



SESSION 2

The Future is Local: How the FOX Project is Transforming Small-Scale Food Production



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Shorter, Greener, Smarter: Transforming the Food Chain with Innovative Technologies



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Local and healthy dried snacks in a mobile container

Malgorzata Nowacka
Warsaw University of Life Sciences (SGGW)



Local and healthy dried snacks in a mobile container

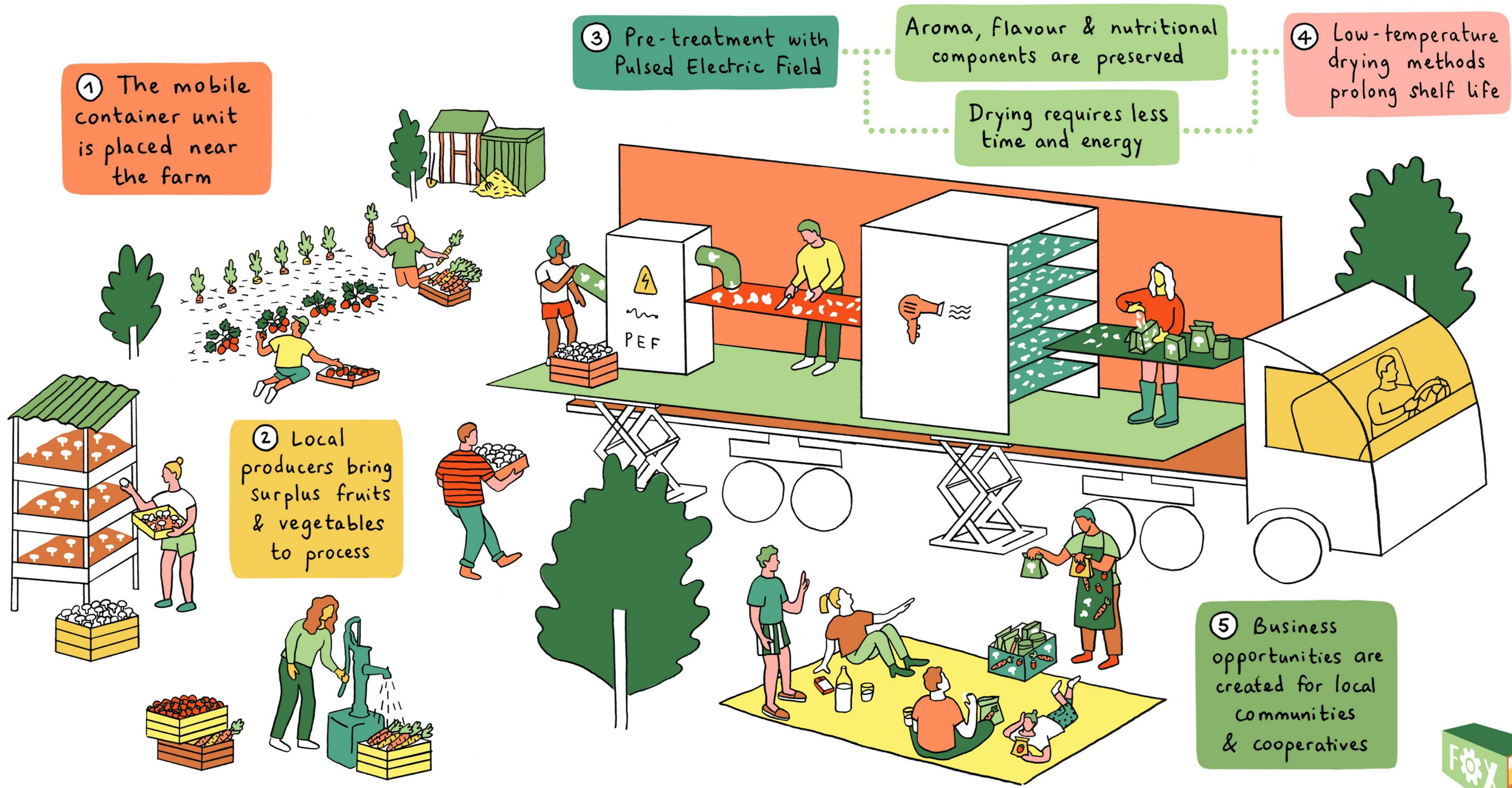


illustration : Fanny Monier

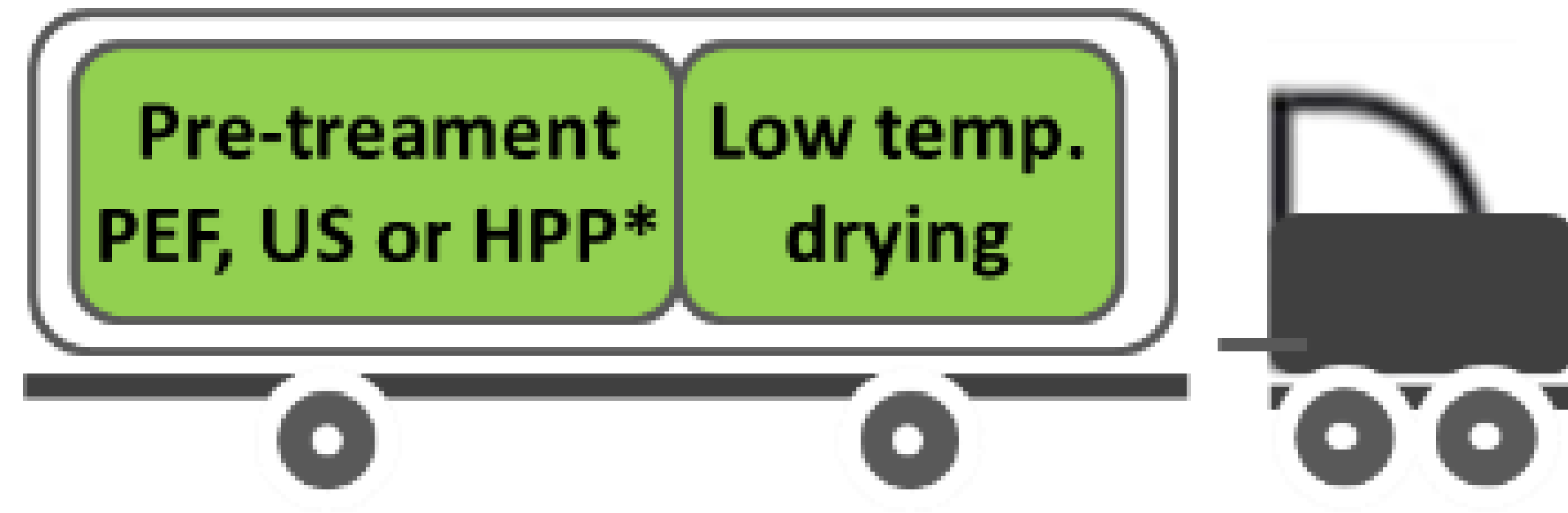




Mild drying



From science...



...to food production

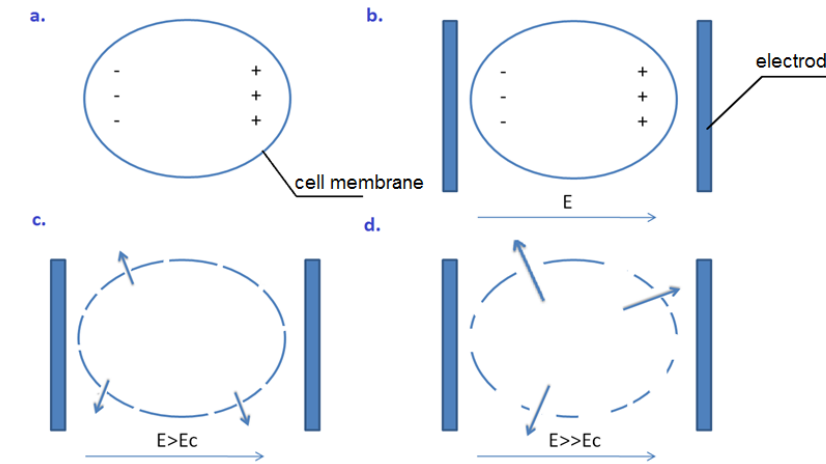




Different novel technologies

PEF

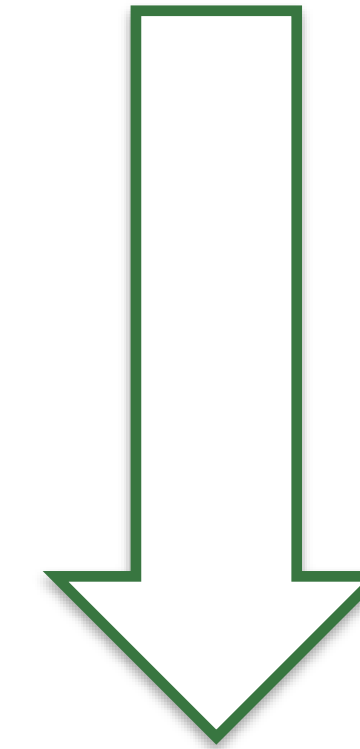
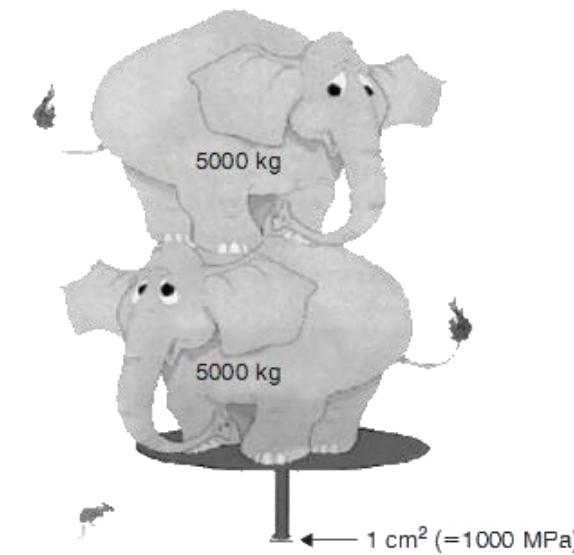
Pulsed Electric Field



Rupture of integrity of cell membrane

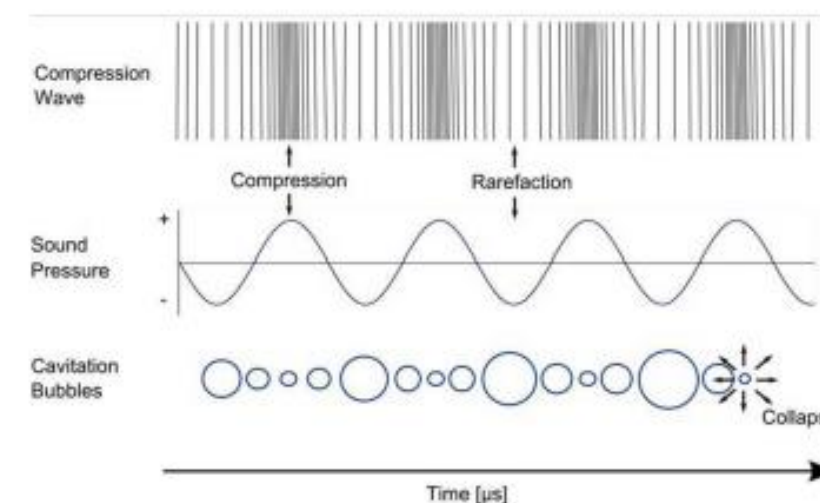
HPP

High Hydrostatic Pressure



Enhanced heat & mass transfer

US
UltraSound





Different methods of drying

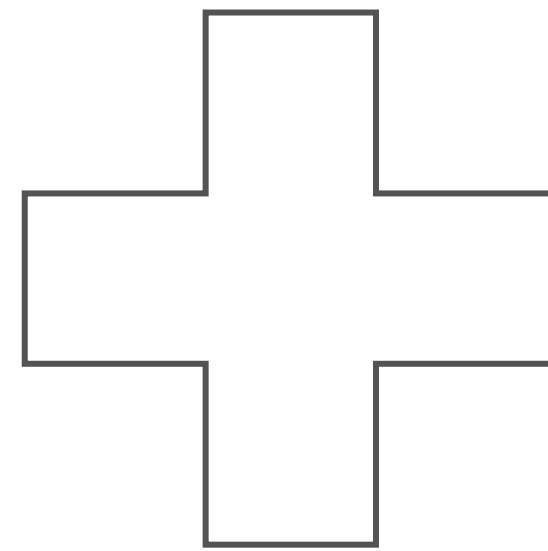
Novel technologies

✓ PEF

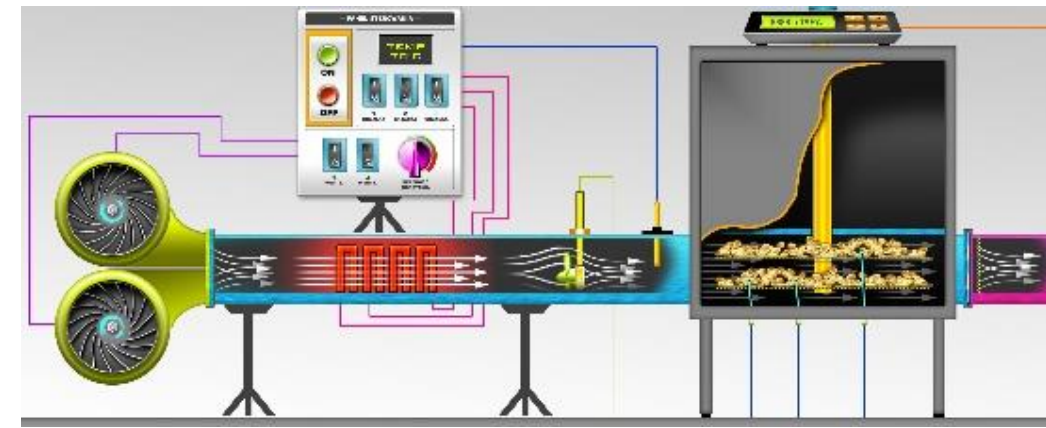
✓ HHP

✓ US

FLEXIBLE & MOBILE



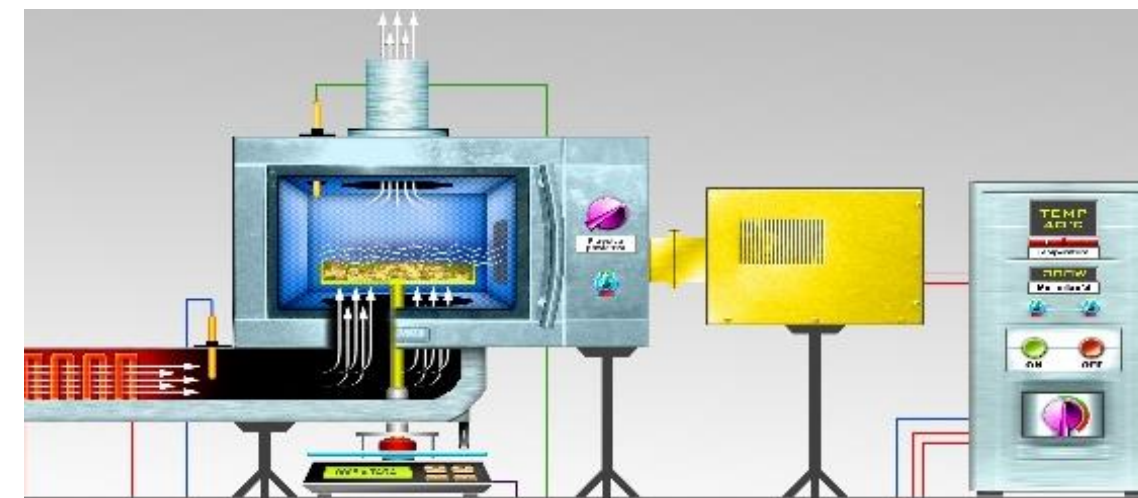
Low temperature air drying (CD) **Hot air**



Infrared drying (IR-CD) **IR lamps**



Microwave drying (MV-CD) **Microwave power**



Vacuum drying (VD) **Lack of air**



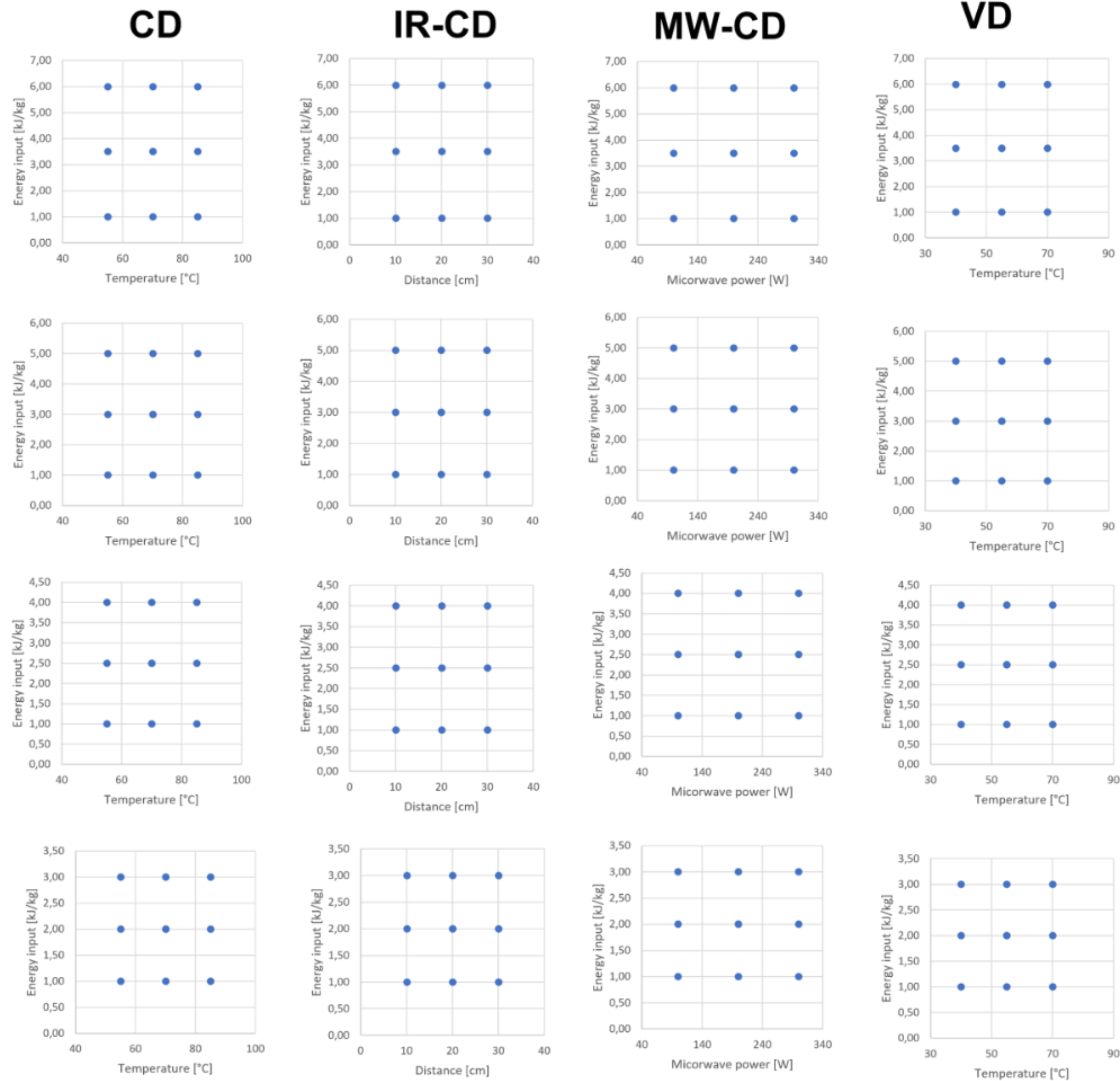
Shorter drying time!





Different parameters analyzed

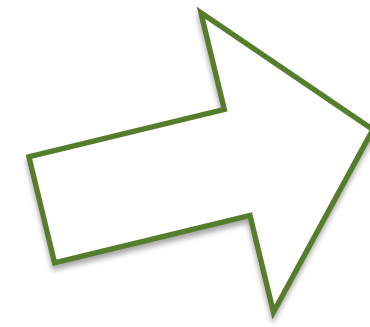
Different sources
Fruits
vegetables &
mushrooms





Results: Quality

Drying time shorter
by up to 24%



Specific Energy Consumption lower
by up to 27%



Optimization



Desirability:
Shortest drying time
The highest antioxidant activity

Factor Coding: Actual

drying time (min)

Design Points:

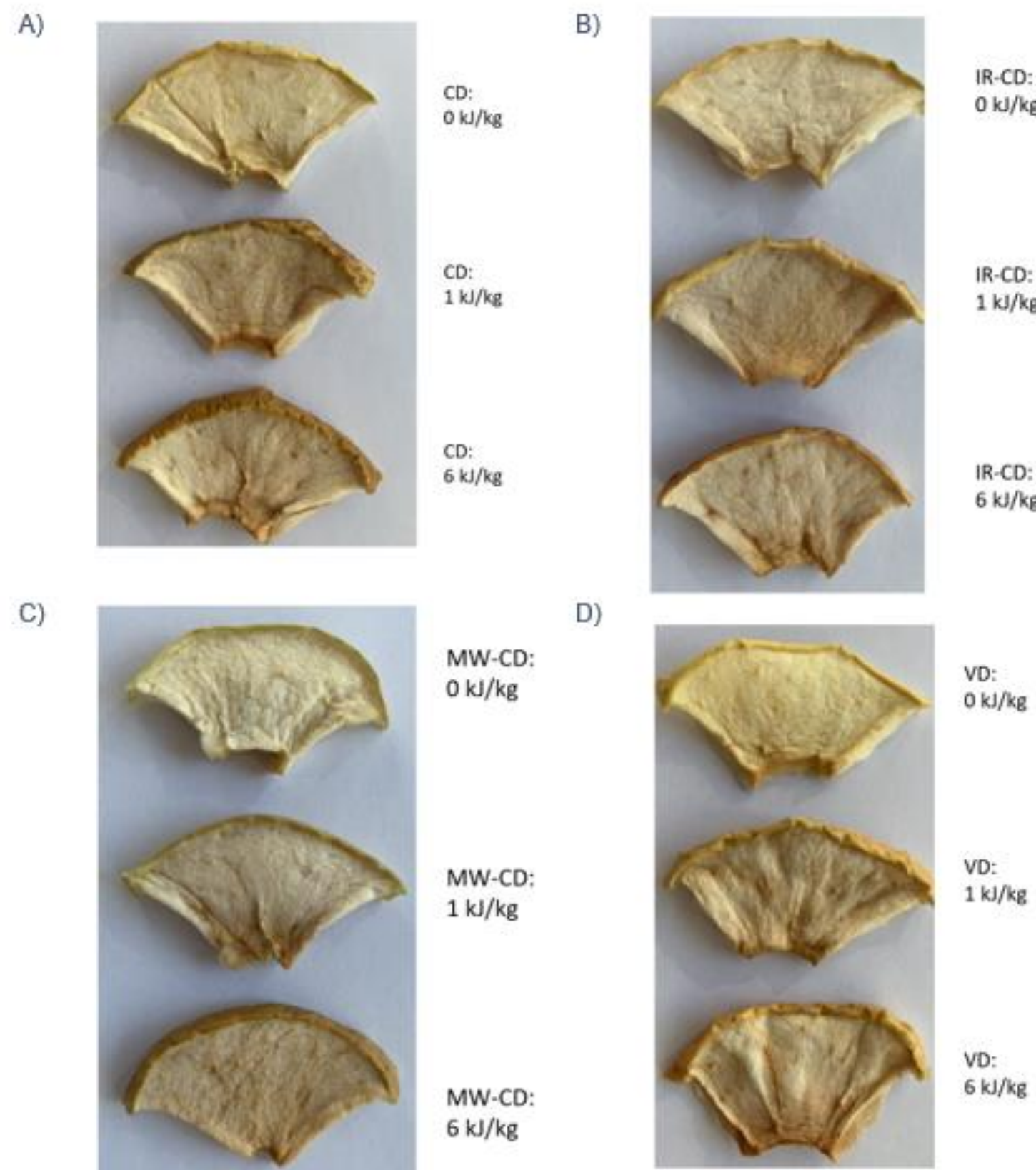
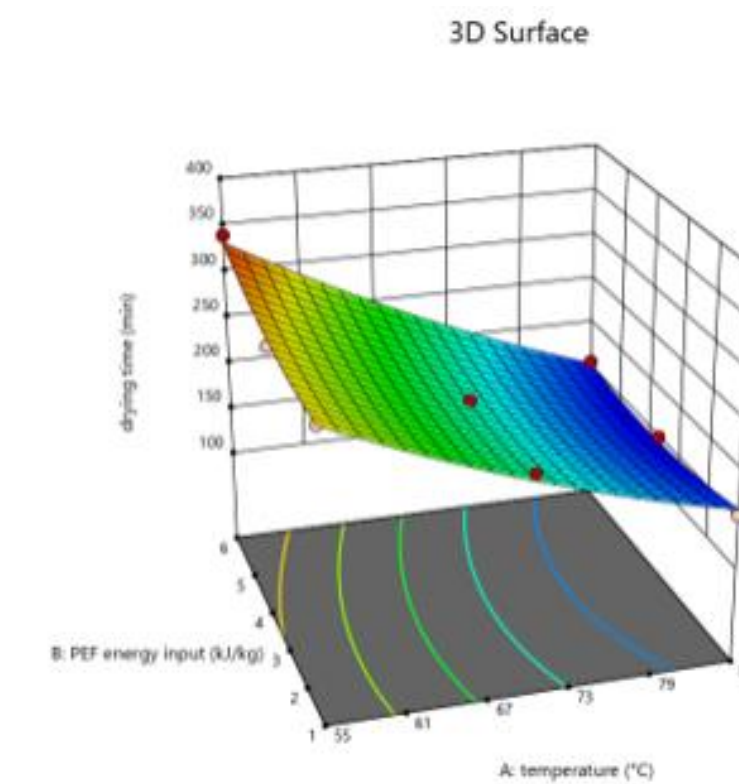
● Above Surface

○ Below Surface

150 340

X1 = A: temperature

X2 = B: PEF energy input

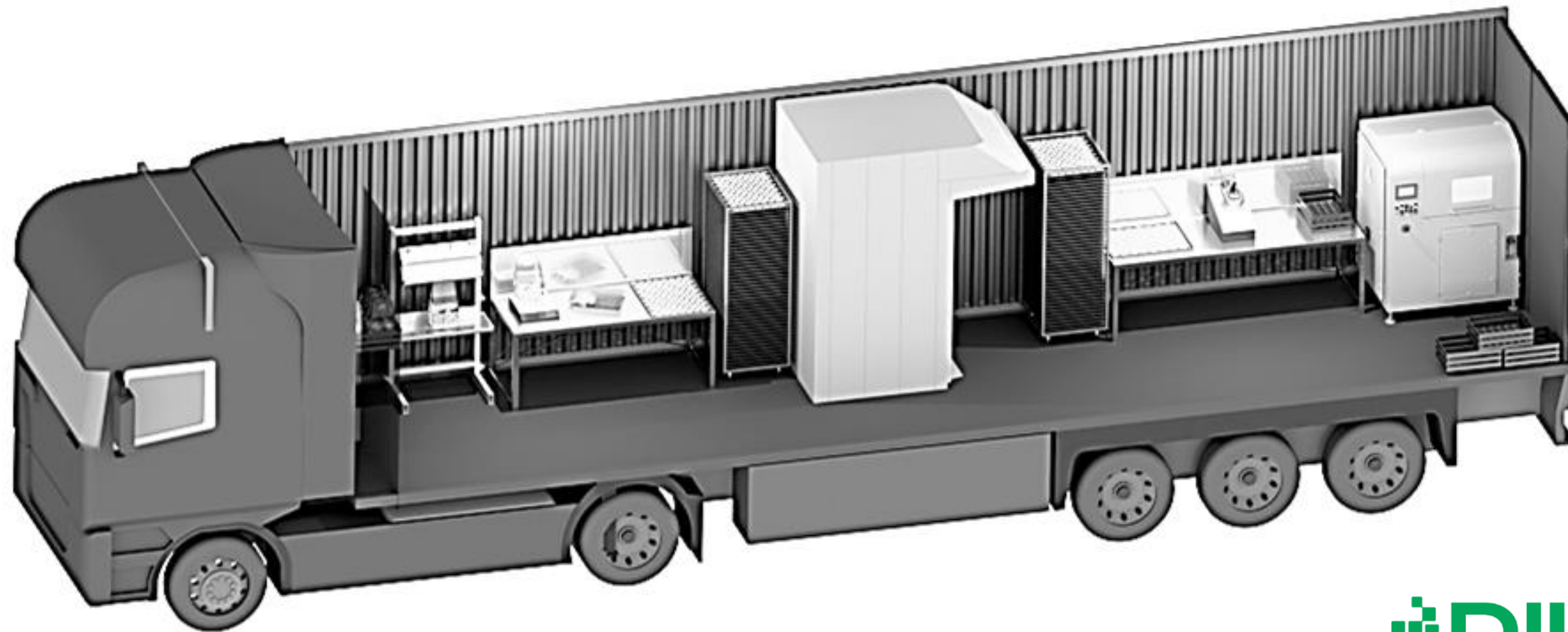


| Number | temperature | PEF energy input | drying time | EC50 DPPH | Desirability | |
|--------|-------------|------------------|-------------|-----------|--------------|----------|
| 1 | 85 | 5,829 | 152,08 | 1,391 | 0,995 | Selected |
| 2 | 85 | 5,912 | 152,726 | 1,387 | 0,993 | |
| 3 | 85 | 5,386 | 149,082 | 1,414 | 0,983 | |





Small-scale fruit and vegetable dryer

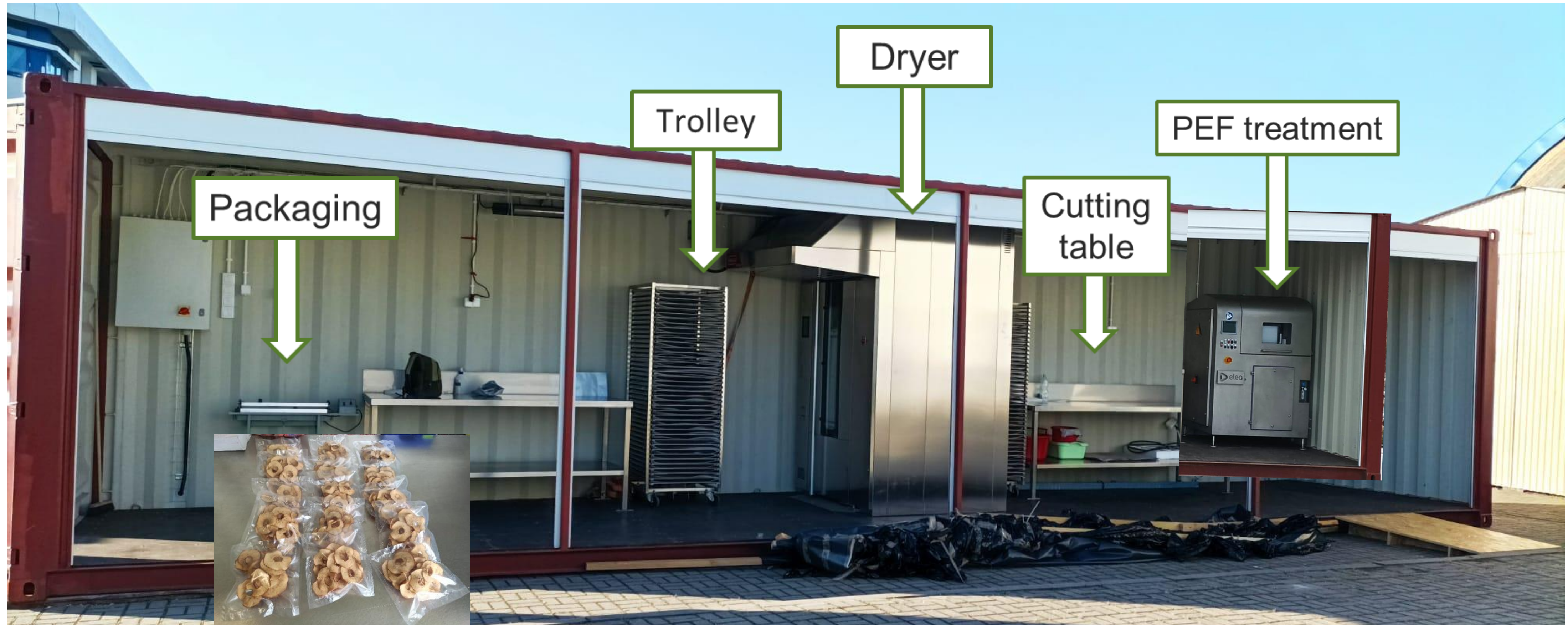


OCHSEN



Small-scale fruit and vegetable dryer

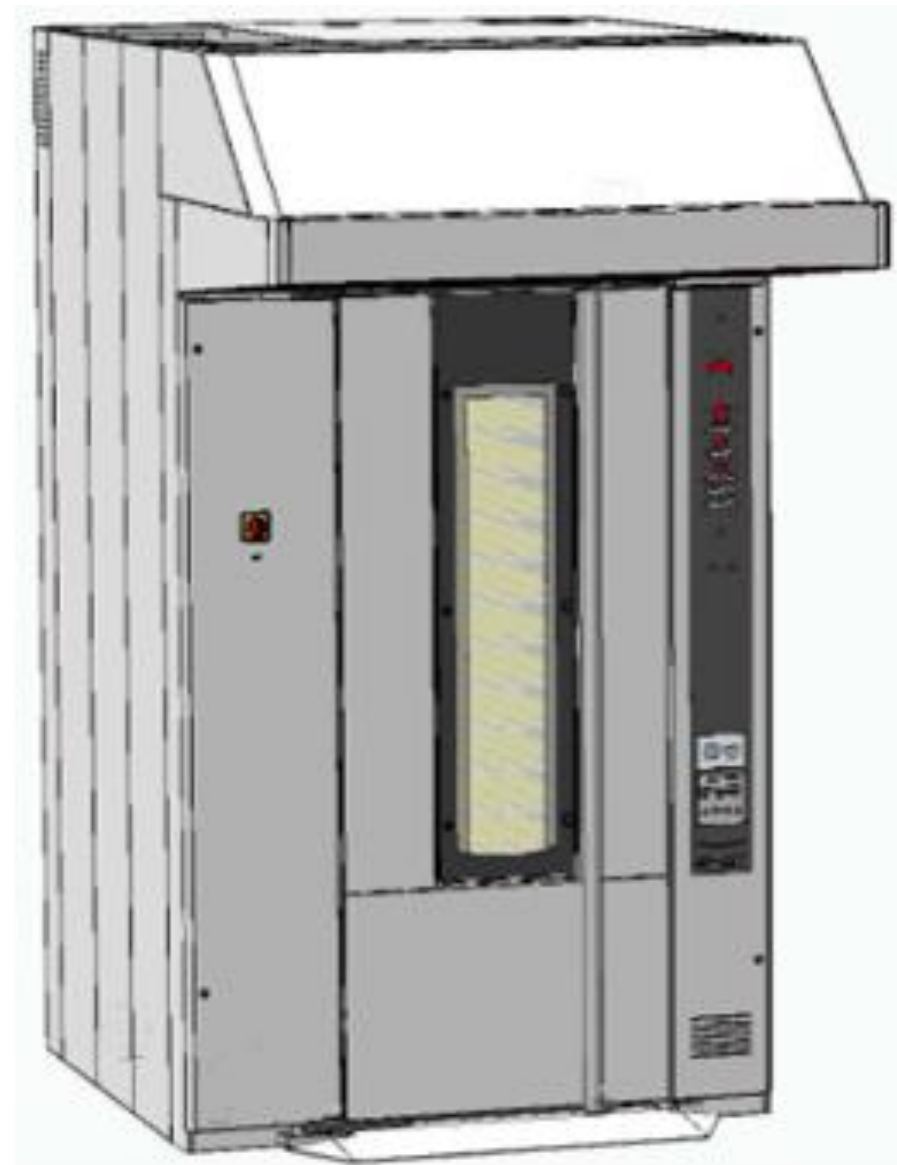
FOX unit





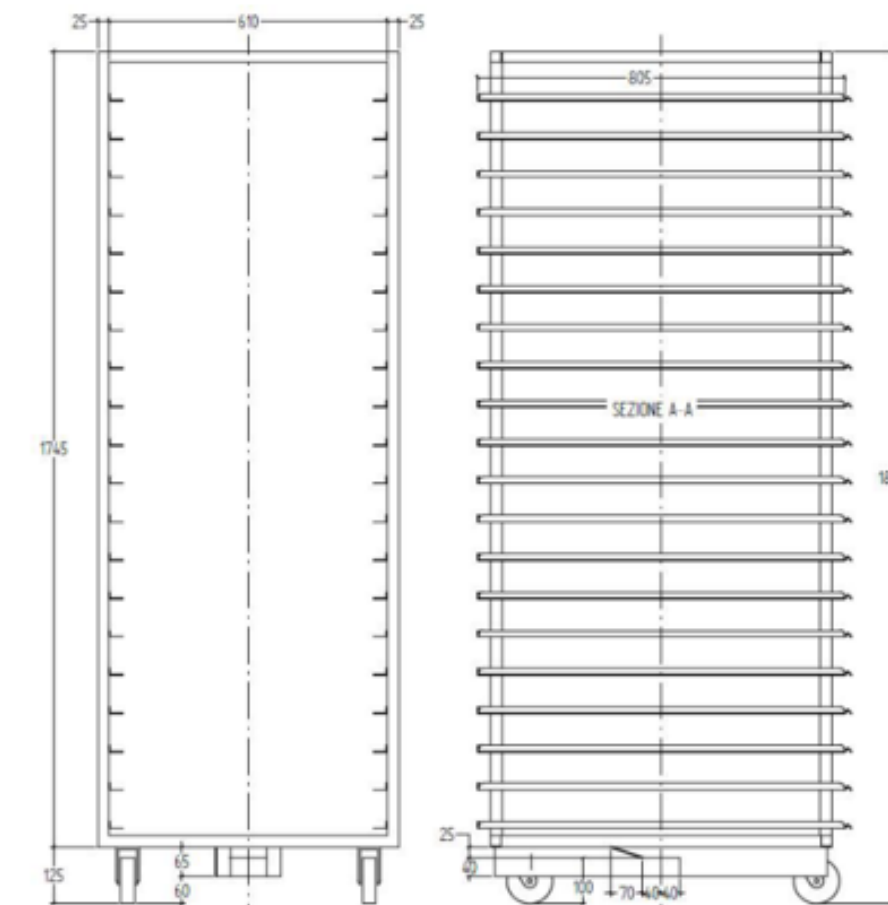
Dryer

Small-scale fruit and vegetable dryer



Dryer characteristic:

- Batch size: 25-200 kg
- ✓ Convective (CD) drying
- ✓ Infrared (IR) drying
- ✓ Rotating sieve for process homogeneity improvement



Trolley





Small-scale fruit a

Food Circle 2
Mild
drying

On farm / company side



Drying mobile unit

DRUS
TECHNOLOGIE





Lessons learned

- **PEF treatment is good for hard materials (easier cutting, not damage samples, might occur color changes, etc.).**
- **PEF treatment is not beneficial for all types of products as well as there are some differences between the laboratory scale and industrial scale operations, thus the optimization proces is helpful.**
- **Each dryer has its own characteristics and some optimization of the process on the production scale is necessary to obtain a good-quality product.**





Innovative local processing
for a sustainable future