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Your Decarbonisation Partner

Heat Pumps in Agriculture

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What We Do

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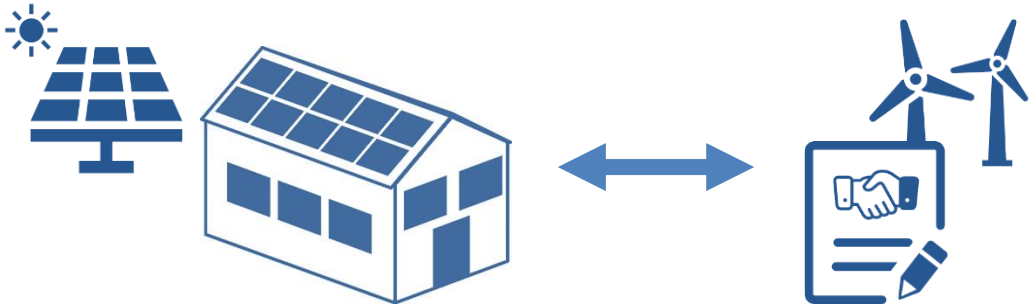
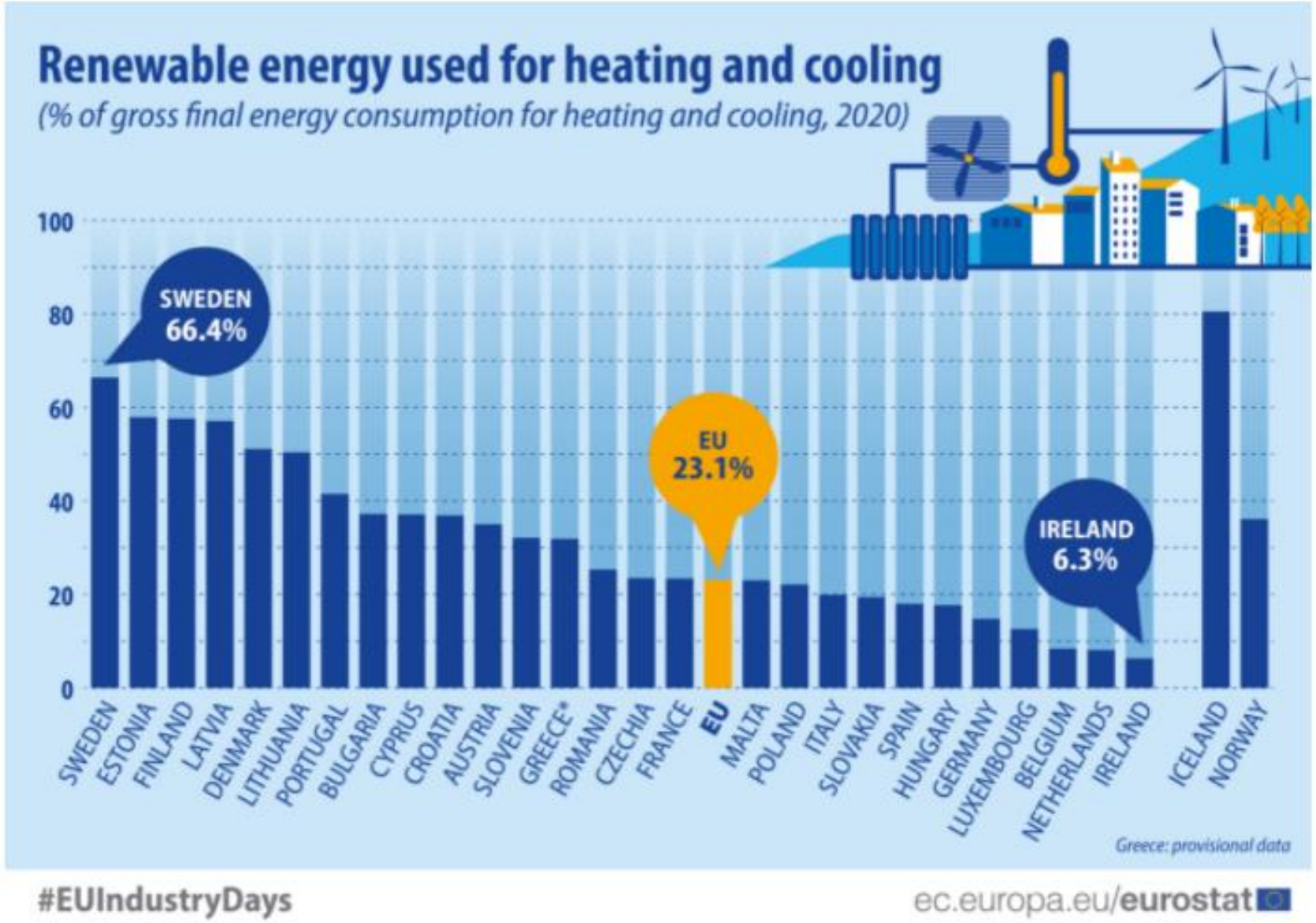
Renewable Heat
(High-temperature heat pumps)

Renewable Electricity
(Onsite Solar Power, Corporate PPAs)



You Fund Or We Can Fund
(Heat & Power As A Service)

IRELAND BOTTOM OF THE PILE FOR RENEWABLE HEAT



Source: https://ec.europa.eu/eurostat/en/web/products-eurostat-news/-/edn-20220211-1

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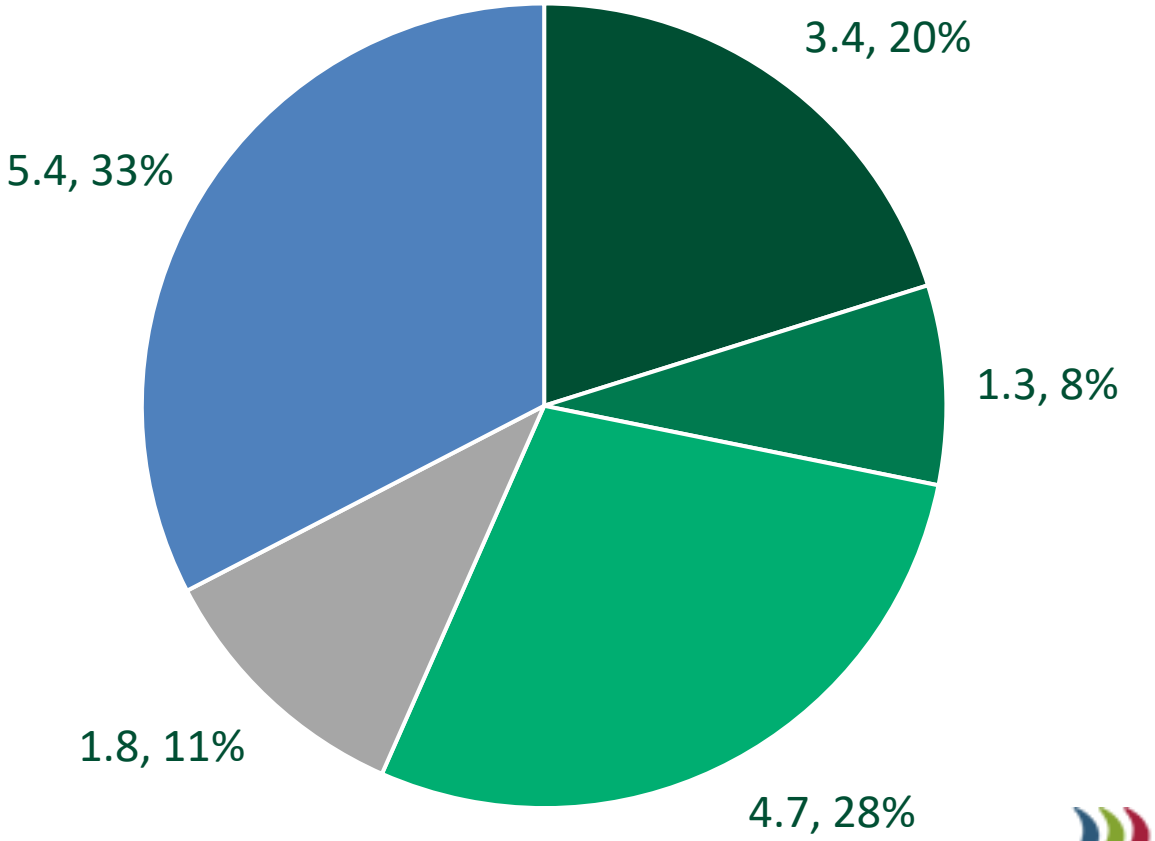
Decarbonising Heat in for Food Processers

Almost 10 TWh of Industrial Heat Demands are <200°C
Represents ~50% of industry & ~25% of total heat demands

Industrial Heat Demand in Ireland: 16.6 TWh



PRIMARY SOLUTIONS

- SH <100C
- PH <100C
- PH 100-200C
- PH 200-500C
- PH >500C

Electrification & District Heating

Fuels e.g. H2 & Bio & Bespoke Electrification

Heat Roadmap Europe

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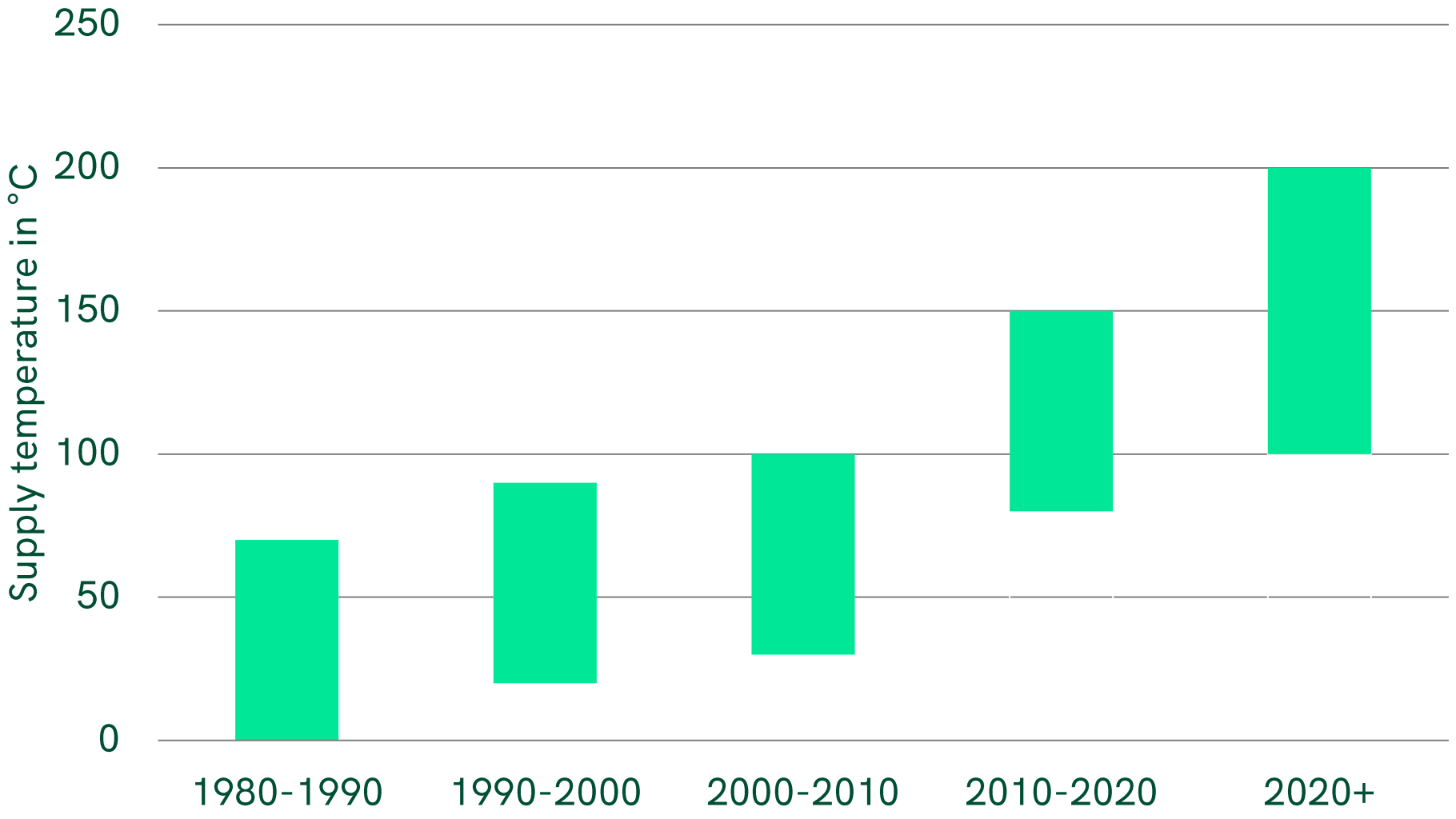
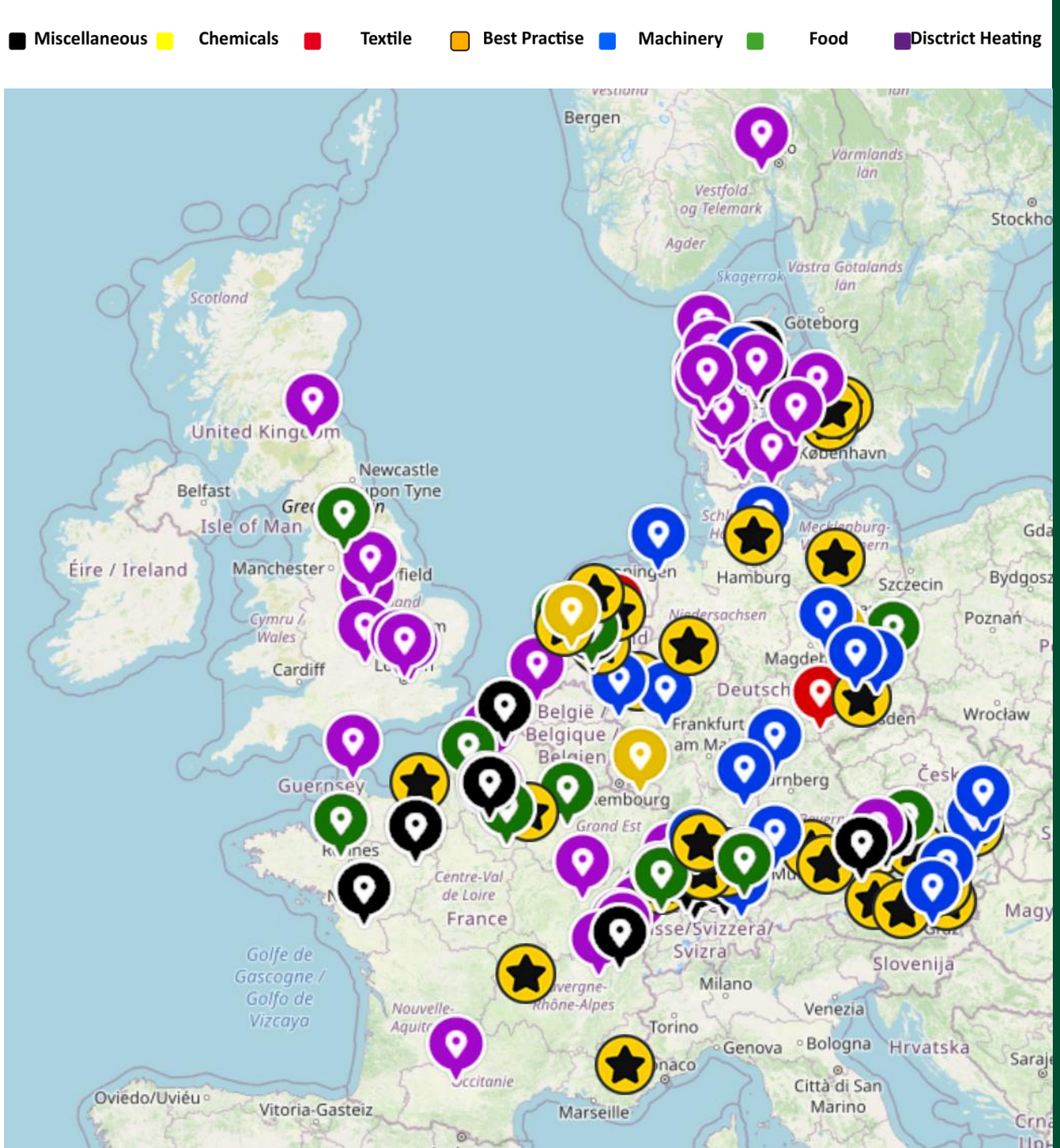
High Temperature Heat Pumps Evolving Rapidly (Approximate Values Only)



*Many thanks to Dr. Cordin Arpagaus for his inputs to this graphic

Approximately 20,000 industrial heat pumps installed in Europe each year

- We are bringing a proven high-temperature heat pump technology widely used in the rest of Europe to Ireland
- 1000s of installations across Europe (examples on map)
- Ireland now has abundance of renewable electricity to utilise – enough to power all of Galway city is currently thrown away
- Combining heat pumps with thermal storage can take advantage of low-cost electricity during windy days when this electricity is wasted



Case Study in the Metals Industry

Application	Process Heat
Country	Sweden
Year of Installation	2020
Heat Capacity	> 2000 kW
Supply Temperature	110°C (120°C if required)
Source Temperature	45°C
Efficiency (COP)	4
Energy Savings	n/a
Financial Savings	n/a
Payback	n/a

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Case Study in the Dairy Industry

Application	Milk & Cream Production
Country	Norway
Year of Installation	2019
Capacity	0.9 MW
Supply Temperature	95°C (returns at 73°C)
Source Temperature	67°C (returns at 60°C)
Efficiency (COP)	5.5
Energy Savings	4.2 GWh
Financial Savings	--
Payback	--

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Case Study in a Meat Processing Plant

Application	Hot Water
Country	Norway
Year of Installation	2007
Capacity	0.75 MW
Supply Temperature	87°C (returns at 55°C)
Source Temperature	49°C (returns at 42°C)
Efficiency (COP)	> 5
Energy Savings	3.4 GWh
Financial Savings	--
Payback	24 Months

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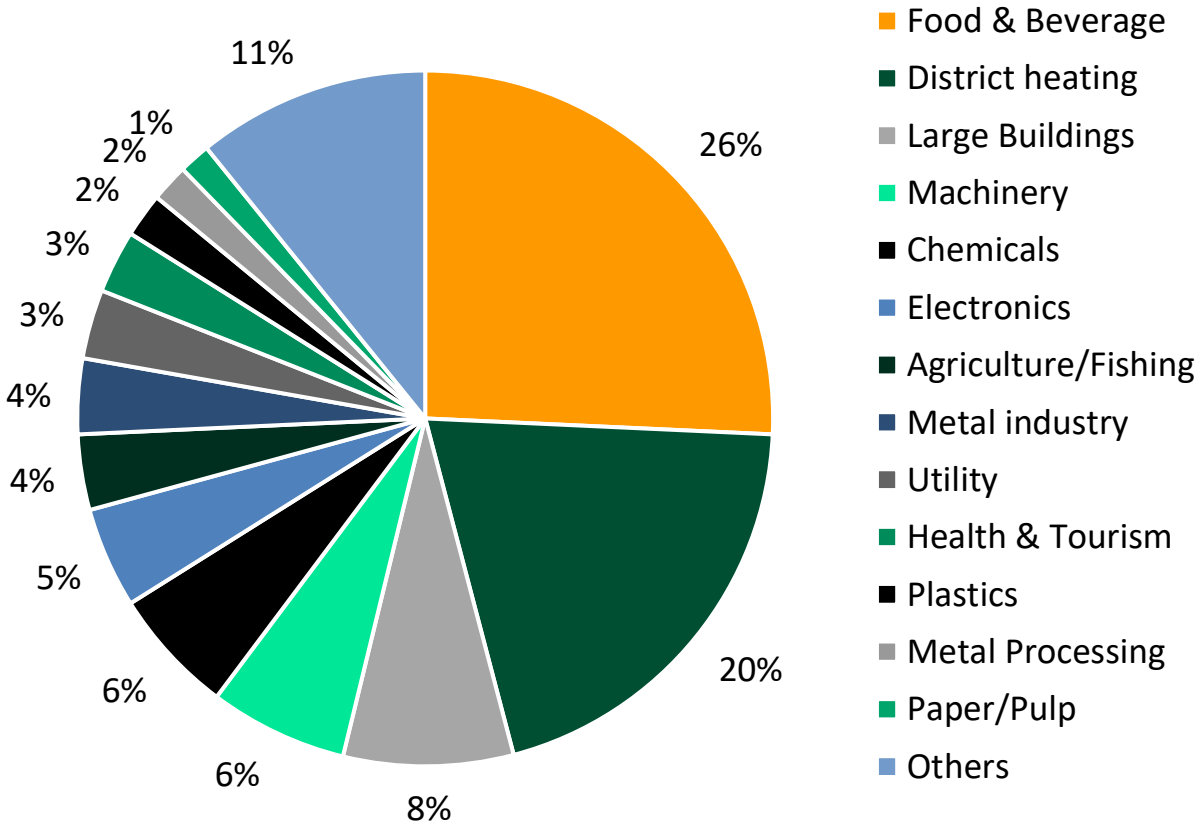
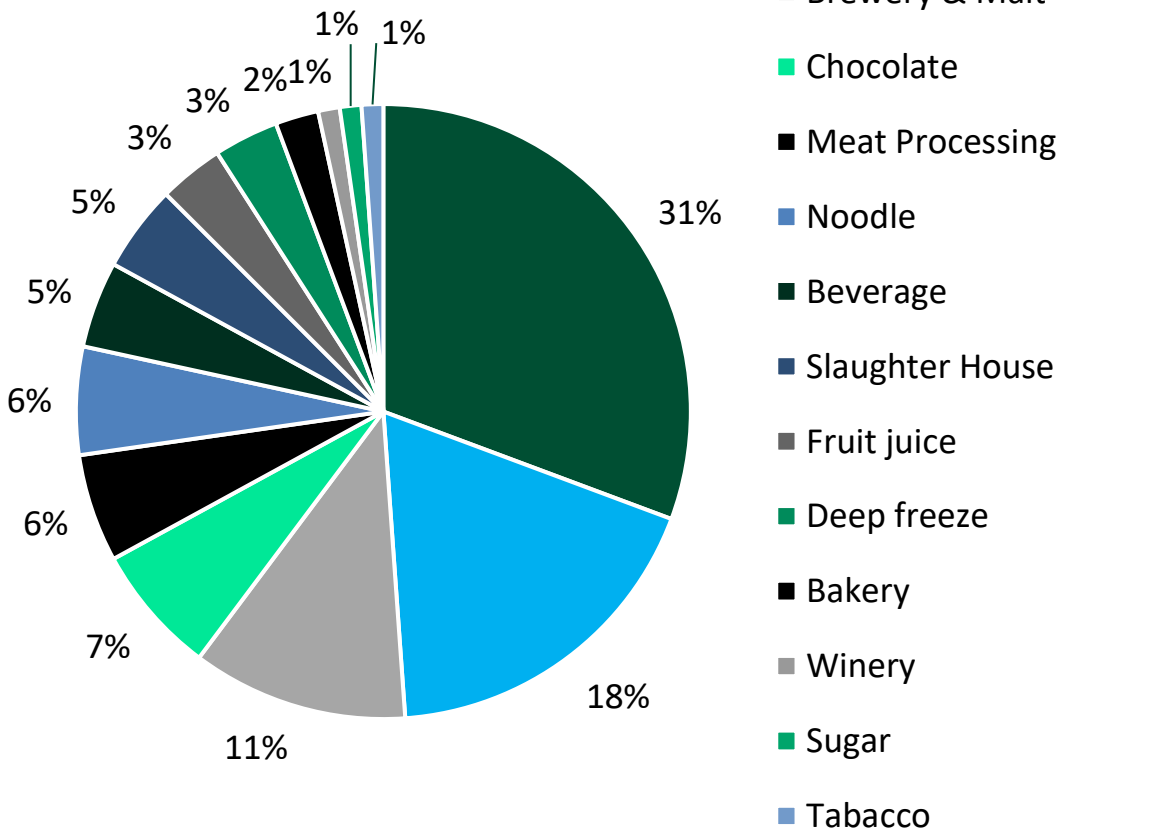
TYPICAL INDUSTRAIL HEAT PUMP APPLICATIONS

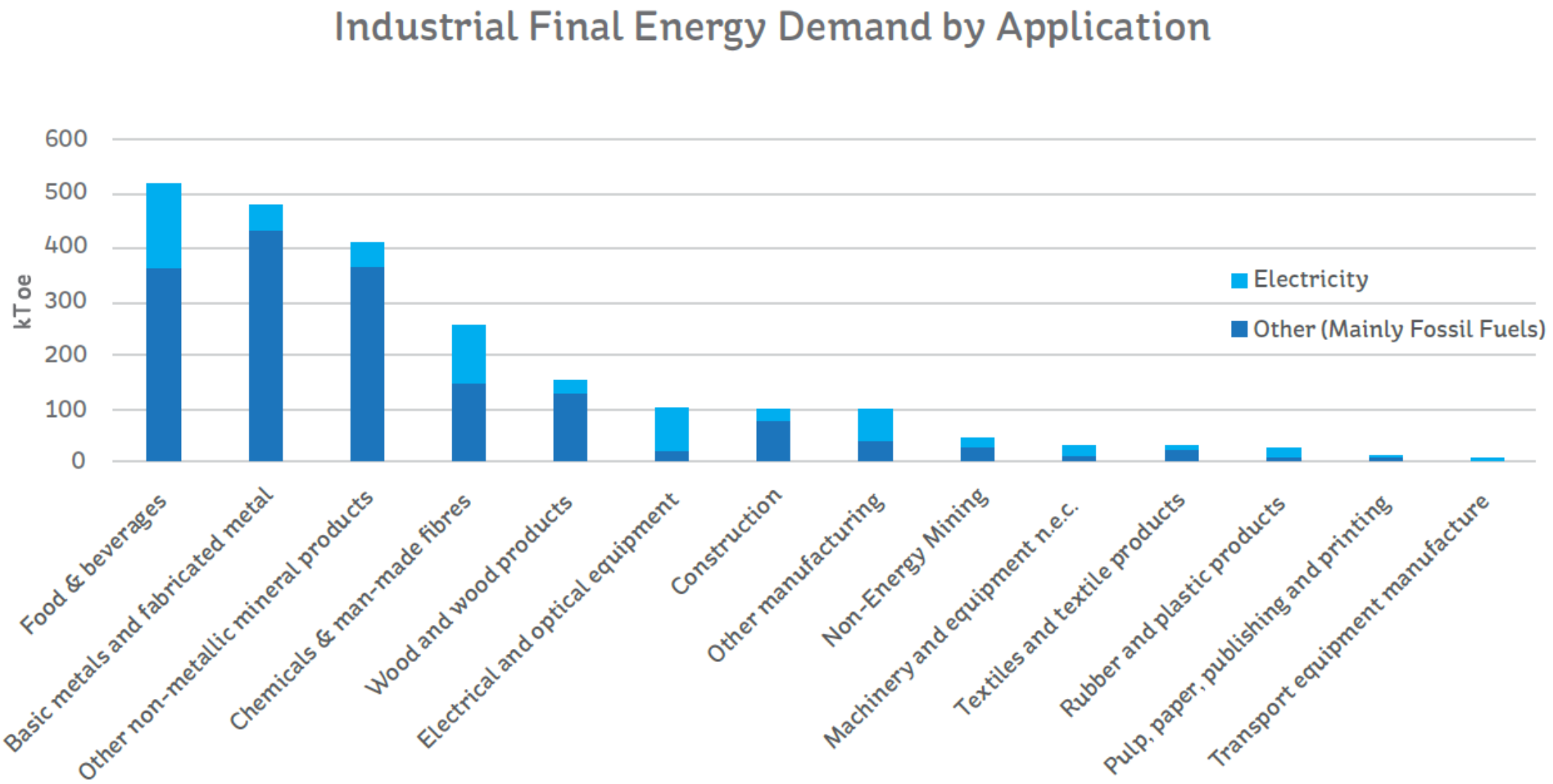
Sample of 342 Industrial Heat Pumps Globally by Application

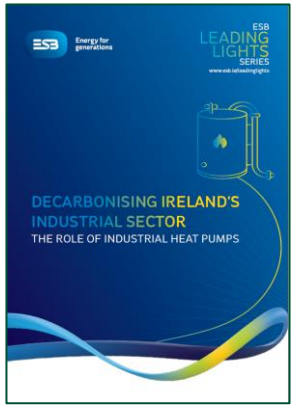


Sample of 88 Food & Beverage Industrial Heat Pumps Globally by Application



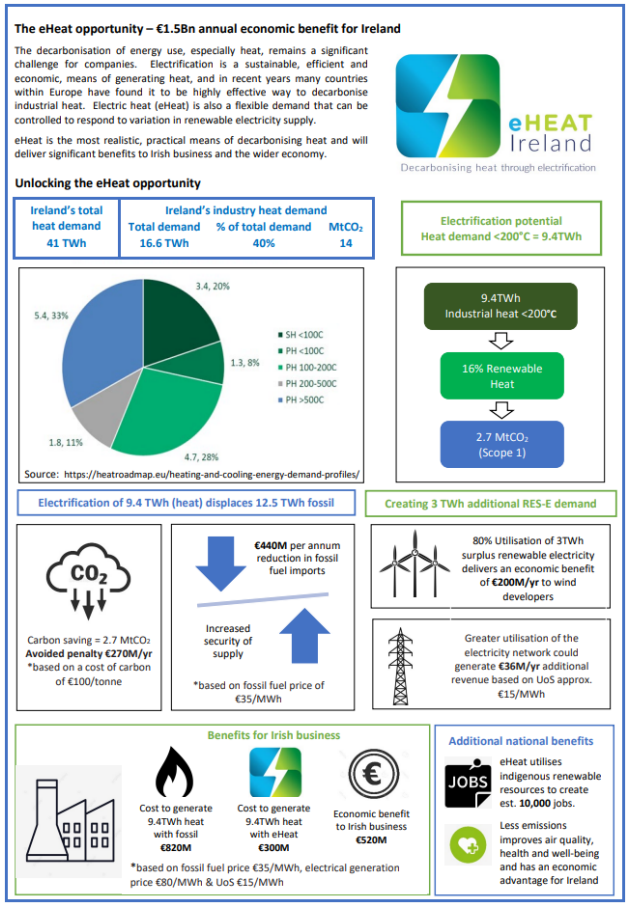
Very Suitable Demands in Ireland for Large-Scale Heat Pumps





Potential Using Existing Technology

- Total Heat Demand = 41 TWh
- 1% Renewable Heat = 0.41 TWh
  - Equates to 3.5% renewable heat for industry sector
  - If oil = ~100 kt CO2 per year
- Concerting industrial heat demand <200°C (9.4 TWh) to heat pumps will:
  - Increase renewable heat to ~16%!
  - Reduce CO2 emissions by 2.7 MtCO2
  - Save ~€440 million of imported fossil fuels



9.4 TWh Industrial Heat → 16% RES-H → 2.7 MtCO2 (Scope 1) → €440 Million Less Imported Fossil Fuels

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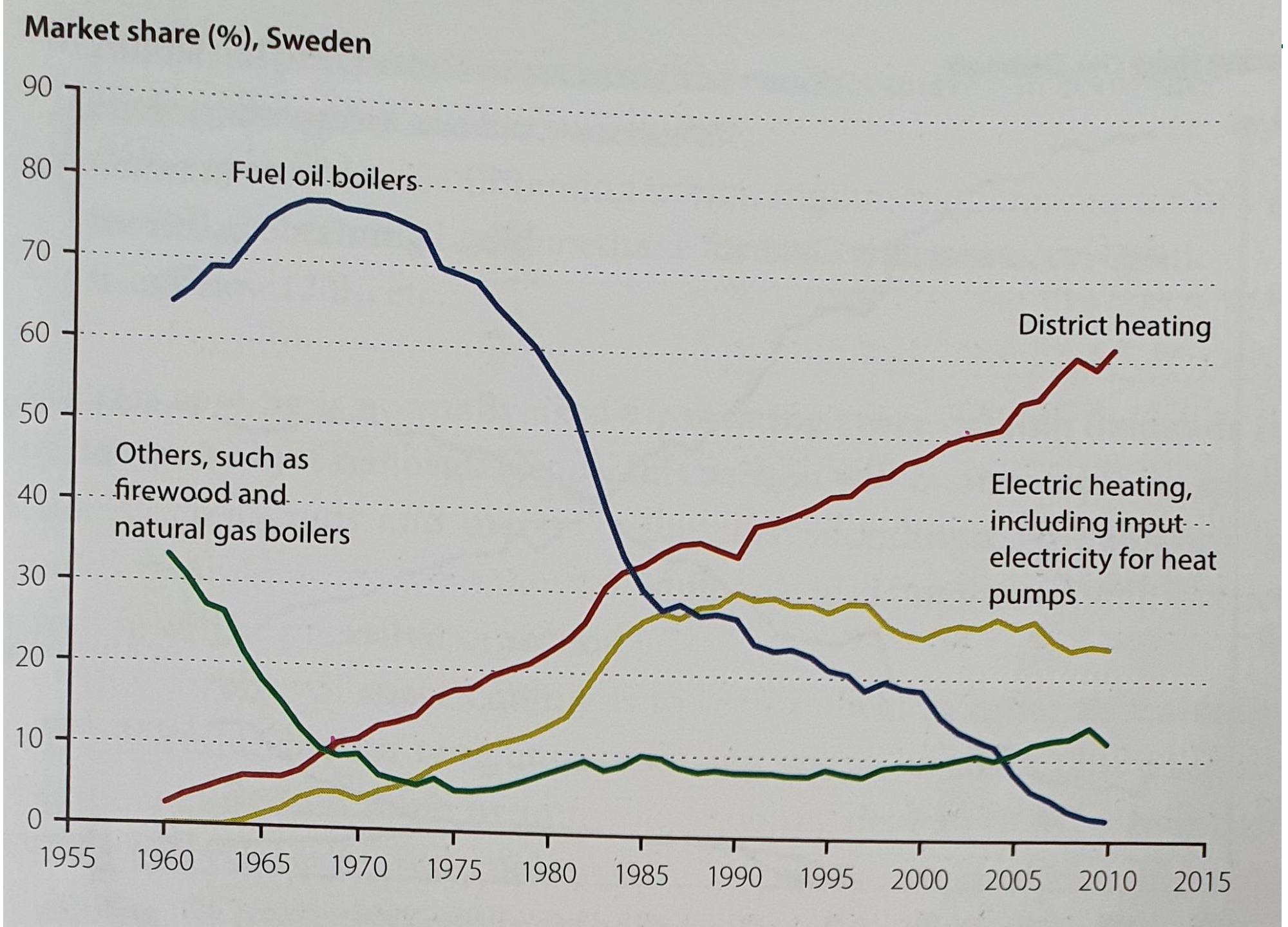
Farm Smart Utility:
A Solution for Farm Level

FSU
FARM SMART UTILITY


Market share (%), Sweden
90
80
70
60
50
40
30
20
10
0
Fuel oil boilers
District heating
Others, such as firewood and natural gas boilers
Electric heating, including input electricity for heat pumps
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

Combination of Solar Electricity, a Heat Pump & a Battery for Dairy Farms

FSU FARM SMART UTILITY

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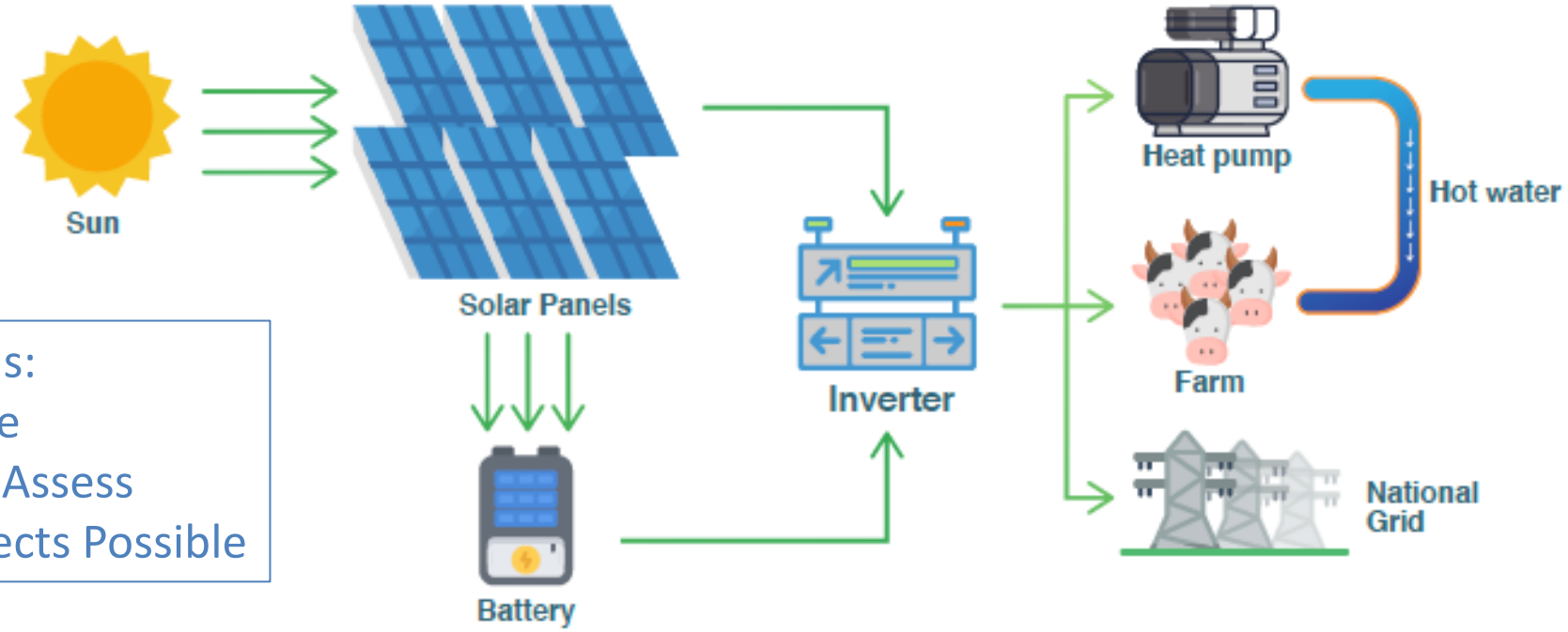


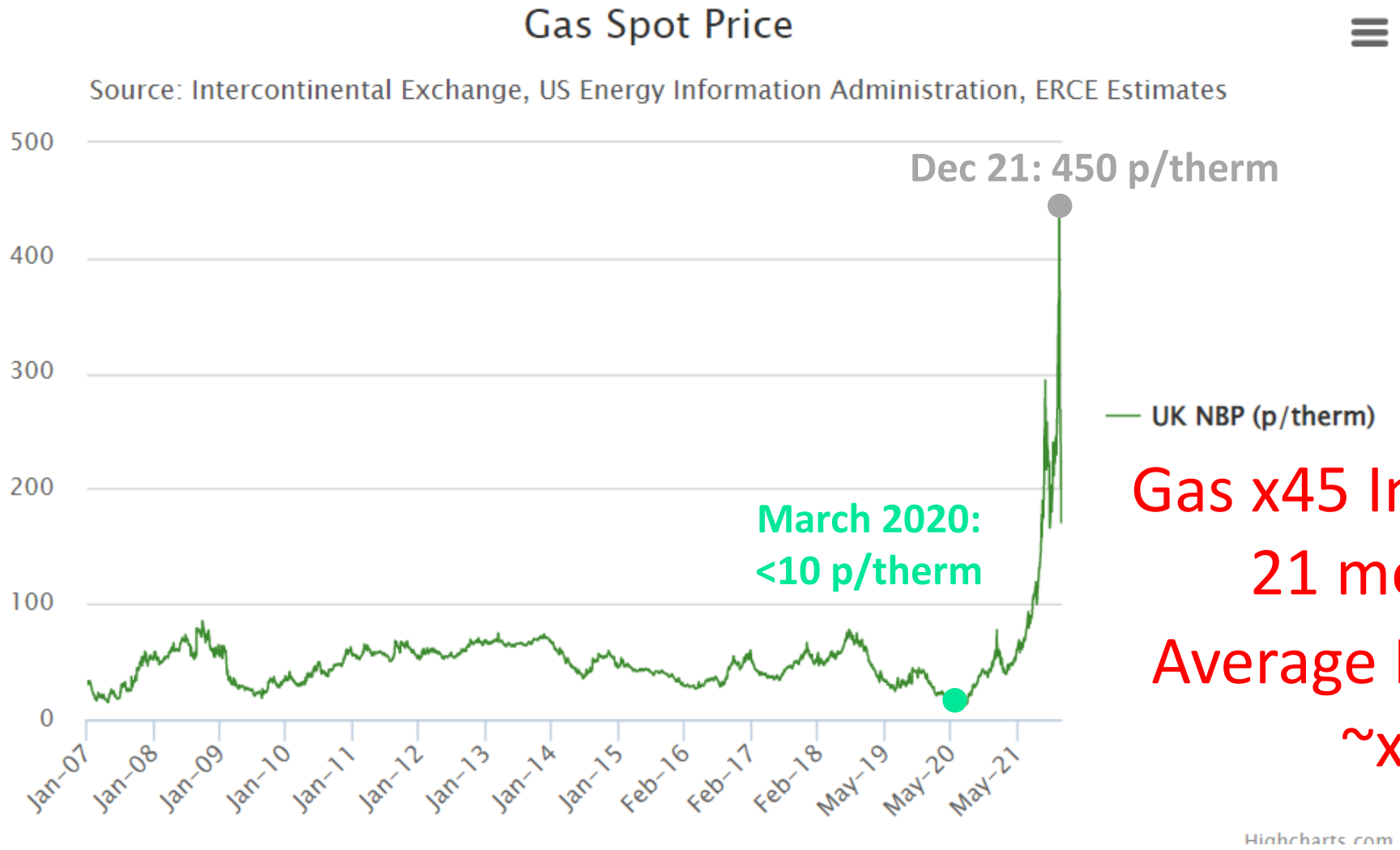
High-Level Guide on Options:

- <100 Cows = FSU for scale
- 100-250 Cows = Need to Assess
- >250 Cows Bespoke Projects Possible

Example of a System

Solar Installed	kWp	20
Battery Installed	kWh	10
Electric Heat Pump Installed	Unit	1

Renewable Heating is About More than CO2: Energy Prices Increasing Rapidly



Gas x45 Increase in 21 months

Average Increase ~x5

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Contact Us to Carry Out An Initial Feasibility Check or a Site Visit