



System Simulation Report



File: 31 BH Import.hgrid

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Location: Leighton Buzzard, UK (51°57.1'N, 0°38.5'W)

Total Net Present Cost: £54,906.98

Levelized Cost of Energy (£/kWh): £0.283

Notes: Example Project

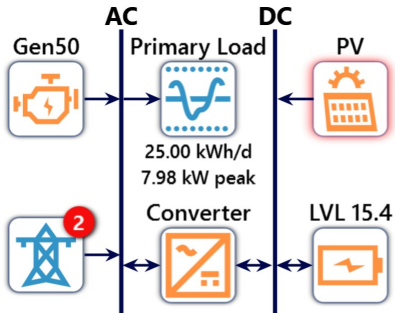
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System Architecture

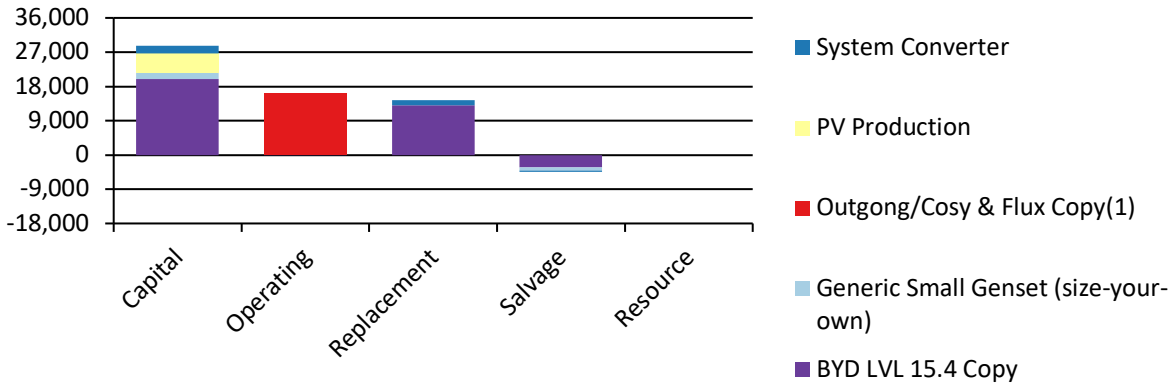
Component	Name	Size	Unit
Generator	6kW HVO Generator	6.50	kW
PV	PV Production	6.50	kW
Storage	BYD LVL 15.4 kWh	2	strings
System converter	System Converter	6.50	kW
Dispatch strategy	HOMER Peak Shaving		
Utility	Outgoing/Cosy & Flux		

Schematic





Cost Summary



Net Present Costs

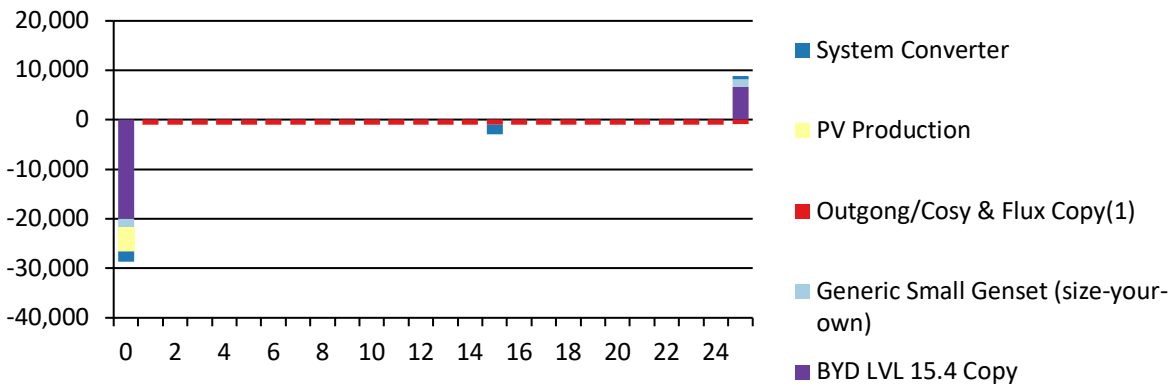
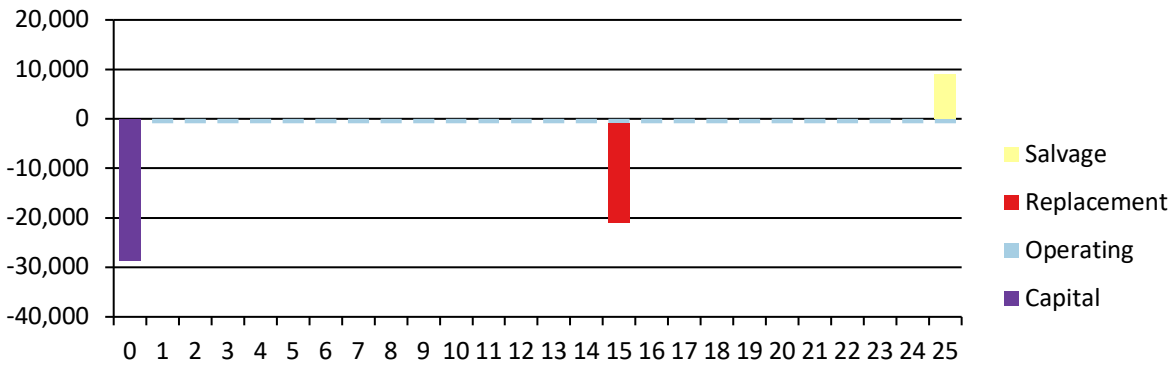
Name	Capital	Operating	Replacement	Salvage	Resource	Total
BYD LVL 15.4 Copy	£20,000	£176.94	£13,107	-£3,296	£0.00	£29,988
Generic Small Genset (size-your-own)	£1,625	£0.00	£0.00	-£783.42	£0.00	£841.58
Outgong/Cosy & Flux Copy(1)	£0.00	£16,096	£0.00	£0.00	£0.00	£16,096
PV Production	£5,000	£0.00	£0.00	£0.00	£0.00	£5,000
System Converter	£2,000	£0.00	£1,311	-£329.65	£0.00	£2,981
System	£28,625	£16,273	£14,418	-£4,409	£0.00	£54,907

Annualized Costs

Name	Capital	Operating	Replacement	Salvage	Resource	Total
BYD LVL 15.4 Copy	£1,130	£10.00	£740.79	-£186.30	£0.00	£1,695
6 kW Genset	£91.84	£0.00	£0.00	-£44.28	£0.00	£47.56
Outgoing/Cosy & Flux Copy	£0.00	£909.73	£0.00	£0.00	£0.00	£909.73
PV Production	£282.59	£0.00	£0.00	£0.00	£0.00	£282.59
System Converter	£113.04	£0.00	£74.08	-£18.63	£0.00	£168.48
System	£1,618	£919.73	£814.87	-£249.21	£0.00	£3,103



Cash Flow





Electrical Summary

Production Summary

Component	Production (kWh/yr)	Percent
PV Production	6,241	51.8
6kW Generator	0	0
Grid Purchases	5,803	48.2
Total	12,044	100

Consumption Summary

Component	Consumption (kWh/yr)	Percent
AC Primary Load	9,125	83.3
Grid Sales	1,823	16.7
Total	10,948	100

Generator: 6kW Generator (HVO)

Generic Small Genset (size-your-own) Electrical Summary

Quantity	Value	Units
Electrical Production	0	kWh/yr
Mean Electrical Output	0	kW
Minimum Electrical Output	0	kW
Maximum Electrical Output	0	kW

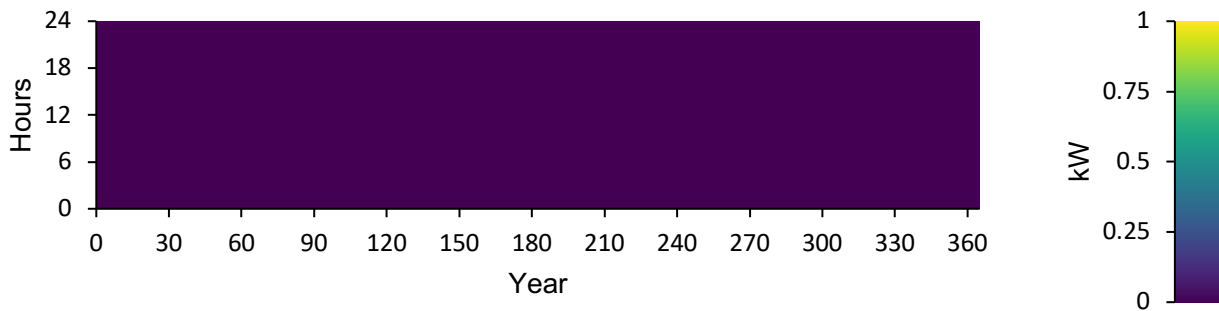
Generic Small Genset (size-your-own) Fuel Summary

Quantity	Value	Units
Fuel Consumption	0	L
Specific Fuel Consumption	0	L/kWh
Fuel Energy Input	0	kWh/yr
Mean Electrical Efficiency	0	%

Generic Small Genset (size-your-own) Statistics

Quantity	Value	Units
Hours of Operation	0	hrs/yr
Number of Starts	0	starts/yr
Operational Life	1,000	yr
Capacity Factor	0	%
Fixed Generation Cost	54.6	£/hr
Marginal Generation Cost	0.410	£/kWh

6kW Generator (HVO) (kW)



PV: PV Production

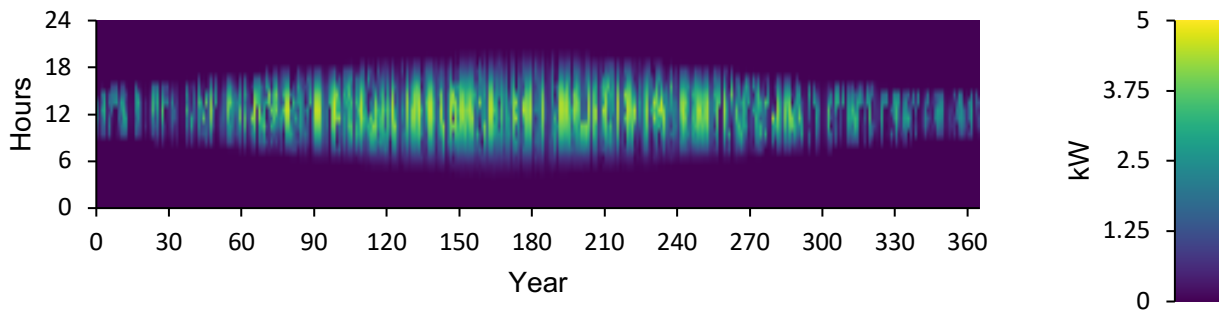
PV Production Electrical Summary

Quantity	Value	Units
Minimum Output	0	kW
Maximum Output	4.58	kW
PV Penetration	68.4	%
Hours of Operation	4,138	hrs/yr
Levelized Cost	0.0453	£/kWh
Clipped production	0	kWh

PV Production Statistics

Quantity	Value	Units
Rated Capacity	6.50	kW
Mean Output	0.712	kW
Mean Output	17.1	kWh/d
Capacity Factor	11.0	%
Total Production	6,241	kWh/yr

PV Production Output (kW)





Storage: BYD LVL 15.4 Copy

BYD LVL 15.4 kWh Properties

Quantity	Value	Units
Batteries	2.00	qty.
String Size	1.00	batteries
Strings in Parallel	2.00	strings
Bus Voltage	48.0	V

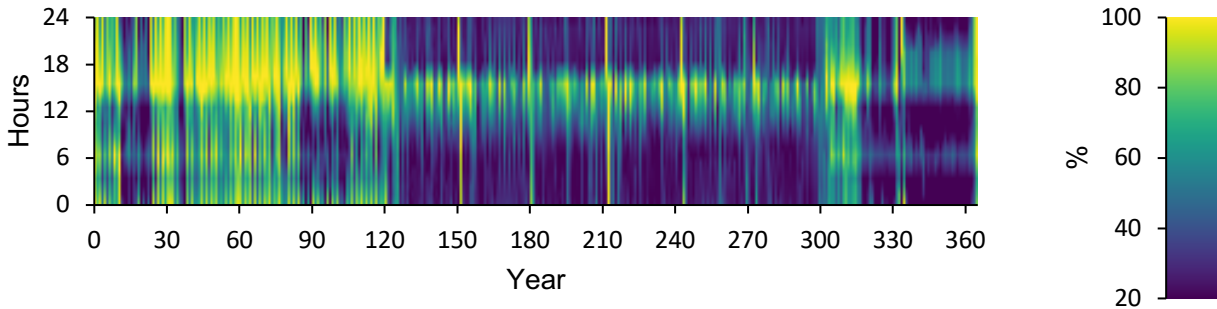
BYD LVL 15.4 kWh Result Data

Quantity	Value	Units
Energy In	5,923	kWh/yr
Energy Out	5,330	kWh/yr
Storage Depletion	-29.6	kWh/yr
Losses	563	kWh/yr
Annual Throughput	5,619	kWh/yr

BYD LVL 15.4 kWh Statistics

Quantity	Value	Units
Autonomy	22.7	hr
Storage Wear Cost	0.234	£/kWh
Nominal Capacity	29.6	kWh
Usable Nominal Capacity	23.7	kWh
Lifetime Throughput	84,282	kWh
Expected Life	15.0	yr

BYD LVL 15.4 Copy State of Charge (%)



Converter: System Converter

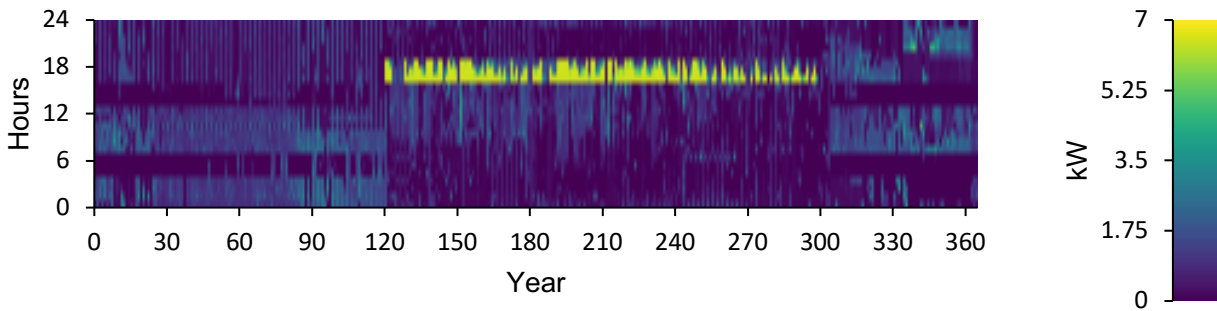
System Converter Electrical Summary

Quantity	Value	Units
Hours of Operation	6,452	hrs/yr
Energy Out	7,415	kWh/yr
Energy In	7,806	kWh/yr
Losses	390	kWh/yr

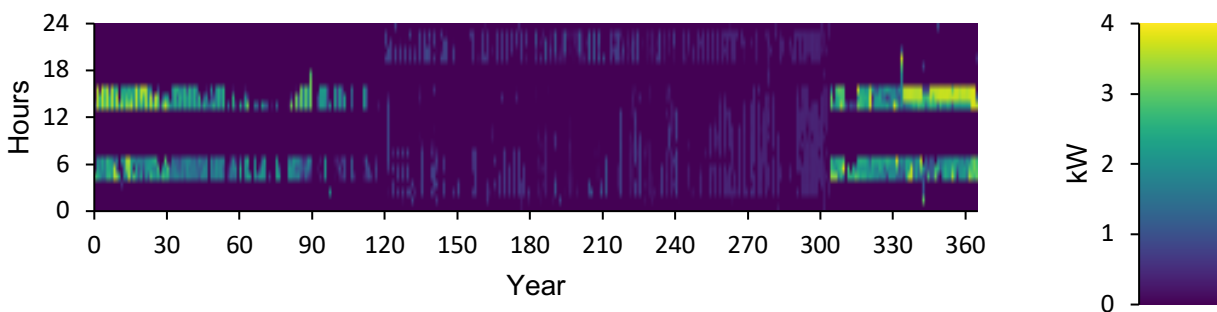
System Converter Statistics

Quantity	Value	Units
Capacity	6.50	kW
Mean Output	0.847	kW
Minimum Output	0	kW
Maximum Output	6.50	kW
Capacity Factor	13.0	%

System Converter Inverter Output (kW)



System Converter Rectifier Output (kW)



Utility: Octo: Outgoing/Cosy (Winter) & Flux (Summer)

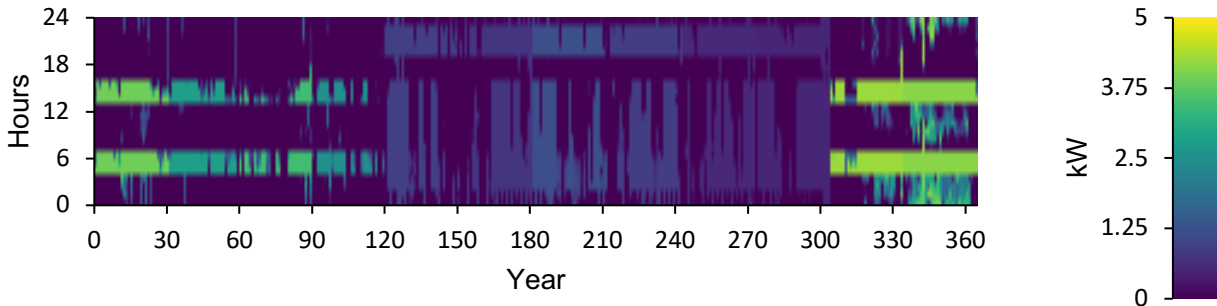
Utility Bill Summary

Charge Type	Amount
Consumption Charge	£796.24
Demand Charge	£0.00
Demand Response Credit	-£36.16
Fixed Rate	£149.65
Minimum Rate	£0.00
Total	£909.73

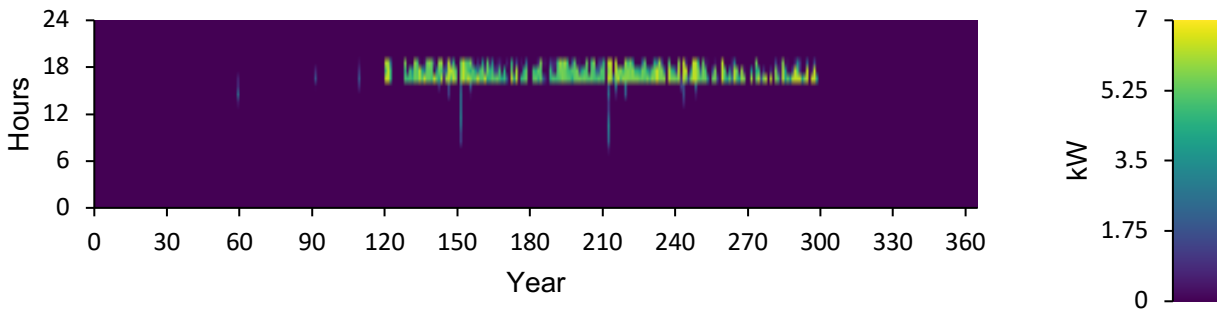
Utility Monthly Summary

Month	Energy Purchased (kWh)	Energy Sold (kWh)	Net Energy Purchased (kWh)	Peak Load (kW)	Demand Limit (kW)	Energy Charge	Demand Charge	Fixed Charge	Minimum Charge	Taxes	Total
January	717	0	717	3.99	3.91	£141.63	£0.00	£12.71	£0.00	£0.00	£145.77
February	407	0	407	2.55	2.81	£76.94	£0.00	£11.48	£0.00	£0.00	£80.62
March	358	4.75	354	3.16	3.48	£70.08	£0.00	£12.71	£0.00	£0.00	£68.81
April	260	6.92	253	3.65	2.50	£49.43	£0.00	£12.30	£0.00	£0.00	£61.73
May	334	321	13.8	3.11	0.940	-£5.54	£0.00	£12.71	£0.00	£0.00	£7.17
June	284	305	-20.9	2.93	0.760	-£13.42	£0.00	£12.30	£0.00	£0.00	-£1.12
July	456	322	134	2.69	1.20	£25.69	£0.00	£12.71	£0.00	£0.00	£38.40
August	348	402	-53.9	3.05	0.900	-£26.02	£0.00	£12.71	£0.00	£0.00	-£13.31
September	224	263	-38.9	3.18	0.580	-£18.89	£0.00	£12.30	£0.00	£0.00	-£6.59
October	250	199	51.1	3.22	0.540	£8.57	£0.00	£12.71	£0.00	£0.00	£17.48
November	825	0	825	3.87	4.26	£169.88	£0.00	£12.30	£0.00	£0.00	£180.53
December	1,339	0	1,339	7.12	4.12	£317.89	£0.00	£12.71	£0.00	£0.00	£330.23
Annual	5,803	1,823	3,980	7.12		£796.24	£0.00	£149.65	£0.00	£0.00	£909.73

Energy Purchased From Grid (kW)



Energy Sold To Grid (kW)



Utility Bill Details

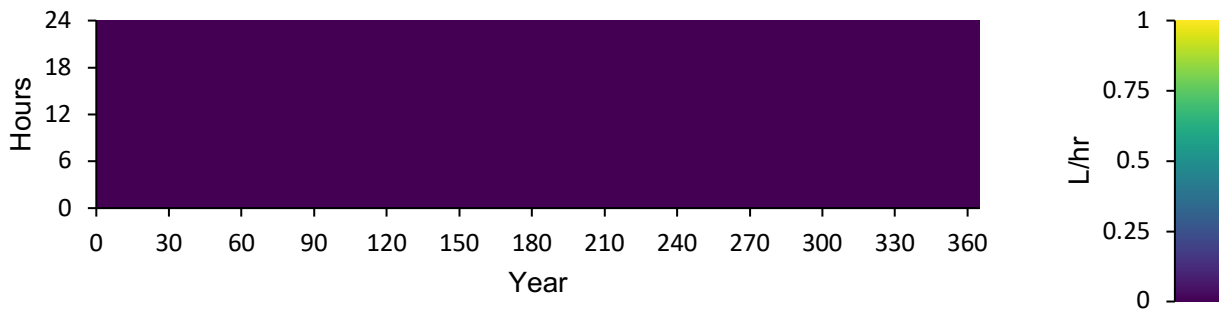
Rate Group	Rate Name	Amount	Cost	Charge Type	Charge Class
New group	Standing charge	£149.65	£149.65	FIXED_PRICE	DISTRIBUTION
New group	Import	£1,370	£1,370	VARIABLE	NONE

Fuel Summary

Diesel Consumption Statistics

Quantity	Value	Units
Total fuel consumed	0	L
Avg fuel per day	0	L/day
Avg fuel per hour	0	L/hour

Diesel Consumption (L/hr)



Emissions

Pollutant	Quantity	Unit
Carbon Dioxide	3,667	kg/yr
Carbon Monoxide	0	kg/yr
Unburned Hydrocarbons	0	kg/yr
Particulate Matter	0	kg/yr
Sulfur Dioxide	15.9	kg/yr
Nitrogen Oxides	7.78	kg/yr

Compare Economics

IRR (%): **11.4**

Discounted payback (yr): **8.13**

Simple payback (yr): **7.16**

Annual utility bill savings: **£2,015**

	Base System	Proposed System
Net Present Cost	£83,850	£54,907
CAPEX	£1,625	£28,625
OPEX	£4,647	£1,485
Annual Demand Charge	£0.00	£0.00
Annual Energy Charge	£2,817	£796.24
LCOE (per kWh)	£0.518	£0.283
CO2 Emitted (kg/yr)	5,808	3,667
Fuel Consumption (L/yr)	21.4	0

Base Case Electric Bill

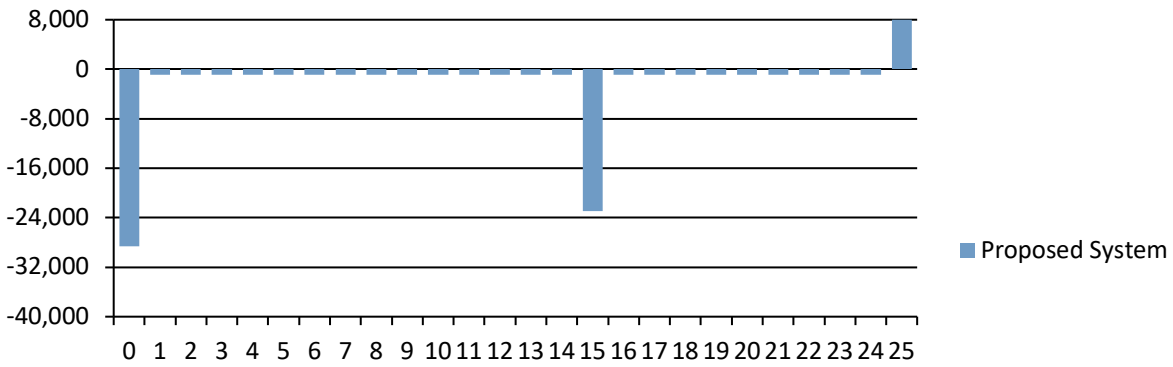
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Energy Charge	£257.64	£185.99	£240.97	£268.55	£217.18	£218.29	£250.82	£166.31	£147.59	£118.85	£304.69	£440.02	£2,817
Energy Purchased	833	602	783	866	702	703	808	538	476	382	985	1,421	9,101
Energy Sold	4.20	4.80	11.0	0	0	0	0	0	0	0.843	5.22	2.96	29.0
Demand Charge	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Peak Load	0	0	0	0	0	0	0	0	0	0	0	0	0
Fixed Charge	£12.00	£12.00	£12.00	£12.00	£12.00	£12.00	£12.00	£12.00	£12.00	£12.00	£12.00	£12.00	£144.00
Taxes	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total	£261.07	£190.19	£239.00	£280.55	£229.18	£230.29	£262.82	£178.31	£159.59	£127.06	£315.04	£451.66	£2,925

Predicted Electric Bill

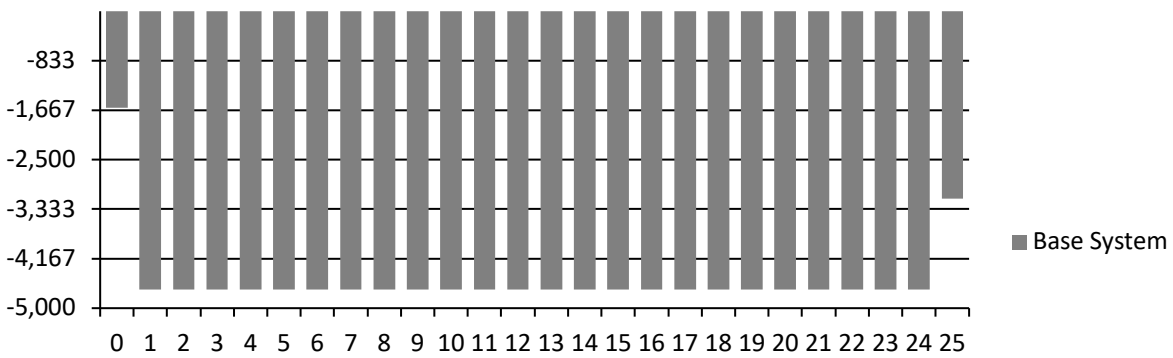
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Energy Charge	£141.63	£76.94	£70.08	£49.43	£-5.54	£-13.42	£25.69	£-26.02	£-18.89	£8.57	£169.88	£317.89	£796.24
Energy Purchased	717	407	358	260	334	284	456	348	224	250	825	1,339	5,803
Energy Sold	0	0	4.75	6.92	321	305	322	402	263	199	0	0	1,823
Demand Charge	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Peak Load	0	0	0	0	0	0	0	0	0	0	0	0	0
Fixed Charge	£12.71	£11.48	£12.71	£12.30	£12.71	£12.30	£12.71	£12.71	£12.30	£12.71	£12.30	£12.71	£149.65
Taxes	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Total	£145.77	£80.62	£68.81	£61.73	£7.17	£-1.12	£38.40	£-13.31	£-6.59	£17.48	£180.53	£330.23	£909.73



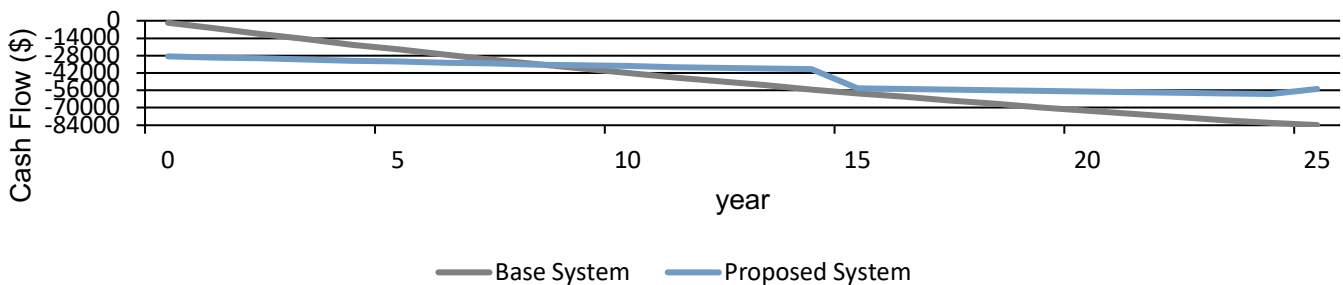
Proposed Annual Nominal Cash Flows



Base System Annual Nominal Cash Flows



Cumulative Discounted Cash Flows





Demand Response Events Summary

Demand Response Program: Generic Demand Response

Incentive: **2.5 £/kW**
Duration: **2.00 hours**
Total revenue: **£36.16**

Event Date	Baseline Load (kW)	Peak Purchases (kW)	Reduction (kW)	Revenue (£)
Tue 30 Oct 06:00 PM	1.52	0	1.52	£3.80
Tue 06 Nov 06:00 PM	0.434	0	0.434	£1.08
Wed 21 Nov 06:00 PM	0.227	0	0.227	£0.568
Mon 31 Dec 05:00 PM	0.145	0	0.145	£0.362
Sun 21 Jan 06:00 PM	0.754	0	0.754	£1.89
Thu 25 Jan 06:00 PM	1.90	0	1.90	£4.75
Mon 29 Jan 06:00 PM	0.775	0	0.775	£1.94
Thu 08 Feb 07:00 PM	1.87	0	1.87	£4.67
Sun 18 Feb 06:00 PM	0.289	0	0.289	£0.723
Thu 22 Feb 07:00 PM	0.961	0	0.961	£2.40
Sat 03 Mar 07:00 PM	0.310	0	0.310	£0.775
Tue 13 Mar 06:00 PM	0.207	0	0.207	£0.517
Wed 14 Mar 06:00 PM	1.02	0	1.02	£2.56
Sun 25 Mar 05:00 PM	0.207	0	0.207	£0.517
Mon 26 Mar 06:00 PM	1.77	0	1.77	£4.42
Wed 28 Mar 05:00 PM	2.08	0	2.08	£5.19