ChalCAN

CHALFORD CLIMATE ACTION NETWORK

Case Studies

Retrofit (& New Build)

Solar PV

Air & Ground-Source Heat Pumps

LED Lighting

Green Roof

E-Vehicles

Batteries

Case Studies

1. GL6 8DJ; Chalford Vale
   Retrofit: Solar PV, ASHP, Green Roof, LED Lighting, Draughtproofing
2. GL6 8LJ; Chalford Hill
   New Build: Passive Haus, ASHP, Solar Thermal, Battery, Green Roof
3. GL6 8FH; Bussage
   Retrofit: Electric Radiators and Hot Water, Upgrade windows, Gardening for Carbon Storage
4. GL6 8EX; Chalford Hill
   Retrofit: Ground Source Heat Pump in a listed Property, Solar PV Farm
5. GL6 8DZ; Coppice Hill
   Retrofit: Solar PV, electric car & bikes, secondary & double glazing
6. GL6 8NB; Chalford Hill
   Retrofit: Solar PV, Battery, EV

GL6 8DJ; Chalford Vale

- 1890’s stone semi-detached, three-storey
- Solar PV (2.2kW) installed 2010
- Loft insulation extended to 250mm minimum
- Lean-to improved to double-glazing and Green Roof August 2021
- ASHP (8kW) installed January 2021
- Ground Floor Cavity wall extension (incl. cavity-wall insulation)
- Draughtproofing, eg door surrounds, letter-box, key hole escutcheons etc.
- Lights replaced with LED alternatives

Solar PV

- 2.2kW (technology now slightly outdated)
- Installation £15,000 with interest free loan over 30 years
- Installed 2010 on higher FITs
  - Generation: 40p / kWh; now 56p / kWh), plus a small amount for export
- £1200pa in FITs

Air Source Heat Pump

- Samsung *Joule* 8kW
- £13,500 installation cost
- RHI Projected payback of £11,500 over 7 years
- Sited 7m from house (via water pipes in a trench under the patio)
- Raised by 0.5m to avoid flood damage
- Hot water boosted by PV

ASHP Detail

- RHI Index-linked (projected)

Years	RHI £
1	£1,555.27
2	£1,586.37
3	£1,618.10
4	£1,650.46
5	£1,683.47
6	£1,717.14
7	£1,751.49
Total	**£11,562.31**

- Electricity Use and Performance

	Energy (kWh)		COP
	Use	Generated	
February	764	2226	2.91
March	541	1888	3.49
April	417	1314	3.15
May	145	553	3.81
June	74	248	3.35

Hot Water Cylinder and Controls

- 3 bedroom radiators were upgraded to double fin (no increase in size)
- 200L cylinder fits into the existing airing cupboard
- Temperature compensating

Insulation & Draughtproofing

- Doors:
  - Surround
  - Key-holes
  - Letterbox

Lean-to Modification & Green Roof (current works)

- Previous lean-to (as pictured) is not weatherproof
- Gaps between walls and polycarbonate roof
- Water damage to single glazed window frame
- Improvement to double glazing
- Roof strengthened and sedum planted
- Updated image to follow…

GL6 8LJ; Chalford Hill

- 2018 New-build
- Passive Haus standards so highly insulated
- ASHP Mistsubishi EcoDan 8.5 kw
- Solar Thermal Panels
- 14 x Solar Edge PV panels plus Tesla Powerwall battery
- Green sedum roof

Solar PV

- PV panels run ASHP, household electricity and charge battery
- We got the last FiT rate (so low)
- RHI paid over 7 years towards capital cost of solar thermal and ASHP
- Total net energy cost around £350 – includes charging electric car

Plant Room

- The ‘plant room’, housing:
  - water storage tank
  - connections for the ASHP and Solar Thermal Panels and MVHR)
  - 1.8 x 1.4 m plus access

Tesla ‘Powerwall’

- 75cm (W) x 115cm (H) x 5cm (D)

GL6 8FH; Bussage

- 2000 2 bed end of terrace, by Frith Wood
- Cool, and solar reduced by trees
- Elderly gas boiler removed
- Elkatherm German radiators
- SunAmp hot water system
- Windows to be replaced
- Small fridge, low ampage induction hob
- Carbon store via tree planting and use of (copious) leaf litter in garden.

Priority of small, simple kit

- Hot water heat battery system: small, heavy unit fits under kitchen units.
- Radiators are small, high output, very adjustable.
- C£10,000 to remove gas and install system.
- Running costs to be known after first winter!

Carbon store

- No electricity generation due to site constraints
- Focus on capturing carbon with tree planting and use of (copious) leafmould to increase carbon layer
- Money saved on solar spent on windows and thermal capacity

GL6 8EX; Chalford Hill

- Grade 2 listed 17/18th century Cotswold stone house with cast iron radiators.
- Improvement to roof insulation
- Ground Source Heat Pump with pipes over 60m runs, 1.5m deep: *EcoForest ecoGeo B1. 5-22kW*
- Additional heating in the house will be provided by a wood burning stove and a gas Aga in the kitchen
- Planning to install solar PV panels in the field

GSHP Specification

ecoGEO Basic ground source heat pumps technical data

- Power range: 1-9 kW / 3-12 kW / 5-22 kW
- Heating production with a performance (COP) of up to 4.9, depending on the model
- Quick and sensible control through internet, using ecoSMART easynet module
- Compatible with energy managers ecoSMART e-manager and e-system, which allows the use of renewable produced electricity to power the ecoGEO heat pumps
- Active cooling production with a performance (EER) of up to 5.5, depending on the model
- Integrated passive cooling in models B2 na B4. The ecoGEO controller also allows other models to control passive cooling with external plumbing.
- Domestic hot water production with external cylinder
- Emergency electrical inline heater incorporated, opcional in all models
- Integrated HTR technlogy in models B3 and B4, opcional in models B1 and B2
- Integrated cascade control of up to 3 units, extending the power range to a maximum of 66kW
- Single phase (230V) and three phase (400V) power supply options
- Dimensions 1060x600x710mm

GL6 8DZ; Coppice Hill

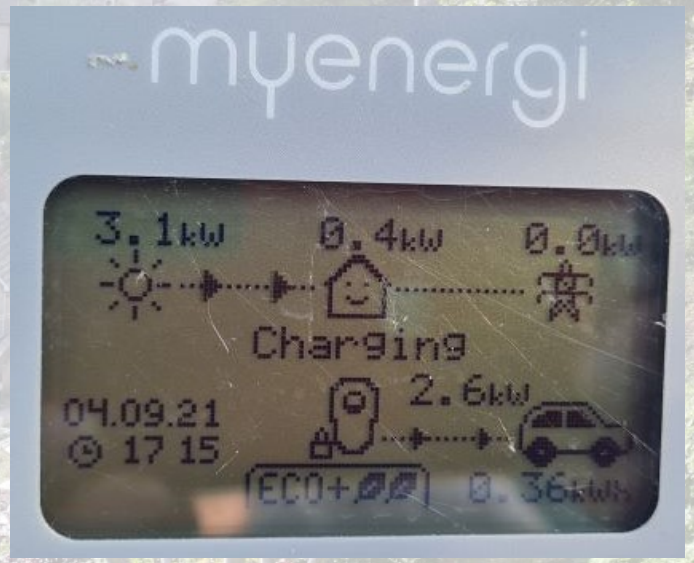
- Victorian and earlier stone semi-detached
- Solar PV (6.2kW) installed 2019
- Solar heats hot water and charge Electric Car
- Two cars reduced down to one EV plus 2 electric bikes
- Loft insulation extended to 250mm minimum
- Secondary glazing on older sash windows (and windows re-furb'ed to fit properly)
- Replacement double-glazed units on newer windows
- Lights replaced with LED alternatives

Solar PV

- 6.8kW, fitted by the GreenShop. Limited to 6kW (max permissible)
- All-black panels to match slate roof
- Slate roof was found to be non-slate asbestos-lookalike tiles
- Water is heated by solar during the day. If by 6pm it's not hot enough, the gas boiler kicks in

Electric Vehicle Charging via Solar PV

- Zappi system integrated to solar PV
- Charge the car if there is a surplus from the panels
- Slow rate (3KWh), or fast (7KWh)
- ZapMap – we offer a charging facility to the public



Radiators and Control

- Thermostatically controlled radiators
- Can be set using an app (incl. remotely)
- Different temperatures in different rooms, as well as different schedules for working at home etc.
- Portable Controller cube

GL6 8NB; Chalford Hill

- Modern 3 bedroom semi-detached
- PV solar
- Battery storage
- EV

Solar PV & Battery Storage

- PV array is made up of 12 x 330W, 4kW monocrystalline panels
- 8.2 kwh capacity Battery
- Monitored and guarantee provided by Giveenergy

EV (Nissan Leaf) Charger

- 30kwh charging up on a 3-pin home charger

Further Details

If you would like to know more about any of the case-studies outlined in this presentation, please contact ChalCAN in the first instance:

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Building a sustainable community | Chalford Climate Action Network (chalcan.org.uk)