



The Ecology of Scale: Data Assessment of Beef, Pork and Wine

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Objectives:

- Researching energy data for entire process chains of food;
- Allocating these data to adequate functional units;
- Comparing regional to global food, in terms of energy;
- Comparing small to large scale business, in terms of energy.

Why?

- Lack of empiric data and
- Many prejudices regarding global and regional food.

Method: Qualitative, performing case studies!

- 1. Researching all the energy efforts such as gas, fuels, power:**
 - of producing food including farming, breed and crop;
 - of transporting and distributing from the place of origin via any processing unit up to the point of sale.
- 2. Allocation of these primary data to the functional units;**
- 3. Specific turnover of energy versus business size.**

Who?

Justus-Liebig University Giessen, Germany

Faculty of Agricultural and Nutritional Sciences,

Chair of Process Engineering in Food and Service Business

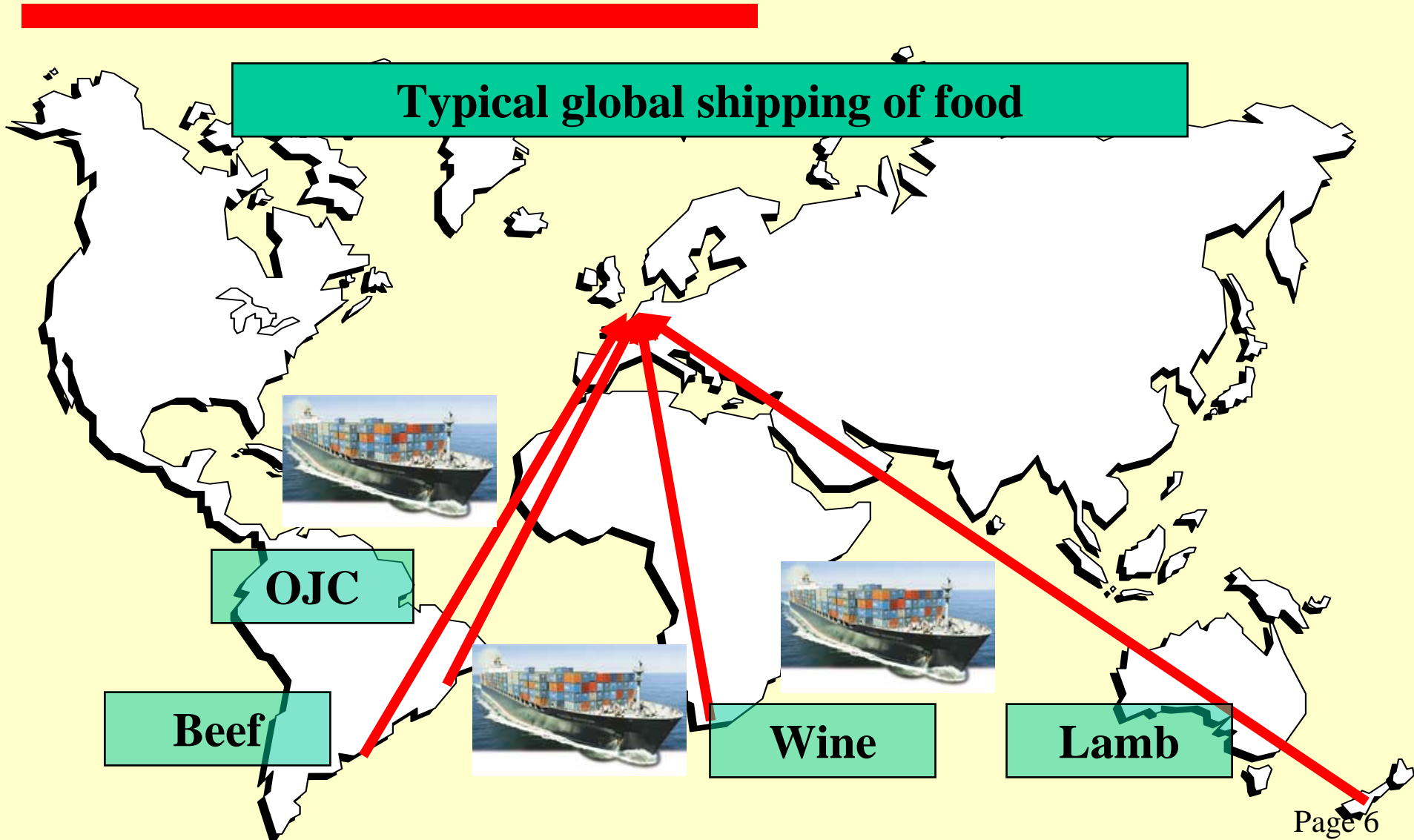
Szent István University Gödöllő, Hungary

School of Mechanical Engineering and

School of Agriculture and Life Science

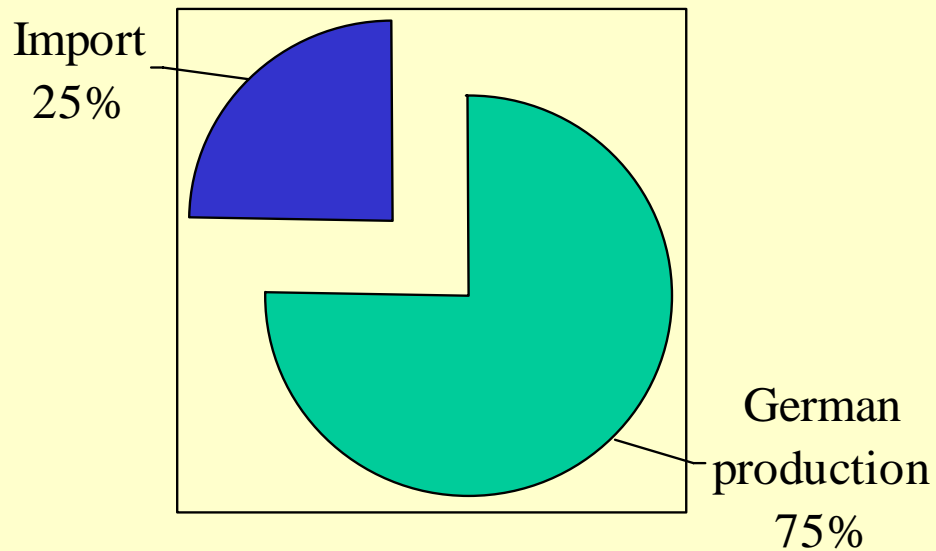
Food examples and places of origin

1. Fruit juices (Brazil, Europe, Germany) [Schlich:InLCA 2003] 
2. Lamb meat (Germany, Hungary, New Zealand) [Schlich:InLCA 2003]
3. **Beef** (Argentina, Germany, Hungary)
4. **Pork** (Germany, Hungary)
5. **Wine** (Germany, Hungary, South Africa)



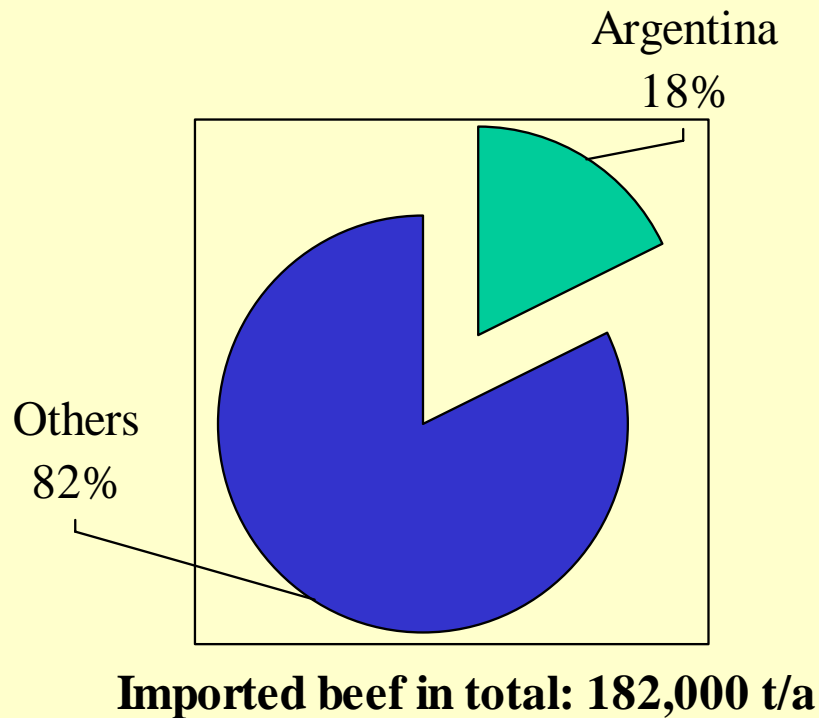
Case study beef: Market data in Germany

Beef per capita: 8.8 kg/a



Beef in total: 730,000 t/a

Beef in Germany: Import data



Beef: Results

Case	Beef [kg/a]	Specific energy [kWh/kg]
Ger A (1)	7,000	3.5
Ger B (1)	2,500	6
Arg A (2)	80,000,000	1.4
Hu A (3)	800,000	1.8

(1): Data of local German farmers: farming, slaughter including local transport.

(2): Main import company from Argentina: data include farming, slaughter, sea container vessel to Hamburg and German truck.

(3): Hungarian farming and slaughter; truck transport to Germany must still be added (under calculation)

Beef: Data assessment

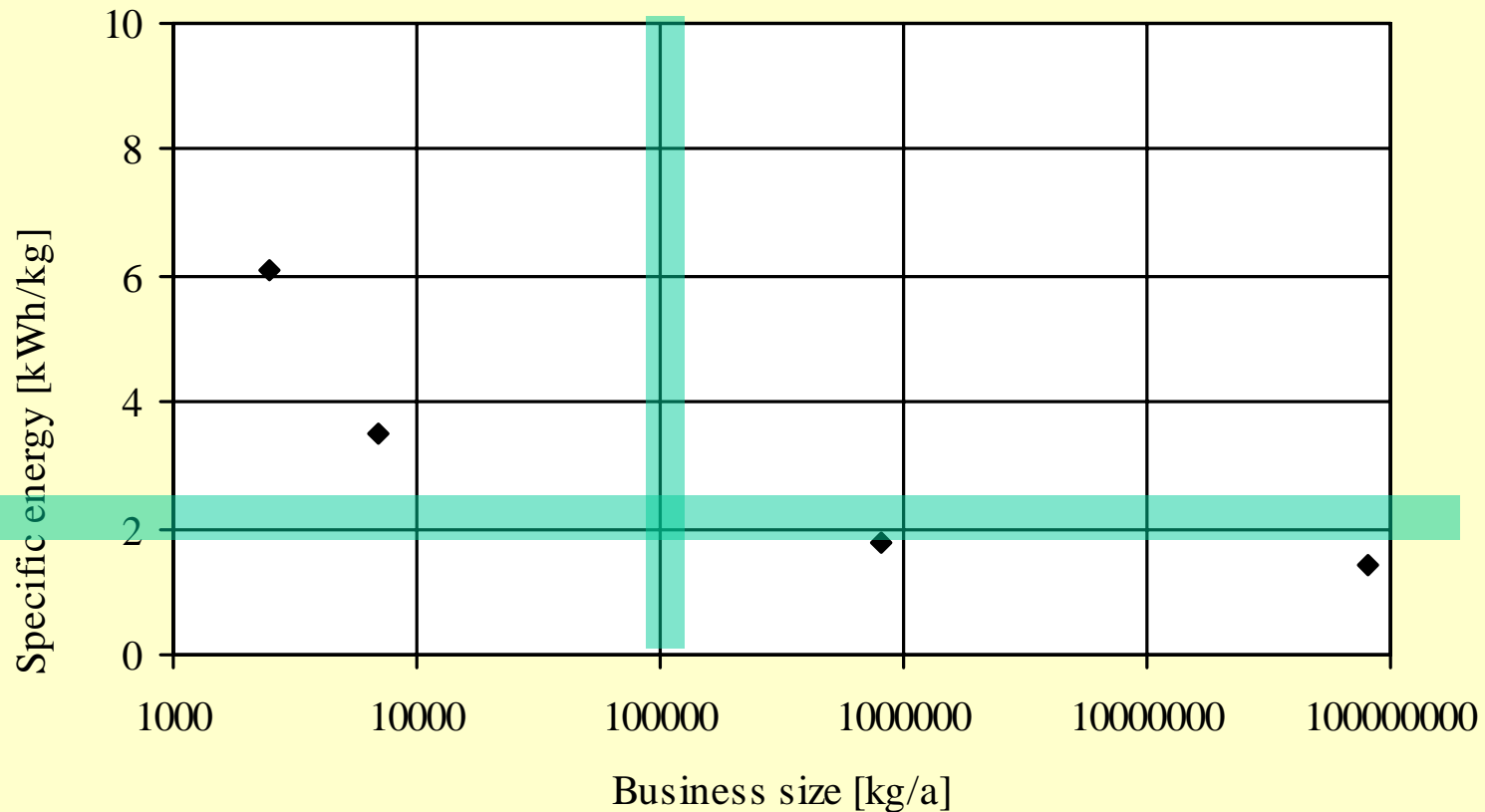
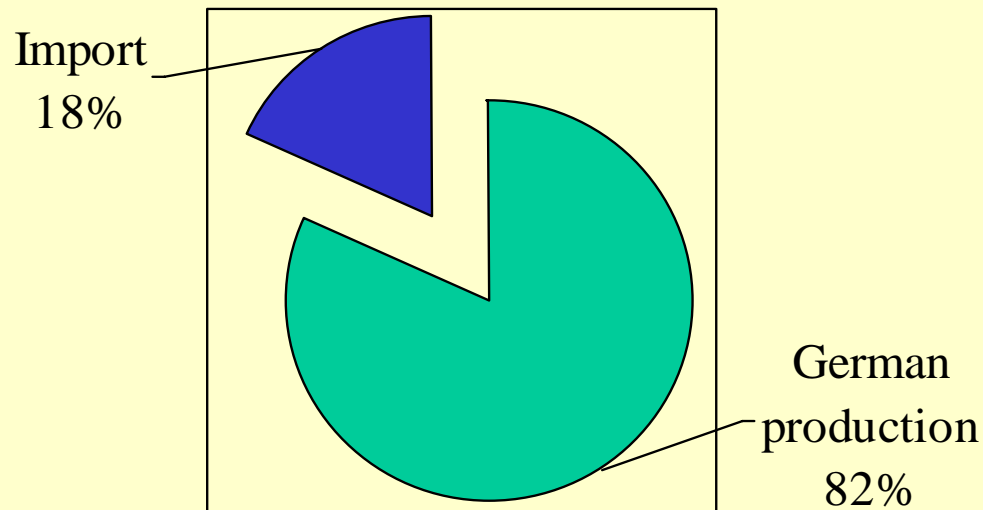


Fig. 1: Specific energy turnover of beef versus business size

Case study pork: Market data in Germany

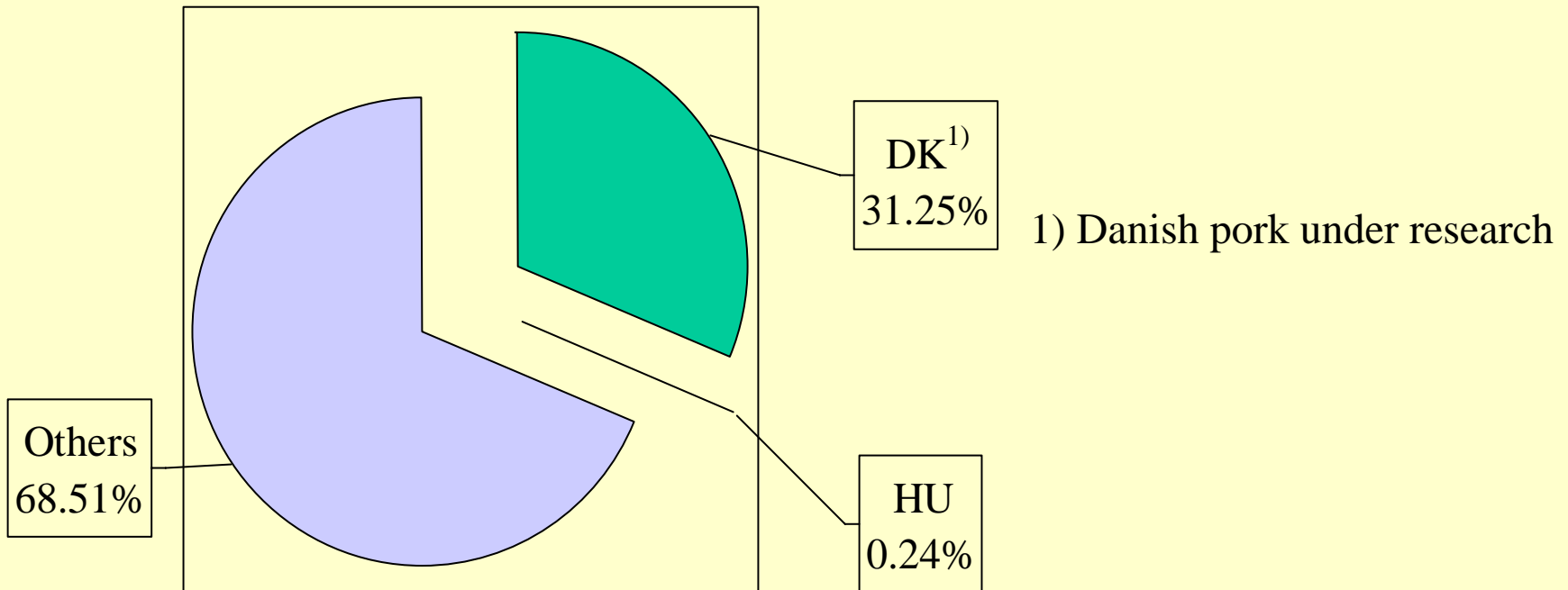
Pork per capita: 39.5 kg/a



Pork in total: 4,600,000 t/a

Pork in Germany: Import data

Imported pork in total: 830,000 t/a



Pork: Results

Case	Pork per a [kg]	Specific energy [kWh/kg]
Ger A	58,800	4.9
Ger B	2,500	9.1
Ger C	8,600	6.5
Ger D	138,000	3.4
Ger E	18,500	4.1
Hu A	625,000	3.9
Hu B	420,000	3.7
Hu C	370,000	3.8

Pork: Data assessment

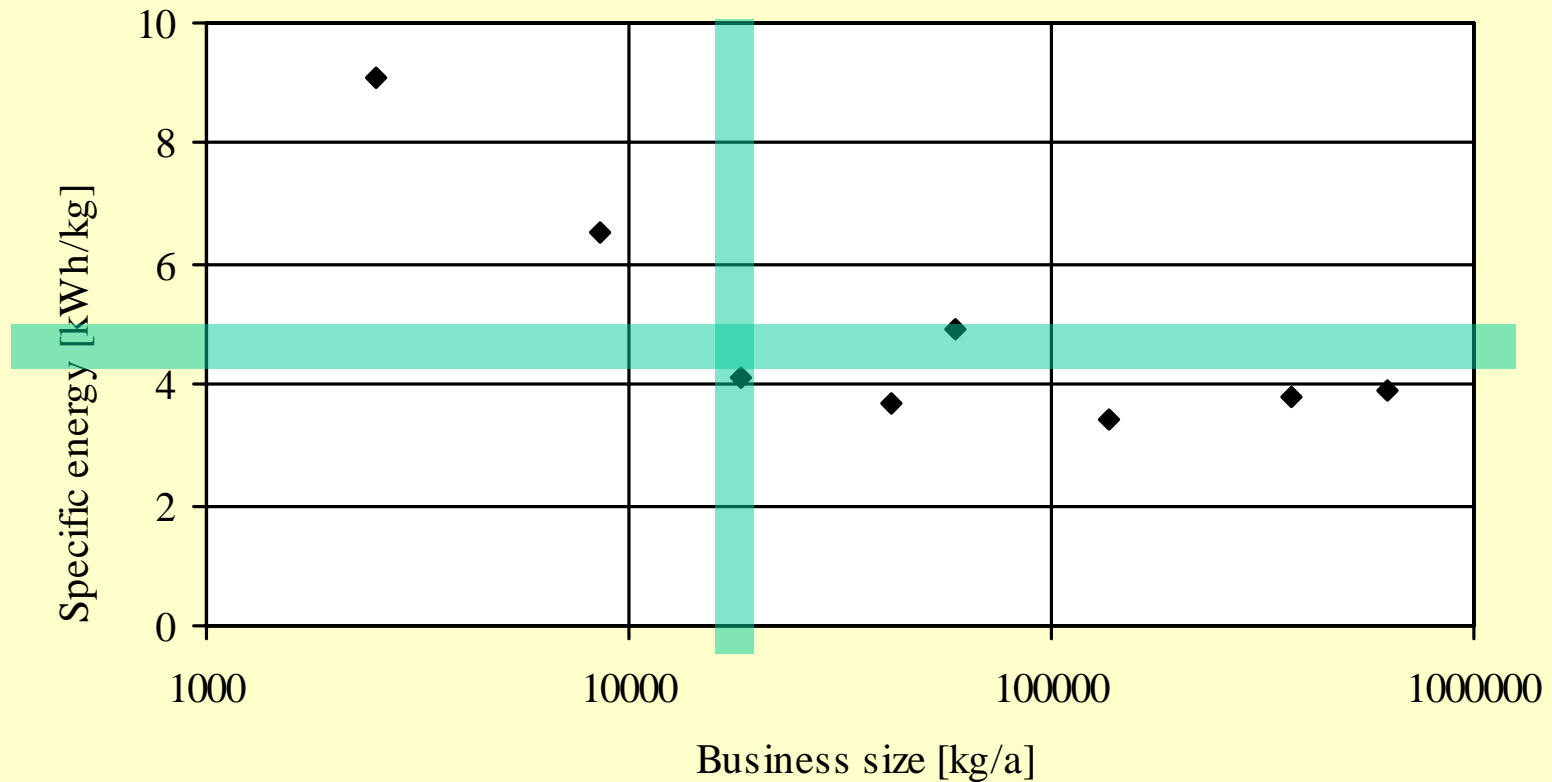
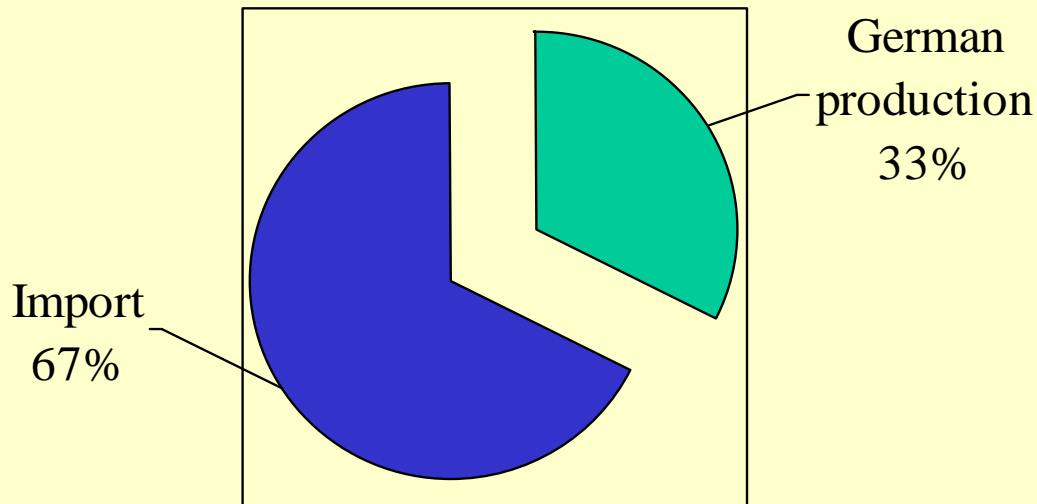


Fig. 2: Specific energy turnover of pork versus business size

Case study wine: Market data in Germany

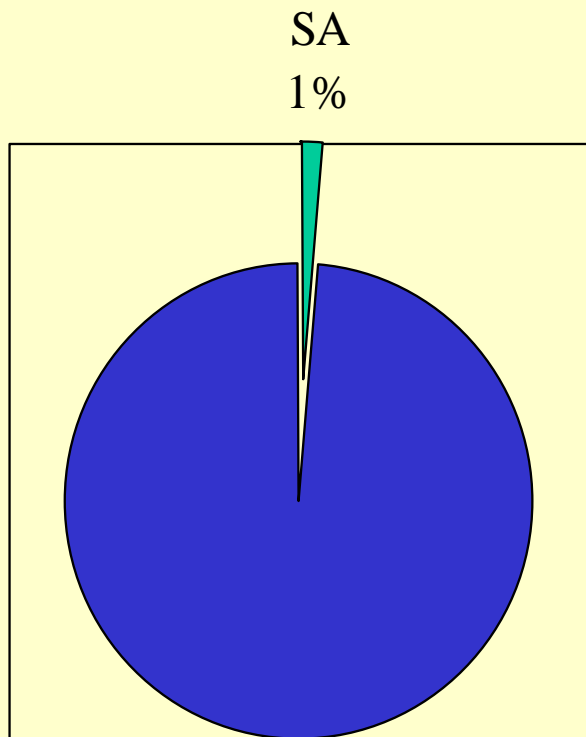
Wine per capita: 24 l/a

(incl. sparkling wine)



Wine in total: 20,000,000 hl/a

Wine in Germany: Import data



Imported wine in total: 13,300,000 hl/a

Wine: Results of typical cases

Winery	Area	Production	Diesel	Electricity	Natural gas	Heating oil
	[ha]	[hl]	[l]	[kWh]	[m ³]	[l]
W2002/1	12.5	1,000	6,045	23,390	150	250
M2001/1	4.4	247.50	5,743	7,595	0	0
M2001/2	4.1	357.89	3,828	4,216	0	400
M2001/5	2.1	153.40	5,290	1,496	0	300
HU2002/3	200	16,000	13,100	54,972	19,900	0
B2001/3	22.5	2,100	2,955	6,490	0	15,000
B2001/6	98.5	8,500	9,970	125,000	0	0
HB2001	254.3	13,640	25,695	330,872	0	71,616

Wine: Data assessment (region 1, Germany)

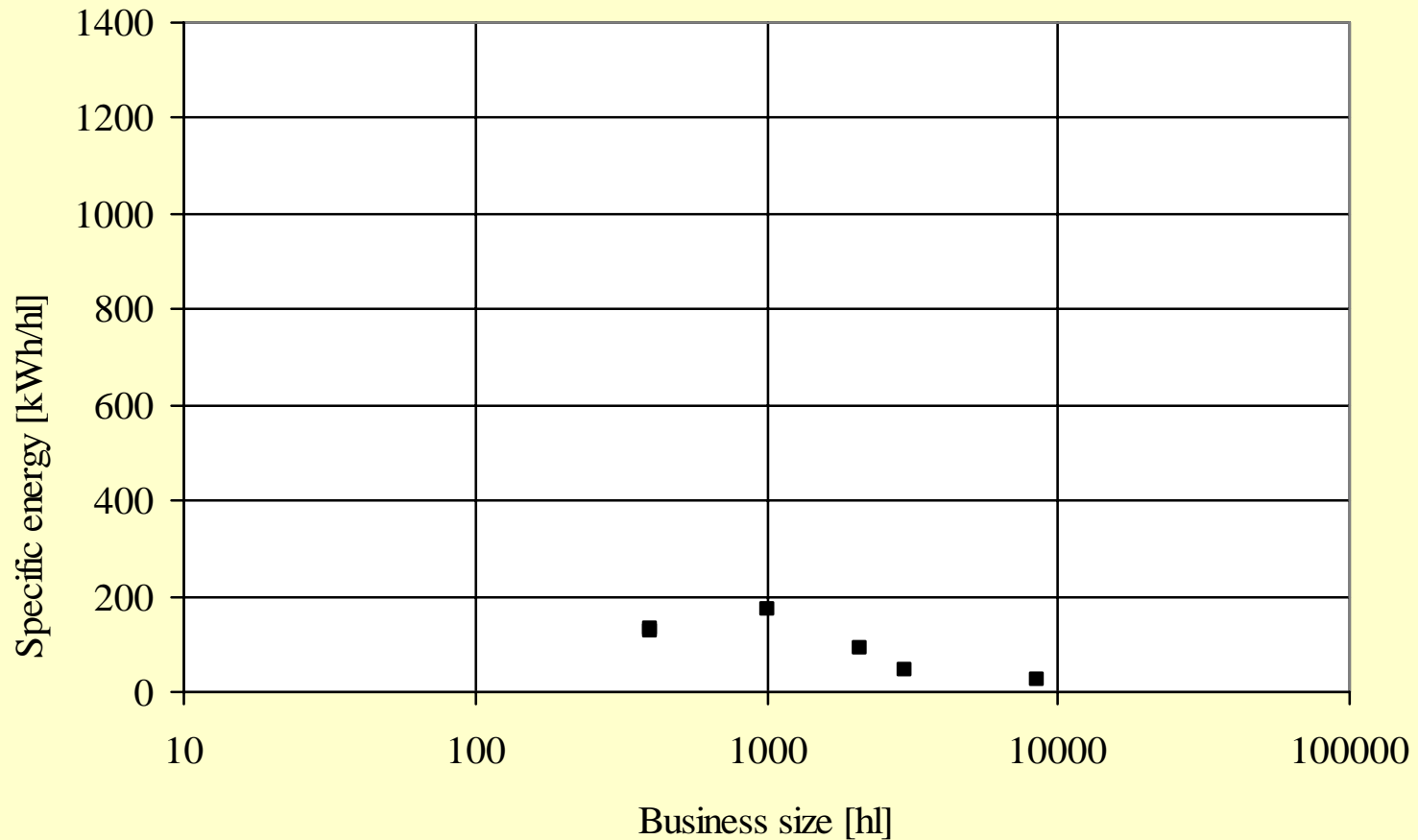


Fig. 3: Specific energy turnover of wine versus business size – German region 1

Wine: Data assessment (regions 1+2, Germany)

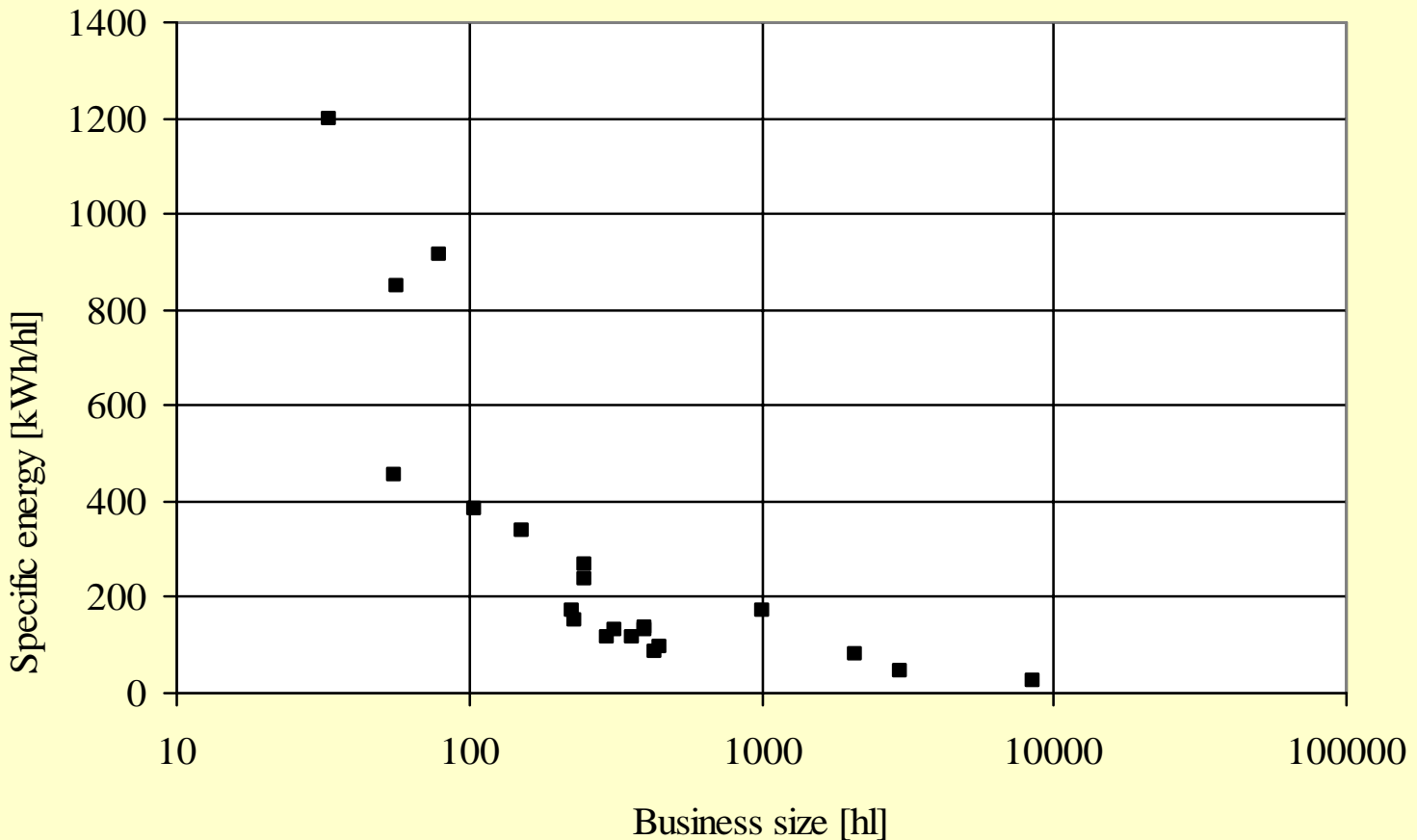


Fig. 4: Specific energy turnover of wine versus business size – German regions 1 and 2

Wine: Data assessment (regions 1+2+3, Germany)

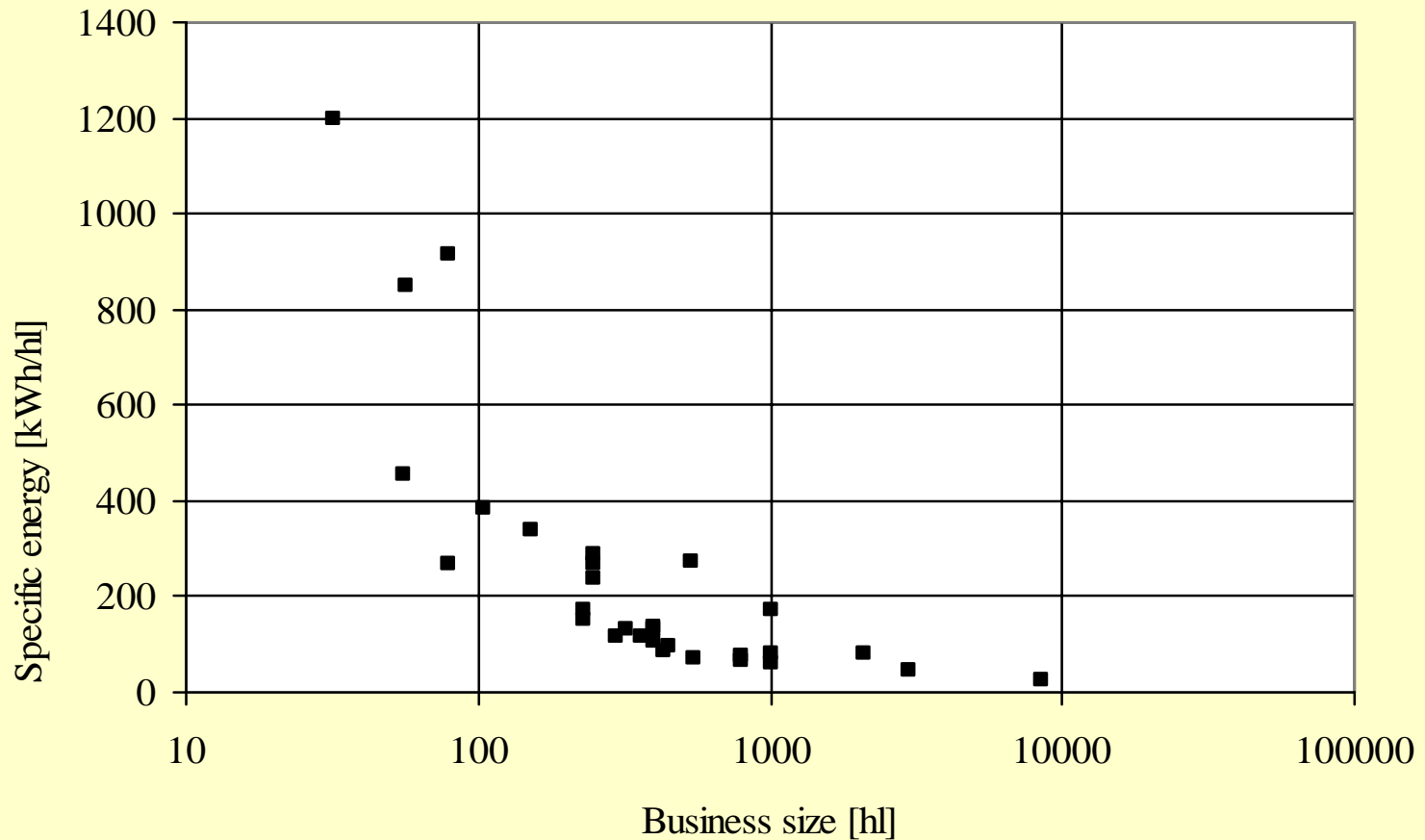


Fig. 5: Specific energy turnover of wine versus business size – German regions 1, 2 and 3

Wine: Data assessment (German regions + Hungary)

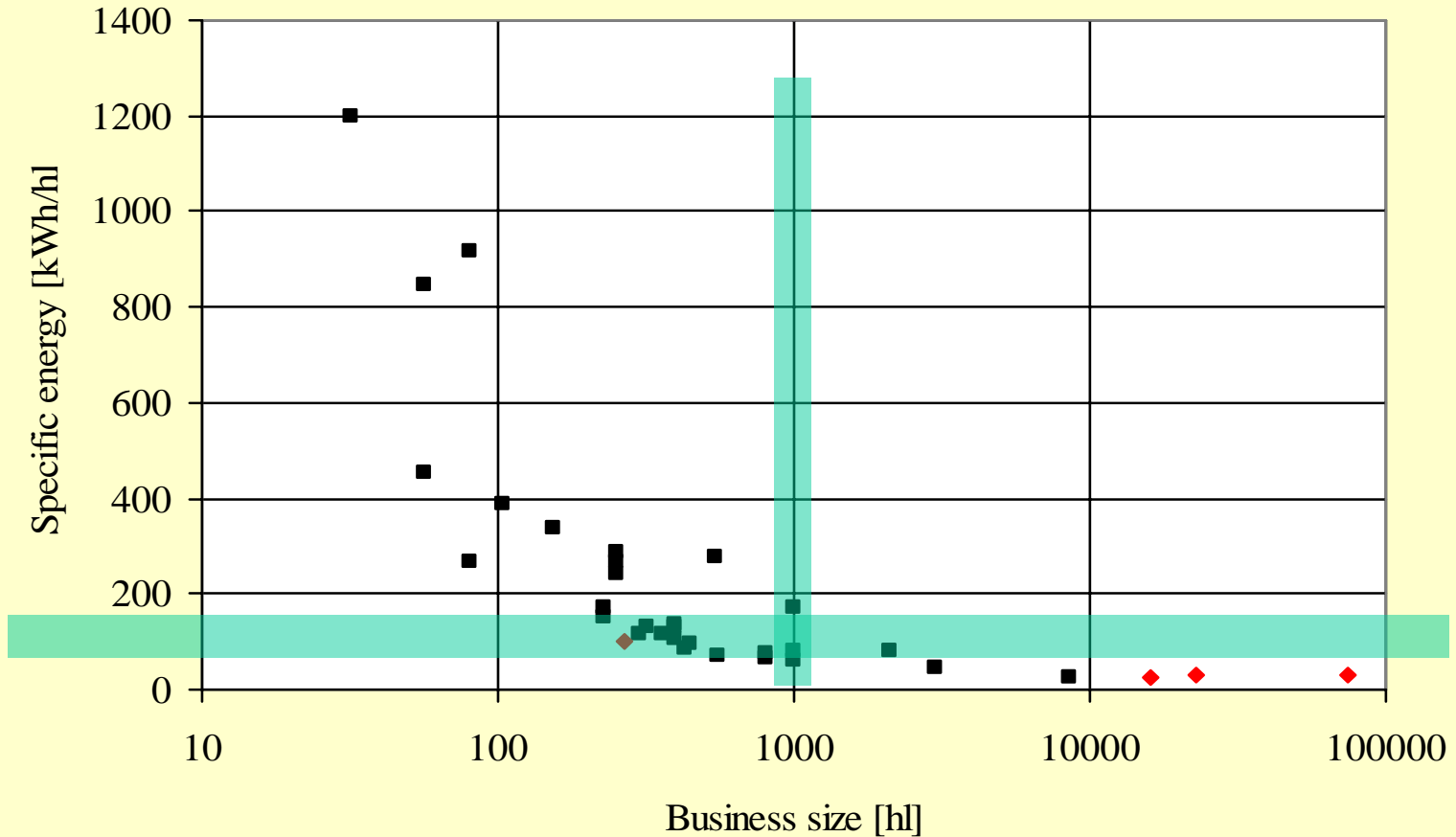


Fig. 6: Specific energy turnover of wine versus business size – Germany, Hungary

Wine: Data assessment (German regions + Hungary + South Africa)

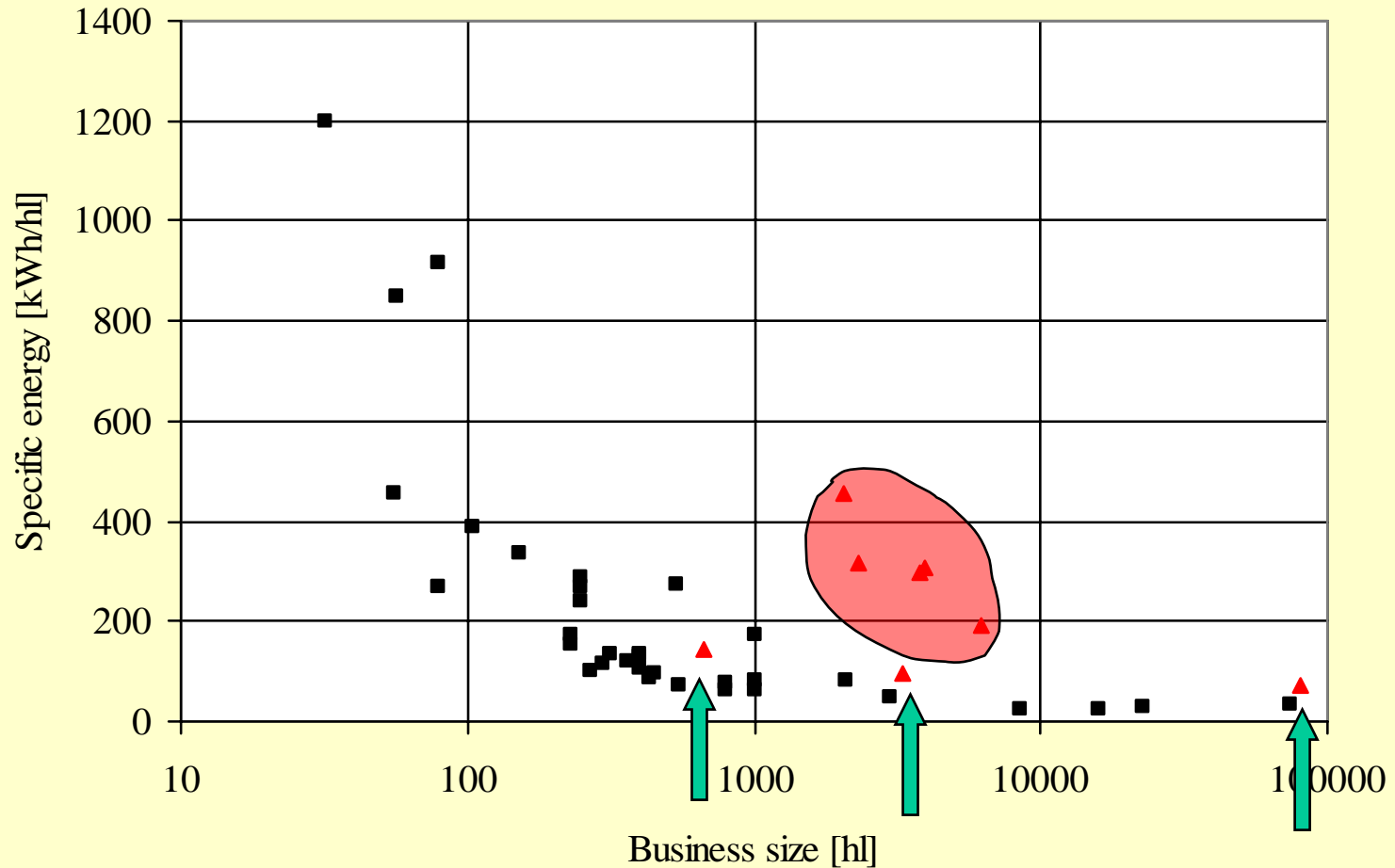


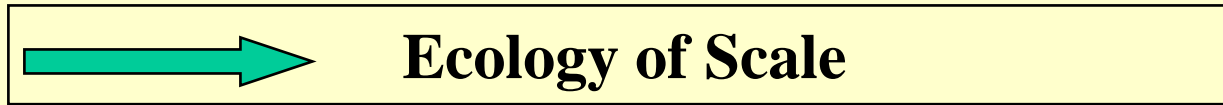
Fig. 7: Specific energy turnover of wine versus business size – Germany, Hungary, South Africa

Conclusions, Recommendation and Outlook (1)

- Results show in all cases degressive dependencies of specific energy turnover and business size!
- No relation between specific energy intake and marketing distance!
- Small units are facing severe disadvantages because of missing logistics and bad operational efficiency!
- The ecological quality depends mainly on the operational efficiency and not on the marketing distance!

Conclusions, Recommendation and Outlook (2)

- Small scale units can obtain energy efficient production and distribution by good cooperation!
- South African wineries prove: Big scale units may waste energy as well! Reasons are to identify!
- Hence: Each case has to be investigated and prejudices are definitely misleading!



The conclusions are valid for the researched examples, but:

The claims for „food regionalität“ in Germany are not generally valid!

Many thanks:

- to the Deutsche Forschungsgesellschaft (German Research Association)
- to the Deutscher Akademischer Austauschdienst (German Academic Exchange Service)
- to all local companies and farmers, supporting our research worldwide!
- and to you for your attention!