

Increasing energy efficiency on dairy farms

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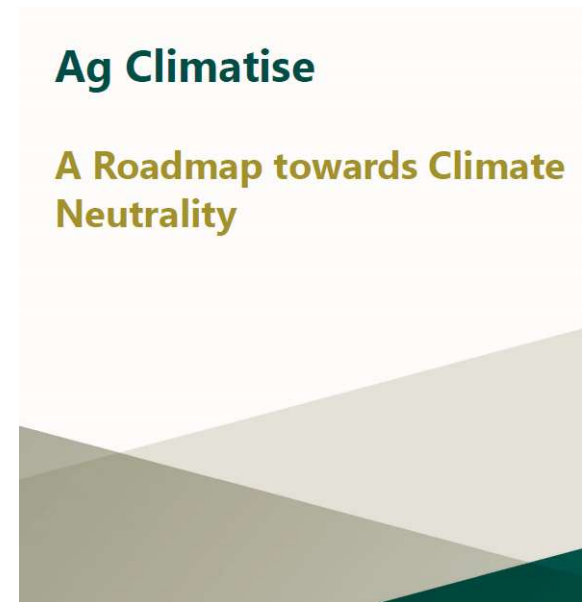


Overview

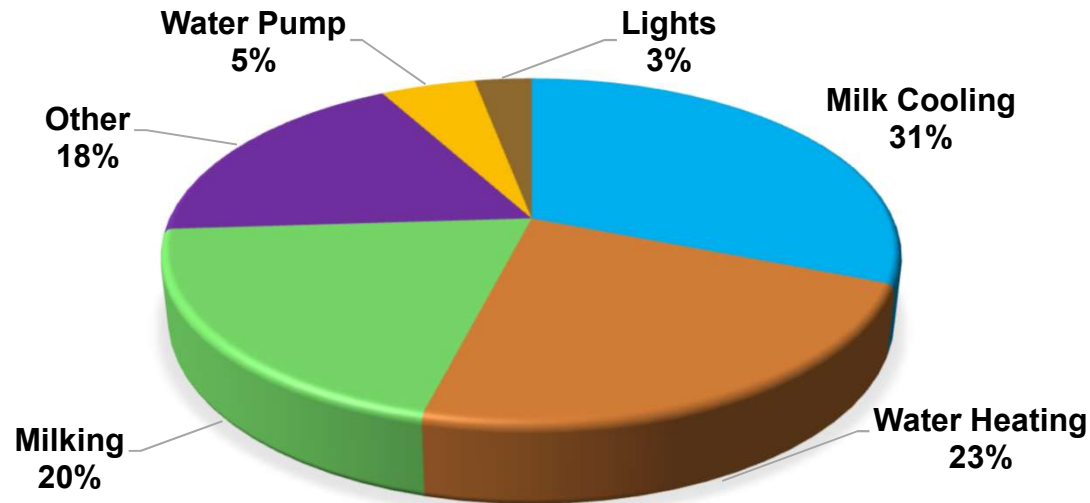
- Energy costs of milk production
- Efficient & renewable technologies available for use on dairy farms
- Decision support tool

Why reduce energy use?

- Better for the environment
- Better for farm profitability
- Ensures that we meet our targets



Energy cost of milk production



Cost of electricity = €5.00 per 1,000L of milk sold

Max = €9.00 Min = €2.50

Night Rate Electricity

- Day rate = €0.18 / kWh
- Night Rate = €0.08 / kWh
- Night rate from 12 midnight to 9am
(11pm to 8am winter time)



Milk cooling systems



DX

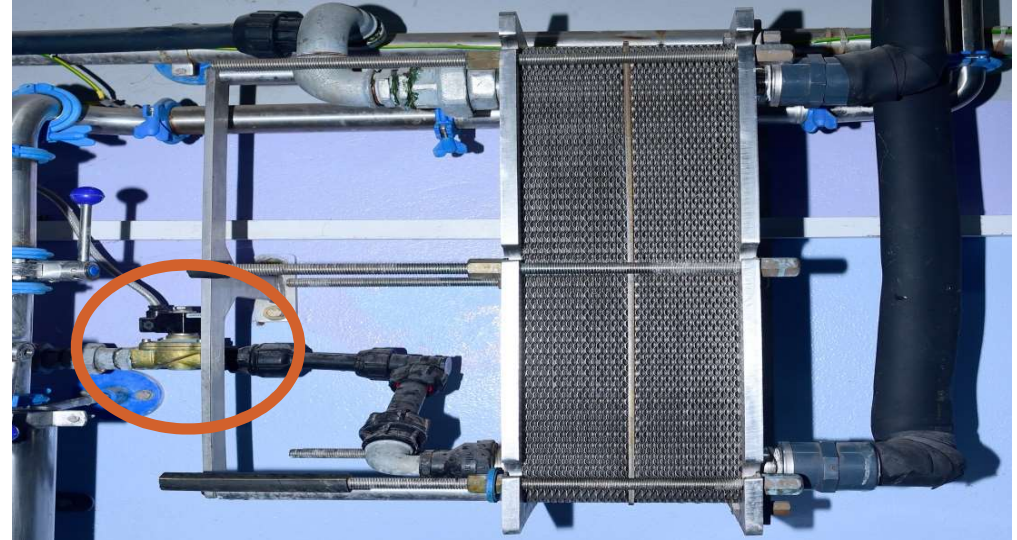


IB



Pre-Cooling

- Goal of pre-cooling is to cool milk to within 5 °C of incoming water temp
- Milk:Water of 1:2
- Can reduce cooling energy use by 40%



Vacuum Pump

- Use Variable Speed Control (possibilities for over 60% savings)
- Reduces pump speed when demand for vacuum is low
- Ramps up speed as needed



Water Heating

- Ensure adequate supply
- 10 Litres required per cluster
- 2% of bulk tank volume

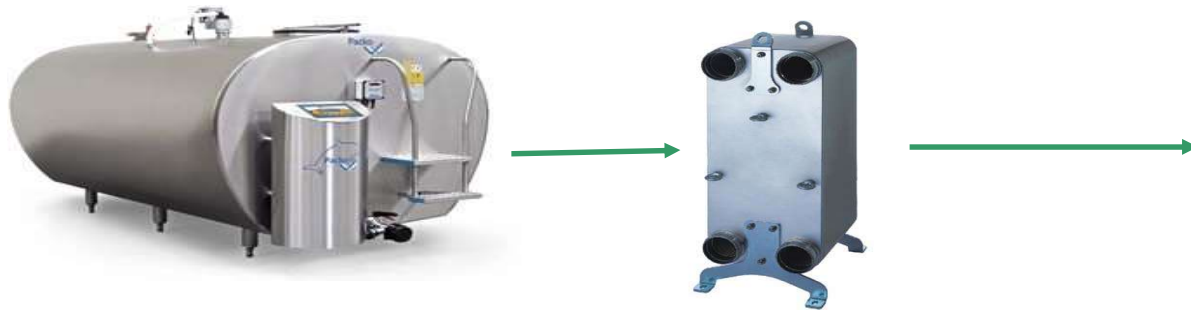


Water Heating Running Costs

| System type | Cost per 100 litres hot water | CO ₂ emissions per 100 litres |
|------------------------|-------------------------------|--|
| Day rate electricity | €2.10 | 4.3 kg |
| Night rate electricity | €0.94 | 4.3 kg |
| Gas (LPG) fired | €0.87 | 2.4 kg |
| Oil (Kerosene) fired | €0.65 | 3 kg |

Heat Recovery

- Heat energy is removed from milk during cooling & transferred to water
- Up to 40% savings



Solar Photovoltaic (PV)

- Generates renewable electricity from the sun
- Effective means of displacing fossil fuels and reducing energy costs
- Size for self consumption
- Use energy storage (water heater)
- Grants & ACA available



Decision support

- Every farm is different (cows numbers, farmer age, expanding, greenfield, water supply, milking system, grant eligibility)
- Dairy energy tool can help guide decision making <https://messo.shinyapps.io/AEOP/>

Farm Details

Current Farm Setup

Farm Location:

Cork (West)

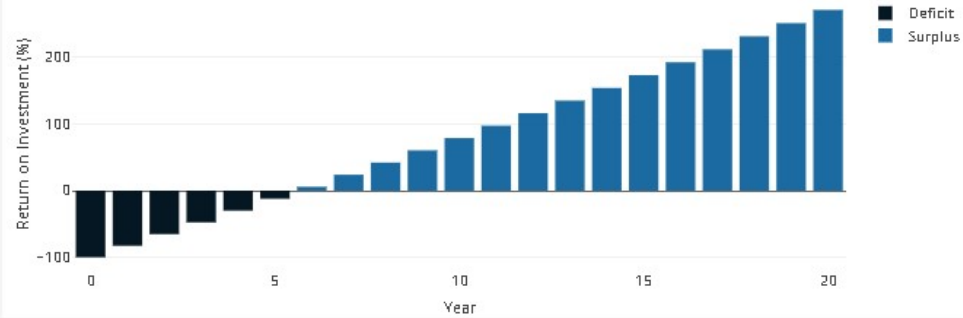
Herd Size:

5

100

Monetary

Return on Investment (%)



5.7

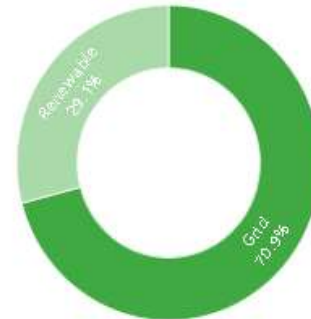
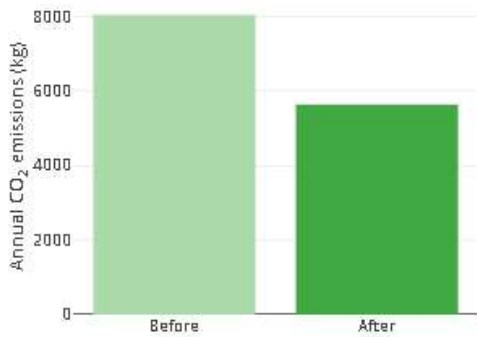
years payback

€3,960

net investment cost

Environmental

Annual CO₂ emissions (kg)



48,063

kg's of carbon saved over 20 years

€82

per tonne of CO₂ reduction

Hour of the day

1 5 9 13 17

60 70 80 90

Summary

- Very achievable to reduce energy use by 20% and generate 20% of power demand from renewable sources
- We have the knowledge and technology to meet our targets, adoption is the next hurdle

A photograph of a group of black and white cows standing in a lush green field. The sky is bright blue with some light clouds. A white rectangular box with a green border is centered in the image, containing the text "Thank You" in a green, sans-serif font.

Thank You