



EXTENSION OF SHELF LIFE OF FRUITS AND VEGETABLES BY SOLAR THERMAL DRYING WITH HIGH SOLAR FRACTION IN TEMPERATE CLIMATES



Wolfgang Striewe*, Friedemar Schreiber, Kurt Schüle

Phoma, wolfgang.striewe@pho-ma.de, Bergstr. 6, 79268 Bötzingen;

„Sonnenobst“ sets high standards for a sustainable food processing

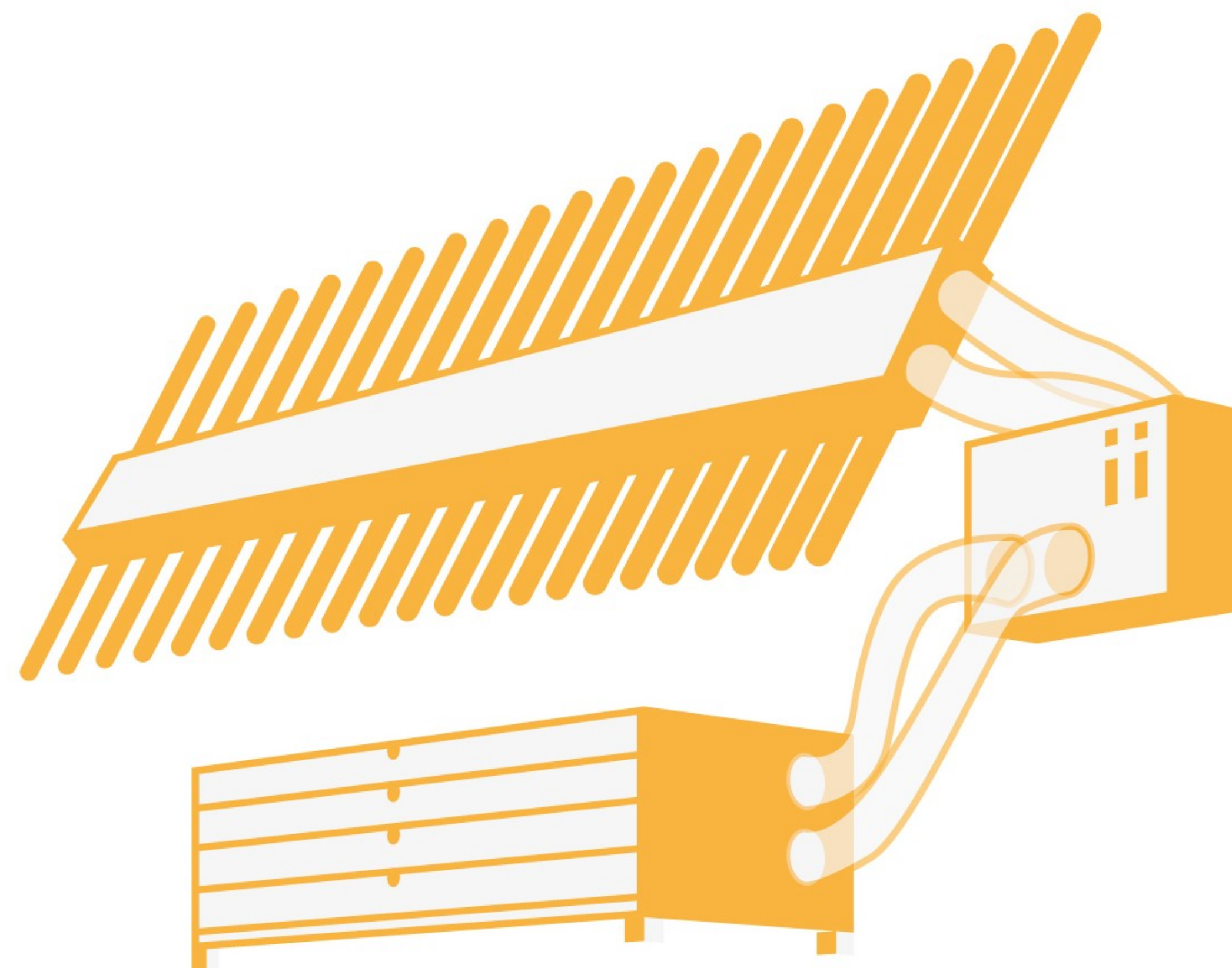
- ☀️ Fruits and vegetables are purchased and harvested at regional ecological farms and gardens.
- ☀️ The drying process is driven by solar energy only.
- ☀️ The sale of the products is run by regional marketing networks.

Positive effects on nature and climate protection

- ☀️ Energy is saved for transportation from raw product supplier (gardener/farmer) and to final consumer
- ☀️ No fossil fuels are used for the drying process.
- ☀️ Orchard meadows are cared for → important wild life habitat.
- ☀️ Organic farms and gardens are supported → no use of pesticides



- ☀️ Fruits and vegetables are used which would otherwise be ploughed in because they are not fit for the market because of looks or size.



- ☀️ Drying as a process for extension of shelf life is favoured. Additional energy would be needed during the storage time for cooling e.g..



Figure 1: Schematic of the Solar drying system.

Innovative solar thermal drying system

- ☀️ An evacuated tube air collector heats air for the drying process.
- ☀️ Integrated air-stone-heat storage enables dryer use in times without sunshine.

- ☀️ Exact temperature control for adoption to different products and specific drying processes.
- ☀️ The system can be run as a solar only system in northern Europe

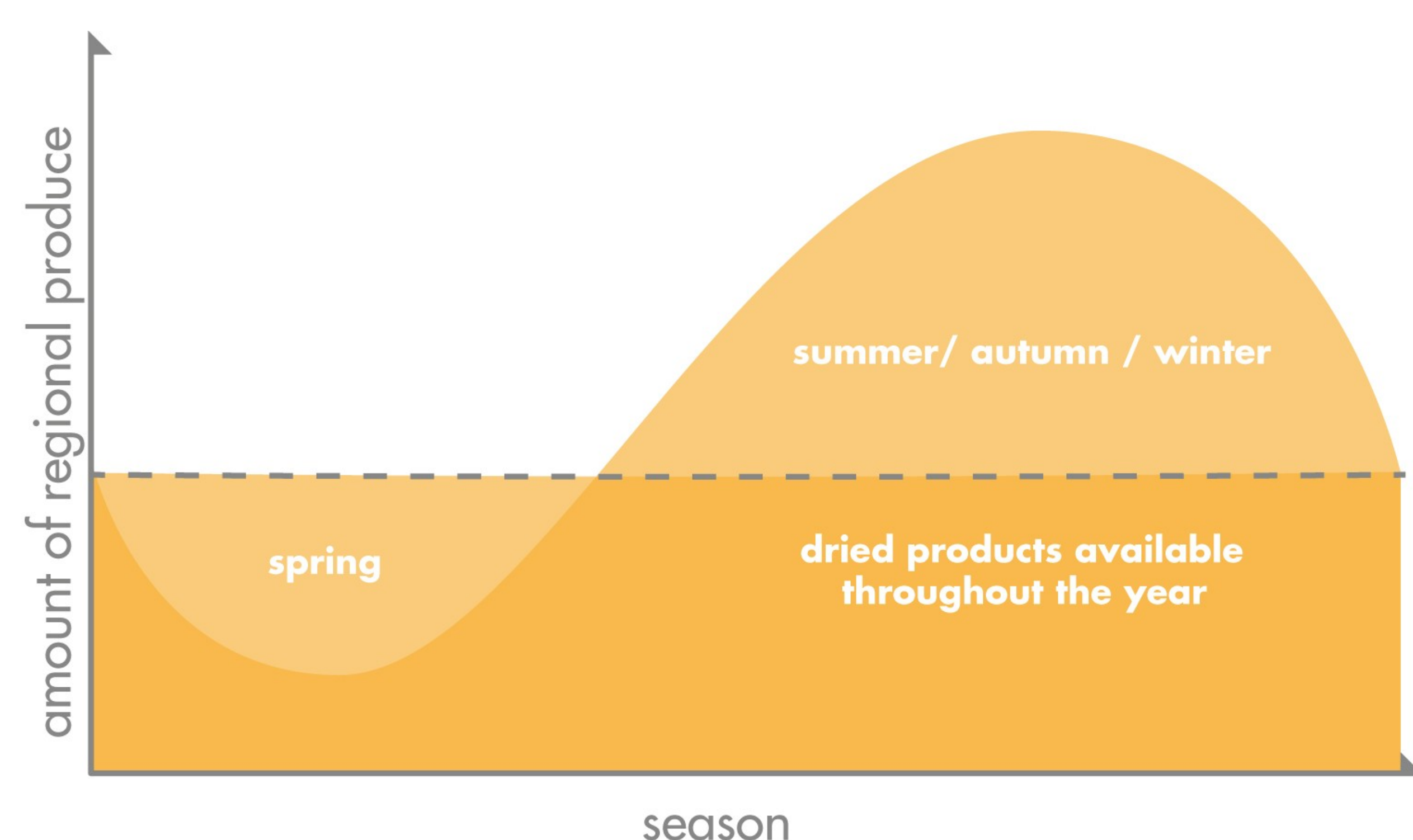


Figure 2: Many regions have seasonal-dependant surpluses of fruits and vegetables. Likewise there are times with low production. The extension of shelf life of fruits and vegetables makes it possible to even out these eventual mismatches.

Seasonal balancing

- ☀️ Vegetables which are not accepted by customers on the market can be used for drying and are not ploughed in.
- ☀️ Drying surplus food allows farmers and gardeners to shift food supply and the resulting income to times with less vegetation resulting in a flatter supply/income curve.

„Energiewende“ in the process heat sector

- ☀️ The „Energiewende“ is taking place in the electricity market only (> 30 % renewable share in Germany now).
- ☀️ Heat accounts for 70 % of the energy consumption within the industry.
- ☀️ The market penetration of renewables within the process heat sector is below 1 %.
- ☀️ Industries demand for energy is all around the clock.
- ☀️ Typical layout for solar energy integration into process heat networks solar fraction ~ 20 %

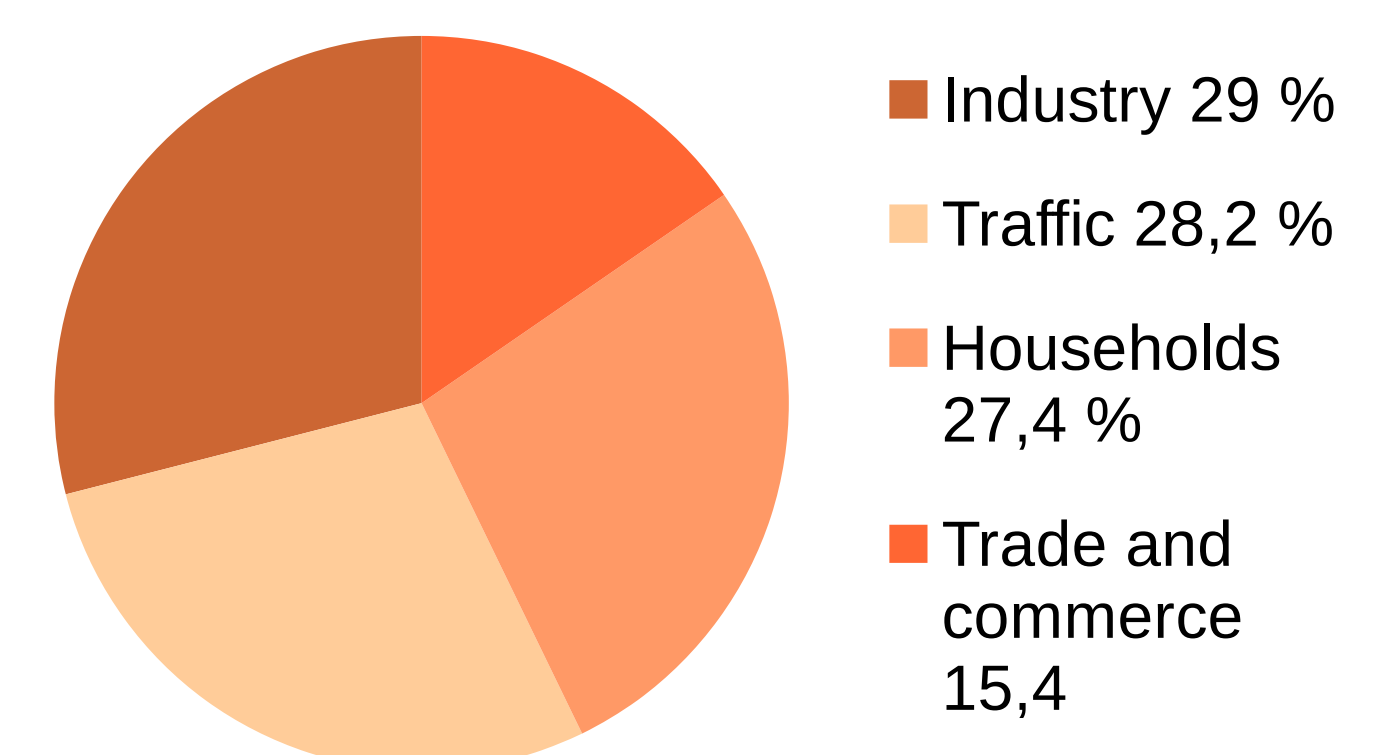


Figure 3: About 1/3 of final energy in Germany is used up in the industrial sector (Statistisches Bundesamt)

- ☀️ High solar fraction possible by organising production times flexible towards solar supply.

Acknowledgements:

The company „phoma“ is the owner of the brand „Sonnenobst“ and thanks all it's partners for their great support. Especially To:



„Distelkiste“ for organic vegetable supply
the ecological winery
„Schaffner“ from
Bötzingen
for fruit supply



Company „Cona“,
Austria, for the supply
of the drying chamber
and knowledge transfer.



„Kaiserlich Genießen“
for opening up the
opportunity to directly
bring the products
on the local market.
„Sonnenobst“ was
partly funded within a
PLENUM-project by
Baden-Württemberg
and the
European Union.
„About Blank“ for
design of logo, graphics,
flyer and homepage.

