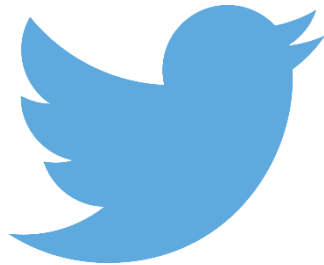


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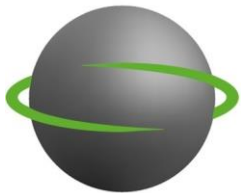


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# Decarbonising Assets

By Alan Barber & Mike Keating

APSE Energy Associates  
& Directors of Salvis



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- Case Study 1 – Listed building (1836)
- Case Study 2 – Office block (1975)
- Case Study 3 – Leisure centre (2012)



**Listed Building – Walton Hall (1836)**



# Options Appraisal

	Recommendation	Annual Electricity Savings (kWh)	Annual Gas savings (kWh)	Annual Saving (£)	Capital Cost	Payback in Years	Carbon Saving (tCO <sub>2</sub> ) per year
1	Air Source Heat Pump	-116,996	513,544	-£2,857	£464,000	NA	71
2	Ground Source Heat Pump	-93,305	513,544	£1,881	£552,000	293	76
3	Hybrid Air Source Heat Pump and Electric Boiler	-219,485	513,544	-£23,355	£458,000	NA	51
4	LED lighting	1,180	-	£236	£4,400	18.6	0.2
5	Secondary Glazing (if elec ASHP)	10,121		£2,024	£51,560	25.5	2.0

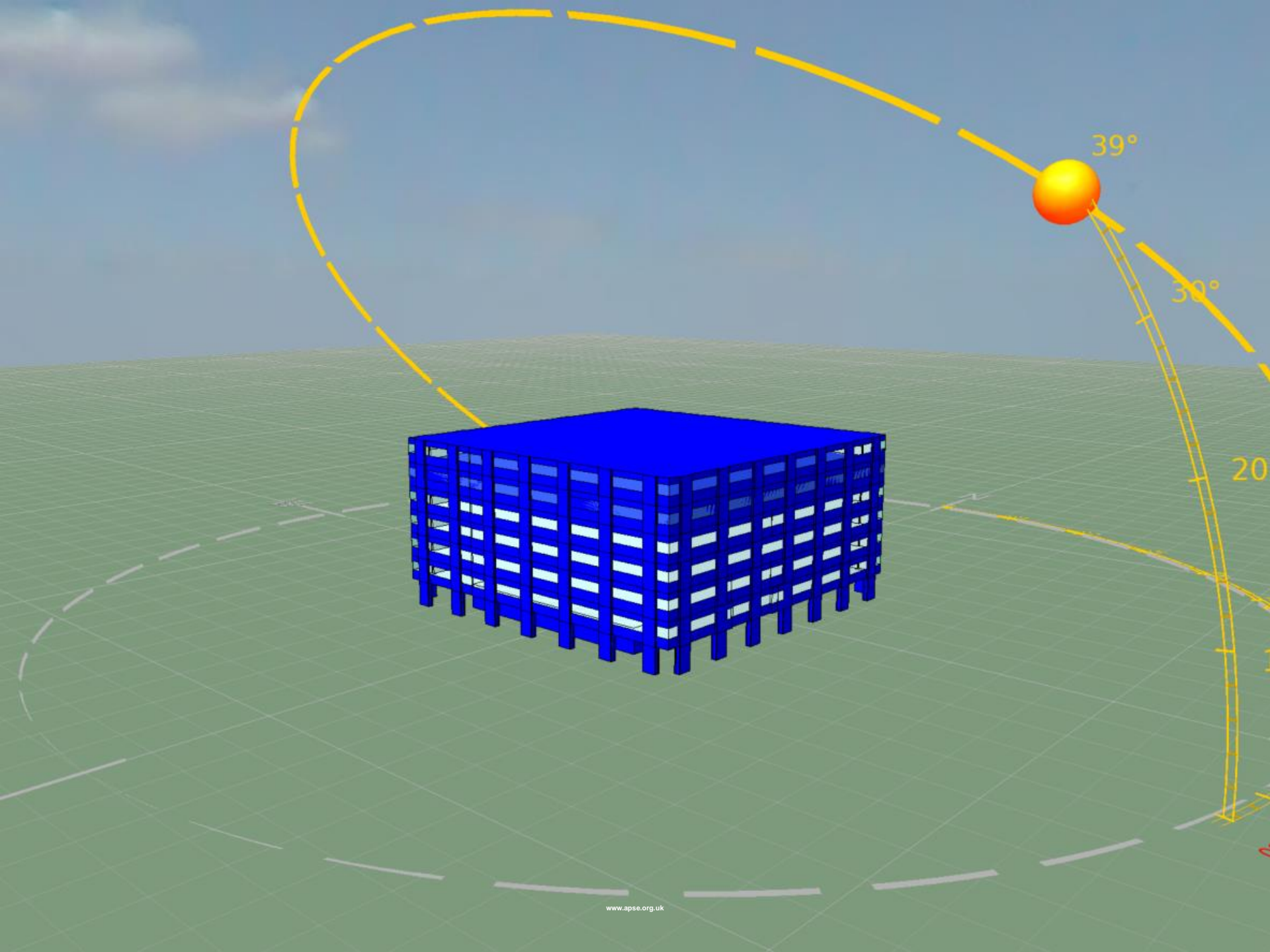
# Solution

- Ground source heat pump
- Crematorium
  - Heat recovery
  - District heating
  - Charging the ground



## Maidstone House and The Link (1975)







# Options Appraisal

	Recommendation	Annual Electricity Savings (kWh)	Annual Gas savings (kWh)	Annual Saving (£)	Capital Cost	Payback in Years	Carbon Saving (tCO2) per year
1a	4-Pipe Chiller Space Heating, AHU & DHW	-466,520	1,196,303	£49,478	£2,317,500	30	306
1b	4-Pipe Chiller Space Cooling	80,373	-	£28,131	As above		16
2a	16 kWp (solar PV used on site)	16,802	-	£5,881	£22,600	3.8	3.2
3	LED lighting	49,130	-	£17,196	£84,100	4.9	9.5
4a	Wall Insulation		343,082	£30,877	£478,300	15	62.6
4b	New Glazing	-	202,638	£18,237	£402,700	22	37.0
4c	Insulate Undercroft	-	426,785	£38,411	£205,300	5	77.9
Total		-320,215	2,168,808	£188,210	£3,510,500	NA	511



16 kWp on roof

185 kWp car park canopy

# 4-Pipe Chiller

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- Simultaneous heating and cooling
- Efficiencies
- Cooling only – 4.9 kW / kW
  - Heating only – 3.4 kW / kW
  - Cooling and heating – 7.1 kW / kW





**Sun Lane Leisure Centre (2012)**



# Options Appraisal

Item	Recommendation	Annual Electricity Savings (kWh)	Annual Gas Savings (kWh)	Annual Saving (£)	Capital Cost (£)	Payback in Years	Carbon Saving (tCO <sub>2</sub> ) per year
1a	4-Pipe Chiller (Space Heating) + HT-ASHP (DHW)	-491,008	1,583,764	£91,495	£1,541,500	15.3	188.0
1b	4-Pipe Chiller (Cooling)	27,799		£9,367	Included in Item 1a	Included in Item 1a	5.8
2a	64.86 kWp Solar PV (used on site)	63,898	-	£21,532	£81,700	3.8	13.2
2b	64.86 kWp Solar PV (exported to the grid)	1	-	£0	As above	As above	As above
3	LED lighting	1,715	-	£578	£2,600	4.5	0.4
4	Decommission Ener-G E70 CHP	-341,464	786,187	£12,488	Included in Item 1a	Included in Item 1a	73.1
<b>Total</b>		<b>-739,059</b>	<b>2,369,951</b>	<b>£135,460</b>	<b>£1,625,800</b>		<b>280.5</b>

# 4-Pipe Chiller Cost

Item	Description	Costs
1	Preliminaries	£25,000
2	<b>Chillers and Plant Room</b>	
	4-Pipe Chiller(s)	£227,000
	Acoustic Attenuation	£42,000
	Buffer Vessel(s) (Heating and Cooling)	£18,000
	Heating Primary Pump(s)	£30,000
	Heating Secondary Pump(s)	£20,000
	Cooling Primary Pump(s)	£30,000
	Cooling Secondary Pump(s)	£20,000
	Pressurisation Unit(s) & Expansion Vessel(s) (Heating and Cooling)	£10,000
	Plant Room Pipework, Valves, & Ancillaries	£66,000
	Automatic Controls, Control Panel & BMS	£60,000
	Electrical Works	£41,000
	Interconnecting Pipework to Plant Room	£10,000
	Builders' Work	£69,000
3	<b>HEATING DISTRIBUTION</b>	
	Removal of Existing Building Plant & Equipment	£72,000
	Heat Emitters (Radiators)	£22,000
	Distribution Pipework	£86,000
	New AHU Heating Coils	£50,000
	Heat Exchangers for Swimming Pools	£28,000
4	<b>COOLING DISTRIBUTION</b>	
	Removal of Existing Building Plant & Equipment	£12,000
	4-pipe Terminal Units	£71,000
	Distribution Pipework	£38,000
	New AHU Cooling Coil	£10,000
5	<b>DHW</b>	
	DHW Air Source Heat Pump (incl. Hydroboxes)	£71,000
	Primary Pump	£7,000
	Secondary Pump	£4,000
	Buffer Vessel(s)	£7,000
	Hot Water Cylinder(s)	£10,000
	Pressurisation Units & Expansion Vessels	£3,000
	Plant Room Pipework, Valves, & Ancillaries	£8,000
6	Upgrading Main Incoming Electrical Supply	£50,000
7a	Testing & Commissioning	£10,000
7b	Demonstration & Training	£2,000
7c	Record Information	£3,500
8	Contingency Sum	£124,000
9	<b>Works Budget Total</b>	<b>£1,356,500</b>
10a	APSE Design Fees	£123,000
10b	APSE Project Management Fees	£62,000
11	<b>Project Budget Total</b>	<b>£1,541,500</b>

# Comparison of Projects

	Carbon Saving (tCO <sub>2</sub> ) per year	Cost	£/tCO <sub>2</sub> Saving
Walton Hall (1836)	78	£607,960	£7,794
Maidstone House (1975)	511	£3,510,500	£6,869
Leisure Centre (2012)	280	£1,625,800	£5,806

# Project Risks

1. DNO
2. Procurement
3. Resources
4. Market / Pricing Volatility
5. Internal Projects Approvals



# The Net Zero Journey Summary

- Get your data and estate in order
- Calculate emissions
- Do a Net Zero trajectory
- Carry out on-site energy audits
- Engineering design
- Procurement
- Installation
- Measurement and verification

# Contact details

**Alan Barber & Mike Keating**

**APSE Energy Associates**

**Email: [alan.barber@salvisgroup.co.uk](mailto:alan.barber@salvisgroup.co.uk)**

**Email: [mike.keating@salvisgroup.co.uk](mailto:mike.keating@salvisgroup.co.uk)**

**Association for Public Service Excellence**

3rd floor, Trafford House, Chester Road,  
Old Trafford, Manchester M32 0RS.

**telephone: 0161 772 1810**

**web: [www.apse.org.uk](http://www.apse.org.uk)**



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