

## System Simulation Report



**File:** 31 Birds Hill - Model -28-06.hgrid

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**Location:** X925+98 Leighton Buzzard, UK (51°57.1'N, 0°38.5'W)

**Total Net Present Cost:** £50,287.60

**Levelized Cost of Energy (£/kWh):** £0.191

**Notes:** 31 Birds Hill Review

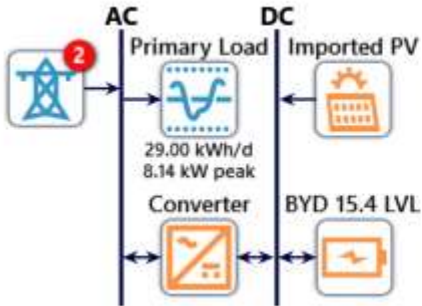
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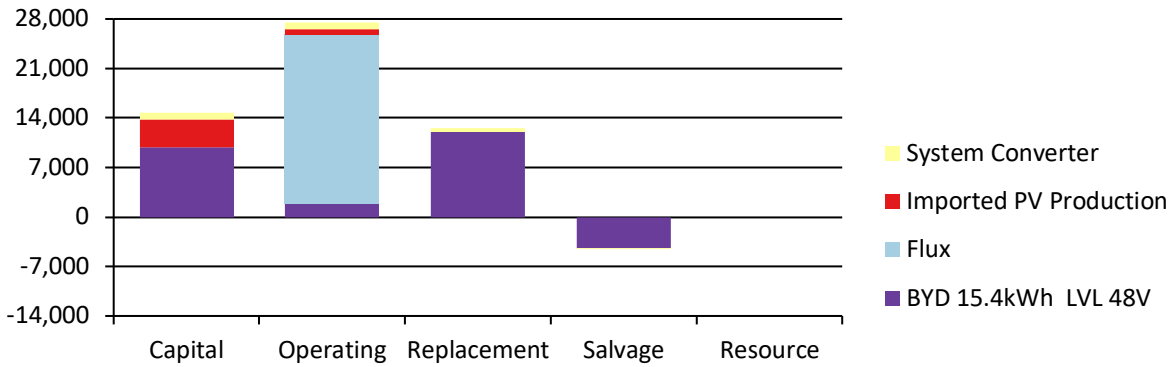
## System Architecture

Component	Name	Size	Unit
PV	Imported PV Production	6.50	kW
Storage	BYD 15.4kWh LVL 48V	2	strings
System converter	System Converter	6.50	kW
Dispatch strategy	HOMER Peak Shaving		
Utility	Flux		

## Schematic



## Cost Summary



## Net Present Costs

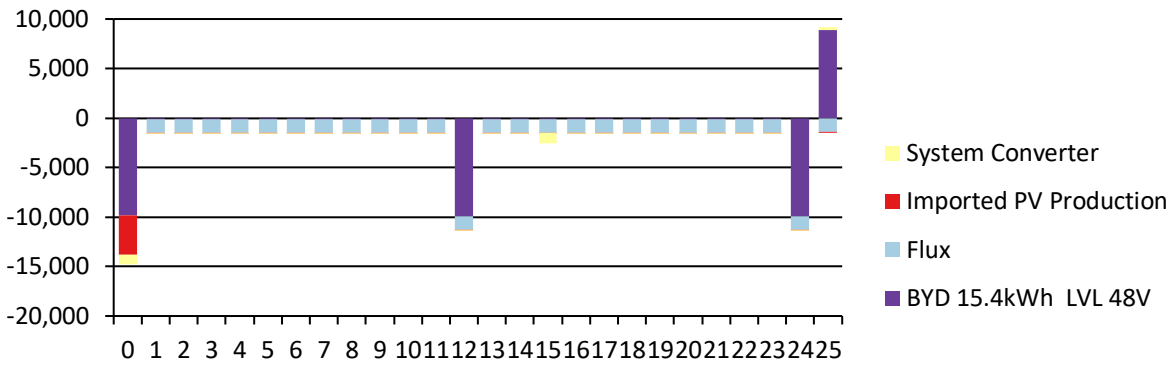
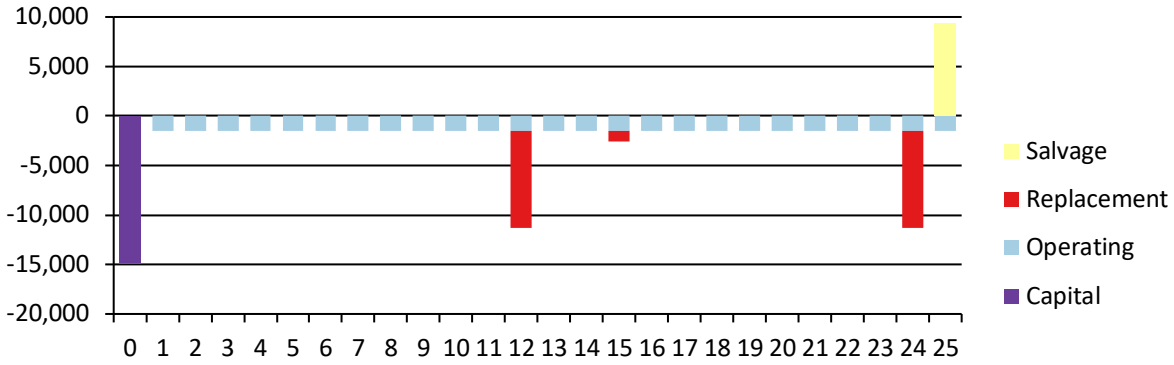
Name	Capital	Operating	Replacement	Salvage	Resource	Total
<b>BYD 15.4kWh LVL 48V</b>	£9,800	£1,769	£11,973	-£4,442	£0.00	£19,101
<b>Flux</b>	£0.00	£23,927	£0.00	£0.00	£0.00	£23,927
<b>Imported PV Production</b>	£4,000	£884.68	£0.00	£0.00	£0.00	£4,885
<b>System Converter</b>	£1,000	£884.68	£655.36	-£164.82	£0.00	£2,375
<b>System</b>	£14,800	£27,466	£12,629	-£4,607	£0.00	£50,288

## Annualized Costs

Name	Capital	Operating	Replacement	Salvage	Resource	Total
<b>BYD 15.4kWh LVL 48V</b>	£553.87	£100.00	£676.70	-£251.05	£0.00	£1,080
<b>Flux</b>	£0.00	£1,352	£0.00	£0.00	£0.00	£1,352
<b>Imported PV Production</b>	£226.07	£50.00	£0.00	£0.00	£0.00	£276.07
<b>System Converter</b>	£56.52	£50.00	£37.04	-£9.32	£0.00	£134.24
<b>System</b>	£836.46	£1,552	£713.74	-£260.37	£0.00	£2,842



### Cash Flow



## Electrical Summary

### Production Summary

Component	Production (kWh/yr)	Percent
Imported PV Production	6,241	39.0
Grid Purchases	9,778	61.0
<b>Total</b>	<b>16,019</b>	<b>100</b>

### Consumption Summary

Component	Consumption (kWh/yr)	Percent
AC Primary Load	10,585	71.2
Grid Sales	4,277	28.8
<b>Total</b>	<b>14,862</b>	<b>100</b>

## PV: Imported PV Production

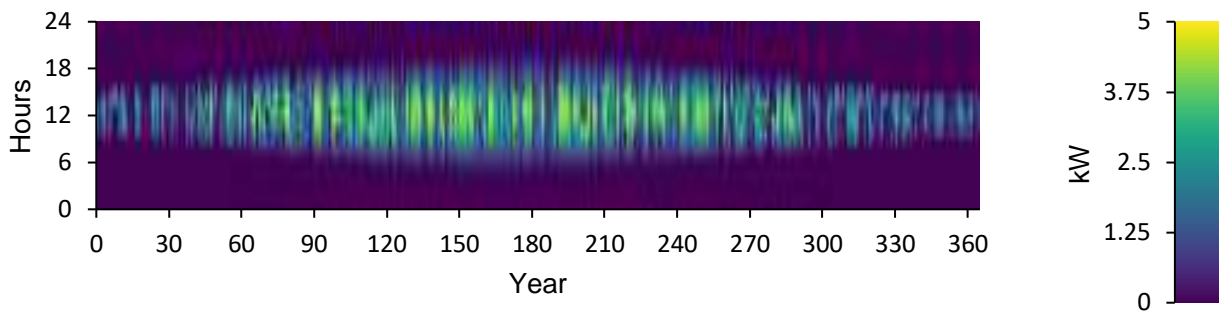
### Imported PV Production Electrical Summary

Quantity	Value	Units
Minimum Output	0	kW
Maximum Output	4.58	kW
PV Penetration	59.0	%
Hours of Operation	4,138	hrs/yr
Levelized Cost	0.0442	£/kWh
Clipped production	0	kWh

### Imported 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

### Imported PV Production Output (kW)



## Storage: BYD 15.4kWh LVL 48V

### BYD 15.4kWh LVL 48V Properties

Quantity	Value	Units
Batteries	2.00	qty.
String Size	1.00	batteries
Strings in Parallel	2.00	strings
Bus Voltage	51.2	V

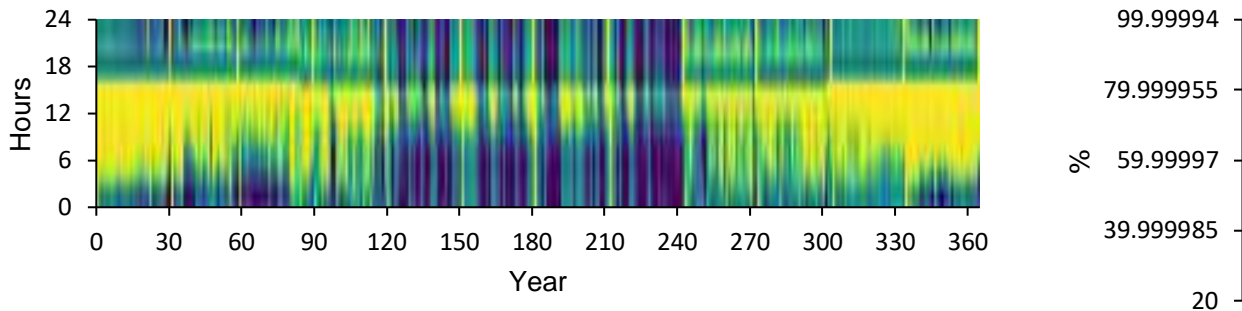
### BYD 15.4kWh LVL 48V Result Data

Quantity	Value	Units
Energy In	7,458	kWh/yr
Energy Out	7,086	kWh/yr
Storage Depletion	-31.7	kWh/yr
Losses	341	kWh/yr
Annual Throughput	7,270	kWh/yr

### BYD 15.4kWh LVL 48V Statistics

Quantity	Value	Units
Autonomy	21.0	hr
Storage Wear Cost	0.0838	£/kWh
Nominal Capacity	31.7	kWh
Usable Nominal Capacity	25.4	kWh
Lifetime Throughput	87,235	kWh
Expected Life	12.0	yr

### BYD 15.4kWh LVL 48V State of Charge (%)





## Converter: System Converter

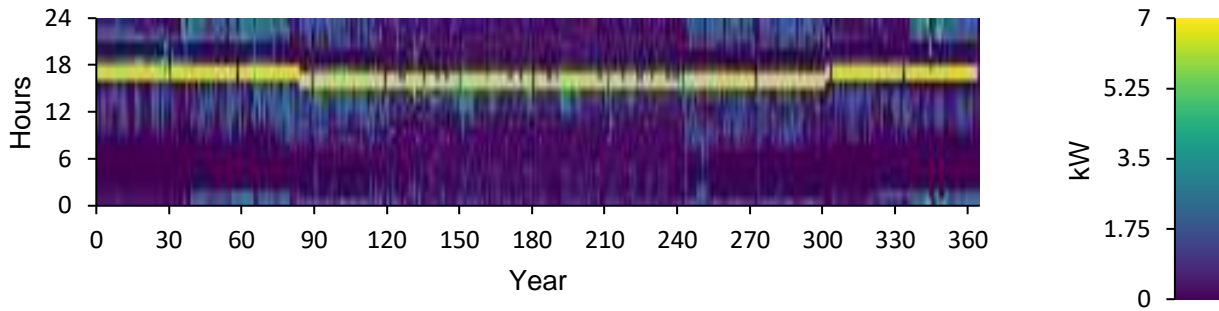
### System Converter Electrical Summary

Quantity	Value	Units
Hours of Operation	6,389	hrs/yr
Energy Out	10,123	kWh/yr
Energy In	10,656	kWh/yr
Losses	533	kWh/yr

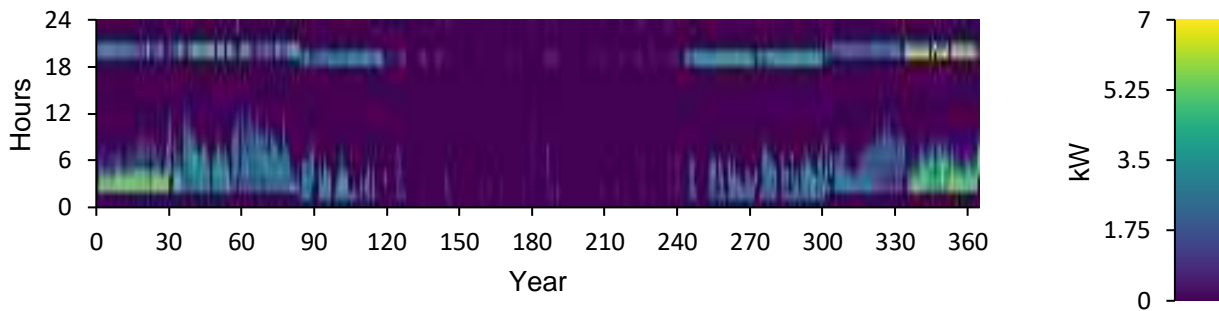
### System Converter Statistics

Quantity	Value	Units
Capacity	6.50	kW
Mean Output	1.16	kW
Minimum Output	0	kW
Maximum Output	6.50	kW
Capacity Factor	17.8	%

### System Converter Inverter Output (kW)



### System Converter Rectifier Output (kW)



## Utility: Flux: Flux

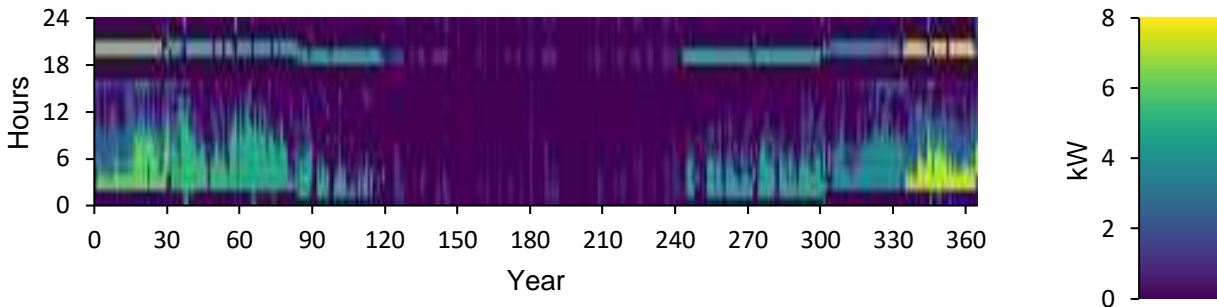
### Utility Bill Summary

Charge Type	Amount
Consumption Charge	£1,313
Demand Charge	£0.00
Demand Response Credit	-£113.88
Fixed Rate	£153.34
Minimum Rate	£0.00
<b>Total</b>	<b>£1,352</b>

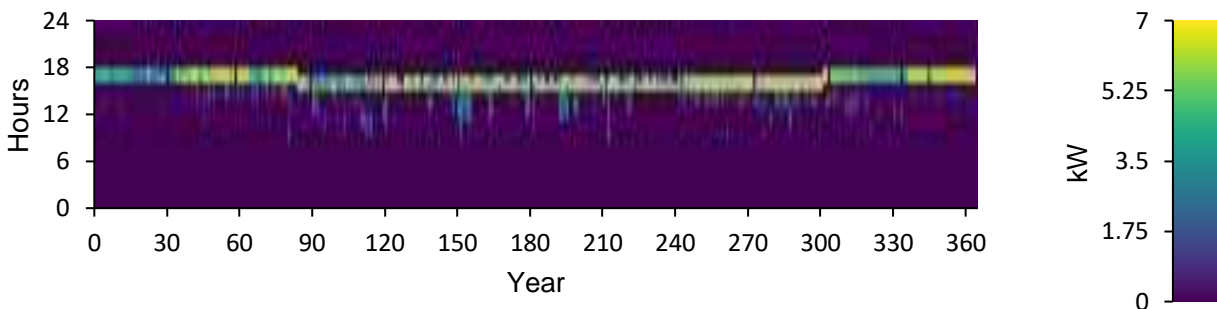
### Utility Monthly Summary

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	1,678	248	1,430	6.36	6.16	£378.63	£0.00	£13.02	£0.00	£0.00	£369.13
February	1,314	337	977	4.82	5.31	£250.02	£0.00	£11.76	£0.00	£0.00	£226.74
March	1,350	389	960	4.46	4.91	£244.74	£0.00	£13.02	£0.00	£0.00	£237.25
April	599	340	259	4.35	4.73	£54.68	£0.00	£12.60	£0.00	£0.00	£67.29
May	112	348	-236	6.48	1.50	-£75.95	£0.00	£13.02	£0.00	£0.00	-£62.93
June	49.1	393	-344	3.17	0.730	-£101.12	£0.00	£12.60	£0.00	£0.00	-£88.52
July	65.7	374	-308	3.17	1.17	-£93.37	£0.00	£13.02	£0.00	£0.00	-£80.35
August	98.6	319	-220	3.17	0.750	-£70.82	£0.00	£13.02	£0.00	£0.00	-£57.79
September	774	398	376	4.35	4.78	£82.10	£0.00	£12.60	£0.00	£0.00	£94.71
October	1,016	431	584	4.35	4.78	£138.50	£0.00	£13.02	£0.00	£0.00	£151.52
November	1,023	328	695	3.52	3.87	£174.51	£0.00	£12.60	£0.00	£0.00	£172.98
December	1,699	371	1,329	6.58	7.24	£330.91	£0.00	£13.02	£0.00	£0.00	£322.27
<b>Annual</b>	<b>9,778</b>	<b>4,277</b>	<b>5,501</b>	<b>6.58</b>		<b>£1,313</b>	<b>£0.00</b>	<b>£153.34</b>	<b>£0.00</b>	<b>£0.00</b>	<b>£1,352</b>

### 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	Customer Charge	£153.34	£153.34	FIXED_PRICE	DISTRIBUTION
New group	Day rate import	£2,014	£2,014	CONSUMPTION_BASED	NONE
New group	Flux rate	£586.97	£586.97	CONSUMPTION_BASED	NONE
New group	Peak rate	£8.00	£8.00	CONSUMPTION_BASED	NONE

## Compare Economics

IRR (%): **10.7**

Discounted payback (yr): **8.01**

Simple payback (yr): **7.07**

Annual utility bill savings: **£2,294**

	Base System	Proposed System
Net Present Cost	£64,518	£50,288
CAPEX	£0.00	£14,800
OPEX	£3,646	£2,006
Annual Demand Charge	£0.00	£0.00
Annual Energy Charge	£3,493	£1,313
LCOE (per kWh)	£0.344	£0.191
CO2 Emitted (kg/yr)	6,690	6,180
Fuel Consumption (L/yr)	0	0

### Base Case Electric Bill

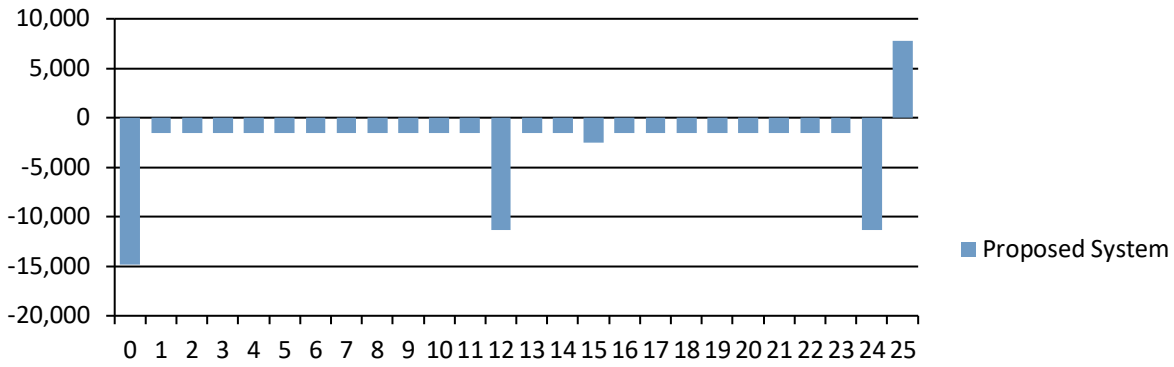
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Energy Charge	£507.92	£376.13	£447.32	£284.48	£158.46	£131.79	£134.07	£133.08	£285.62	£289.75	£287.99	£456.43	£3,493
Energy Purchased	1,539	1,140	1,358	862	479	399	406	404	865	878	873	1,383	10,585
Energy Sold	0	0	0	0	0	0	0	0	0	0	0	0	0
Demand Charge	£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	£13.02	£11.76	£13.02	£12.60	£13.02	£12.60	£13.02	£13.02	£12.60	£13.02	£12.60	£13.02	£153.34
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	£520.95	£387.89	£460.35	£297.09	£171.48	£144.39	£147.10	£146.10	£298.22	£302.77	£300.59	£469.46	£3,646

### Predicted Electric Bill

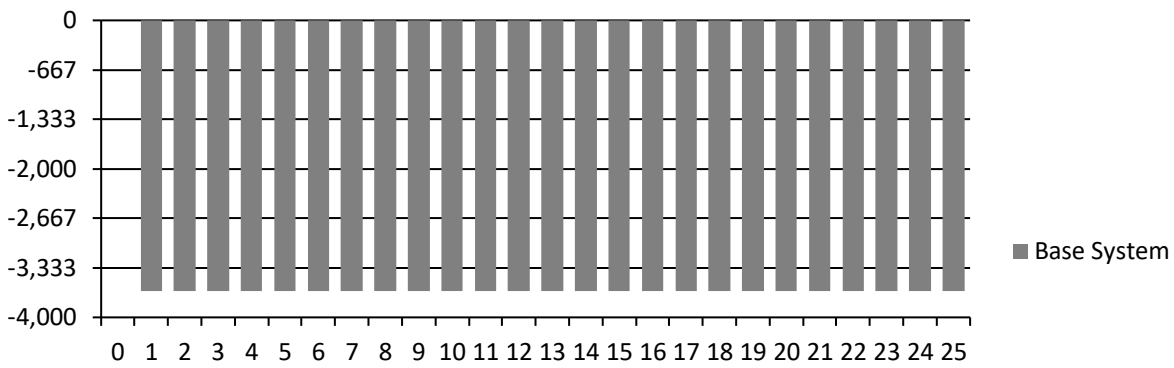
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Energy Charge	£378.63	£250.02	£244.74	£54.68	£-75.95	£-101.12	£-93.37	£-70.82	£82.10	£138.50	£174.51	£330.91	£1,313
Energy Purchased	1,678	1,314	1,350	599	112	49.1	65.7	98.6	774	1,016	1,023	1,699	9,778
Energy Sold	248	337	389	340	348	393	374	319	398	431	328	371	4,277
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	£13.02	£11.76	£13.02	£12.60	£13.02	£12.60	£13.02	£13.02	£12.60	£13.02	£12.60	£13.02	£153.34
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	£369.13	£226.74	£237.25	£67.29	£-62.93	£-88.52	£-80.35	£-57.79	£94.71	£151.52	£172.98	£322.27	£1,352



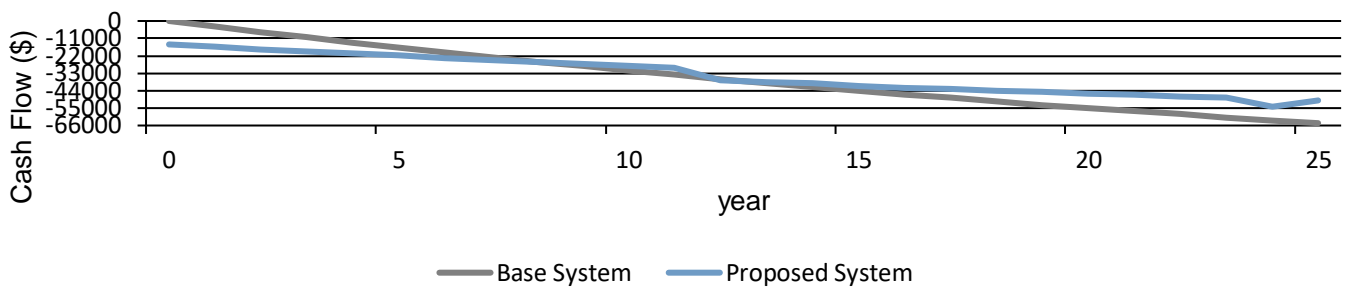
### Proposed Annual Nominal Cash Flows



### Base System Annual Nominal Cash Flows



### Cumulative Discounted Cash Flows



## Demand Response Events Summary

### Demand Response Program: Generic Demand Response

Incentive: **3 £/kW**

Duration: **3.00 hours**

Total revenue: **£113.88**

Event Date	Baseline Load (kW)	Peak Purchases (kW)	Reduction (kW)	Revenue (£)
Thu 02 Nov 05:00 PM	1.23	0	1.23	£3.70
Thu 23 Nov 05:00 PM	1.48	0	1.48	£4.44
Thu 30 Nov 06:00 PM	2.00	0	2.00	£5.99
Mon 11 Dec 07:00 PM	5.07	0	5.07	£15.22
Wed 13 Dec 05:00 PM	0.439	0	0.439	£1.32
Tue 19 Dec 07:00 PM	1.71	0	1.71	£5.13
Thu 12 Jan 04:00 PM	2.76	0	2.76	£8.28
Sun 29 Jan 06:00 PM	4.75	0	4.75	£14.24
Wed 01 Feb 05:00 PM	3.43	0	3.43	£10.29
Mon 06 Feb 05:00 PM	2.30	0	2.30	£6.91
Tue 07 Feb 06:00 PM	1.79	0	1.79	£5.36
Sun 19 Feb 06:00 PM	0.267	0	0.267	£0.802
Thu 23 Feb 06:00 PM	0.105	0	0.105	£0.315
Tue 28 Feb 07:00 PM	3.79	0	3.79	£11.38
Tue 07 Mar 07:00 PM	2.24	0	2.24	£6.71
Wed 15 Mar 06:00 PM	1.81	0	1.81	£5.42
Sat 18 Mar 05:00 PM	0.248	0	0.248	£0.745
Mon 27 Mar 05:00 PM	0.831	0	0.831	£2.49
Tue 28 Mar 04:00 PM	0.191	0	0.191	£0.573
Wed 29 Mar 04:00 PM	1.53	0	1.53	£4.58