Road Map towards Net Zero Carbon for Cambridge City Council's Housing
APSE

28th September 2021

Purpose of Today's Briefing

1. 500 programme
2. Why adopt the road map
3. Challenges
4. Q&A

500 home programme

- 542 net new council homes
- 934 new homes
- 526 started onsite one year ahead of March'22 deadline

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500 home programme

- Local Plan or above
- Mill Rd and Cromwell Rd – CHP, Solar PV
- Fabric First approach
- MVHR
- Later schemes gas free

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Climate Emergency

Housing Emergency

Policy Trade offs

Climate emergency

- Need to reduce carbon
- Low carbon housing is more expensive
- Build less?

Housing Emergency

- 2000 on waiting list
- Need lower energy bills
- Need to build more?

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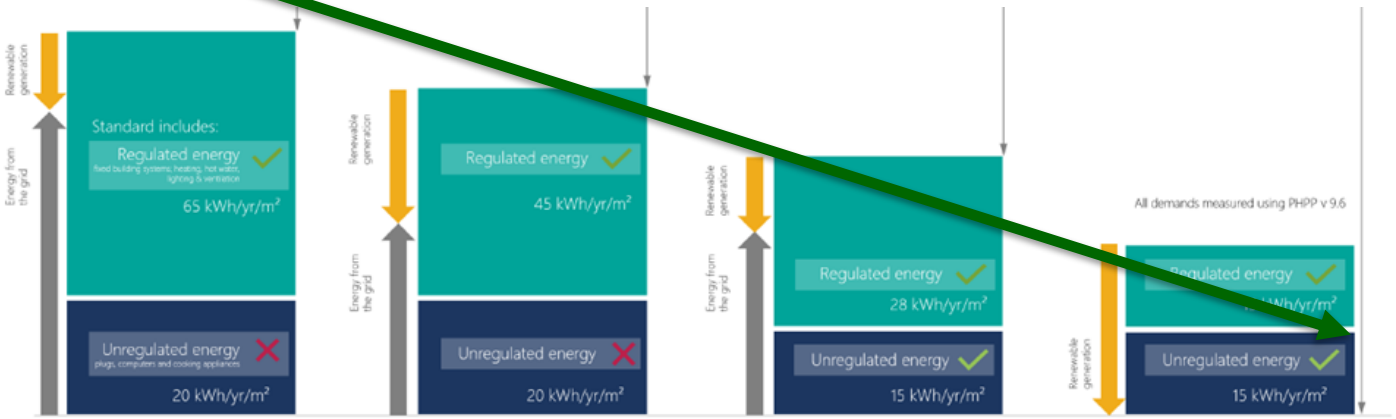
What is the roadmap

2020
National standards

2020
-19%
Cambridge Local Plan & SHDG

2025
-35%
Proposed National Standards?

2030
-100%
Proposed Cambridge Local Plan



Gas,
Fabric
Solar PV

Gas
Fabric +
Solar PV +

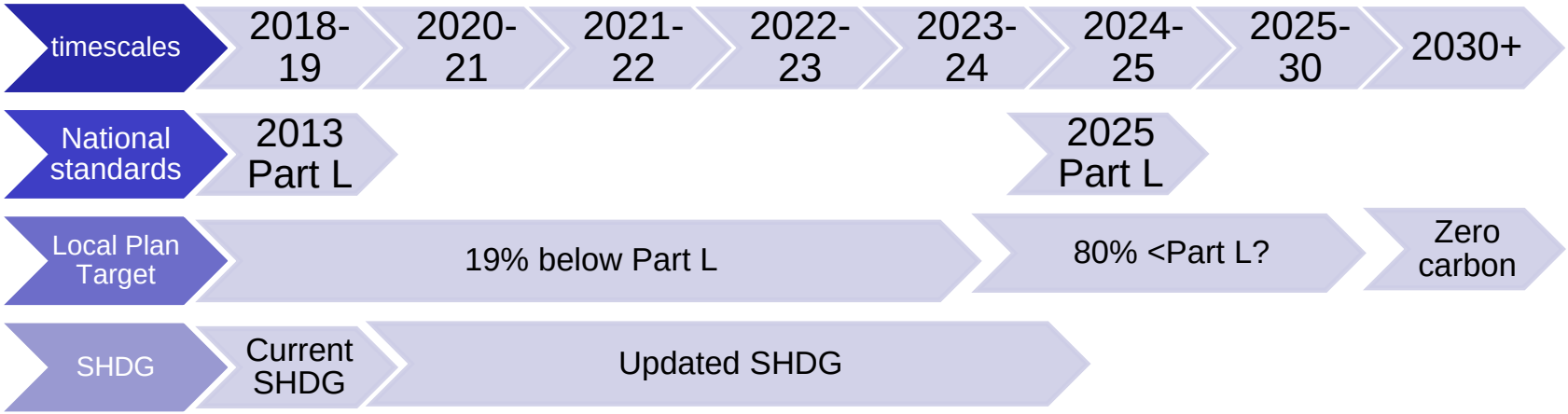
No gas
Fabric ++
MVHR
Solar PV

What is Net Zero Carbon

1000 home programme

1. 1,000 net Council rented units to be delivered over 10 years in a total programme of 1933
2. includes shared ownership/intermediate tenure and private sales/private rental schemes
3. grant support for the programme is assumed
4. Buro Happold to look at sustainability options
5. Technical constraints may restrict sustainability

Buro Happold brief



1. Provide a roadmap to zero carbon
2. Whole Life Costs – capital costs, maintenance costs and tenant costs
3. Constraints
4. Include other sustainability measures
5. Provide guidance on options

Passivhaus

A zero carbon house needs zero carbon tenants and asset management

- Asset management, Housing and finance teams must be involved
- Engage with members
- Engage with tenants
- Be clear in messaging

Roadmap to Net Zero Carbon

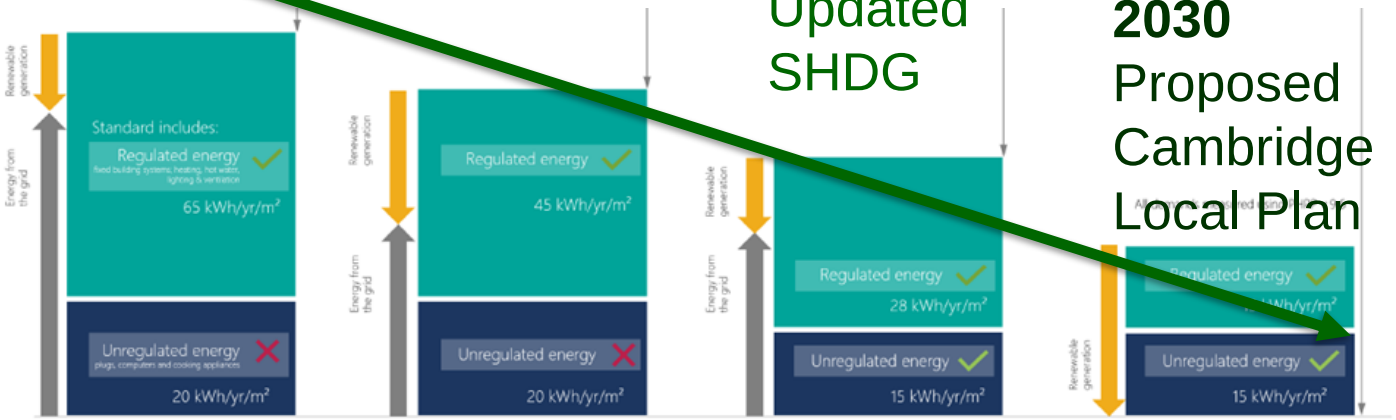
2020
National standards

2020
Cambridge Local Plan & SHDG

2025
National Standards

2021
Proposed Updated SHDG

2030
Proposed Cambridge Local Plan



Local Plan

Local Plan Plus

Passivhaus

Net Zero Carbon

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Sustainable housing standard options
Operational energy

This outlines potential standards and targets that could be applied to new council homes delivered. Standards will be applied through the 'Interim Sustainable Housing Standards 2020'. Standards focus on operational energy, the energy used for living in a home from fixed heating, hot water, lighting, ventilation, plugs, cooking and appliances. It however excludes consideration of electric vehicle (EV) charging.

1. Existing Local Plan

Homes will require:

- Typical energy efficiency
- Gas fuelled heating and hot water
- Solar technologies for energy generation

2. Local Plan Plus

Homes will require:

- High levels of energy efficiency
- Heat pumps for heating and hot water
- Solar technologies for energy generation
- Hot water store with WWHR

3. Passivhaus Certification

Homes will require:

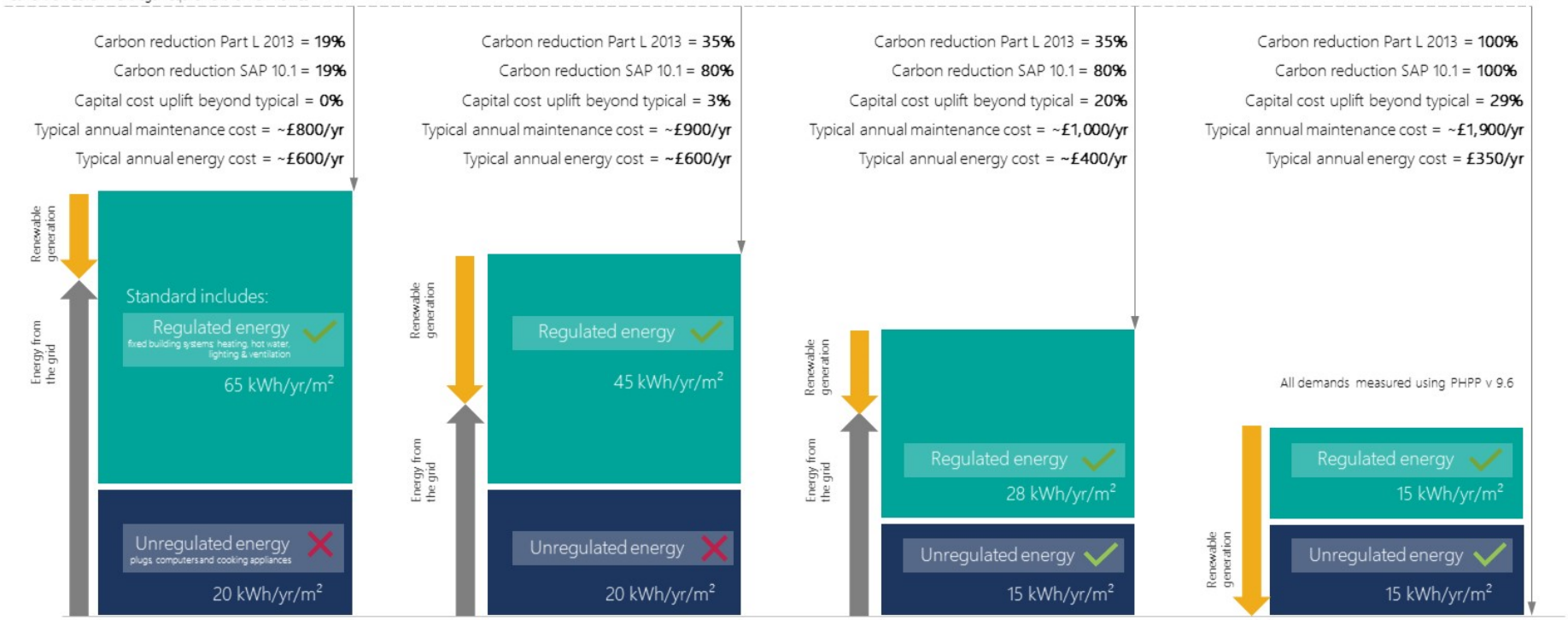
- Ultra-high levels of energy efficiency
- Electric heating and hot water
- Solar technologies for energy generation
- Hot water store with WWHR

4. Net Zero Carbon on-site

Homes will require :

- Ultra-high levels of energy efficiency
- Heat pumps for heating and hot water
- Solar technologies for energy generation
- Batteries for energy storage

Building Regulations Part L baseline
Current UK Government legal requirement for new homes



BURO HAPPOLD

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(1) kWh – a unit of measurement that equals the amount of energy (1kWh = 1000 watt appliance running for 1 hour)
(2) WWHR – Waste Water Heat Recovery - a system that captures heat from the drain of showers and baths for reuse in heating systems
(3) Cost uplift – the % of additional cost per m² compared to a typical social housing historic design and build cost of £2020/m²
(4) Annual energy costs – means the cost outlay of tenants per year including energy costs and standing charges etc. minus savings from solar PV or government incentives

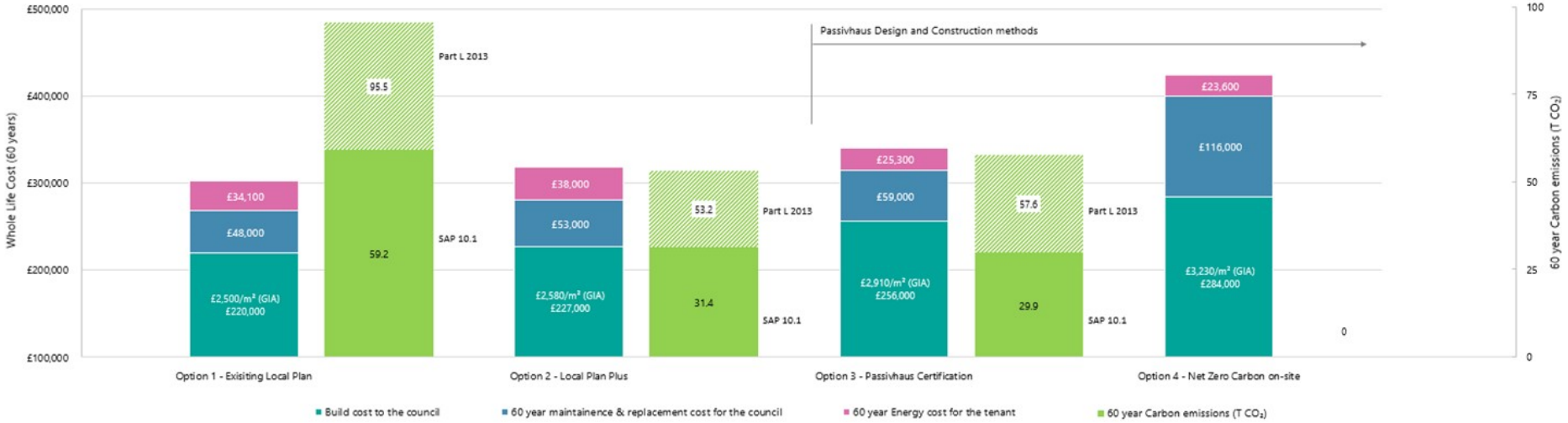
Cost, tenant bills and carbon trade off

Local Plan

Local Plan Plus

Passivhaus

Net Zero Carbon



Fabric ++
Technology +++

Risk:
E&F: +++
Contractor: +
Tenant: +++

Fabric ++++
Technology ++

Risk:
E&F: ++
Contractor: +++
Tenant: ++

Fabric ++++
Technology +++++

Risk:
E&F: +++++
Contractor: +++
Tenant: +++++

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What does this mean?

All council new builds built to:

- **Net Zero Carbon from 2030**
- **Passivhaus certification from 2021**

- Sustainability Options appraisal for every development to include:
  - Future proofing all schemes to Net Zero Carbon when funds permit
  - Technical and financial justification for not attaining Passivhaus

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Don’t forget the other sustainability targets

Summaries	Current Local Plan (2018)	Local Plan Plus	Passivhaus	Net Zero regulated Energy / Carbon
Water Summary	110 l/p/d	90 l/p/d	90 l/p/d	80 l/p/d
Overheating Summary	Recommended but not mandatory to use TM59	Mandatory use of TM59	Mandatory use of TM59	Mandatory use of TM59
POE Summary	Recommended through SHDG but not mandatory	POE for first year of occupation	POE for first 5 years of occupation.	POE for first 5 years of occupation.
EV Summary **Car Parking ratios across sites** **Car Club**	SPD: 50% active and 50% passive charging points. ~0.7-0.9 parking spaces per home	SPD: 50% active and 50% passive charging points. ~0.5-0.6 parking spaces per home Increased Car Club provision	50% active and 50% passive charging points. 0.5 parking spaces per home Increased Car Club provision all with active charging	50% active and 50% passive charging points. <0.5 parking spaces per home Increased Car Club provision all with active charging
Biodiversity Summary	Flat roof must be green roof 10% net gain in biodiversity	Flat roof must be green roof 10% net gain in biodiversity (DEFRA)	All Flat roofs to be extensive (Sedum) green roofs. 20% improvement in biodiversity (DEFRA)	All Flat roofs to be extensive (Sedum) green roofs. 20% improvement in biodiversity (DEFRA) All features with habitat value to be retained

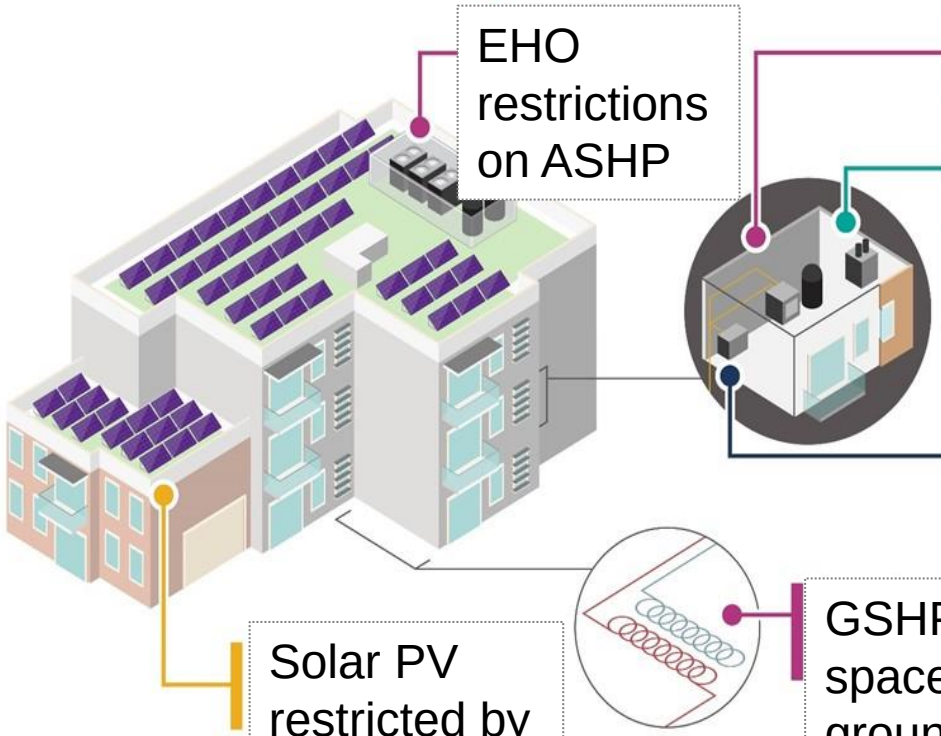
Constraints

Not all sites suited for Passivhaus due to orientation, other design and planning constraints

Council will have less design control over S106 sites

Limited experience from designers, contractors and supply chains

Difficult to control tenant behaviour



EHO restrictions on ASHP

Energy and carbon reduction limited if tenants and E&F are not able to operate or maintain new technology

Significant storage space required for technology

GSHP need lots of space or the right ground conditions

Solar PV restricted by roof space

Water restrictions and lack of car parking may be unpopular

Biodiversity easier on brownfield and greenfield sites but not overgrown sites

Sustainability - choices

Apartments: Performance and cost summary.

			Original	Iteration 1 New Baseline	Iteration 2 Communal ASHP	Iteration 3 Communal ASHP + WWHR	Iteration 4 EAHP	Iteration 5 DE	Iteration 6 DE + Sunamp	Iteration 7 Local GSHP	Final ASHP + WWHR + ST + PV
CO2	Building Regulations compliance carbon performance	% Reduction against 2013 Notional building	35%	36%	37%	39%	42%	-5%	-4%	50%	58%[1]
		Compliance with 19% planning target?	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
	Estimated SAP 10.1 carbon performance	% Reduction against 2020 Notional building	-8%	-5%	81%	82%	83%	68%	69%	85%	88%
		Aspirational 55% improvement met?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
£	Tenant regulated operational energy cost	Total (£) per dwelling	£511	£505	£431	£421	£416	£693 - £585	£678 - £579	£370 - £326	£352[2]
		% Change against "New Baseline"	1%	N/A	-15%	-17%	-18%	37% -16%	34%- 15%	-35%- -27%	-30%
	Heat metering/ billing cost[3]	Total (£) per dwelling	£94.90	£94.90	£94.90	£94.90	-	-	-	-	£94.90
	Maintenance cost[4]	Total (£) per dwelling	£662	£662	£544	£494	£670	£670	£670	£539	£853
		Total (£) All apartments	£41,706	£41,706	£34,272	£31,122	£42,210	£42,210	£42,210	£33,957	£53,739
		% Change against "New Baseline"	0%	0%	-18%	-25%	1%	1%	1%	-19%	29%
	Capital cost	Total (£) whole site	N/A	£184,500	£194,050	£269,950	£237,960	£70,525	£233,961	£484,474	278,136
		% Change against "New Baseline"	N/A-	-	5%	46%	29%	- 62%	27%	126%	51%
	Landlord CHP electrical generation cost recovery	Total (£) per dwelling	£236	£230	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Total (£) whole site	£14,868	£14,490	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1]Based on Stage 3 Part L Compliance report [2]Calculated based on the stage 3 TM54 Prediction of operational energy analysis. [3]Based on the Kurve system [4]Maintenance costs provided by Buro Happold

Air source heat pumps
Waste water heart recovery
Solar thermal
Solar PV

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Sustainability - constraints

- Biodiversity Net Gain
  - No current requirement
  - 10%+ gain in draft SPD-
  - 20%+ gain for CIP schemes
- Green grass – green deserts - OK
- Brownfield sites – OK
- BUT overgrown sites with trees makes 20% difficult
- Off-site mitigation is necessary

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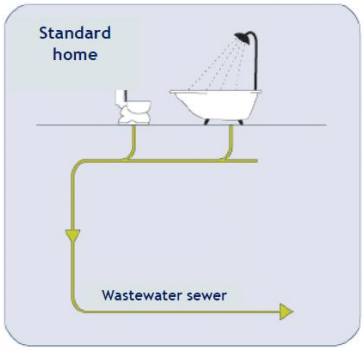
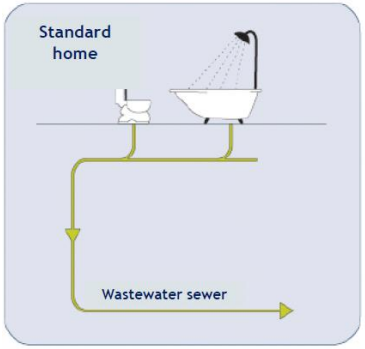
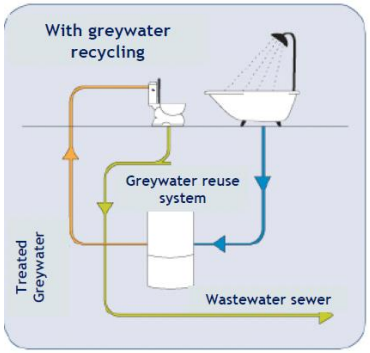
Sustainability - constraints

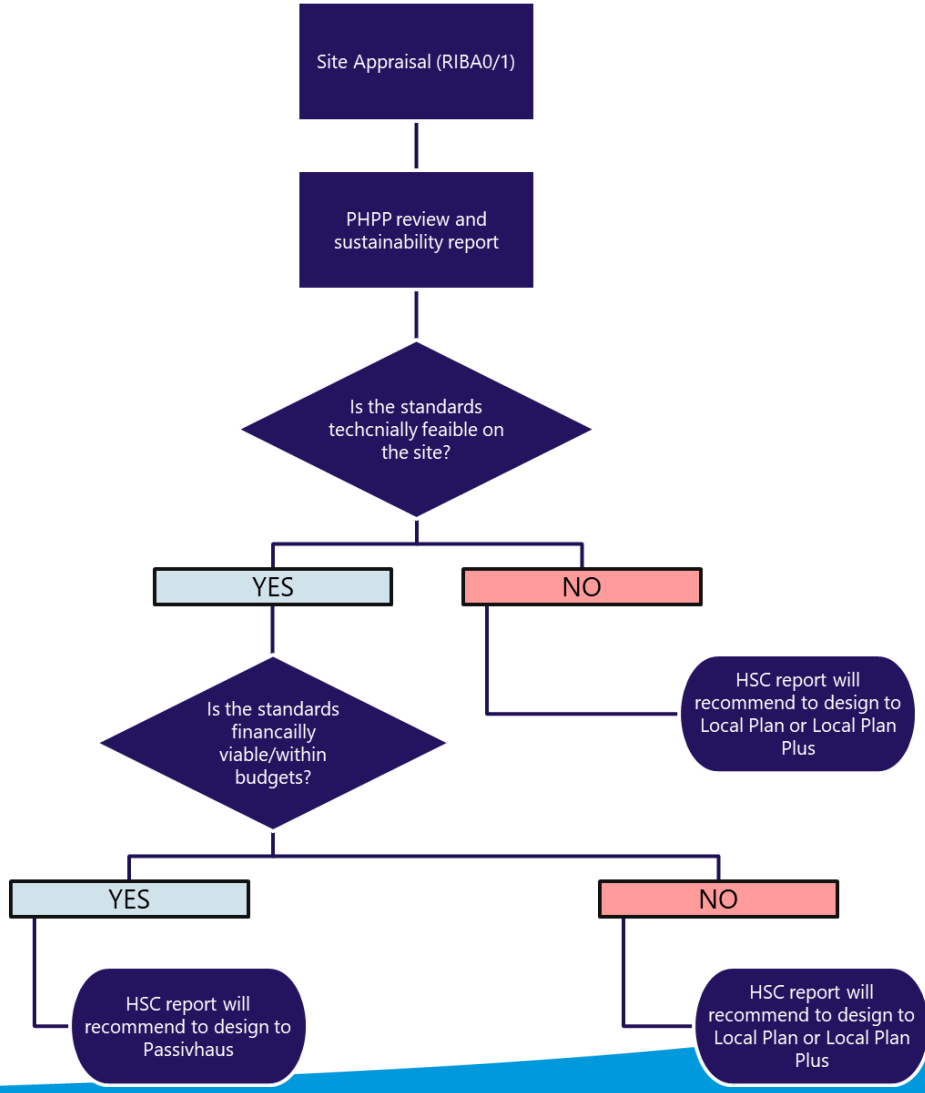
Standard	current requirement	Passivhaus	Net Zero
lppd	110lppd	90lppd	80lppd
impact	none	No bath or small bath Tenant concerns?	Extra cost, extra maintenance







Decision making on sustainability



Sustainability – progress

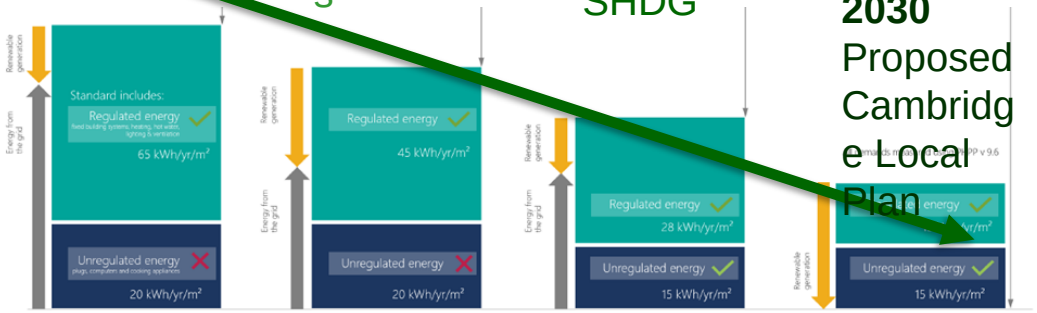
2020
National standards

2020
Cambridge Local Plan & SHDG

2025
National Standards

2021
Updated SHDG

2030
Proposed Cambridge Local Plan



Local Plan

Anstey Way
Garage Sites
Cromwell Rd
Ventress
Akeman
Mill Rd 1

Local Plan +

Mill Rd 2
Campkin 2
Colville 2, 3
Meadows
L2

Passivhaus

Aylesborough
Fen Rd, Ditton

Net Zero Carbon

Net Zero Carbon pilots

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Thank you for listening

Any questions?

Swansea Council
Building Better Homes

More Homes Project

- 7,400 affordable homes needed (2010 – 2025)
- Initially we had a 4 year Plan to deliver 140 Homes
- Cabinet then agreed a plan to develop 1000 homes over 10 years
- One Council approach – schemes designed and built by our in house team
- Developed our own house types and our own Swansea Standard specification

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Swansea Council

Key Drivers

- Council's desire to drive own new-build housing programme
- Develop highly energy-efficient & environmentally conscious homes which -
  - Reduces primary energy demands
  - Reduces carbon footprint
  - Reduces energy bills – tackling fuel poverty
  - Welsh Design Quality Requirements (WDQR) and Lifetime Homes compliant
  - All have private gardens and accessible green space
- Building homes and communities not just houses – creating environments which are comfortable & contribute towards positive health & well-being

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Swansea Council

Our New Build Journey

- The first new build council housing development in a generation
- Pilot Passivhaus scheme of 18 homes completed in 2018
- Both schemes at Parc Yr Helyg and Colliers Way 2, consisting of 16 and 18 homes are built to our own highly energy efficient standards, and have innovative technology funded through Welsh Governments Innovative Housing Programme (IHP)
- The schemes were completed during 2020/21, and handed over on programme, despite the lockdown and continuing covid restrictions
- A third Swansea Standard development consisting of 25 x 3 bed homes – is currently on the ground and due for completion in the spring of 22, and a small development of 6 bungalows is on site.

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Swansea Council

Developing the Swansea Standard

- Following on from it's first new build pilot of 18 pasivhaus homes, the Council has now developed its own Swansea Standard for new build housing.
- The Swansea Standard is a Fabric First approach, 25% improvement on Building Regulations u-values and can be combined with innovative and renewable technologies
- IHP funding was used to include renewables on top of the Swansea Standard, to make these homes energy positive also known as Homes as Power Stations.
- These homes are all off gas

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Swansea Council

Swansea Standard -HAPS

- Set out to achieve a 25% uplift on Building Regulations thermal performance standards of primary elements and a fabric first approach

  - Timber-frame structure and floors – highly insulated
  - High performance doors & triple-glazed windows
  - Improved air-tightness (5m³/ (m².hr)@50Pa)

- Recognisable construction form – efficiencies in term of scalability
- Can be combined with other technologies

- Ground Source Heat Pumps (GSHPs), PV solar roofs, battery storage and Mechanical Ventilation Heat Recovery (MVHR) Systems, and will be able store and use their own energy.

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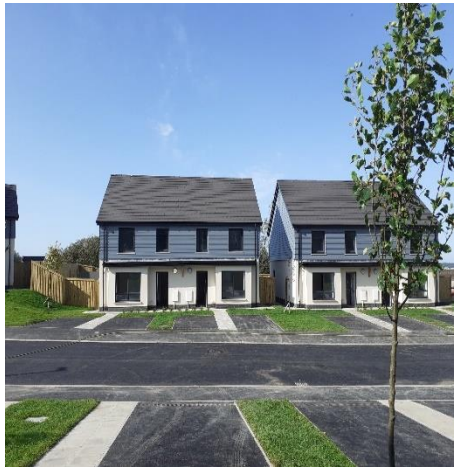
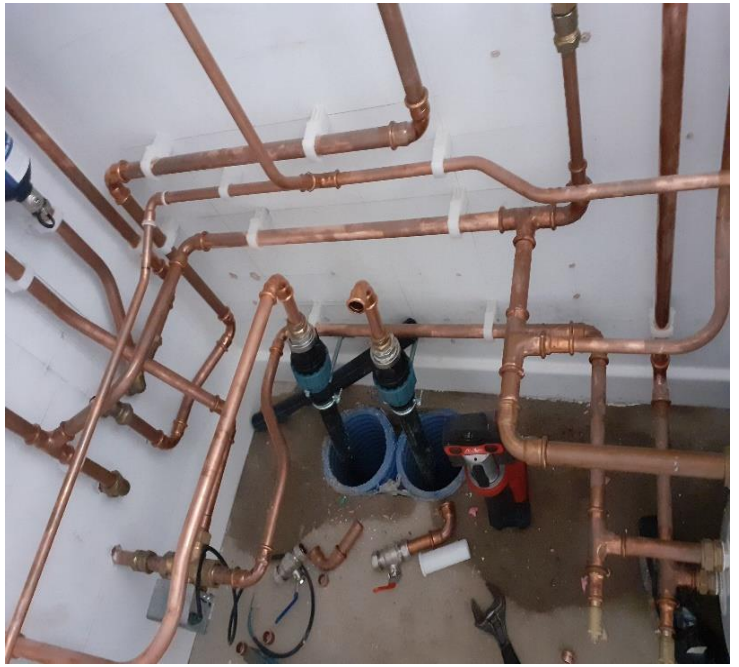
Swansea Standard Developments



HAPS Technologies



Outcomes

- Beautiful and spacious homes with private gardens, green space, downstairs wet rooms
- The homes have been designed to reduce the amount of energy used, for energy to be generated from the sun and for excess energy from the sun to be stored.
- PV panels generate energy during most of the day, which is stored in the battery, enabling the occupants to be energy self-sufficient for large parts of the year
- Tenants can monitor use via the Tesla app.
- The post occupancy monitoring will help develop wider understanding of the impact that can be made on comfort, health and fuel poverty, together with energy and carbon savings

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Outcomes

- Homes have achieved an EPC rating A, and a very impressive SAP score of 107
- During sunny periods the homes can be 100% self powered
- Example for month of June shows 376% of the energy offset
- Most importantly tenant satisfaction is very high
- One tenant has said she has been paying £27 a month for electricity – this covers all hot water, heating, appliances and standing charge
- Room for Extra Guests – each home has a swift brick

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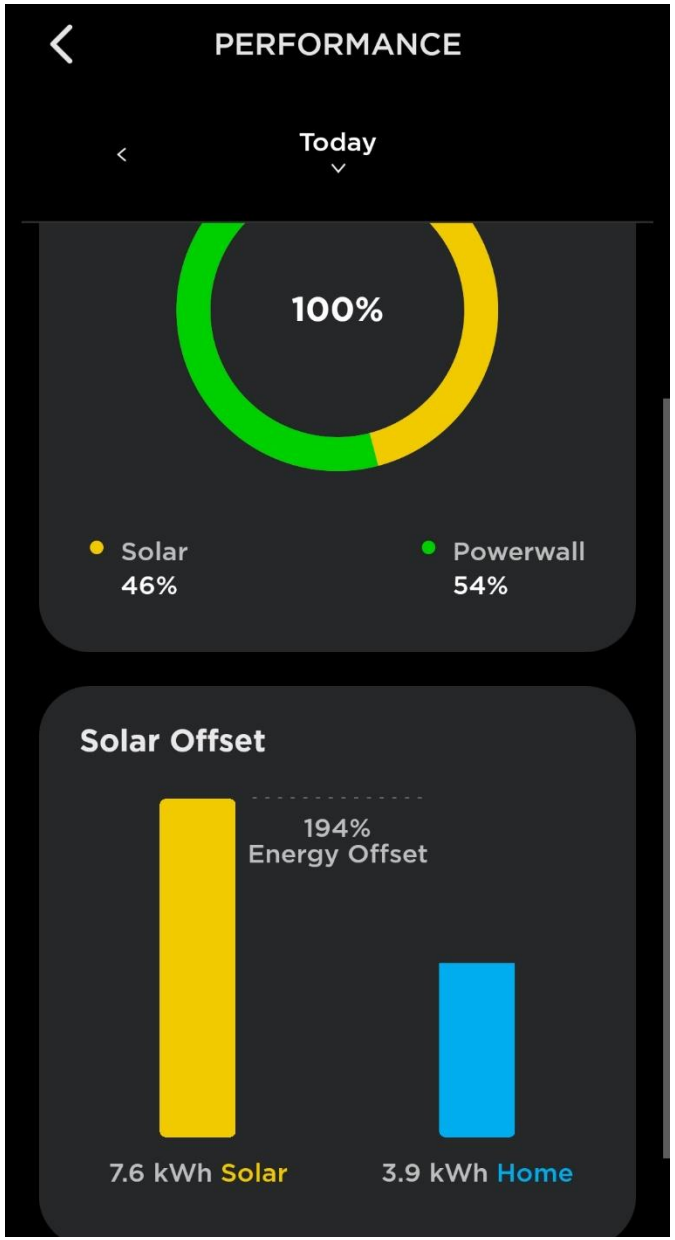

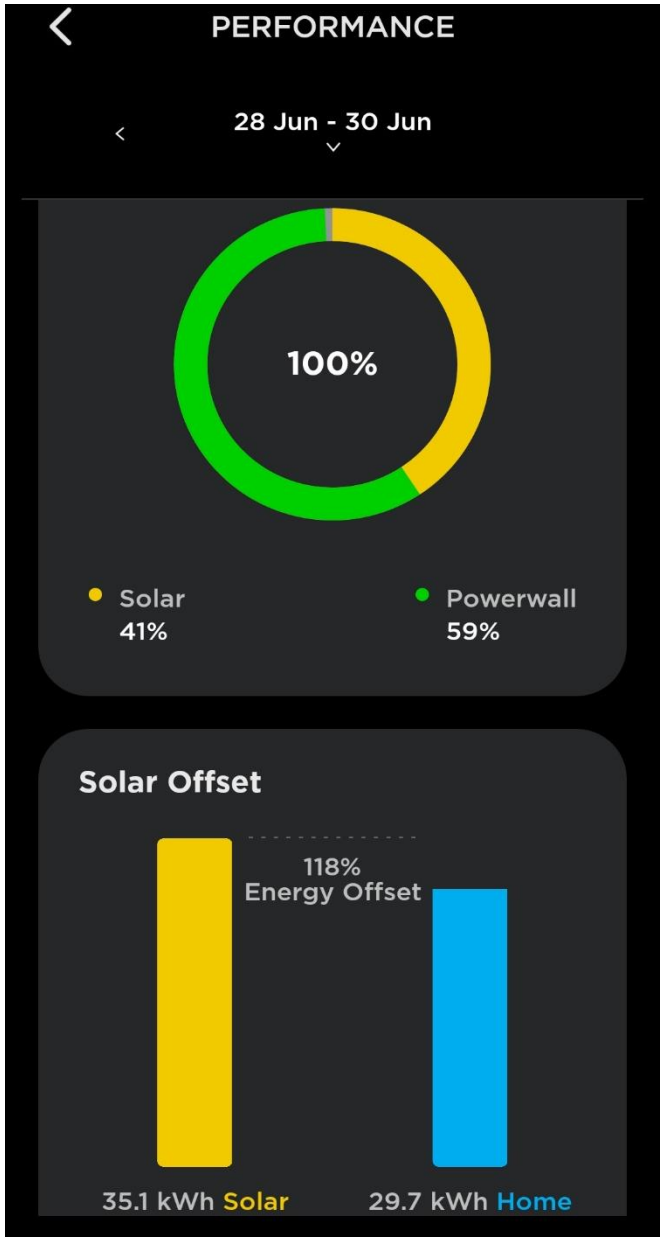

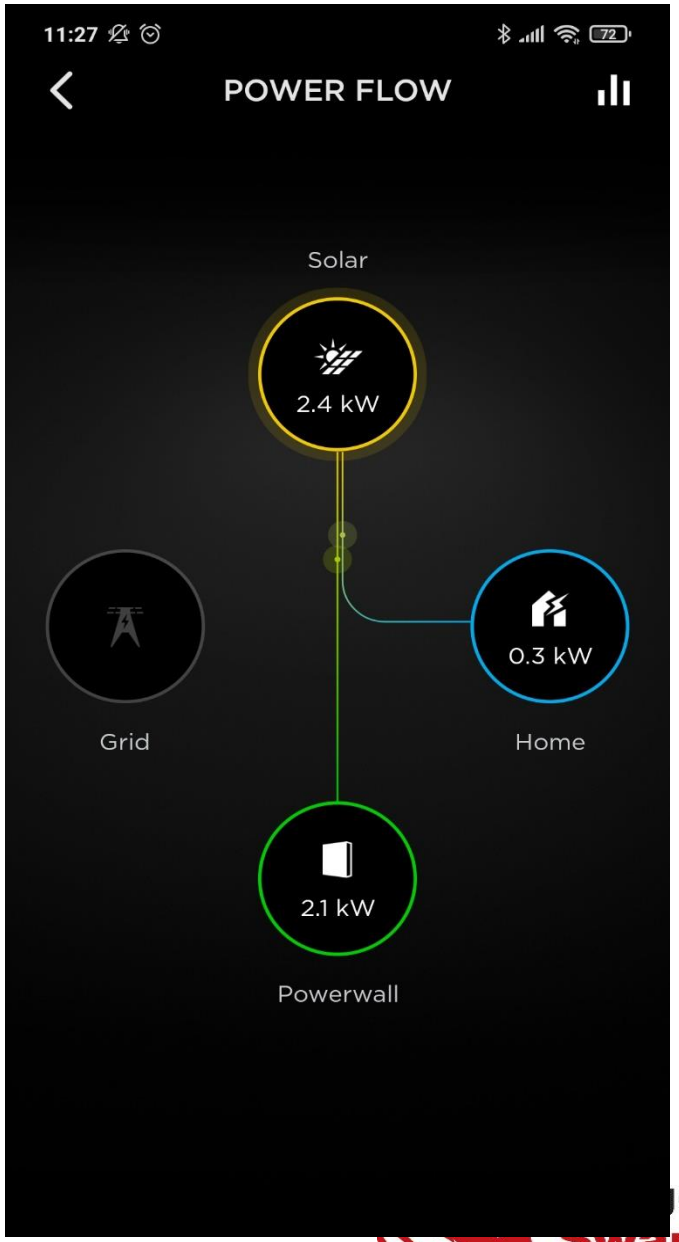

The Real Benefits

- Throughout lockdown access to good quality housing and open space was key benefit for health and well being
- When handing over the keys, our staff were in tears seeing children who had moved from flats tearing through the house and jumping around the gardens!
- Meeting the residents and seeing their reaction is the most rewarding part of the process
- Sense of pride in the whole delivery of the project from start to finish
- To be part of the team and to have played a part in providing people with a secure, warm, affordable and spacious modern home is priceless
- Can’t wait to handover the keys to the next scheme

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Swansea Council

Challenges and Lessons Learnt

- Overall commissioning and testing of the systems is critical
- Tenant engagement key – simple handover packs and ongoing dialogue and visits
- Monitoring is key to understanding success
- Balancing high standards with scale of delivery
- Understanding our journey to NZC

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