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Federation of Burial & Cremation Authorities

The Climate Emergency;

Reducing the Carbon Footprint of Bereavement Services – Part 1

Scott Storey

14th April 2021

Note: The FBCA is committed to working to avert the climate emergency, the views put forward by individual presenters are not necessarily supported by the FBCA

Our Panelists

Robert Meney
FFMA

Steve Telford
Facultatieve

Howard Pickard
Managing Director
Resomation Ltd

Brendan Day
Secretary - FBCA

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The Journey So Far

The Climate Emergency:

What Changes Can Crematoria, Funeral Directors and Cemeteries Make to Protect Our Environment?

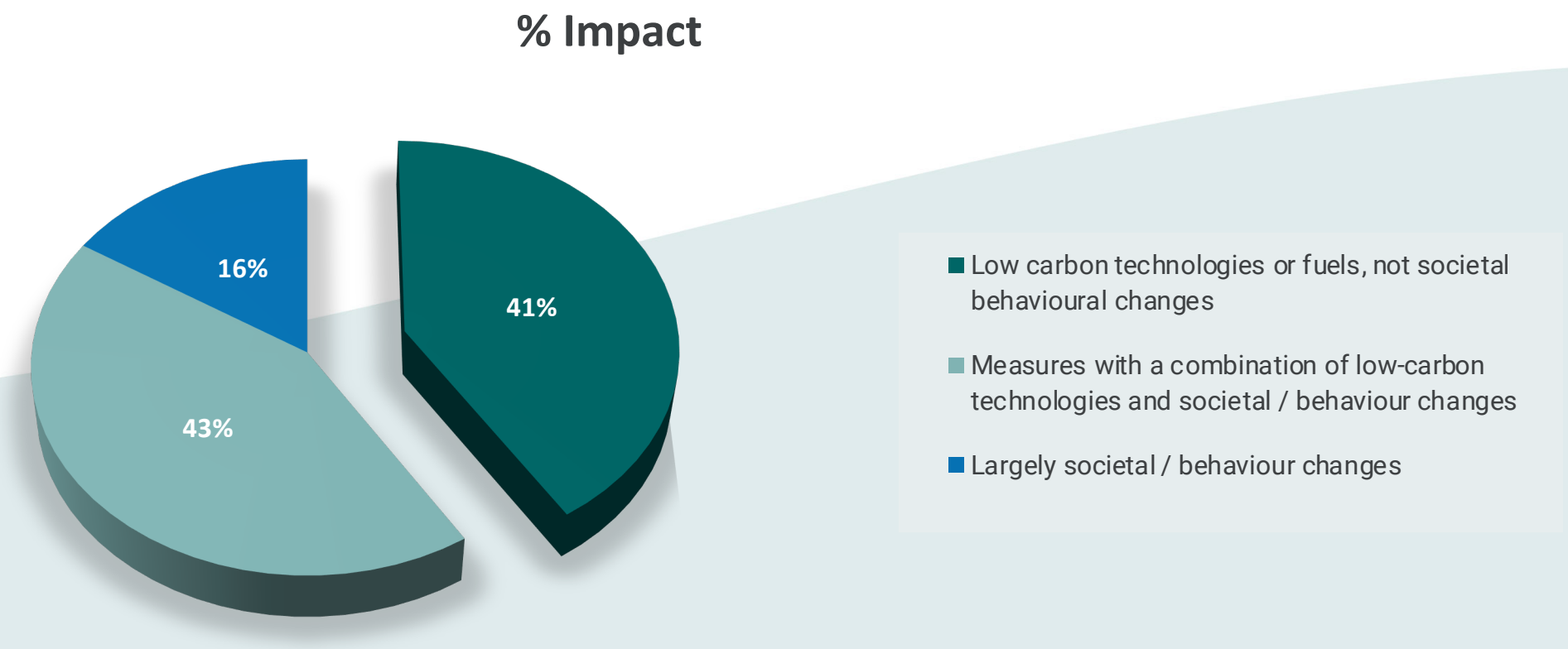
- 1,000,000 Trees planted a year
- NOx Emissions equivalent of a car circumnavigating the world 43,000 times a year

The Climate Emergency:

Contributing to Change Locally and Strategically

- The Environmental Stewardship Group
  - Engaging with the Sector in a series of Roundtable events.
  - Net Zero by 2050
  - Actions to reduce / offset 10% per annum
  - 65% reduction by 2030

Delivering UK Net Zero



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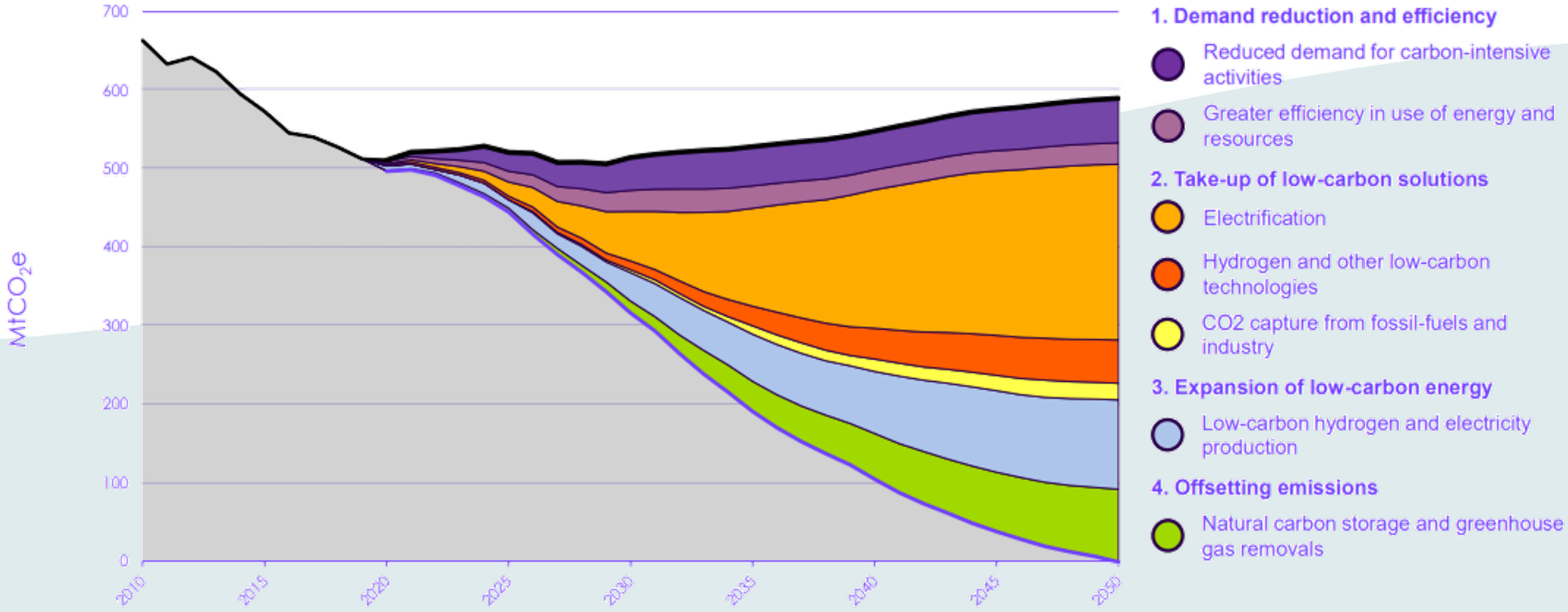
Emissions Abatement on the Balanced Path

Meeting Net Zero requires actions across four key areas



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Environmental Impact – The Truth

- Human Disposal will ALWAYS have an environmental impact regardless of method.
- Today we all have a part to play to review the services that each of us provide and what can be done to minimise the environmental impact of our services.
- Moving forward environmental considerations will form part of everyone's decision making criteria, personally and professionally.

‘Greening’ Cremation

Steve Telford

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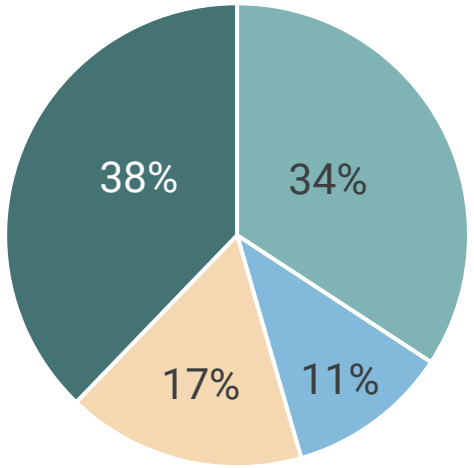
In terms of energy use, how did we get to where we are now?

- Our sector (in terms of environmental performance) was essentially unregulated until the introduction of the Environmental Protection Act in 1990, with the Sector being regulated by Process Guidance Note PG5/2.
- The EPA had a profound effect on Crematoria, to the extent that the entire UK cremator stock had to be replaced over a short period.
- In order to meet the operational requirements and emissions limit values imposed, support fuel consumption increased typically by 300 – 400% from previous levels as the cremators had to run hotter with a much larger secondary combustion chamber (850°C and a 2 second gas residence time).
- The 2004 update to PG5/2 contained major revisions that required the installation of flue gas treatment systems in order to abate at least 50% of crematoria mercury emissions.
- The cremators being served by abatement plant had the secondary combustion chamber minimum operational requirements relaxed to 800°C with a 2 second gas residence time. This reduced support fuel use typically by 30 – 40% as chamber temperatures greatly influence energy consumption.

How can I reduce my energy use and greenhouse gas emissions?

- The most dramatic in effect, the lowest cost, and most environmentally friendly action you can take is to operate the plant you already have more efficiently.
- This means operating the lowest number of cremators for the longest possible period, and this is the approach adopted in many other Countries to dramatic effect when compared with the UK.
- A “typical” natural gas consumption of 32m³ per cremation has been offered as a figure from which the UK’s contribution to greenhouse gas emissions resulting from cremation can be calculated. I would expect this number to vary widely across the UK, and hopefully we can obtain better data from each individual site. A gas consumption rate of 32m³ per cremation should not be considered to be good or even normal however, and can be reduced significantly by adopting changes to operating procedures, and the introduction of energy saving measures. Nevertheless, we can use this rate as an initial basis for comparison.
- FT’s Parent Company owns and operates Crematoria in Europe (with UK specification cremators and abatement plant installed) and so this gives us a unique opportunity to conduct R&D and closely monitor performance. I dug deep down into performance data for a random week during March 2021 at one of our installations in Germany with the following results.

Breakdown of natural gas use for the week



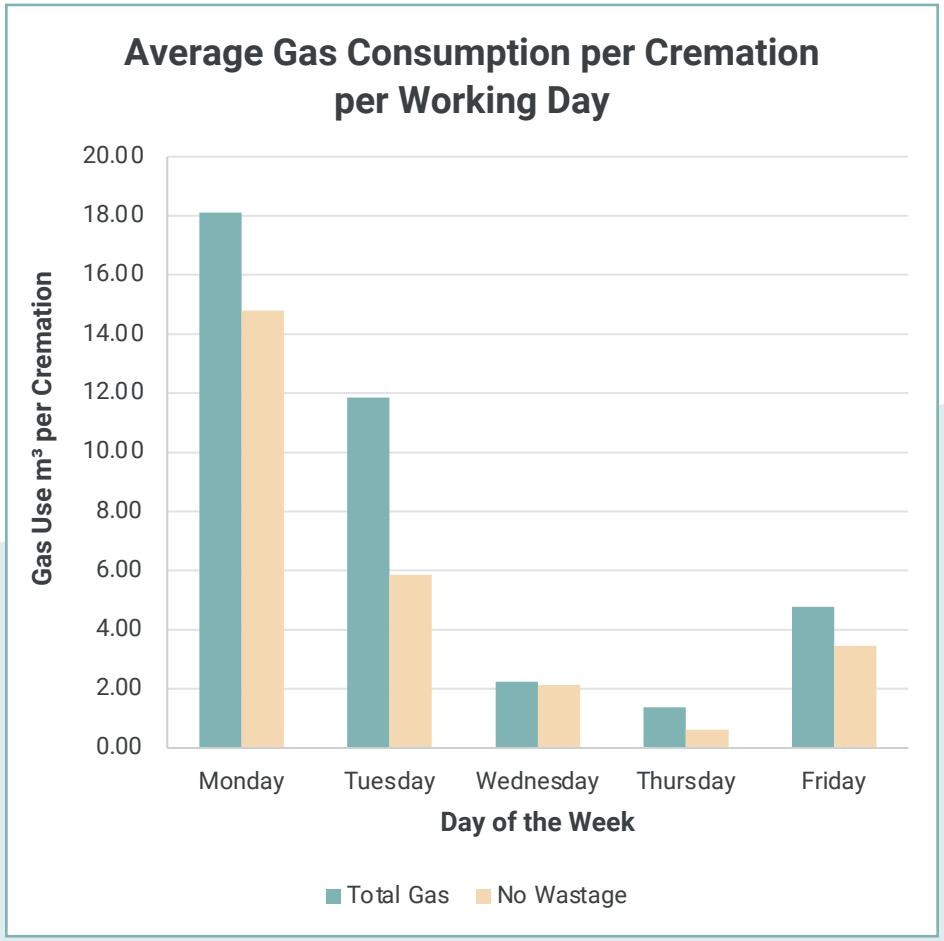
Total metered weekly natural gas consumption = 336 m³

Number of adult cremations carried out = 42

Average gas consumption per cremation = 8.0 m³

- Preheat gas is for Mon – Fri combined. The cremator was not in use over the weekend. Monday morning preheat alone accounted for 93% of the weekly preheat total.
- Waiting gas relates to the cremator idling at full temperature unnecessarily when a cremation has completed but the operator delays raking down for some reason.
- Overrun gas occurs when the cremator has reached operating temperature, is ready to cremate but there is a delay in charging the cremator for some reason causing unnecessary idling time.
- Cremation gas is that used whilst a coffin was loaded in the cremator, and before raking. This also includes sometimes holding the main burner on high fire to deal with difficult to cremate tissue remaining on the hearth to avoid a significantly increased cremation cycle time.
- The cremator is abated, with German secondary chamber requirements of 850°C and a 1.5 second gas residence time (therefore potentially more demanding and energy intensive than UK requirements under PG5/2 (12)).

How does gas use vary across the working week?



- Energy use during the early part of the week is heavily influenced by the quantity of gas used for preheat following the weekend closedown.
- The “No Wastage” data represents savings that could potentially be made by minor operational efficiency measures during that week.
- By Tuesday, the plant is fully heat soaked, and support fuel use drops to, or close to zero for many cremations.
- Gas use on Friday increased due to “difficult” cremations requiring the burner in the main chamber to be held on to deal with tissues remaining on the hearth after say 60 minutes into the cycle. This is to shorten what would otherwise potentially be a very along cremation cycle, and comparable to that for an electrically heated cremator under the same circumstances.

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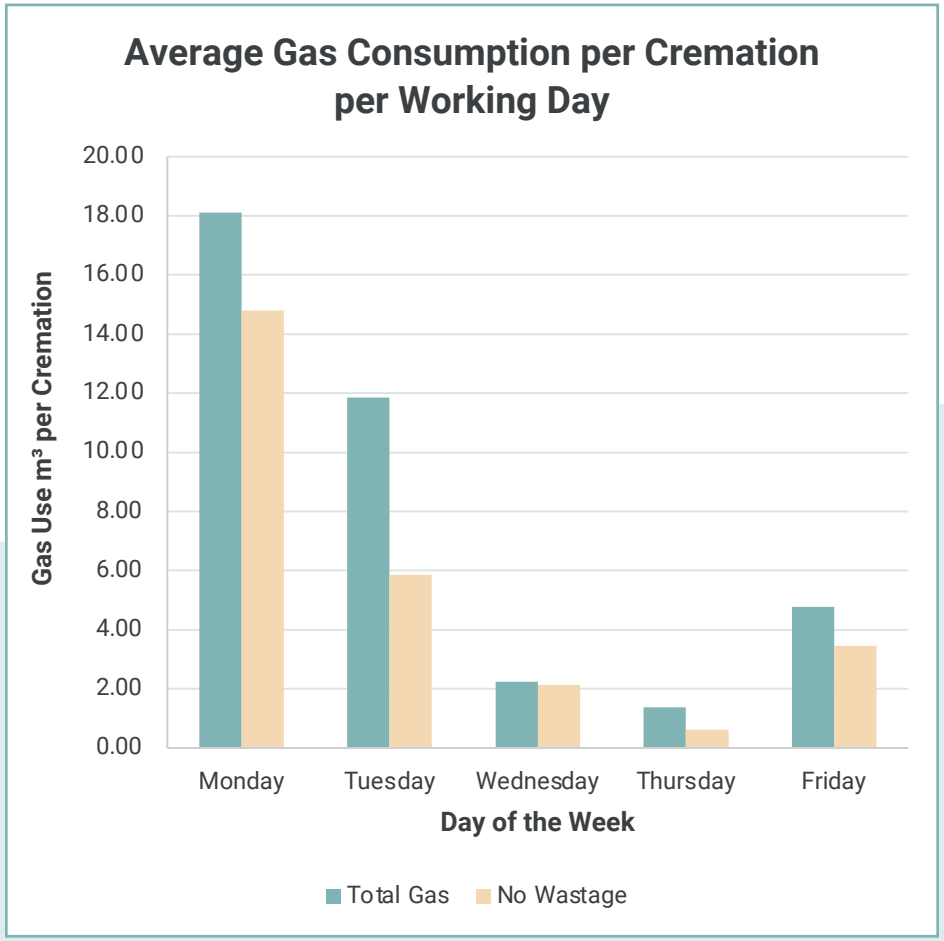
How does gas use vary across the working week?



What could we do to reduce these metered gas consumption values?

- Reduce the amount of gas used for preheat by reducing the plant standing heat losses when idle or operate 7 days per week.
- Install flue sealing dampers that close when the plant is idle to reduce heat losses.
- Accept some long cremation cycle durations as being inevitable by restricting use of the main burner during “difficult” cremations.
- Operate the secondary combustion chamber at 750°C.
- Improve automatic controls to the latest standards.

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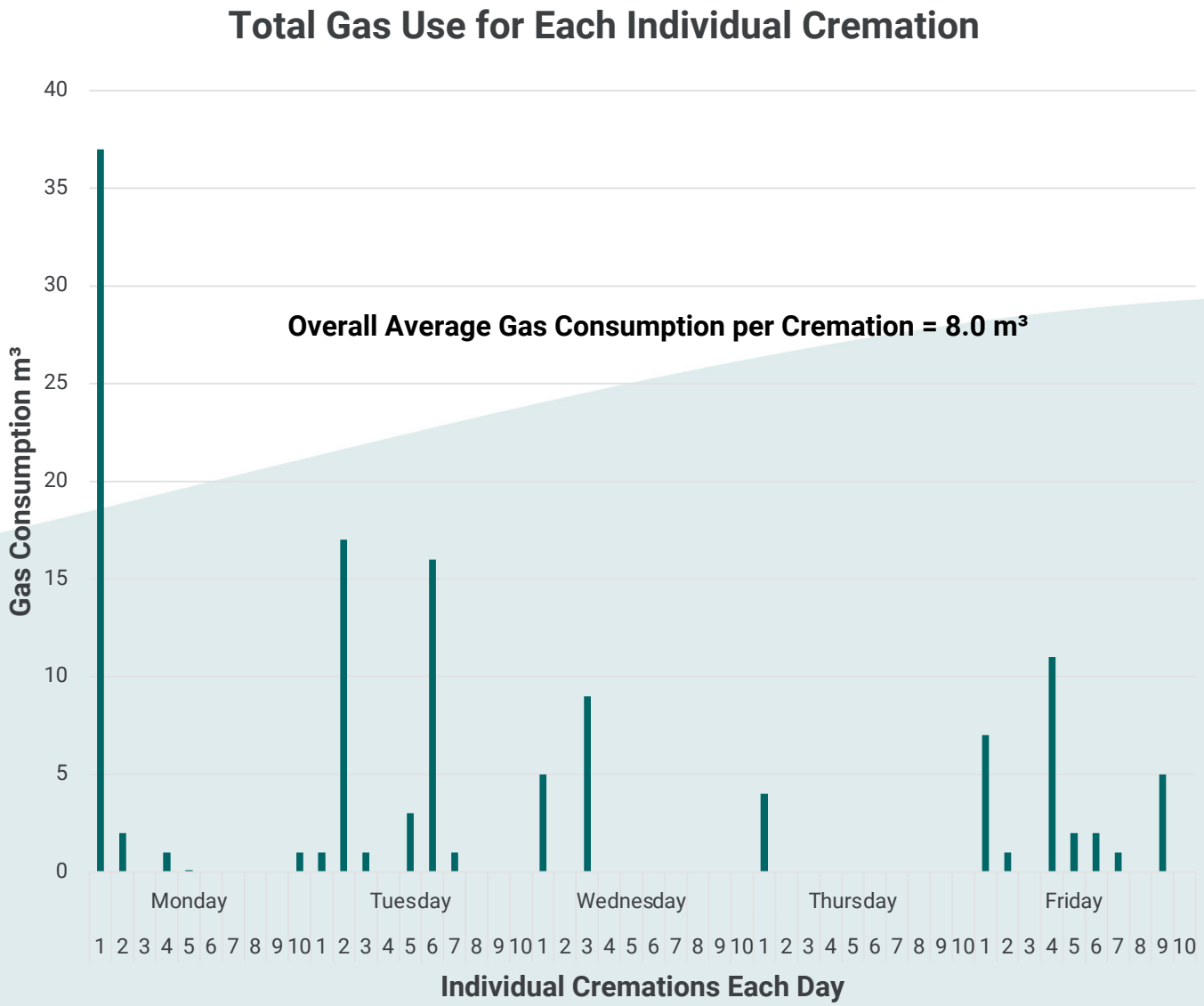
How does gas use vary for individual cremation cycles?

- The effect of the Monday morning preheat is shown very clearly.
- Subsequent cremations generally show little, or zero support fuel is needed. The variations that do occur really show how very differently individual cremations can be for many reasons. The vast proportion of “additional” energy is that taken by manual operation of the main burner to shorten the cycle time of “difficult” cremations as this capability exists for a gas fired cremator, and is very important in a high throughput scenario.
- The data is not intended or should be taken to be indicative of a fully optimised process, but is snapshot from a working crematorium “warts and all”.



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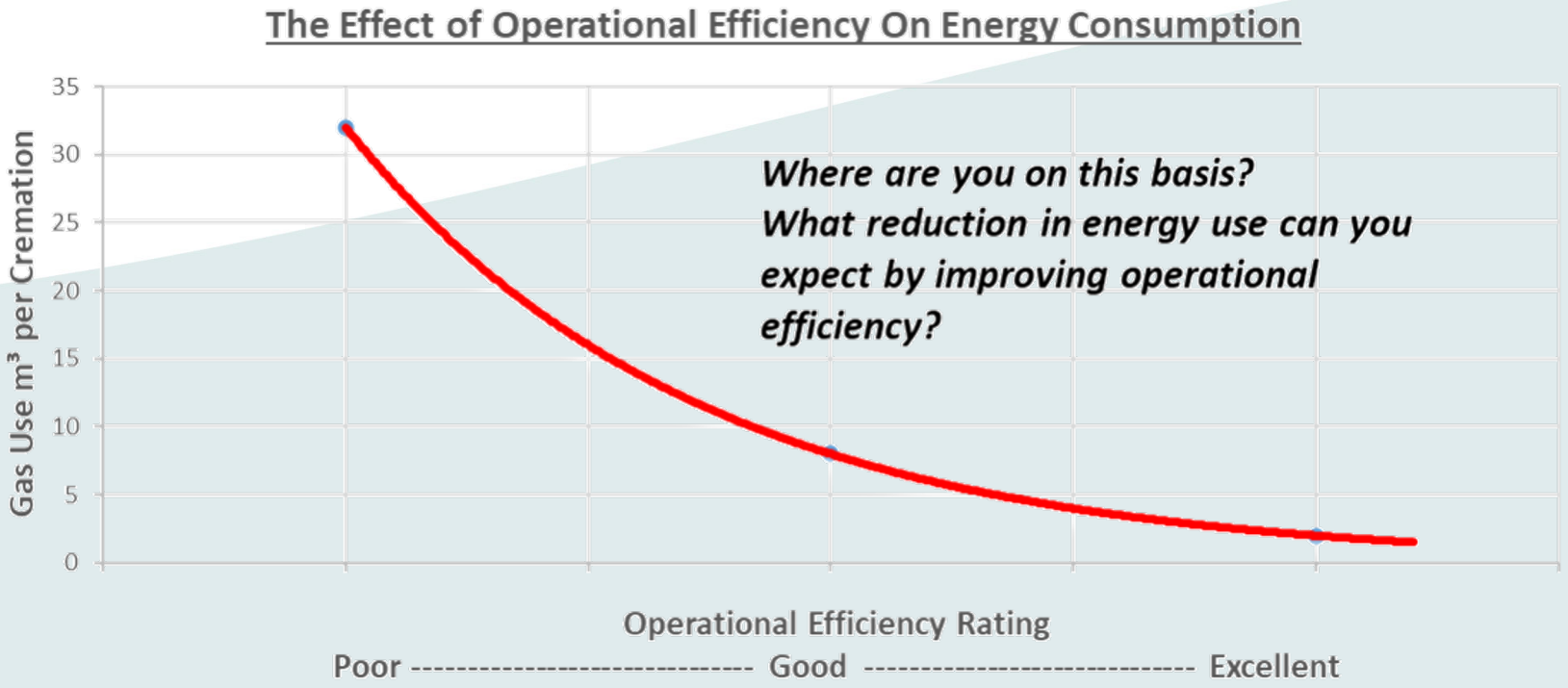
How much energy can I save by operating more efficiently?

- For discussion purposes I have used the suggested 32m³ of gas use per cremation as the basis of “poor” utilisation, the 8m³ per cremation given in the earlier example as being “good” and stripped out some of the wasted gas to represent “excellent” utilisation.
- The graph below does not take into account other measures that could be applied to a gas fired cremator to further reduce energy consumption.
- The gas consumption value expressed in m³ would be better expressed as consumption in kWh to allow different energy sources to be compared.



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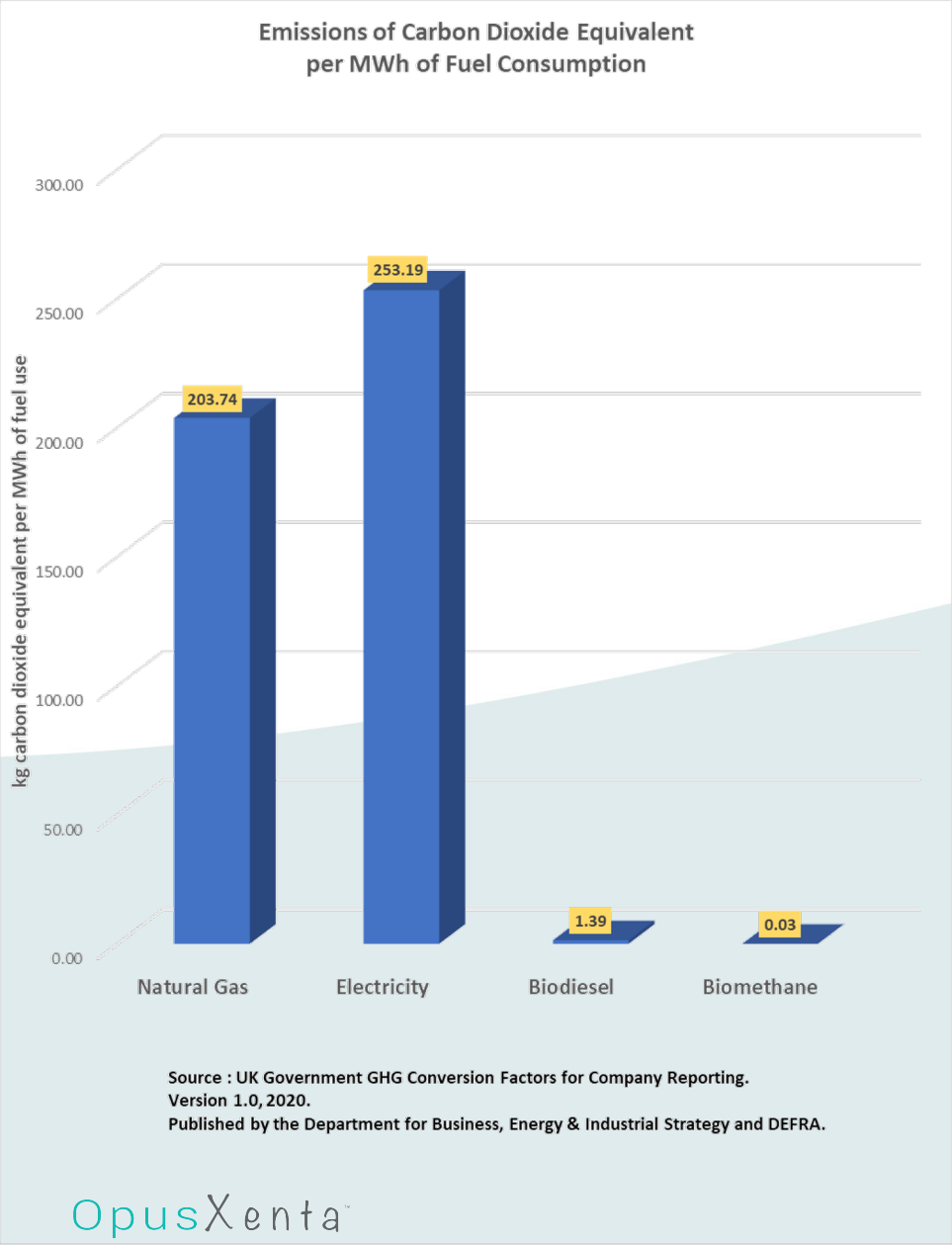
What are the cost vs. environmental benefits of improving gas fired plant operational efficiency against replacement with electrically heated cremators?

	Install Electric Cremators	Improve Gas Cremator Utilisation
Potential decrease in UK CO_2 emissions	No data	75% reduction *
UK wide capital cost to effect change	£300,000,000 **	£ Nil
Will cremation cycle times increase?	Yes	No

** On the basis of a reduction from 32m³ of natural gas use down to 8m³ as outlined previously. The implementation of further energy saving measures along with fuel substitution to say BioLPG could well increase the potential reduction to 95% and would require relatively minor capital investment.*

*** Excludes any costs associated with the upgrading of the site electricity supply infrastructure (that could be considerable) and the dismantling and removal of old plant.*

There has, to my knowledge, been no data published that indicate the likely performance of an electrically heated cremator other than meaningless terms such as “up to a 90 - 95% reduction”. The industry needs to know the actual CO_2 reductions anticipated (but preferably measured), before any worthwhile comparisons can be made. For this reason, the table above states “No data” for greenhouse gas reductions resulting from the adoption of electric cremators until these proven data are forthcoming.



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How green are the various energy sources available?

- The chart to the left shows the official Government stated CO_2 equivalent emissions per MWh of fuel consumed for various sources of energy. You will see that electricity is the highest emitter due to the fact that natural gas is the fuel from which much of our power is generated at relatively low thermal efficiencies.

- We could add electricity and BioLPG purchased on “green” tariffs that have been carbon offset, but energy supplied from the national power and gas distribution systems must be converted to CO_2e emissions for Greenhouse gas reporting purposes using Government published factors, and the latest figures have been used in this chart.

- Until such a time that power generation from renewable sources reaches the stage that, overall, the CO_2 emissions from grid purchased power are lower than that from combusting natural gas locally at your crematorium, then there is a danger that wholesale adoption of electric cremation could actually increase national CO_2 emissions rather than reduce them until that tipping point is reached.

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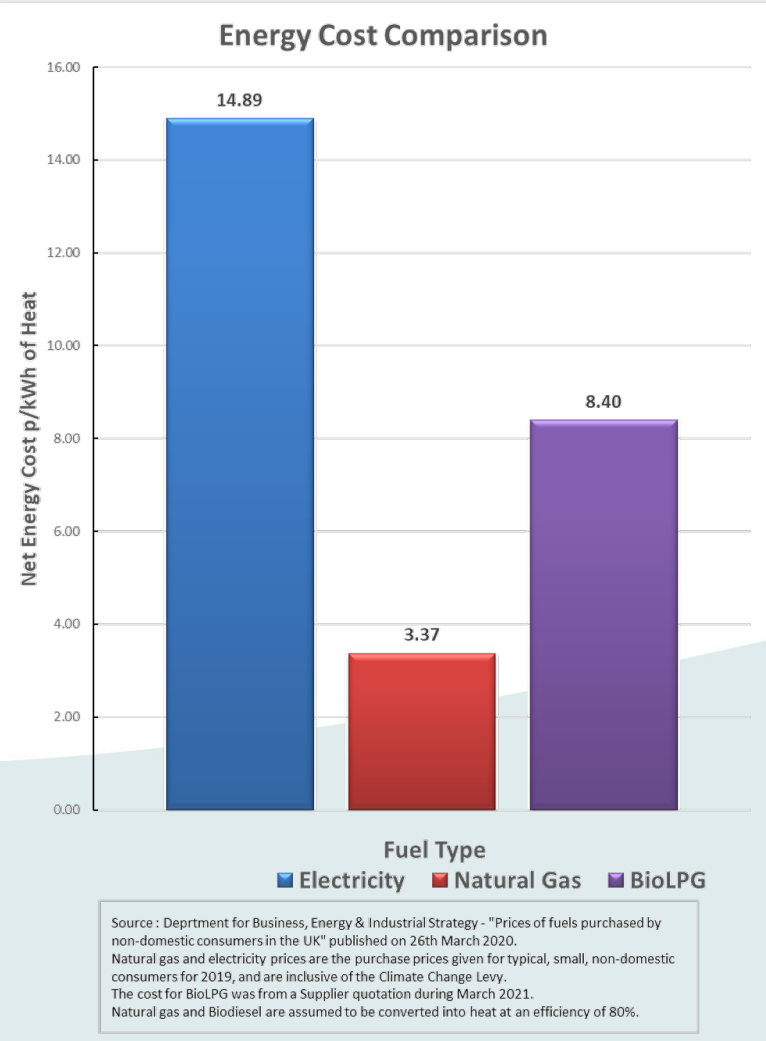

Are there cost implications associated with energy substitution?

- The inevitable answer is yes. Using published Government data, an illustrative comparison of energy costs on a similar basis is shown on the chart to the left.
- Natural gas is the fuel predominantly in use at this time and is relatively low in cost.
- Electricity is a premium energy source and has a price to match.
- Both electricity and BioLPG may be purchased on “green”, carbon offset tariffs to reduce your CO_2 emissions on paper.
- If you purchase energy under an “umbrella” agreement covering multiple sites to improve your purchasing power then your own, individual costs will probably be lower.

Are there any other factors we need to consider resulting from “Greening Cremation”?

Yes there are……

- The adoption of electrically heated cremators would seem to require operating the secondary combustion chambers at a minimum of 750°C when compared to 800°C for a gas fired equivalent (when abated). In order to reduce fuel use the gas cremator could similarly operated successfully at 750°C without any issues in order that we can compare like with like, so what is the problem?
- This concerns the desire to incorporate NOx abatement technology to improve local air quality standards.
- FT have numerous cremator DeNOx systems already in place (including in the UK) that abate NOx emissions, and these all operate on the basis of SNCR (Selective Non-Catalytic Reduction). The process works best within a defined temperature band, and operating currently at a minimum temperature of 800°C is at the bottom end of this accepted range. This could mean running at a lower temperature will reduce the efficiency of the process, and lower the NOx abatement plants potential to abate, and therefore could create difficulties.
- An earlier paper in-part covering NOx abatement implied that cremators (gas or electric) could be fitted with SCR (Selective Catalytic Reduction) plant. This is not a viable option and would be very expensive and space consuming. SCR is a post-combustion process and would have to be fitted after the bag filter. SCR again only operates effectively within a defined temperature window, and the temperature of the gases exiting a bag filter is far too low at around 150°C for effective NOx abatement using this technology. This would require the waste gases being re-heated prior to entering the SCR system that would increase energy consumption (and therefore greenhouse gas emissions) significantly.
- It follows that for NOx abatement to be viable, we may have to continue to operate the cremator secondary combustion chamber above 800°C unless further research proves that a lower temperature is acceptable to provide the degree of NOx abatement desired, or to satisfy any future statutory emissions limit.

What are the next steps?

- Establish your present energy use per cremation to determine where you are ranked, introduce an energy monitoring and target setting scheme, and decide where you would like to be going forwards.

- Move away from the long-established UK tradition of the cremation plant essentially operating as a 9 a.m. – 5 p.m. single shift operation 5 days per week and operate more in the manner of our European neighbours if you really want to minimise greenhouse gas emissions, irrespective of cremator type or energy source.

- Consider a change to BioLPG on the same basis as moving to a “green” electricity tariff if you wish to be seen to be moving towards being classified as carbon neutral. Conversion to BioLPG is straightforward in most cases, and the cost of conversion will be around 1% of the cost of replacing the cremator with an alternative type, or zero cost if you already use LPG.

- The Cremation sector needs to decide if the move to electrically heated cremators is the desired direction of travel, or whether if using what is installed already more efficiently is more appropriate, or even a combination of the two.

What are the next steps?

- As a matter of urgency, DEFRA need to rule on the issue of continued operation of an electric cremator either on emergency bypass, or unabated at a temperature of less than 850°C. Existing Crematoria operating unabated cremators could not use an electric cremator as an alternative unless they also have sufficient space to install abatement plant. If due to local issues or Listed Building status this is not possible, then they will have to remain gas firing, or cease cremation activities.

- Investigate how the future introduction of NOx abatement systems will be effected by the lowering of cremator secondary combustion chamber temperatures.

- Should it be decided that electric cremators are the way forward meaning that there are potentially up to £300 million worth of contracts to be won, then of course FT would make such a machine available in a very short time. Given the size of the market, and FT's potential production capacity, the UK needs FT to be producing electric cremators if that is really what the market wants.

- We must always bear in mind that a capital investment programme of say £300 million will release an awful lot of CO_2 given that a cremator is built from materials such as steel and refractory materials that are highly energy intensive to produce.

Resomation: A Sustainable Form of Disposition

Howard Pickard

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Resomation
NATURAL WATER CREMATION

Resomation – Natural water cremation

- Brief explanation of the process
- Relevance to today
- Global recognition
- Engagement
- Moving forwards

Saving our environment

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Resomation
NATURAL WATER CREMATION

Howard Pickard
Managing Director
LBBC Group

5th generation family business
Est 1876
£10m t/o, 80% export
80 employees

LBBC GROUP

LBBC TECHNOLOGIES

Industrial Autoclaves

LBBC BEECHWOOD

Sub contract engineering

LBBC BASKERVILLE

Lab Reactors / Autoclaves

LBBC RESOMATION

Water Cremation

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Resomation
NATURAL WATER CREMATION

Resomation – Natural Water Cremation

A gentle, natural end of life alternative to flame cremation and to burial, with environmental benefits over both.

Essentially returning the body to cremated remains (“ash”) using water (hydrolysis) instead of flame.

> “Just as British inventive engineering helped ‘save the land for the living’ in 20th century UK through flame-cremation so, in the 21st century, this innovative water-based process of accommodating human bodies offers new opportunities for an age framed by ecological concerns of land use and air quality.”

Professor Douglas J Davies
Director of Centre for Death and Life Studies, Durham University

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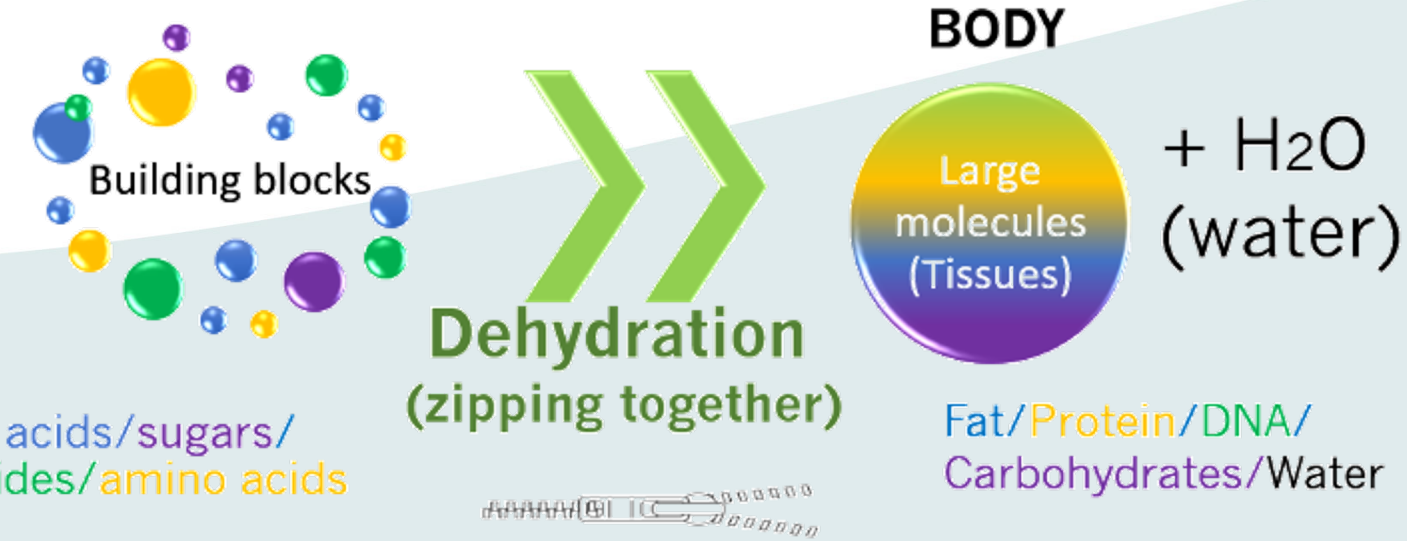
Resomation
NATURAL WATER CREMATION

The Process – Outline

Nature's **Creation** of Life



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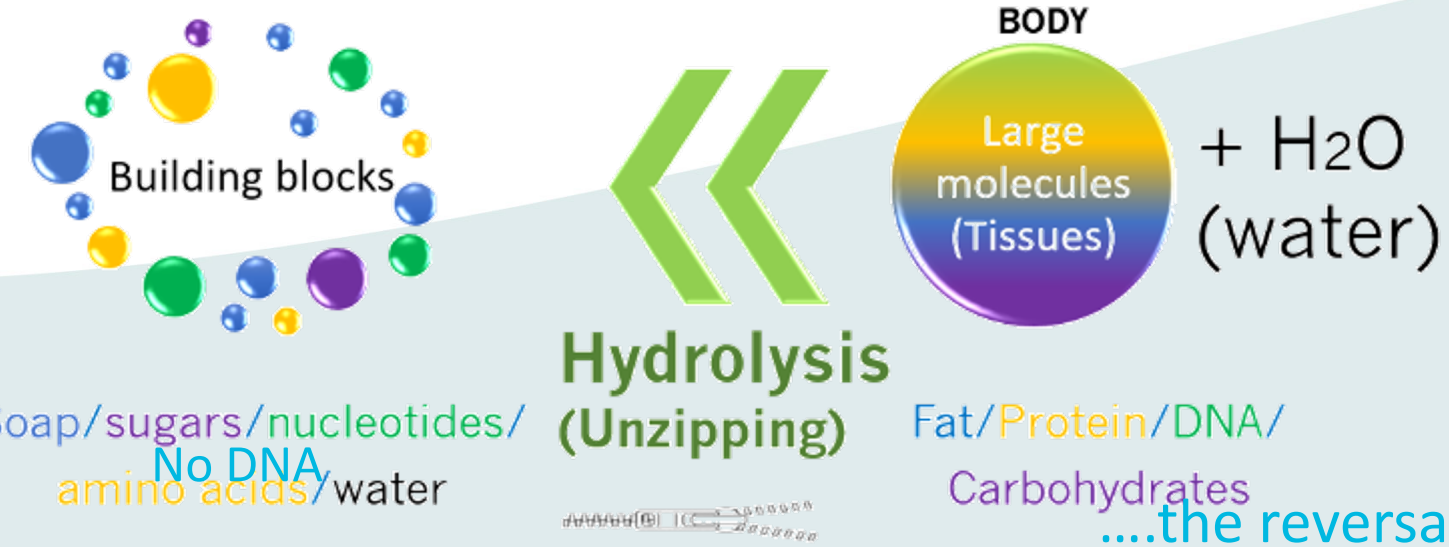
The Process – Outline

Nature's End of Life



....the reversal of the process

The Process – Outline

Post Resomation

Remains dried

Processed

White ‘Ash’ remains

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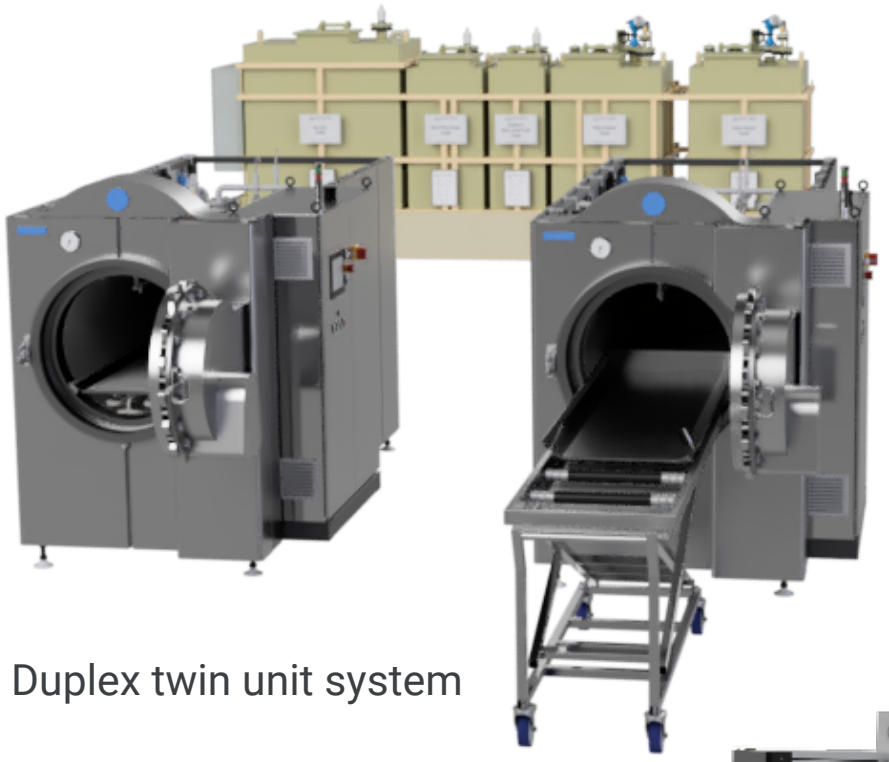
NATURAL WATER CREMATION

The Process – Benefits



Duplex twin unit system

Drying oven

Life Cycle Analysis (LCA) by TNO*, 2014

	Burial	Cremation	Resomation
Climate change kg CO_2 eq	95	208	28

*TNO, independent Dutch research organisation

LCA currently being updated for the UK

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Resomation NATURAL WATER CREMATION

The Process – Awareness

Open Days in Leeds
- >200 attendees
- Informative, demonstration of Resomation equipment
- Next one….July 2021?

Presentation
- groups, zoom presentations

Contact us…
info@resomation.com

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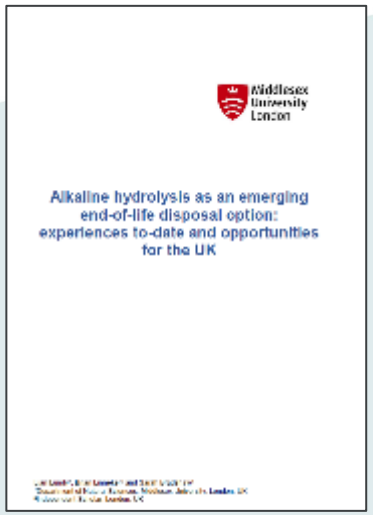
NATURAL WATER CREMATION

Yorkshire Water Study

April 2019
FBCA sponsored working group
Temporary installation at Sheffield Uni
MoJ informed
5 deceased resomated (full consent)
Independent Report by Middlesex Uni
YW consent issued Feb 2020


Middlesex University London

Alkaline hydrolysis as an emerging end-of-life disposal option: experiences to-date and opportunities for the UK

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Resomation NATURAL WATER CREMATION

Global Status

- Offered in USA for over 5 years – **proven technology**
- 1000's of families selecting when offered – **gentle** as well as **environmental**
- New states (Wisconsin, Hawaii) legislating – increasingly **accepted**

Bradshaws Funeral Home, MN

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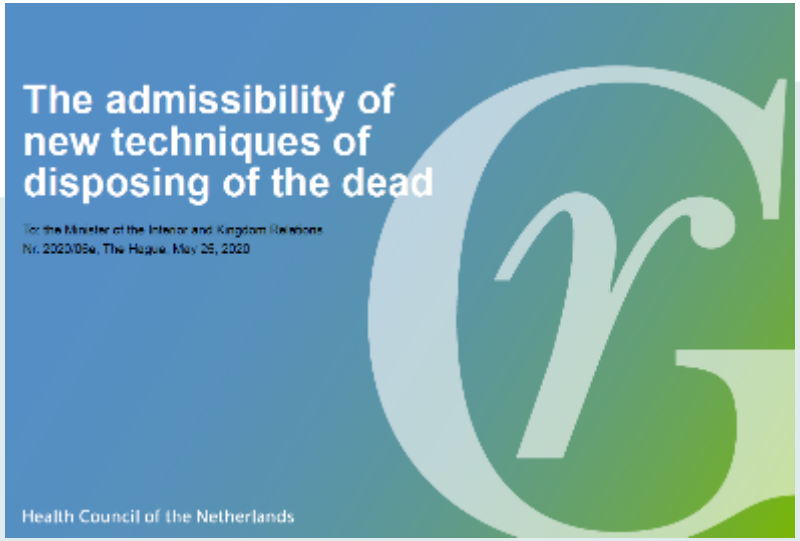
Resomation NATURAL WATER CREMATION

Global Status

European countries addressing the environmental issues of flame cremation (Netherlands, Ireland, Spain, France) – Resomation a **genuine alternative**



"After assessing the technique under the principles of Safety, Dignity and Sustainability, The Committee is of the opinion that, regarding sustainability, sufficient evidence has been provided to show that alkaline hydrolysis compares favourably to burial and cremation."

Health Council of Netherlands May 25th 2020

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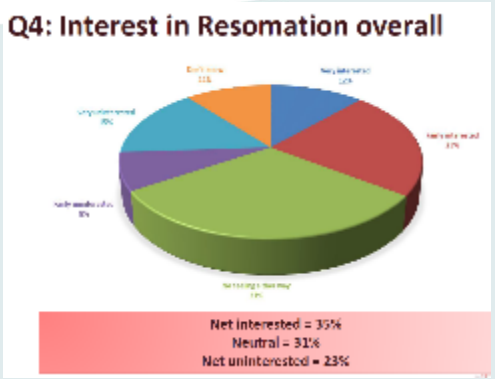
Resomation NATURAL WATER CREMATION

Engagement

- Trade associations/Government
- Environmental Stewardship Group
- Funeral sector : Visits, Open Days, Webinars, Zoom presentations
- Public increasingly aware, weekly emails requesting where Resomation can be done

"How beautiful and clean can it be"


religions
MDPI
Article
Dying to Go Green: The Introduction of Resomation in the United Kingdom
Georgina M. Robinson



Recent Ipsos/Mori poll

JC Atkinson

BatchelorClark

Research consistently shows ~30%+ interested with little knowledge

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Resomation
NATURAL WATER CREMATION

Change

From his presentation at CBCE 2019 by Prof Douglas Davies, Durham University

Elements :	Earth	Fire	Water
Periods in Time..			
Reformation		individual	Saving souls
Industrial Revolution		masters –workers	Making profit
Ecological Revolution		science versus politics	Saving planet

21st century - Ecological Age, Social choice

CREMATION, dominant but moderated **Natural Burial**

POTENTIALS -**Alkaline hydrolysis, Body decompositions.**

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Resomation NATURAL WATER CREMATION

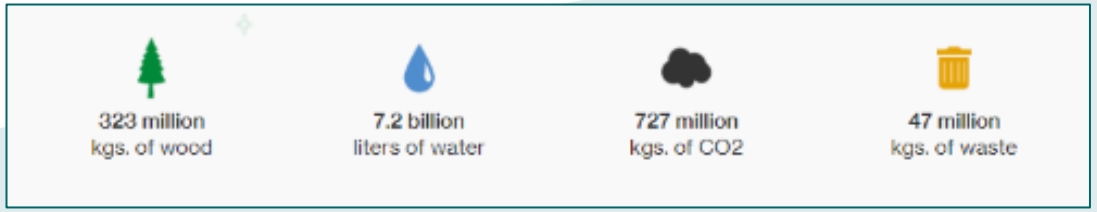
Change

Resomation has a place in disposition complementing existing technologies.
It has to have a part to play in reducing the emissions of disposition.

The Public will make the choice themselves

ESG launch event……

Example of illustrating environmental savings



DocuSign website

- **"In a sector with a great degree of sensitivity around cultural change, the court of public opinion is changing fast, sustainability and environmental issues are at the forefront of market change, those who rise to this challenge will be at the forefront of market advantage, those who lag behind will be at a significant disadvantage"**

Richard Macdonald, Deputy Chair, The Environment Agency

Thank You

www.resomation.com

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Resomation
NATURAL WATER CREMATION

FFMA Insights

Robert Meney

OpusXenta

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F.F.M.A.

FFMA

- Funeral Furnishing Manufacturers' Association est. 1939
- Over 70 active members
- Members representing crematoria, funeral vehicles, interior soft goods, embalming products, coffin furniture, coffins, refrigeration, mortuary equipment, celebrants, uniforms, funeral business M&A, insurance services, funeral directors, etc.
- Members across UK & Ireland
- Chief Exec representing FFMA on Deceased Management Advisory Group & All-Party Parliamentary Group on Funerals & Bereavement
- Active involvement with UK Government during pandemic crisis
- UK's most comprehensive coffin, casket & shroud certification scheme partnering with one of the world's leading product testing organisations

Funeral Furnishing Manufacturing

- FFMA Product Certification programme – over 170 coffins
- Increased focus on environmental concerns
- Biomass, rainwater collection, water management, waste management & recycling
- Forestry Stewardship Council
- Water-based lacquers & paints
- SEDEX
- Supply Chain Mapping
- Fair Trade
- SMETA or SMETA-standard audits

Manufacturer’s Challenges

- Almost all companies specialist – SME’s, many family-owned
- Practical ability to impact economic-driven change
- 87% funeral traditional
- Scale of funeral sector as a whole
- Constituent elements of funeral as environmental impact factors
- Settled view on environmental impact of constituent elements & products
- Data-driven decision making
- Diversity of study conclusions
- Viability of alternate solutions

Moving Forward

We must not allow the scale of the challenges to paralyse us into inactivity

FFMA willing to partner with other interested parties to:

- Arrive at independently commissioned data
- Clear set of definitions
- Full LCA

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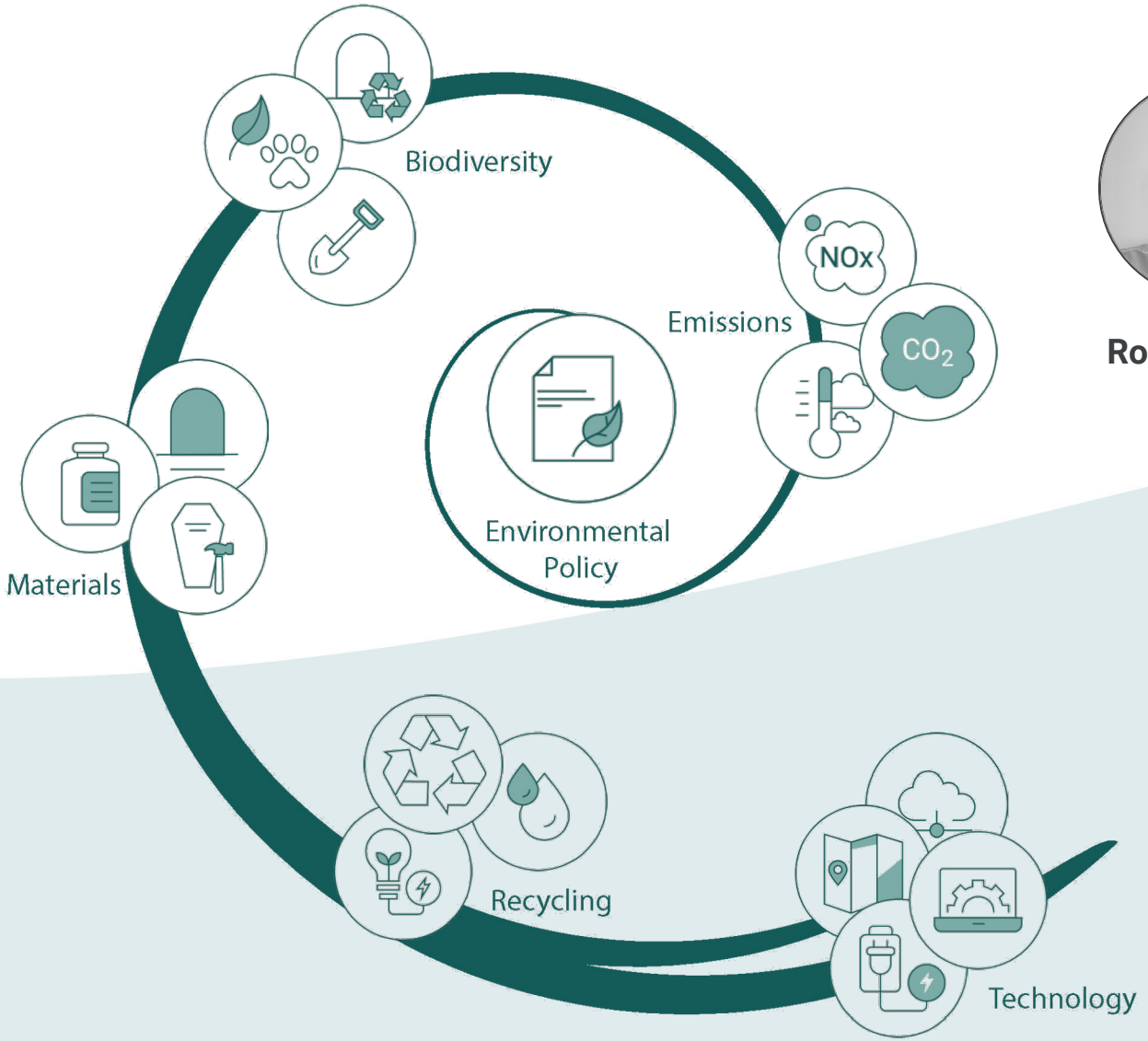
F.F.M.A.



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Q&A

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FBCA
Federation of Burial & Cremation Authorities

Join Us for Upcoming Events	Date
Climate Emergency: #4 Reducing the carbon footprint of bereavement services - Greening Cremation Part 2	12th May- 10:00am

Brendan Day

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Federation of Burial & Cremation Authorities

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