

RETRO-FITTING HEAT EXCHANGERS TO HAEMODIALYSIS MACHINES

<http://www.greenerhealthcare.org/nephrology-resources/heat-exchangers>



HEAT EXCHANGER

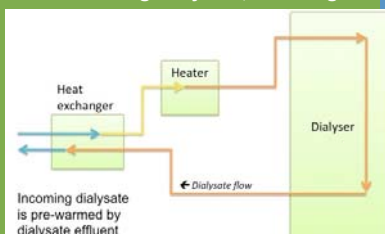


Renal technicians at the Maidstone dialysis unit have investigated the potential costs and benefits of retro-fitting heat exchangers to their existing Braun Dialog+ haemodialysis machines. The team selected five machines at random and ran simulated dialysis treatments before and after fitting the machines with heat-exchangers. They found that the average reduction in power required for each treatment session was 0.86kWh, representing an 18% increase in efficiency.

The team went on to calculate that an investment of £15,687 to fit heat exchangers to all 83 machines across the Kent and Canterbury renal service would deliver an annual saving of £3988.15 from reduced electricity consumption, with an annual reduction in greenhouse gas emissions of 22.6 Tonnes of CO₂ equivalents.

BACKGROUND

The dialysate is usually warmed to just below body temperature. The way this warming is done varies. Most machines use a heater controlled by a thermostat to warm the dialysate. However, some machines will also have a heat exchanger incorporated into the system before this heater. In these machines, heat is recaptured from the dialysis effluent ('used' dialysate) and transferred to the incoming dialysate, warming it up before it enters the heater and thereby saving energy and reducing the environmental impact of a haemodialysis treatment.



ENVIRONMENTAL SAVINGS

Assuming each machine is used twice daily, six days a week for 52 weeks of the year, an annual power saving of 536.64 kWh per machine ($2 \times 6 \times 52 \times 0.86$) is predicted. Applying a conversion factor of 0.50748 kg CO₂ equivalents per kWh, this in turn equates to an annual saving of 272.33 kg (0.272 Tonnes) of CO₂ equivalents per machine per year.

There are approximately 1150 Braun Dialog+ machines in operation in the UK at present. If each of these were to be fitted with a heat exchanger, and assuming once again that each machine is used twice daily, six days a week for 52 weeks of the year, an annual saving of 313 tonnes CO₂ equivalents would be realised. Environmental Saving Total Number Conversion [in tonnes of CO₂ = power saving* of * Factor equivalents] per yr per treatment treatments (0.50748) (0.86 kWh for run per yr Braun Dialog+)

INVESTMENT APPRAISAL

Given the local electricity rate of £0.089 per kWh, the lower energy usage translates to financial savings of £0.077 per treatment (0.089×0.86), and an annual financial saving of £48.05 per machine (if used twice daily, six days a week, for 52 weeks of the year).

Financial saving per treatment = local electricity rate * energy saving per treatment (£/kWh) (0.86 kWh for Braun Dialog+)

The unit cost of the device (£189) could be recouped within four years (£189/£48.05) and a profit made thereafter.

HOW-TO GUIDE: GETTING STARTED

- Firstly identify whether the machines in your unit are fitted with heat exchangers.
- If not, identify the make of the machine, whether a retro-fit kit exists and what it costs.
- Also, clarify any plans to replace or update the machines.
- Remember that the figure quoted here for the energy saving per treatment (of 0.86 kWh) has been derived from tests using Braun Dialog+ machines. If your unit uses different machines, for which retro-fit heat exchangers are available, you will need to clarify the potential energy saving per treatment (either using the method outlined in this case study, or through correspondence with the manufacturer).
- Ascertain the number of machines to which you plan to fit heat exchangers, and how frequently they are used.
- Find out the local rate for electricity.
- You should now be in a position to follow through the calculations outlined above. This will enable you to determine the potential financial and environmental savings for your unit.
- Funding for projects of this nature is most commonly sought through the budget of the renal service. However, interest free loans for energy efficiency measures may also be available from Salix Finance - <http://www.salixfinance.co.uk/home.html>

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