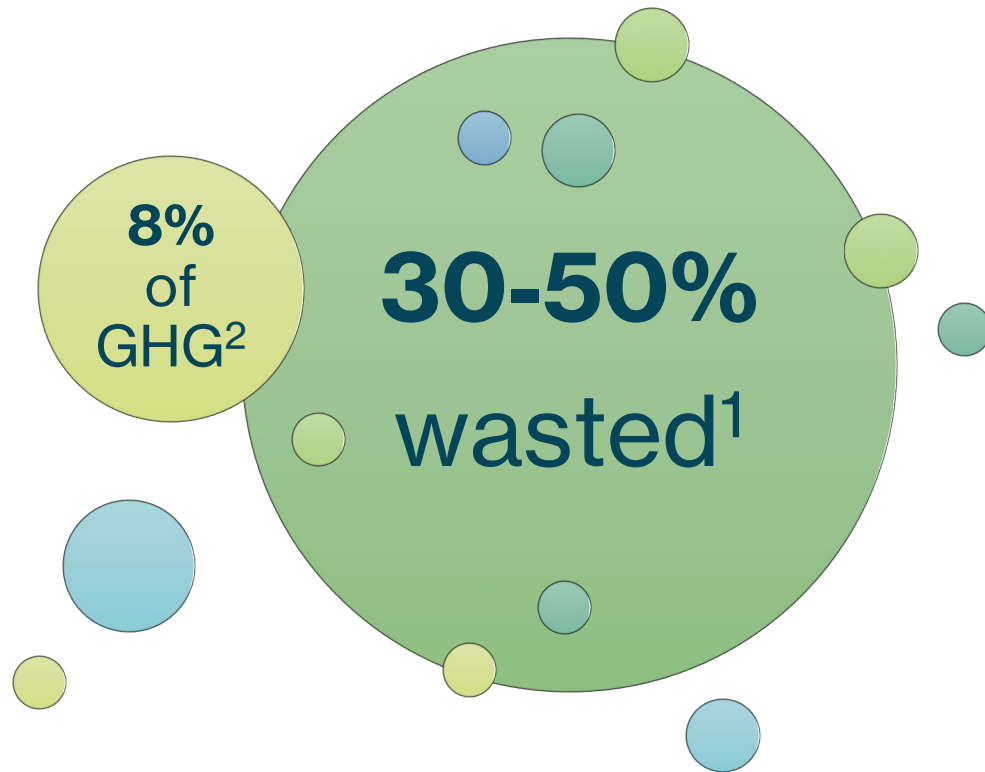
FUTURE OF FOOD FORUM
REDUCING THE CARBON FOOTPRINT OF FOOD SYSTEMS

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March 2, 2022

Sustainable Future of Food Systems



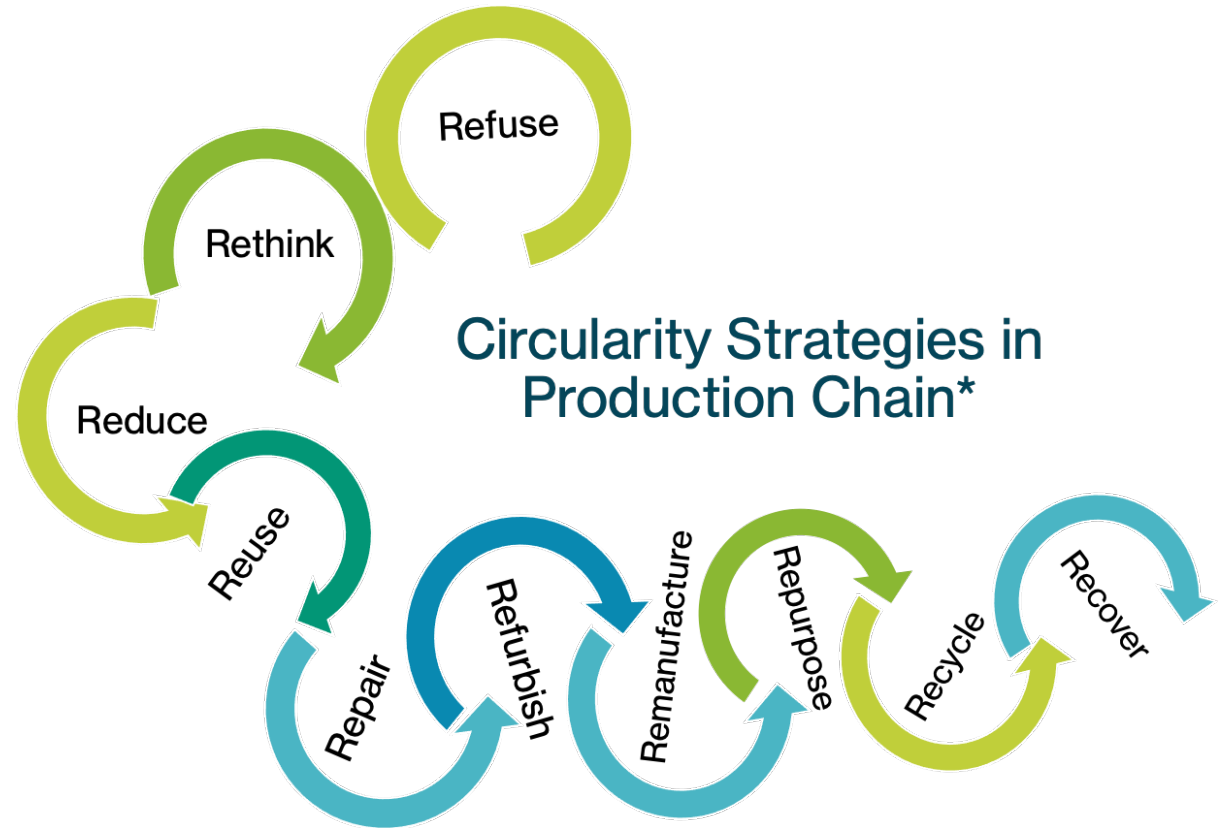


¹ Project Drawdown (2020)

² ReFED Roadmap to reduce US **food waste** by 20 percent

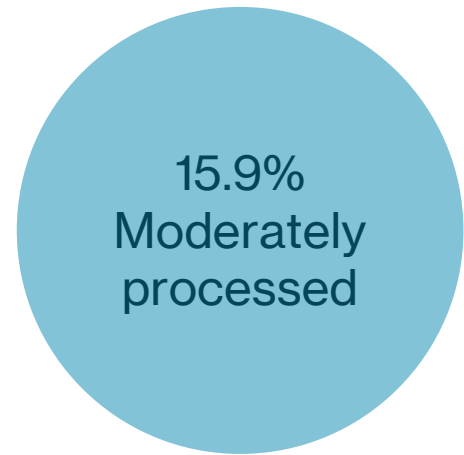


Source: Ellen MacArthur Foundation

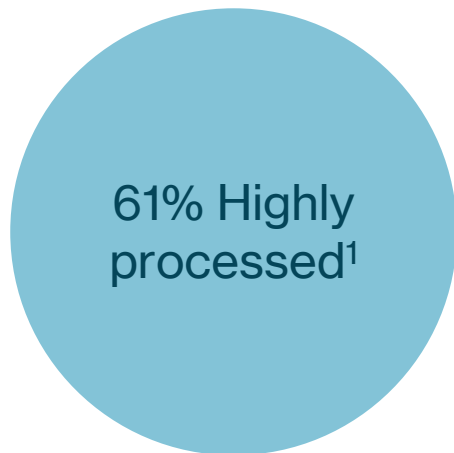


*Potting, J., Hekkert, M. P., Worrell, E., & Hanemaaijer, A. (2017). *Circular economy: measuring innovation in the product chain*

Processing



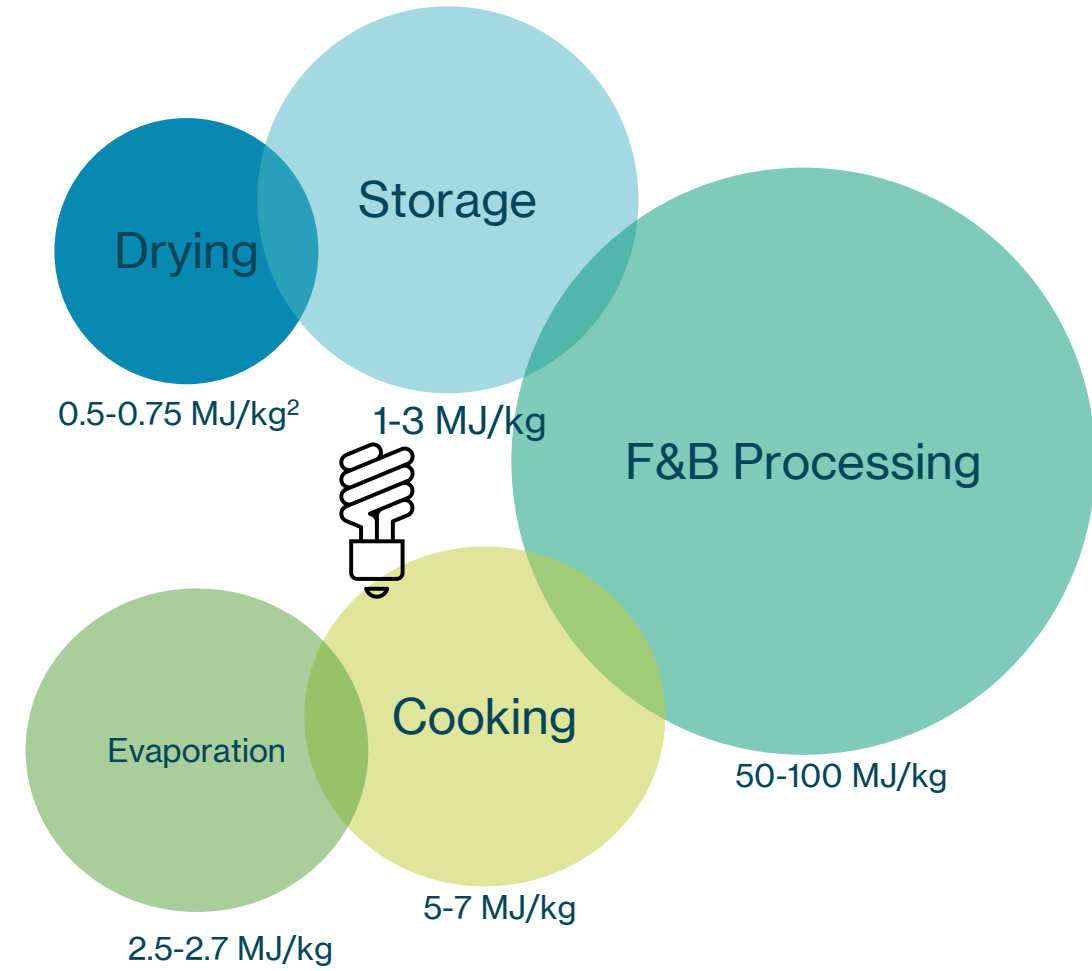
&



Energy embedded in consumption



10-15 Mt CO₂eq/year (FAO,2011)

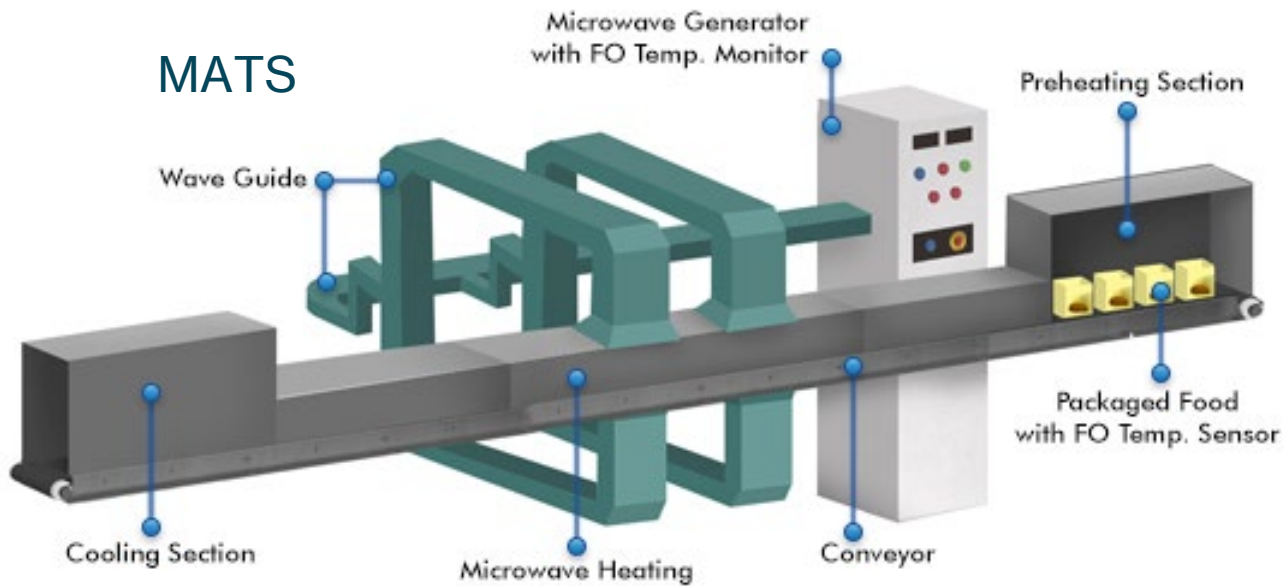


¹Poti et al. (2015) Journal of Clinical Nutrition, 101(6), 1251–1262

²Clairand, J. et al. (2020). "Review of energy efficiency technologies in the food industry...". *IEEE Access*, 8, 48015-48029

Processing

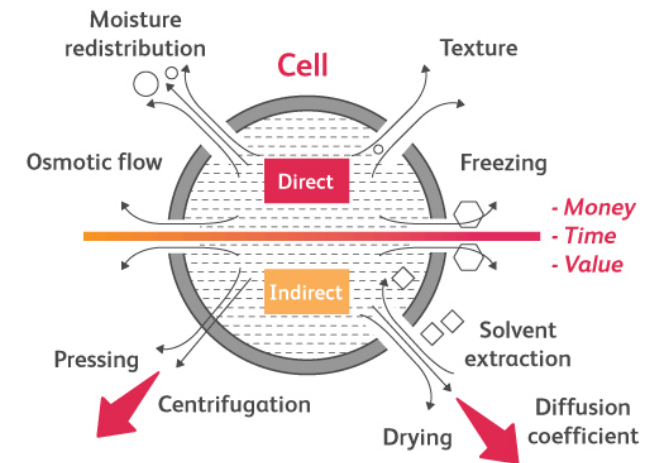
MATS



164 kt CO₂/year
40% waste heat recovery



Thermal



apfoodonline.com

Non-thermal

Packaging



Packaging \$180B industry in the US
Packaged food \$3,407B (US) by 2030 PRNewswire

Product	Packaging Relative Env. Impact (PREI)* Licciardello (2017)
Beef	1.2-6.5
Cheese	1.7
Coffee	10-15
Milk	3.3-13.9
Pasta	13-28
Wine	34-82
Beer	48-78

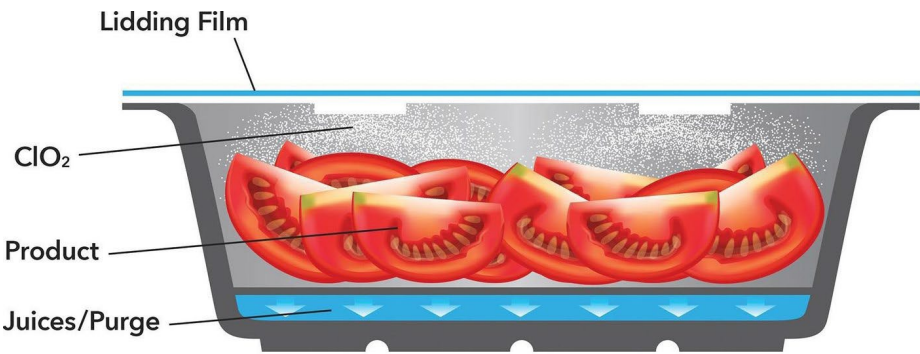
Expressed as GWP

Licciardello, F. (2017). Packaging, blessing in disguise. Review on its diverse contribution to food sustainability. *Trends in Food Science & Technology*, 65, 32–39.

Packaging

Smart use of packaging can mitigate Food Waste Issue

Solution	Emissions Reduction ^{ReFED} (Tons CO2e)
Package Design	3.57
Std. Date labels	2.73
Active/Intelligent Pkg	2.43
Portioning	11.5



Digitalization as key enabler of sustainability



Innovation with a Purpose: The role of technology innovation in accelerating food systems transformation

Figure 1: The 'Transformative Twelve' could deliver significant impacts to food systems by 2030

Changing the shape of demand

ALTERNATIVE PROTEINS



- Reduce GhG emissions by up to 950 megatonnes of CO₂ eq.
- Reduce freshwater withdrawals by up to 400 billion cubic metres
- Liberate up to 400 million hectares of land



FOOD SENSING TECHNOLOGIES FOR FOOD SAFETY, QUALITY, AND TRACEABILITY

- Reduce food waste by up to 20 million tonnes

NUTRIGENETICS FOR PERSONALIZED NUTRITION



- Reduce the number of overweight by up to 55 million

Promoting value-chain linkages



MOBILE SERVICE DELIVERY

- Generate up to \$200 billion of income for farmers
- Reduce GhG emissions by up to 100 megatonnes of CO₂ eq.
- Reduce freshwater withdrawals by up to 100 billion cubic metres

BIG DATA AND ADVANCED ANALYTICS FOR INSURANCE



- Generate up to \$70 billion of income for farmers
- Increase production by up to 150 million tonnes



IOT FOR REAL-TIME SUPPLY CHAIN TRANSPARENCY AND TRACEABILITY

- Reduce food loss by up to 35 million tonnes

BLOCKCHAIN-ENABLED TRACEABILITY



- Reduce food loss by up to 30 million tonnes

Future Workforce

- Future of the US agri-food industry workforce
- Introduction to sustainability and digitalization components
- Retiring generation
- Upcoming workforce differences
- Micro-credentials

A promotional poster for the USDA REEU Circular Economy & Digitalization program. The background is a vibrant green field of crops. A robotic hand is shown holding a bundle of wheat. The text is overlaid on the image in various colors and fonts. The main title is in large, bold, black letters. Below it, there are two lines of text in green and yellow. A large ampersand is used as a separator. The application and information details are in small black text. The logos for USDA and the University of Florida are in the bottom left. The deadline and 'APPLY NOW!' are in large, bold, yellow letters in the bottom right.

**USDA REEU
CIRCULAR
ECONOMY &
DIGITALIZATION**

LEARN CIRCULAR ECONOMY &
INDUSTRY 4.0 TOOLS
& JOIN RESEARCH IN A 10-WEEK
SUMMER PROGRAM at
the UNIVERSITY of FLORIDA

APPLICATION:
<https://go.ufl.edu/cdskillsreeu>

INFORMATION:
[CDSkillsREEU.com](https://cdskillsreeu.com)

Deadline April 15
**APPLY
NOW!**

USDA
UNIVERSITY of
FLORIDA

Thank you!



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AGRICULTURAL & BIOLOGICAL
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**FOOD SYSTEMS
INSTITUTE**