CPIR Energy Strategy - SDHA Datasheet

AECOM

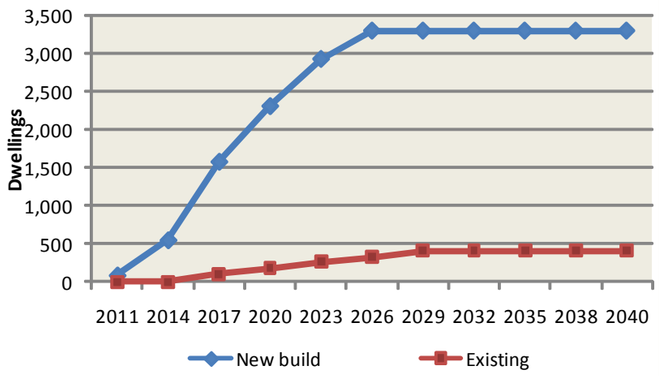
SDHA Option 5A - using higher RSS housing figure for urban extension — **Pool EFW - 40,000 tpa plant - core option**

Existing Heat Loads	Future Heat Loads	
Potential Anchor Loads	Residential	Non Residential
Pool - Carn Brea Leisure Centre, Cornwall College, Pool School and Community College	13,600 MWh	17,900 MWh
Existing Residential Heat Load	Mixed	
3,700 MWh	H91 & E, H92 & E, H36 & E, H37 & E, H38 & E, H41 & E,	
Existing Non-Residential Heat Load	Non-residential	
3,700 MWh	E10, E11, E12, E13, E2, E9	
Potential Social Housing Connection?	Residential	
7% of existing housing	H40, H90, H46, H45, H33, H34, H93, H122, H30b	
Percentage of assumed connected load that is 'secure'	91 %	

Heat Load

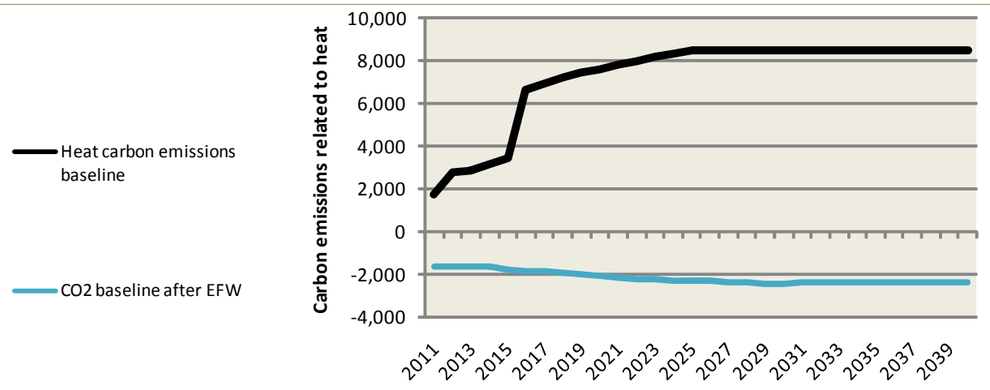
No. of connected dwellings

Year	New build	Existing	Load (MWh)
2011	84	0	4,253
2014	548	0	11,153
2017	1,581	104	31,000
2020	2,314	180	35,048
2023	2,935	256	38,609
2026	3,307	332	41,089
2032	3,307	408	41,952
2040	3,307	408	41,190



	Waste input	Waste type	Plant type	Max annual output	Heat Rejected
EFW	40,000 tpa	Commercial	Steam turbine	73,882 MWh	MWh

CO_2 Data



Total CO_2 Saved		%CO_2 Saved	
EfW	8,890 tonnes	75%	of avg. regulated dwelling CO_2

Description

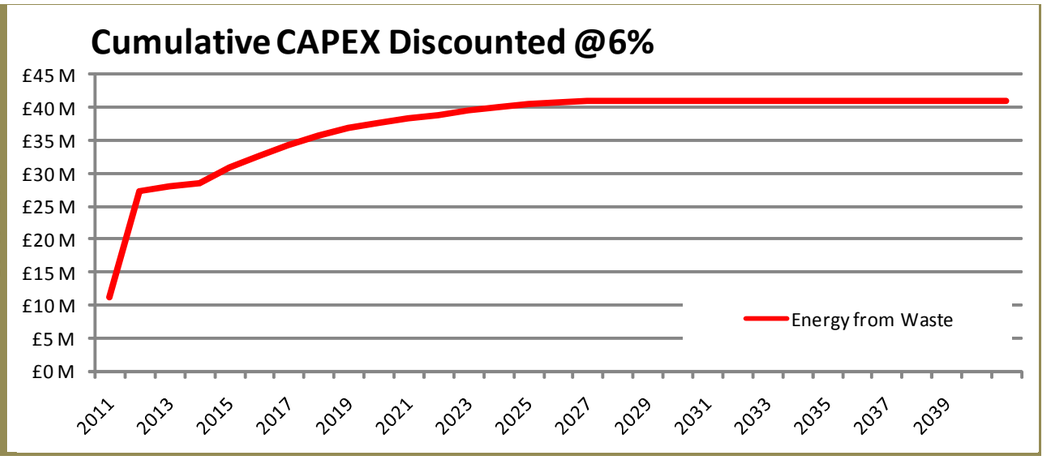
The Pool Energy from Waste SDHA is based on the idea of locating an EfW plant in the Resource Recovery Park directly to the south, and on the edge, of the Pool area. We assumed a 40,000tpa plant for both the core and extended options.
Assuming a steam turbine plant was used the heat output could be 'tuned' to meet heat load requirements. Where the plant heat output exceeded the demand, the heat could be rejected
Therefore, the extended option makes better use of 40,000tpa plant's heat output, rather than requiring a larger plant.
The core options encompass all the new build development in the Pool area south of the A30, in addition to the Tolvaddon and Park Bottom urban extension.
This datasheet is based on the higher RSS housing figure for the urban extension.

Assumptions

Technical
Life of principal plant: 15 years
Life of infrastructure: 30 years

Financial
Discount rate: 6%, 12%
Gate fees for waste £80 / tonne
Project life: 30 years
Fuel costs (p/kWh): [Gas 2] [Elec 8.4] [Wholesale Elec 5] [HeatResi 5.25] [HeatNonResi 3.20] [wood chip 1.29)
Renewable Heat Incentive: 4.3p/kWh for biomass heat from 2011
Renewable Obligation Certificate (ROC): 4.3p/kWh
Number of ROCs for biomass CHP = 2

CAPEX



Viability

Energy from waste	
IRR @ 30 years	14%
NPV @ 30 years & 12% DF	£3.3 M
NPV @ 30 years & 6% DF	£27.5 M

Constraints

Avaiability of sufficient gas main infrastructure to support the back-up gas boilers
EFW constraints relate to possible additional separation from dwellings due to air emissions and the impact of vehicle movements.
Waste supply should also be considered in relations to other planned waste recovery facilities.

Conclusions

Energy from waste has the best financial performance of all the technologies considered and could enable significant carbon emissions reductions for new and existing housing. However, the financial performance is highly dependant on the gate fees. CC should begin discussions with potential technology providers, such as EnerG , and the CC waste team.

CPIR Energy Strategy - SDHA Datasheet

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SDHA Option 5b - using lower RSS housing figure for urban extension — **Pool EFW - 40,000 tpa plant - extended option**

Existing Heat Loads	Future Heat Loads	
Potential Anchor Loads	Residential	Non Residential
Pool - Carn Brea Leisure Centre, Cornwall College, Council Offices, Pool School and Community College, Blackwood House (HFE)	15,000 MWh	18,500 MWh
Existing Residential Heat Load	Mixed	
21,100 MWh	H5 & E, H6, H91 & E, H92 & E, H36 & E, H37 & E, H38 & E, H41 & E, H42 & E, E14	
Existing Non-Residential Heat Load	Non-residential	
4,700 MWh	E10, E11, E12, E13, E2, E9	
Potential Social Housing Connection?	Residential	
8% of existing housing	H3, H9, H30, H40, H90, H46, H45, H33, H34, H93, H122	
Percentage of assumed connected load that is 'secure'	67 %	

Description

The Pool Energy from Waste SDHA is based on the idea of locating an EfW plant in the Resource Recovery Park directly to the south, and on the edge, of the Pool area. We assumed a 40,000tpa plant for both the core and extended options. Assuming a steam turbine plant was used the heat output could be 'tuned' to meet heat load requirements. Where the plant heat output exceeded the demand, the heat could be rejected. Therefore, the extended option makes better use of 40,000tpa plant's heat output, rather than requiring a larger plant.
The extended option would require strategic investment in heat main backbones, to connect the Dolcoath Site as well existing housing with Camborne and the Tuckingmill and boilerworks.
This datasheet is based on the lower RSS housing figure for the Tolvaddon and Park Bottom urban extension.

Assumptions

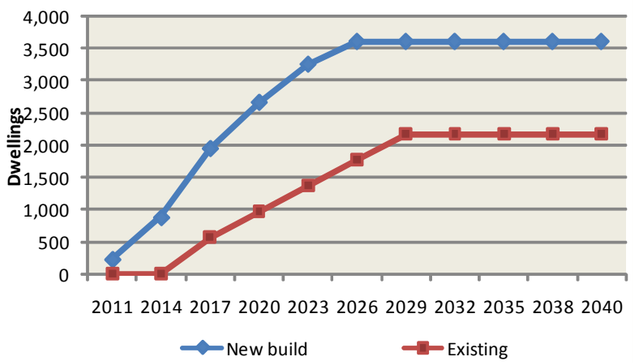
Technical
Life of principal plant: 15 years
Life of infrastructure: 30 years

Financial
Discount rate: 6%, 12%
Gate fees for waste £80 / tonne
Project life: 30 years
Fuel costs (p/kWh): [Gas 2] [Elec 8.4] [Wholesale Elec 5] [HeatResi 5.25] [HeatNonResi 3.20] [wood chip 1.29)
Renewable Heat Incentive: 4.3p/kWh for biomass heat from 2011
Renewable Obligation Certificate (ROC): 4.3p/kWh
Number of ROCs for biomass CHP = 2

Heat Load

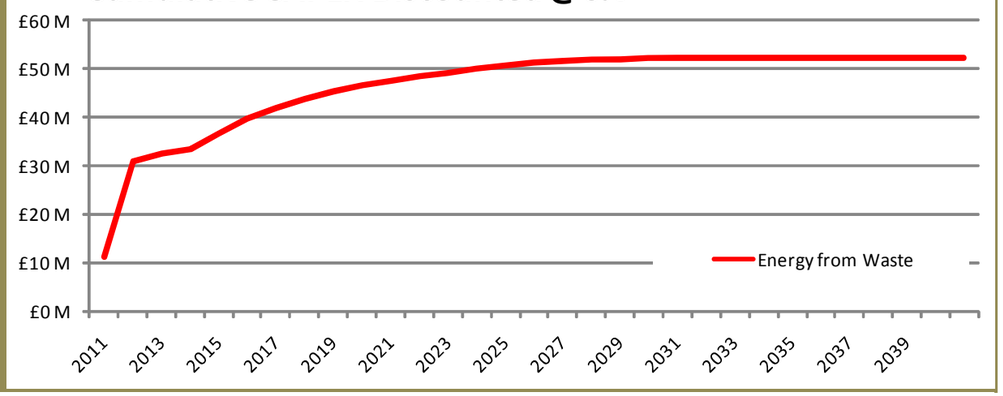
No. of connected dwellings

Year	New build	Existing	Load (MWh)
2011	221	0	5,981
2014	874	0	14,044
2017	1,947	575	39,981
2020	2,666	976	48,211
2023	3,258	1,376	55,893
2026	3,612	1,777	62,538
2032	3,612	2,176	67,634
2040	3,612	2,176	62,812

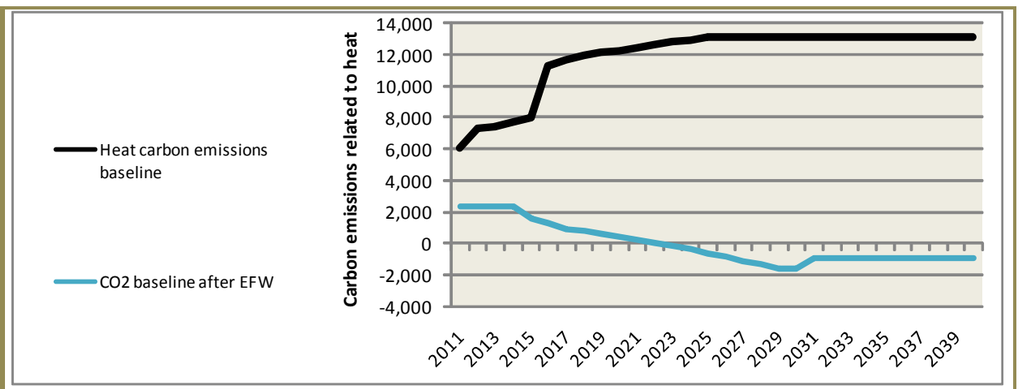


	Waste input	Waste type	Plant type	Max annual output	Heat Rejected
EFW	40,000 tpa	Commercial	Steam turbine	73,882 MWh	None

Cumulative CAPEX Discounted @6%



CO_2 Data



	Total CO_2 Saved		%CO_2 Saved	
EfW	13,505	tonnes	75%	of avg. regulated dwelling CO_2

Viability

Energy from waste	
IRR @ 30 years	13%
NPV @ 30 years & 12% DF	£1.8 M
NPV @ 30 years & 6% DF	£29.7 M

Constraints

Avaiability of sufficient gas main infrastructure to support the back-up gas boilers
EFW constraints relate to possible additional separation from dwellings due to air emissions and the impact of vehicle movements.
Waste supply should also be considered in relations to other planned waste recovery facilities.

Conclusions

The extended Pool Energy from Waste option tests the viability of connecting over 5,500 dwellings to the plant, giving carbon emissions reductions of over 13,500 tonnes per annum. As with the option 5A the financial performance is highly dependant on the gate fees that can be secured for the waste received.

CPIR Energy Strategy - SDHA Datasheet

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SDHA Option 5b - using higher RSS housing figure for urban extension

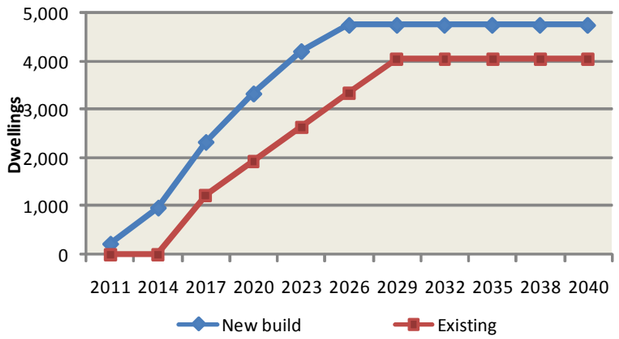
Pool EFW - 40,000 tpa plant - extended option

Existing Heat Loads	Future Heat Loads	
Potential Anchor Loads	Residential	Non Residential
Pool - Carn Brea Leisure Centre, Cornwall College, Council Offices, Pool School and Community College, Blackwood House (HFE)	19,600 MWh	18,500 MWh
Existing Residential Heat Load	Mixed	
38,900 MWh	H5 & E, H6, H91 & E, H92 & E, H36 & E, H37 & E, H38 & E, H41 & E, H42 & E, E14	
Existing Non-Residential Heat Load	Non-residential	
4,700 MWh	E10, E11, E12, E13, E2, E9	
Potential Social Housing Connection?	Residential	
13% of existing housing	H3, H9, H40, H90, H46, H45, H33, H34, H93, H122, H30b	
Percentage of assumed connected load that is 'secure'	59 %	

Heat Load

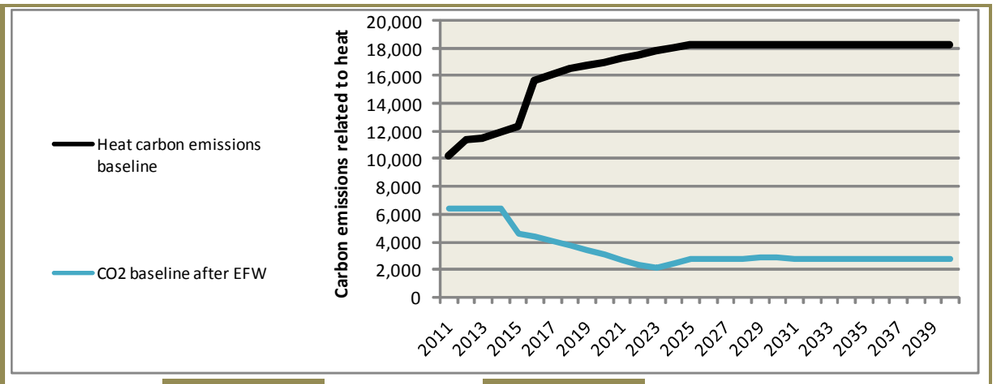
No. of connected dwellings

Year	New build	Existing	Load (MWh)
2011	221	0	5,981
2014	968	0	14,453
2017	2,324	1,227	48,716
2020	3,325	1,930	62,045
2023	4,200	2,632	74,827
2026	4,742	3,335	86,163
2032	4,742	4,036	95,123
2040	4,742	4,036	86,674



	Waste input	Waste type	Plant type	Max annual output	Heat Rejected
EFW	40,000 tpa	Commercial	Steam turbine	73,882 MWh	None

CO_2 Data



Total CO_2 Saved		%CO_2 Saved	
EfW	16,154 tonnes	75%	of avg. regulated dwelling CO_2

Description

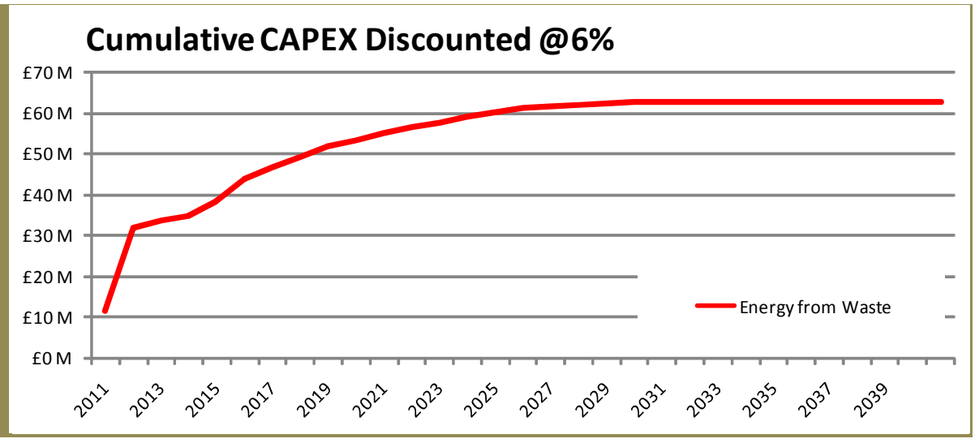
The Pool Energy from Waste SDHA is based on the idea of locating an EfW plant in the Resource Recovery Park directly to the south, and on the edge, of the Pool area. We assumed a 40,000tpa plant for both the core and extended options. Assuming a steam turbine plant was used the heat output could be 'tuned' to meet heat load requirements. Where the plant heat output exceeded the demand, the heat could be rejected. Therefore, the extended option makes better use of 40,000tpa plant's heat output, rather than requiring a larger plant.
The extended option would require strategic investment in heat main backbones, to connect the Dolcoath Site as well existing housing with Camborne and the Tuckingmill and boilerworks.
This datasheet is based on the higher RSS housing figure for the Tolvaddon and Park Bottom urban extension.

Assumptions

Technical
Life of principal plant: 15 years
Life of infrastructure: 30 years

Financial
Discount rate: 6%, 12%
Gate fees for waste £80 / tonne
Project life: 30 years
Fuel costs (p/kWh): [Gas 2] [Elec 8.4] [Wholesale Elec 5] [HeatResi 5.25] [HeatNonResi 3.20] [wood chip 1.29]
Renewable Heat Incentive: 4.3p/kWh for biomass heat from 2011
Renewable Obligation Certificate (ROC): 4.3p/kWh
Number of ROCs for biomass CHP = 2

CAPEX



Viability

Energy from waste	
IRR @ 30 years	13%
NPV @ 30 years & 12% DF	£1.8 M
NPV @ 30 years & 6% DF	£33.1 M

Constraints

Avaiability of sufficient gas main infrastructure to support the back-up gas boilers
EFW constraints relate to possible additional separation from dwellings due to air emissions and the impact of vehicle movements.
Waste supply should also be considered in relations to other planned waste recovery facilities.

Conclusions

The extended Pool Energy from Waste option tests the viability of connecting over 8,700 dwellings to the plant, giving carbon emissions reductions of over 16,500 tonnes per annum. As with the option 5A the financial performance is highly dependant on the gate fees that can be secured for the waste received.

CPIR Energy Strategy - SDHA Datasheet

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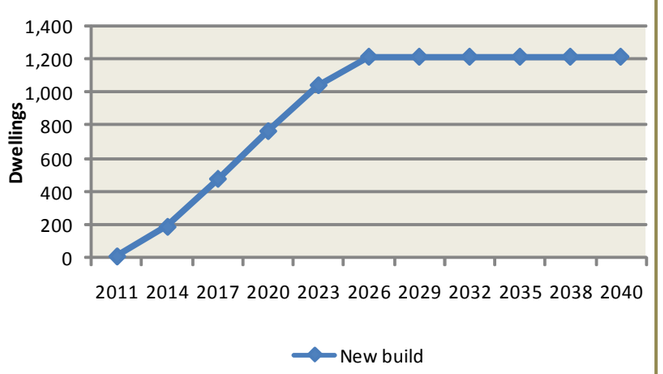
SDHA Option 6a — **Redruth - core option**

Existing Heat Loads	Future Heat Loads	
Potential Anchor Loads	Residential	Non Residential
Camborne & Redruth Community Hospital, Redruth School: Technology College, Penventon Park Hotel, Longreach House Hospital	5,000 MWh	2,400 MWh
Existing Residential Heat Load	Mixed	
None	H43 & E, E7/H111	
Existing Non-Residential Heat Load	Non-residential	
4,900 MWh	E3	
Potential Social Housing Connection?	Residential	
None	H66, H65, H67, H127	
Percentage of assumed connected load that is 'secure'	100 %	

Heat Load

No. of connected dwellings

Year	New build	Existing	Load (MWh)
2011	12	0	5,183
2014	190	0	6,190
2017	479	0	9,676
2020	766	0	10,923
2023	1,042	0	12,121
2026	1,214	0	12,868
2032	1,214	0	12,868
2040	1,214	0	12,868



	Gas CHP	Biomass CHP	Biomass Heat
Lead unit size	1.2MW x 2	N/A	1.2MW x 2
Lead unit Install year(s)	2011 & 2015	N/A	2011 & 2015

Description

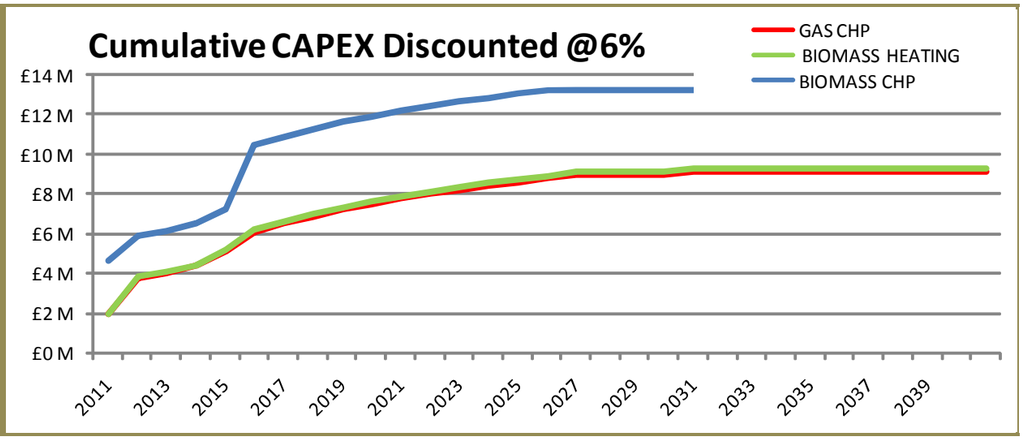
The Redruth SDHA is located primarily around the development of the Tolgus Urban Extension and the Avers Roundabout site. We also assumed that Redruth Technology College and Penventon Park Hotel could connect. The core option also includes the Penventon Site and the Redruth Corridor which could be connected by a mainly soft-dig heat main through playing fields. We have assumed that the Camborne and Redruth hospital site would connect to such a scheme, although this may have to connect later than envisaged if new development begins in the north of the urban extension.

Assumptions

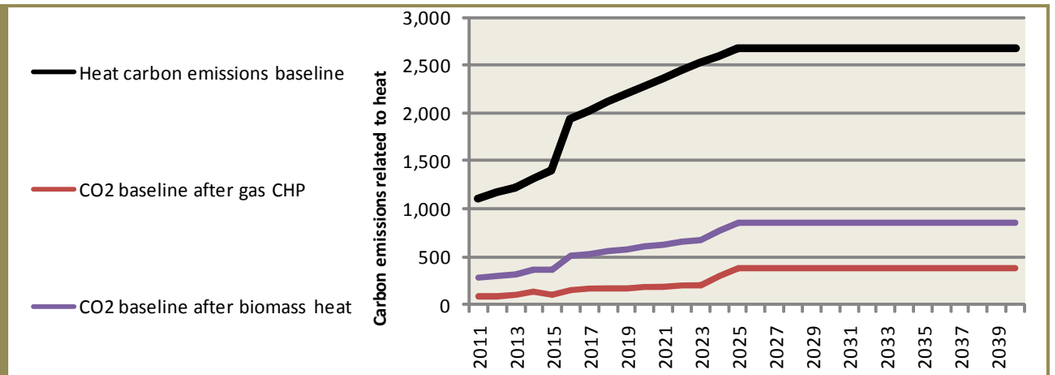
Technical
Life of principal plant: 15 years
Life of infrastructure: 30 years

Financial
Discount rate: 6%, 12%
Project life: 30 years
Fuel costs (p/kWh): [Gas 2] [Elec 8.4] [Wholesale Elec 5] [HeatResi 5.25] [HeatNonResi 3.20] [wood chip 1.29)
Renewable Heat Incentive: 4.3p/kWh for biomass heat from 2011
Renewable Obligation Certificate (ROC): 4.3p/kWh
Number of ROCs for biomass CHP = 2

CAPEX



CO_2 Data



	Total CO_2 Saved		%CO_2 Saved	
Gas CHP	2,292	tonnes	70%	of avg. regulated dwelling CO_2
Biomass Heat	1,822	tonnes	70%	of avg. regulated dwelling CO_2
Biomass CHP	N/A	tonnes	N/A	of avg. regulated dwelling CO_2

Viability

Gas CHP		Biomass (heat only)		Biomass CHP	
IRR @ 30 years	2%	IRR @ 30 years	7%	IRR @ 30 years	N/A
NPV @ 30 years & 12% DF	-£2.84 M	NPV @ 30 years & 12% DF	-£1.75 M	NPV @ 30 years & 12% DF	N/A
NPV @ 30 years & 6% DF	-£1.82 M	NPV @ 30 years & 6% DF	£0.76 M	NPV @ 30 years & 6% DF	N/A

Constraints

Avaiability of sufficient gas main infrastructure to support the CHP option.
Network operators may require a significant contribution to enhance local infrastructure.
Local availability of wood chip fuel for the biomass option.
The impact of biomass delivery vehicles should be considered.
Insufficient heat load to support Biomass CHP option

Conclusions

The Redruth SDHA benefits from a large number of new build houses with the Tolgus Urban Extension and the hospital and college as significant potential anchor loads. Careful consideration would be needed to match the phases of development with the location of an energy centre. There is insufficient heat load to fully utilise proven biomass CHP plant. Biomass performs better than gas CHP for reasons listed under option 2A.

CPIR Energy Strategy - SDHA Datasheet

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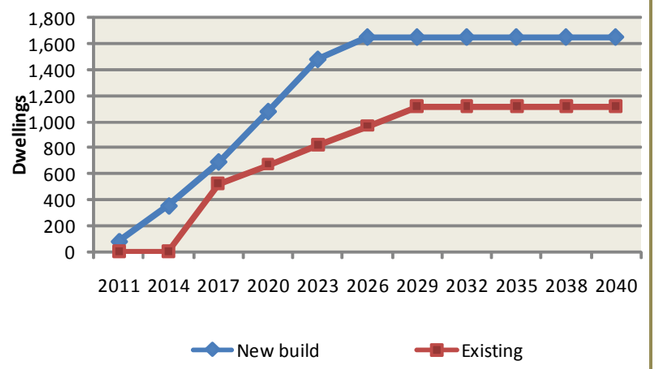
SDHA Option 6b — **Redruth - extended option**

Existing Heat Loads	Future Heat Loads	
Potential Anchor Loads	Residential	Non Residential
Camborne & Redruth Community Hospital, Redruth School: Technology College, Penventon Park Hotel, Longreach House Hospital	6,900 MWh	2,400 MWh
Existing Residential Heat Load	Mixed	
10,600 MWh	H43 & E, E7/H111	
Existing Non-Residential Heat Load	Non-residential	
4,900 MWh	E3	
Potential Social Housing Connection?	Residential	
36% of existing housing	H54, H64, H66, H65, H67, H62, H70, H80, H127, H116,	
Percentage of assumed connected load that is 'secure'	71 %	

Heat Load

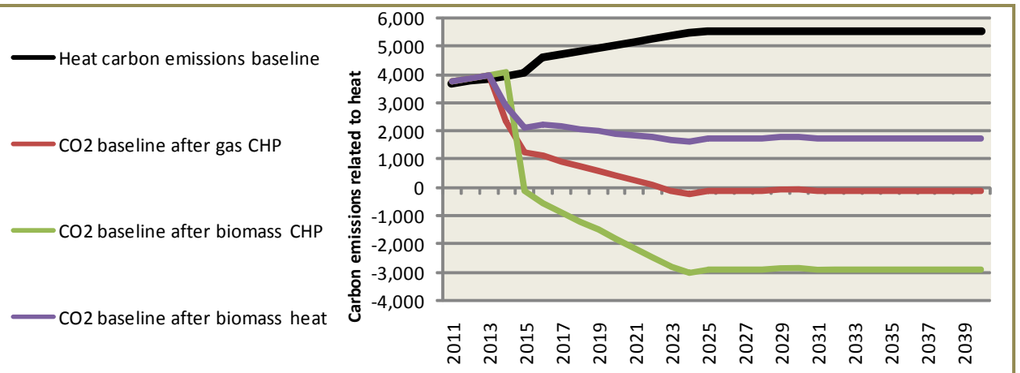
No. of connected dwellings

Year	New build	Existing	Load (MWh)
2011	81	0	5,517
2014	355	0	6,961
2017	692	520	16,114
2020	1,078	670	19,831
2023	1,478	819	23,608
2026	1,650	968	26,395
2032	1,650	1,117	28,431
2040	1,650	1,117	26,089



	Gas CHP	Biomass CHP	Biomass Heat
Lead unit size	2.5MW x 2	5.0MW x 1	2.5MW x 2
Lead unit Install year(s)	2014 & 2015	2015	2014 & 2015

CO_2 Data



	Total CO_2 Saved		%CO_2 Saved	
Gas CHP	5,649	tonnes	70%	of avg. regulated dwelling CO_2
Biomass Heat	3,811	tonnes	70%	of avg. regulated dwelling CO_2
Biomass CHP	8,412	tonnes	140%	of avg. regulated dwelling CO_2

Description

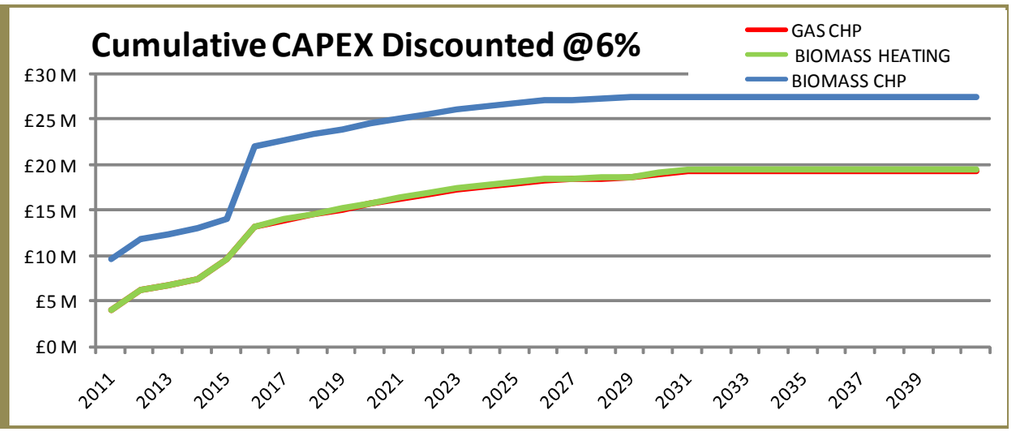
The extended Redruth SDHA connects little additional new build, as most development consists of infill, and as such would be unlikely to be feasible for connection. The extension does assume strategic investment to connect significant numbers of existing housing. Firstly, to the south of the core SDHA, possibly using Falmouth road and taking in housing to the west and east of the road. Secondly, to the north east of the site, which has a high concentration of social housing, a strategic backbone serving this area might use the A3047.

Assumptions

Technical
Life of principal plant: 15 years
Life of infrastructure: 30 years

Financial
Discount rate: 6%, 12%
Project life: 30 years
Fuel costs (p/kWh): [Gas 2] [Elec 8.4] [Wholesale Elec 5] [HeatResi 5.25] [HeatNonResi 3.20] [wood chip 1.29)
Renewable Heat Incentive: 4.3p/kWh for biomass heat from 2011
Renewable Obligation Certificate (ROC): 4.3p/kWh
Number of ROCs for biomass CHP = 2

CAPEX



Viability

Gas CHP		Biomass (heat only)		Biomass CHP	
IRR @ 30 years	4%	IRR @ 30 years	6%	IRR @ 30 years	6%
NPV @ 30 years & 12% DF	-£5.90 M	NPV @ 30 years & 12% DF	-£4.76 M	NPV @ 30 years & 12% DF	-£9.16 M
NPV @ 30 years & 6% DF	-£2.78 M	NPV @ 30 years & 6% DF	£0.65 M	NPV @ 30 years & 6% DF	-£0.84 M

Constraints

Avaiability of sufficient gas main infrastructure to support the CHP option.
Network operators may require a significant contribution to enhance local infrastructure.
Local availability of wood chip fuel for the biomass option.
The impact of biomass delivery vehicles should be considered.

Conclusions

As mentioned in the description, the addition of existing housing along Falmouth road forms the basis of the extended option. This amounts to nearly 1,200 existing houses, of which just under 40% are social. The Redruth extended option has a high enough potential heat load to use relatively established biomass CHP Organic Rankin Cycle (ORC) technology. This could potentially increase carbon emission saving, over that possible with other LZC technologies, to 8,412 tonnes.

6 Policy recommendations and further actions

This section sets out the policy recommendations which arise as a result of the analysis work undertaken throughout the project. The text assumes some familiarity with the various terms used when discussing such issues, however, should there be a need to review some of the terminology used here please visit http://www.planningportal.gov.uk/england/genpub/en/1018892037172.html where a full planning glossary can be found.

6.1 Policy context

There is a clear framework throughout national policy for inclusion of planning policies designed to reduce CO_2 emissions and promote decentralised renewable and low carbon energy (PPS1, PPS3 and PPS22). The draft South West Regional Spatial Strategy (RSS) includes region-wide renewable energy targets of 509 to 611 MWe installed capacity by 2020, with a specific target of 93 to 108 MWe for Cornwall. There are also proposed renewable heat targets to seek 100MW of thermal capacity by 2010 and 500MW by 2020. Strategic sites in CPIR could have an important role to play in meeting these targets.

Key drivers are the legal requirements for an 80% reduction in CO_2 emissions over 1990 levels by 2050 (with an interim target of 34% by 2020) and to generate 15% of the UK's total energy from renewable sources by 2020. The Government's strategy for delivering these hugely challenging targets are set out in the *UK Low Carbon Transition Plan*[28], published on 15th July 2009, which includes the *Renewable Energy Strategy*. These national targets alone provide sufficient justification for setting challenging energy policies in development plan documents. It is probable that the *Low Carbon Transition Plan* will, over the CPIR plan period, result in increasingly demanding targets above those in the draft RSS.

The draft RSS requires that local planning authorities set targets in their Development Plan Documents (DPDs) for the energy to be used in new development to come from decentralised and renewable or low-carbon energy sources where it is feasible and viable, and the development thresholds to which such targets would apply.

Changes to the Building Regulations in 2010, 2013 and 2016 are expected to bring in tough dwelling (CO_2) emissions rate targets for residential development and for commercial development by 2019. Planning policy has an important role to play in supporting developers in achieving these requirements without duplicating requirements.

The suite of policies recommended here seek to address the requirements of the draft RSS while providing an easily understandable and deliverable local response. We have avoided setting targets for on-site CO_2 reduction or energy generation for three reasons:

- It should be assumed that Part L will make such policies redundant over time;
- Requiring developers to show percentage reductions in emissions or energy generation places a significant burden on both applicant and development manager to understand and make decisions based on technically complex calculations; and
- District scale solutions are particularly appropriate to CPIR and will bring significant CO_2 savings without placing undue burden on applicants.

A key feature of the proposed approach is to identify the specific roles of planning policy supported by delivery from local strategic partners and other parts of the local authority, including the corporate level. The figure below describes the relationship between each of the elements that should make up a local energy strategy. This recognises that planning cannot deliver the desired levels of CO_2 reductions and energy alone; rather it needs to play a defined role within a wider strategy that encompasses other local authority departments and local strategic partners. This study can act as the starting point for these wider discussions which planners, with their emerging spatial knowledge of the opportunities, are well placed to lead in the first instance.

[28] The plan can be found at http://www.decc.gov.uk/en/content/cms/publications/lc_trans_plan/lc_trans_plan.aspx

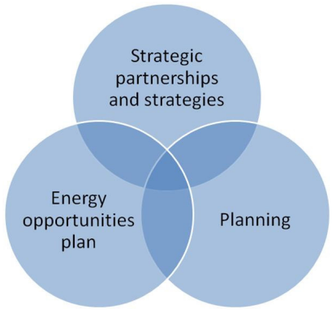


Figure 27: Interrelated elements of a local energy approach

Strategic partnerships and strategies

The evidence base can be used to support a wider reduction target and/or trajectory that contributes towards national and regional targets (especially the 15% renewable energy by 2020 and 80% CO_2 reduction on 1990 levels by 2050 targets). Due to the overarching nature of these targets it is likely that the most appropriate place for it is in a corporate strategy that applies to the local authority as a whole and its strategic partners rather than just planning, such as a Sustainable Community Strategy. The local driver for this could be delivery of National Indicator (NI) 186 (per capita CO_2 emissions reduction) and NI185 (local authority CO_2 emissions reductions) as well as the forthcoming new NI on renewable energy.

A similar approach can be taken to renewable and low carbon energy generation by locating an area wide, renewable and low carbon energy generation target in the corporate strategy with reference to it in DPDs. These are not requirements of the PPS nor this study and to be effective will require sufficiently robust links between planning and the corporate structure. These kinds of targets are beyond the scope of an Area Action Plan and therefore this study, but the recommendations and the Energy Opportunities Plan (below) give a clear indication of the possibilities for co-ordinated CO_2 reductions through energy generation that a wider Cornwall Council study could provide.

Energy Opportunities Plan

The evidence base should enable us to develop an area wide 'energy opportunities plan' (EOP) which also identifies opportunities for 'allowable solutions' and strategic energy centres. Although not a requirement of the PPS it is a desirable output from the evidence base work and will satisfy the PPS1 suggestion that local planning authorities "consider identifying suitable areas for renewable and low-carbon energy sources, and supporting infrastructure". This information can be used to inform wider local authority action, beyond planning.

The EOP should identify areas that have distinctive characteristics that will support broad groups of technologies or infrastructure. Geographical areas containing existing buildings with a significant energy demand should be identified, enabling planning and corporate policy to pinpoint buildings and areas that lend themselves well to particular solutions, such as district heating.

The Energy Opportunities Plan is presented on pages 14 to 32 and brings together GIS layers showing existing heat densities, wind opportunity sites, waste sites, public sector housing, anchor loads, committed development sites and so on. The Plan can be used as a key diagram to guide planning policies and targets, but also corporate strategy policies and targets and the investment decisions of other local authority departments and local strategic partners. It should therefore be presented in both the LDF and relevant corporate strategies. In order that it remains up to date, it may be preferable to include it in an SPD rather than DPD.

Planning policy

Policy can then be developed aimed at the three types of energy opportunity of interest to planners and their delivery partners:

- The first, stand alone generation, includes wind turbines.
- The second refers to community integrated generation and infrastructure such as district heating and combined heat and power (CHP). Essentially we are talking not just about renewable and low carbon generation, but also infrastructure. It is delivery of these opportunities that are particularly dependent upon a wider local authority delivery approach.
- The third relates to building or development integrated CO_2 reductions and generation.

This broader approach is important if opportunities for delivery are to be maximised and will involve the following, but fall outside the scope of this commission:

- A clear statement of the relationship between planning, development and the CDC public/private partnership as part of the work of the partnership and in a Supplementary Planning Document (SPD).
- Engagement with and buy-in from the Local Strategic Partnership and from other local authority departments

6.2 Strategic opportunity – CPIR heat main

The evidence base has highlighted the opportunity to develop a strategic heat main that stretches across Camborne, Pool, Illogan and Redruth. The purpose of this would be to provide the energy backbone for the towns. Other local networks would connect to this.

The Cornwall Development Company (CDC) is ideally placed to deliver this and local networks via the proposed public/private partnership ESCo. Delivery of public sector led infrastructure would provide greater investment certainty to developers proposing local networks by extending the available market for their heat. Similarly, the use of planning policies requiring new development to connect to the network would give investor certainty. The CDC is likely to need to partner with the private sector, though it is not dependent upon it, or take a lead in developing local heat networks in strategic district heating areas.

As illustrated in Section 4, there are two routes which provide the most obvious opportunity for such a heat main, namely: the proposed east west link road and the mainline railway.

Potential delivery mechanisms for this are:

- CDC public/private partnership ESCo with project finances securitised and underwritten by the public sector to provide certainty to investors. Local authority Prudential Borrowing may play an important part in facilitating this.
- Local authority commitment to link their own stock and purchase heat to form nucleus of the heat main – effectively underwriting the project finances.
- Local authority to release their own land where necessary.
- A Local Development Order (LDO) should be designated for the district heating network across the CPIR area meaning that planning permission is not required for elements of the development included in the Order.

Particularly in the instance of the railway line, there would also be a need to engage with Network Rail to secure their backing.

Local Development Order

Introduced in the 2004 Planning and Compulsory Purchase Act and amended by the 2008 Planning Act, Local Development Orders (LDO) grant permission for types of development specified in the Order and by so doing, removes the need for a planning application to be made by the developer. The PPS1 Supplement supports their use in bringing energy projects forward. No examples of their use yet exist but a pilot is underway for the Barking Power Station strategic heat main promoted by the London Development Agency.

A number of opportunities present themselves, as follows:

- LDOs can be used to provide permission for certain types of technology currently not part of the General Permitted Development Order (GDPO).
- LDOs can be used to provide permission for certain types of development in parts of a local planning authority area. It is possible that permitted development could be used to develop a framework for district heating networks, thereby bringing together and simplifying the currently relatively complex consents process.
- An LDO could also be site-specific to bring forward development of a particular site. This could simplify the process for delivering key energy opportunities identified in the evidence base. Alternatively, an LDO could be linked to achieving higher standards of the Code for Sustainable Homes on specific sites.

LDOs could improve scheme viability since they remove the need to apply for planning permission: a developer would be able to progress with greater speed and certainty and associated costs may well be lower as there will not be a planning application fee or need for resources to prepare an application.

Two potential difficulties include:

- Circular 1/2006 implies that LDOs will be used mostly for minor projects that are likely to be determined by officer delegation. Key energy opportunities are unlikely to fall into this category.
- The complexity and administrative burden involved in setting them up means that strong buy-in and commitment will be needed from local authorities.

6.3 Planning policy approach

Planning policy for energy can be split into two themes:

- Large development sites in Strategic District Heating Areas (SDHA)
- All other development

The Energy Opportunities Plan will identify where these designations are within CPIR.

The approach represents the application of national policy to the specific CPIR context. Broadly, the PPS1 Supplement on Planning and Climate Change requires the following:

- Along with criteria based policies, identify suitable sites for decentralised and renewable or low carbon (DRLC) energy and supporting infrastructure.
- Expect a proportion of energy supply for new development to be secured from DRLC energy. This can involve:
  - Setting a target percentage of the energy to be used in new developments to come from DRLC energy where viable.
  - Bringing forward development area or site-specific targets, where opportunities allow higher percentages.
  - Setting thresholds and development types to which the target will be applied and ensuring a clear rationale and proper testing for the targets.
  - Utilising existing and fostering new opportunities to supply development. For example, co-locating potential heat customers and suppliers, requiring development to connect to an identified system or to be able to in the future, setting out how proposed development should contribute to securing the DRLC energy system from which it would benefit, and facilitate connection.
- Anticipate levels of building sustainability ahead of the Building Regulations on specific sites where opportunities exist or development would otherwise be unacceptable.

It is clear that the PPS adopts a non-prescriptive approach which enables local planning authorities to develop policy responses that suit the particular characteristics of their area. Our understanding of CPIR's economy and energy opportunities has informed the proposed planning policy approach.

In paragraph 6.1 we justify why we do not consider on-site CO_2 reduction targets to be appropriate. Similarly, discussions with Cornwall Council have led us to the conclusion that anticipating levels of building sustainability ahead of the Building Regulations will not be viable. Indeed, viability calculations, undertaken to assess the residual land value in CPIR, suggest that the residual land

value is relatively low compared to the wider South West region. This is primarily due to the relatively low house prices, the level of remediation required (particularly on former industrial land), and the additional infrastructure needed to deliver the levels of additional growth proposed.

The creation of an energy strategy that imposes significant additional cost on the development of new dwellings in the area is likely to exacerbate the issue of site viability and impact upon the delivery of the Area Action Plan strategy as a whole. Consequently, an approach that seeks to deliver maximum gain in terms of carbon reduction for minimum cost is considered expedient. Therefore, the energy study approach has focused on the opportunities provided by the development of district heat networks across CPIR rather than asking developers to make all their carbon savings on a site by site basis.

Instead of on-site CO_2 targets, we have focused particularly on identifying suitable sites for decentralised renewable and low carbon energy and drafting policies that require development to connect to the strategic heat main and other district heating networks.

This approach requires that rather than pay for compliance on an individual building basis, a developer will be required (conditional on viability) to contribute to the cost of the provision on the DHN infrastructure. The level of contribution will be based on the cost of associated energy infrastructure.

6.4 Policy and further actions framework

The framework on the next page sets out the recommended support required for development both within and without the identified SDHAs. The framework is split into four policy areas and sets out for each evidence base and policy requirements that would be needed for implementation. This report is intended to provide the evidence base required to support the proposed policies, subject to the further work required that is set out in section 8.

Planning Policy

Development in Strategic District Heating Areas

1. Strategic District Heating Area Designation	2. Policy Requiring Connection to DHNs and Associated Requirements	3. Policy Informing Dwelling Density, Layout & Mix	4. Policy Supporting S.106/CIL or CPIR-wide Allowable Solutions
Policy Requirements	**Policy Requirements**	**Policy Requirements**	**Policy Requirements**
a. Cornwall Council to designate viable areas as Strategic District Heating Areas. b. District heating networks (DHN) will be developed via an ESCo on sites designated as SDHA (led by CDC). c. Cornwall Council will consider favourably applications for development which will connect to or contribute to the expansion of the DHN. It will be the responsibility of the ESCo to ensure phasing of its DHN delivery plan is compatible with the phasing of build out of strategic sites. The ESCo will set out what applicants can expect from it as part of the Supplementary Planning Document (SPD). d. Applicants should comply with guidance in the SPD	a. All new development and refurbishment within an SDHA should connect to a DHN unless it can be shown not to be viable or feasible. b. Where appropriate applicants may be required to provide land, buildings and/or equipment for an energy centre to serve proposed or multiple developments. The SPD will set out guidance.	a. New and refurbished residential and commercial development should be designed to maximise the opportunities to accommodate a district heating solution. Further guidance will be given in an SPD but should consider: density; mix of use; layout; and development phasing. b. Applicants should liaise with public/private partnership ESCo at inception of planning and design process with regards to the development density, mix of use, layout, and phasing.	a. Where applicants are able to demonstrate that connection to a DHN is not viable or feasible they should either achieve the same level of CO2 savings as if they had connected OR contribute to a fund. The level of contribution should be the financial value of the carbon difference between the CO2 performance achieved on site and that which could have been achieved if conencted to the DHN. The rate of contribution should be based on the shadow price of carbon over a 30 year period (approximately £800/tCO_2). Further guidance on viability and feasibility will be set out in an SPD. [Viability – if the cost of on-site Part L compliance at the same CO2 savings as provided by connection to a district heating network is less than or equal to the district heating network connection costs, then connection will not be considered to be viable. In such cases compliance with Part L will need to be demonstrated on-site.] b. Financial contributions or activities undertaken as part of S.106 or a Community Infrastructure Levy will be used to deliver primarily, but not limited to, projects identified in the Energy Opportunities Plan. Where a developer is to connect to a DHN, the level of contribution will be based on the cost of associated energy infrastructure, and be viable as defined above. c. Subsequent to whatever date Part L requires homes and/or buildings to be 'zero-carbon', all developments within the CPIR area will be required to either: i. Pay into an 'allowable solutions' fund to deliver projects identified in the Energy Opportunities Plan; or ii. Undertake other 'allowable solutions' identified in the SPD.
Evidence Base	**Evidence Base**	**Evidence Base**	**Evidence Base**
SDHAs identified and tested for viability as part of the Energy Opportunities Plan.	Evidence – technical viability of district heating for SDHA; financially viable at commercial Internal Rate of return; and is payment less than onsite carbon compliance cost for 2010?		Evidence – total CO2 availability within CPIR; policy viability of such a fund; level of financial contributions; and the Energy Opportunities Plan.

Development outside Strategic District Heating Areas

	Policy Requirements	**Policy Requirements**	**Policy Requirements**
	a. All new development and refurbishments outside of a SDHA should connect to a district heating network where feasible and viable. b. Where connection can be shown not to be feasible or viable then development should be capable of connecting in the future. c. Applications for wind energy generation schemes will be favourable considered in all areas and particularly in areas defined as wind opportunity areas in the Energy Opportunities Plan.	a. New developments and refurbishments should safeguard utility corridors to accommodate future connection to district heating networks. b. Development layouts should be able to accommodate efficient district heating network layouts.	a. Financial contributions or activities undertaken as part of S.106 or a Community Infrastructure Levy will be used to deliver primarily, but not limited to, projects identified in the Energy Opportunities Plan. b. Subsequent to whatever date Part L requires homes and/or buildings to be 'zero-carbon', all developments within the CPIR area will be required to either: i. Pay into an 'allowable solutions' fund to deliver projects identified in the Energy Opportunities Plan; or ii. Undertake other 'allowable solutions' identified in the SPD.
	Evidence Base	**Evidence Base**	**Evidence Base**
	Evidence – technical viability of district heating for SDHA; financially viable at commercial Internal Rate of return; and is payment less than onsite carbon compliance cost for 2010?		Evidence – total CO2 availability within CPIR; policy viability of such a fund; level of financial contributions; and the Energy Opportunities Plan.

Figure 28: Policy Framework

6.5 Further actions

Corporate policy

In order to maximise the opportunity for delivery of the district heating network Cornwall Council will need to align planning policy and the activities of other local authority departments and the Local Strategic Partnership. Key activities would need to include:

- Ensuring buildings within their own estate connect to district heating networks wherever feasible.
- Ensuring that their own land is made available for energy centres and district heating infrastructure where necessary.
- Exploring other strategic funding from internal or external sources.

It may be worth considering corporate policies which reflect this position in appropriate corporate strategies, such as a Sustainable Community Strategy or specific energy strategy.

Waste planning and spatial planning

The opportunities map has identified the potential for district heating and CHP linked to a potential waste-to-energy facility located south of Dudnance lane, as identified in the proposals map (K4) in the 2007 Cornwall Waste Development Framework (WDF) submission stage document.

Clearly, therefore, it would be helpful if any future analysis of potential sites as part of finalising the WDF could also reflect the potential for supplying district heating at this site from an advanced thermal treatment ATT[29] waste-to-energy scheme[30]. We recommend that such an option is considered as part of any future exercise to assess and screen suitable sites that the Council may undertake in preparing the WDF.

In considering its options for dealing with the residual element of MSW, we recommend that the Council consider the potential of a waste-to-energy scheme (using advanced thermal treatment) at the Dudnance Lane site as part of a solution.

Even if the Council decides not to take forward this site as part of a solution for residual waste, it may still be viable for commercial operators to develop a waste-to-energy facility at the site for commercial and industrial waste without an MSW contract. However, this would be facilitated considerably if the WDF were to identify the site as suitable for such a facility as this would make it easier for developers to secure planning consent.

Further action to support planning policy

Cornwall Council in co-operation with the ESCo are recommended to develop a Supplementary Planning Document that includes the Energy Opportunities Plan. The EOP will define the SDHAs. The SPD is important since it enables Cornwall Council to set out guidance and advice that is likely to evolve over time, e.g. the EOP will change perhaps more frequently than the planning policy that underpins it. Similarly, the objectives of the CDC may change overtime and, although directly relevant to the planning policies requiring connection to a district heating network, would not be suited for inclusion in a DPD. Broadly, the SPD will:

- Guide delivery of development that is able to connect to and accommodate district heating networks.
- Provide guidance on assessing feasibility and viability of connections including clarifying issues around maximum distance from a DHN which still maintains financial viability.
- Include a statement of what applicants should expect from the public/private partnership ESCo and/or other partners, e.g. on matching development phasing with district heating network delivery.
- Identify Allowable Solutions, S.106 and/or CIL spending priorities.

[29] i.e. pyrolysis or gasification

[30] in theory it may be possible to use a small scale incinerator at such a site. However, this may cause greater planning objections and also, in our experience, developers appear less interested in developing incineration plant at this scale than ATT

Cornwall Council will need to engage with Registered Social Landlords with the aim of gaining their commitment to connect to district heating networks as part of their development, upgrade and refurbishment programmes, where this is feasible and viable.

Precedence

The approach set out in this report is in many ways relatively ground breaking and there are only a few examples of similar work. In particular a similar connection policy was used in Southampton and similar funding policies pursued in Milton Keynes and Ashford.

It may be worth considering commissioning the development of case studies of these examples to further support the case presented here.

There is also a great deal of uncertainty around the extent to which planning can set up and require developers to pay into a fund to offset emissions or, post 2016, to cover allowable solutions. A number of planning bodies have sought to establish something: the Great London Authority is looking into the legalities of a fund for the whole London area. Milton Keynes has a saved Local Plan policy (see below) but the £200 per tonne of carbon levy is unlikely to be sufficient to cover the high infrastructure costs of many of the proposals in CPIR's Energy Opportunities Plan.

We recommend that a number of options should be explored as part of a further study, namely:

- A fund based around Section 106 – spending of the fund will be restricted by its proximity to the development concerned and by other calls on monies raised.
- A fund based around the CIL – overcomes the proximity issue and could be a powerful mechanism once it is introduced in April 2010. As with S.106 there will be other calls on money raised.
- A fund related to Allowable Solutions – the final list of Allowable Solutions has yet to be confirmed by Government (due later in 2009) and so uncertainties remain around details. The nature of the fund will need to consider carefully the potential links between a fund based around the CIL and one that may be included as an Allowable Solution.

Case study: Milton Keynes planning policy D4

The policy seeks to reduce the resource consumption of new development and to achieve carbon neutral growth. Energy efficiency, thermal performance, sustainable drainage, use of sustainable building materials and waste reduction are all parts of this sustainable construction policy. The policy aims to reduce emissions from the development by using renewable energy and making payments into a carbon offset fund.

The policy recognises that, in the short term, it is challenging and expensive to achieve carbon neutrality using solely on-site measures. On-site measures are encouraged where possible to reduce carbon dioxide emissions, which reduce the carbon offset payment. In addition, a one-off contribution is required to the carbon offset fund, at a rate of £200 (index-linked) for each tonne of carbon dioxide by means of a Section 106 agreement or unilateral undertaking.

The carbon offset fund is managed by The Milton Keynes Energy Agency on behalf of the Council and Milton Keynes Partnership. Based on the findings of an offset study, the fund is spent across Milton Keynes on carbon reduction measures with a lifespan of at least 20 years equivalent to the increased carbon output from new development.

Similarly, the idea of an Allowable Solutions Fund is a new concept which has only come about since discussions around the allowable solutions themselves have developed. A key issue here is understanding the legal aspect of this approach and the Council should consider commissioning work to develop this theme further.

7 Further considerations

7.1 2010 Part L consultation

The Consultation document entitled *Proposals for amending Part L and Part F of the Building Regulations* proposes some changes to Part L of the Building Regulations in 2010 that are particularly relevant to this energy strategy study. Some key proposed changes, for dwellings, are:

- There is a key omission in the method used in calculating compliance with 2006 Part L that results in dwellings performing less efficiently in reality, with regard to carbon emissions. The Standard Assessment Procedure (SAP) 2005 does not assume any heat loss through party walls. In future versions of SAP building elements experiencing heat loss would include party walls; as such they would have to be fully insulated.
- Changes to Part L would allow credit for 100% of all light fittings being energy efficient, and electric heaters as secondary heating would be removed in Part L 2010 as a default assumption.
- Changes to Part G that require improved efficiency of water fittings will impact on the amount of domestic hot water required in a dwelling, and therefore the heating energy required. SAP 2009 will take account of these changes.

Depending on the outcome of this consultation the result for dwellings falling under 2010 Building Regulations could be that the required 25% reduction in carbon dioxide over the Target Emission Rate (TER) would be achieved, for most dwellings, for what is essentially the cost of meeting 2010 Part L. In this study we have based 2010 Part L compliance costs on assumptions made prior to the release of the consultation (June 2009); however, it should be noted that the cost of complying with 2010 Part L will depend largely on the result of the consultation.

7.2 UK Low Carbon Transition Plan

On 15th July 2009, the Government launched the UK Low Carbon Transition Plan, which includes the Renewable Energy Strategy (white paper) and Low Carbon industrial Strategy. Some key points are:

- An Office for Renewable Energy Deployment (ORED) is to be established
- Government expect regions to set targets for renewable energy capacity in line with national targets, or better where possible. These targets are expected to be reviewed in the light of delivery and revised upwards where appropriate.
- Government will review PPS22 and PPS1 Supplement on Climate Change and consult on a new combined climate change PPS by the end of 2009.
- Devolved Administrations will complete an evidence-gathering exercise to assess renewable electricity and heat potential and barriers, and propose a level of ambition for renewable deployment based on that assessment for renewable energy delivery by 2020. In England, the RDAs and Local Authorities will follow a similar approach to identify renewable energy potential and set their own targets as part of their Regional Strategies. The evidence-based approach will provide important information to developers when working up project proposals but also ensure a more strategic approach to identifying the most appropriate, or equally, inappropriate areas for renewable energy projects.
- The ORED will bring together industry, NGOs, DAs, regional and local planners, statutory advisors on the environment and other planning stakeholders to develop a robust methodological approach and criteria for identifying the opportunities and constraints for renewable deployment in any given area at a strategic level. In England this work will be overseen by a new Renewables Deployment Taskforce.
- ORED will provide up to £1.2 million of support to help all regions put in place a robust evidence-based assessment of their capacity for energy projects.
- Through this process Government will ensure regional targets are set at a level that reflects both the potential and constraints in the region as well as national level commitments to 15% renewable energy by 2020 and the 2050 carbon reduction goals. Government will consult on more explicit guidance later in 2009 on how the regions are to deliver these targets and any specific expectations of regional strategies (RS).
- The Government will work with statutory advisors on the environment and other stakeholders to bring together all the relevant view points and consider a coordinated approach to 'mapping' renewable constraints and opportunities.
- ORED and CLG will provide up to a further £10 million over two years of support to ensure the right skills and knowledge are available within the planning community at local and regional level. This will include setting up, funding and managing a variety of support including an 'Expert Support Network' for planners on renewable energy as well as through existing bodies such as the Planning Advisory Service (PAS).
- ORED and CLG will facilitate specific additional hands-on support to Local Authorities dealing with larger planning applications for renewables or low-carbon energy projects.
- As part of the current review of national indicators, the development of a new renewable energy indicator for the next spending cycle will be examined. Government will work with local government to consider how a renewable energy indicator might fit with the existing climate change indicators.

7.3 Response to Zero Carbon Homes consultation

On 16th July 2009 the Government issued its response to the Zero Carbon Homes Consultation. Some key points from this are:

- The triangle of energy efficiency, carbon compliance and allowable solutions has been confirmed (see Section 3.7).
- A task group has been established to examine the energy efficiency metrics and standards which will be applied to all dwellings. Decisions on a new standard are to be announced by the end of 2009.
- Carbon compliance will be set at 70% and renewable heat incentive and feed-in tariff can be used by developers to meet this.
- The allowable solutions will cover carbon emitted from the home for 30 years after build. Those that received broad support are:
  - Further carbon reductions on site beyond the regulatory standard
  - Energy efficient appliances meeting a high standard which are installed as fittings within the home
  - Advanced forms of building control system which reduce the level of energy use in the home
  - Exports of low carbon or renewable heat from the development to other developments
  - Investments in low and zero carbon community heat infrastructure
  - Other allowable solutions remain under consideration

  Government will announce final decisions on allowable solutions by the end of this year.

- A final announcement on an allowable solutions financial cap will follow further work on costs. However, for the purposes of the impact assessment, the Government has included costs of up to the central option in their consultation of £100 per tonne of carbon dioxide, reflecting the cost of off-site renewable electricity.

7.4 Implications for CPIR energy strategy

The potential implications of the above are as follows:

- The costs of achieving compliance with 2010 Part L may be less than anticipated. This may reduce the amount developers can be charged for connection to a DHN, in 2010, and may push back the date by which such charges could be introduced to the next anticipated revision of part L, in 2013.
- The UK Renewable Energy Strategy and the initiatives it sets out strongly endorses the approach being taken by Cornwall Council in CPIR to identify and facilitate strategic options for decentralised renewable and low carbon energy.

- The confirmation that the on-site compliance target for zero carbon will be a 70% reduction in regulated carbon emissions may increase the attractiveness of a DHN solution to developers to meet their zero carbon requirements. It may also increase the amount that can be charged for DHN connection after 2016, as the cost of any alternative solution, such as micro-generation, will be higher.

The next section sets out recommendations on further work that will be required to support the evidence base once, among others, the above issues have been clarified and finalised.

8 Next Steps

This section sets out some key next steps which the Council should consider undertaking for developing and implementing the policies suggested in this report.

The items listed are intended as an aide memoire and should be further developed as part of producing an action plan which clearly describes the route from here to implementation of the policies.

8.1 Corporate

From a corporate perspective the Council should be seen to be supporting the policy it has set out for developers by ensuring that;

- buildings within their own estate connect to district heating networks wherever feasible;
- their own land is made available for energy centres and district heating infrastructure where necessary;
- other strategic funding from internal or external sources is fully explored, and;
- the link between establishing district heat networks and the county's waste strategy is developed.

Due to the overarching nature of these targets it is likely that the most appropriate place for it is in a corporate strategy that applies to the local authority as a whole and its strategic partners rather than just planning, such as a Sustainable Community Strategy.

A similar approach can be taken to renewable and low carbon energy generation by locating an area wide, renewable and low carbon energy generation target in the corporate strategy with reference to it in DPDs. These are not requirements of the PPS nor this study and to be effective will require sufficiently robust links between planning and the corporate structure.

Clearly, there is a need to review, revise and possibly develop new corporate policy that can be used to support and drive forward these next steps.

A sensible way to bring together each of these actions would be to develop a plan with a set of clear objectives described as key milestones. The achievement of each milestone should move the Council closer to the final implementation of robustly supported policy.

8.2 Policy

The report highlights a number of key policies which will need to be developed to fully support the implementation of the SDHAs. These are described in detail in the Policy Framework in section 6 above and are summarised here.

1. Policy designating SDHAs

In preparing for the delivery of the DHNs the Council will need to develop a policy which designates areas indicated by the Energy Opportunities Plan as being viable as Strategic District Heating Areas.

2. Policy requiring connection to DHNs and associated requirements

The Council will need to develop a policy requiring all new development within SDHAs to connect to the DHN where viable or feasible. In addition, the policy will need to set out that; where appropriate, applicants may be required to provide land, buildings and/or equipment for an energy centre.

3. Policy informing dwelling density, layout & mix

A further policy will be required to ensure that, in particular, the masterplans put forward by applicants are arranged so as not to significantly reduce the viability of the DHN.

4. Policy supporting S.106/CIL or CPIR-wide allowable solutions

This policy will support the concept of a CPIR-wide fund which will gather together contributions from developers in order to fund the connection of existing buildings to the DHN or the implementation of other allowable solutions.

5. Development of a supplementary planning document (SPD)

The report also highlights that further work will need to be carried out in order to support the policies suggested by providing clear guidance. The key work here will be around the production of a Supplementary Planning Document.

Cornwall Council in co-operation with the public/private partnership ESCo will need to develop a Supplementary Planning Document that includes the Energy Opportunities Plan. The SPD will need to:

- Provide guidance on how development should be designed so as to enable it to connect to and accommodate district heating networks,
- Assess feasibility and viability of connections including clarifying issues around maximum financially viable distance from a DHN,
- Include a statement of what applicants should expect from the public/private partnership ESCo and/or other partners,
- Identify Allowable Solutions, S.106 and/or CIL spending priorities.

6. Route safeguarding

The report discusses briefly the use of strategic heat mains between SDHAs which may well present an opportunity to increase the overall efficiency of the policies being adopted. More work will be needed to examine these possible routes in more detail and once this is complete, it would be necessary, or at least desirable, for the Council to consider ways in which they might safeguard the routes so that provision of the infrastructure is not compromised in the future. In particular, this work might revolve around guidelines for masterplanners, for example.

8.3 Wider actions

The wider actions which will be required to generate a robust environment for the delivery of the SDHAs revolve around engaging with strategic partners. These partners will have varying levels of roles to play but each will be essential if the most successful delivery is to be achieved.

We recommend that the following parties are engaged as a key element of the next steps;

- Hospitals – as these present significant potential for anchor loads they should be brought on board as soon as possible
- Registered Social Landlords - the aim here should be to gain their commitment to connect to district heating networks as part of their development, upgrade and refurbishment programmes, where this is feasible and viable.
- Waste companies – any company dealing with suitable waste streams will need to be engaged as part of the wider discussion around aligning waste and energy policy
- Network Rail – The use of the railway as a possible route for the provision of a strategic heat main across CPIR should be explored with Network Rail at the earliest opportunity as this presents a significant possibility to reduce the cost of installing such a significant element of infrastructure.

There may also be other parties who should be involved and for a more detailed consideration of these we recommend that the Council liaise with internal stakeholders to identify who they might be.

A further essential piece of work is to engage with one or more organisations as part of a public / private Energy Supply Company (ESCo) to gain their assistance in developing a suitable Supplementary Planning Document. See below for more detail.

8.4 Wind energy actions

Wind power can contribute to the CPIR energy strategy in one of three ways:

1. By locating wind turbines within the boundary of strategic new development sites, to contribute to on-site carbon compliance targets. However, the analysis has found that there are no viable sites in the immediate vicinity of the strategic development sites.
2. Government has indicated[31] that one of the allowable solutions for 2016 could be for off-site wind turbines to be connected to a development site. This could potentially be relevant for site C, which is close to a proposed housing development parcel south of the A30 (H10).
3. Government has also indicated that another possible allowable solution for developers to offset residual carbon emissions from new development, after 2016, could be for developers to transfer share ownership in new wind turbines to householders. The Council/ CDC could, as an ESCO, potentially build wind turbines on one or more of the sites indicated, with the aim of then selling shares in those to developers to make it easier for them to meet their zero carbon requirements[32].

In addition to the above, outside of the CPIR energy strategy, Cornwall Council may wish to highlight some of the opportunities identified above as part of the Cornwall LDF and as part of broader activity around delivering renewable energy targets and reducing per capita carbon emissions.

As none of the sites identified are directly owned or controlled by CC or CDC, this will make further analysis and development of these opportunities more complex. We suggest that actions for Cornwall Council (CC) and/or the Cornwall Development Company (CDC) are as follows:

1. To discuss with RAF St Mawgan (which is the parent for RAF Portreath) whether the radar station remains operational and whether they would have any interest in pursuing wind development on their land. This may require a formal consultation to be lodged with the MoD, which provides a central contact point for all queries regarding potential wind farm sites.
2. To discuss with Duchy College whether they would be interested in exploring the feasibility of a wind turbine on their site, potentially in partnership with CDC. If so, we suggest that the next steps would be to:
    - look in more detail at the viability of locating a turbine close to the non-residential buildings at the site, in terms of space availability, access, shadow flicker and insurance implications
    - assess whether there are any constraints in relation to birds, bats or other ecology from discussion with the relevant Council officer, the College, English Nature and other local wildlife groups
    - formally consult with MoD and Ofcom to identify any potential issues in relation to radar and telecommunications
    - secure the services of a wind development partner to work up a planning application (the development partner may wish to submit a planning application for a wind speed monitoring mast first)

In terms of funding to develop any of the sites, or carry out more detailed analysis, as a charity the Cornwall College may be able to access utility "green energy funds" such as that run by EDF. For the other sites, a typical approach would be for the landowners to engage with utility companies and specialist wind developers about whether they would be interested in developing the sites. Such companies may be prepared to absorb or share development costs in return for having the option to develop the site.

8.5 Further evidence base work

In terms of work specifically highlighted in this report, there are several fundamental elements which are required to support the policies suggested. These include:

Case studies

Developing case studies to demonstrate precedence of similar policies will add to the robustness of the evidence base. It should be recognised though that by its nature, the development of the suggested policies have very few precedents in the UK.

Costs of compliance with the 2010 edition of Part L

In this report we have made assumptions about the estimated cost of complying with the 2010 revision of part L based on a prediction of what those requirements may be. In particular, this has drawn on analysis carried out to support the consultation on a definition for zero carbon new homes, issued by CLG in December, 2008. A firmer idea of what the requirements will be will only be known once the final version of the 2010 part L has been released by the end of 2009. Therefore, we recommend that the evidence base should be updated to reflect this, in early 2010.

Renewable Heat Incentive (RHI)

The UK Government has indicated that it intends to have the RHI in place by April 2011, and will consult on its details by the end of 2009. However, currently the value of the RHI for heat generators is not known and we have had to make an assumption about this value for our analysis. If the actual value is significantly different to our assumption, then this could have a large impact on financial viability (either positive or negative). Therefore, we recommend the financial models for the SDHAs should be re-run once the details of the RHI are know, which is likely to be mid to end of 2010.

Allowable solutions

Within the next 12 months the issue of allowable solutions will continue to develop and currently ambiguous issues should clarify into a coherent and consistent approach. It is advisable therefore for the Council to revisit the findings of this report to ensure that they are robust in the light of the more fully developed context.

Some of the issues to be investigated will be around the impact of the move away from private wire systems as well as engaging more fully with ESCo partners on the value of any energy generated and the confirmation of the 70% below TER requirement for zero carbon homes.

[31] In its consultation on a definition for zero carbon homes and non-domestic buildings, issued December 2008

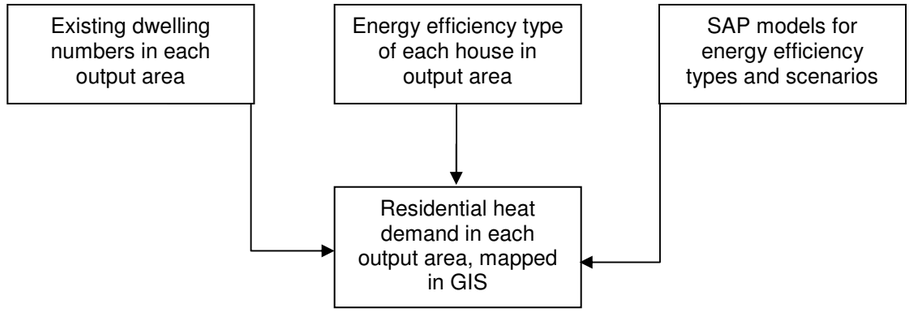
[32] Although, in theory, these wind farm sites wouldn't need to be within the old Kerrier district, or even within Cornwall

Appendix 1: Energy baseline methodology

Existing residential development

The following data sources were use to compile the existing residential heat maps:

- Census (2001)[33] data
- Fuel poverty data[34]
- English House Conditions Survey data (2006)[35]
- Council Tax Band data (2007)[36]
- Communities and Local Government (CLG) completions data (2001-2008)[37]



Number of existing dwellings

- Census (2001) data was used to establish the number of detached, semi-detached, terraced houses and flats in each output area in the CPIR region in 2001
- Council Tax Band data (2007) was used to establish the number of new houses built (or possible demolitions) between 2001 and 2007. In order to provide a suitable distribution between house types, data on new dwelling completions during these years from Communities and Local Government (CLG) was used to estimate the number of flats and detached houses built. The remaining new dwellings were apportioned to the semi-detached and terraced house categories according to the ratio of semi-detached to terraced houses in the relevant output area in 2001
- Where the number of dwellings decreased, dwelling numbers of each type were removed from the original census data categories in proportion with their relative abundance.
- Caravans and other temporary and mobile structures were not considered so were not included in the census data used, and were removed from the Council tax band data.

Energy efficiency type of each house

- Fuel poverty data provided the ratio between solid and cavity walls in each output area.
- English House Conditions Survey data gave a national ratio between un-insulated and insulated cavity walls which was applied to the number of dwellings with cavity walls in each output area.
- In the cases where the number of houses in an output area increased between 2001 and 2007, new dwellings of each house type were placed in a new “2002 Building Regulations” category. This process resulted in estimated numbers of dwellings in each output area that fall into the following sixteen categories:

Table 9: Categories of modelled residential dwellings

	Detached	Semi-detached	Terraced	Flat
Solid Wall	D1	S1	T1	F1
Un-insulated Cavity	D2	S2	T2	F2
Insulated Cavity	D3	S3	T3	F3
2002 Building Regulations	D4	S4	T4	F4

SAP Models for Energy Efficiency Types and Scenarios

- Each of the sixteen housing categories has different factors affecting heating and electrical demands.
- The sixteen house types were modelled using the Standard Assessment Procedure (SAP) 2005 methodology to give annual heat and electrical demands.
- Average dwelling sizes were taken from the English House Conditions Survey (EHCS) and used in the SAP models
- EHCS data on heating systems was used to infer the proportion of dwellings using gas, oil, solid fuel and electricity as the primary heating fuel. This was incorporated into the SAP models
- Domestic heat demands were then summed into output areas

Assumptions

The following assumptions were made in using Standard Assessment Procedure (SAP) methodology to estimate the energy demands of the sixteen dwelling types.

Dwelling dimensions

- Floor areas and storey heights for each dwelling type from the English House Condition Survey (EHCS)

Wall construction

- U-values initially taken from Reduced Data SAP (RDSAP) within the SAP methodology
- U-value for a solid wall used for all pre 1919, solid wall dwellings
- An average U-value for solid, un-insulated cavity and insulated cavity wall used for dwellings built between 1919 and 1975, using the EHCS uptake rate of cavity wall insulation
- U-value for insulated cavity wall from RDSAP used for all dwellings built after 1975, and therefore in the insulated cavity wall category

Glazing

- U-values taken from RDSAP
- For pre-1919 dwellings current uptake from EHCS is used, restricted to account for historic/listed buildings, therefore an average window U-value on a restricted current uptake
- There is potential for all homes built between 1919 and 1975 to have double glazing, therefore a current average is used based on current uptake, giving a u-value between the RDSAP U-values for single and double glazed windows
- For all post 1975 houses, assume RDSAP U-value for double glazed windows

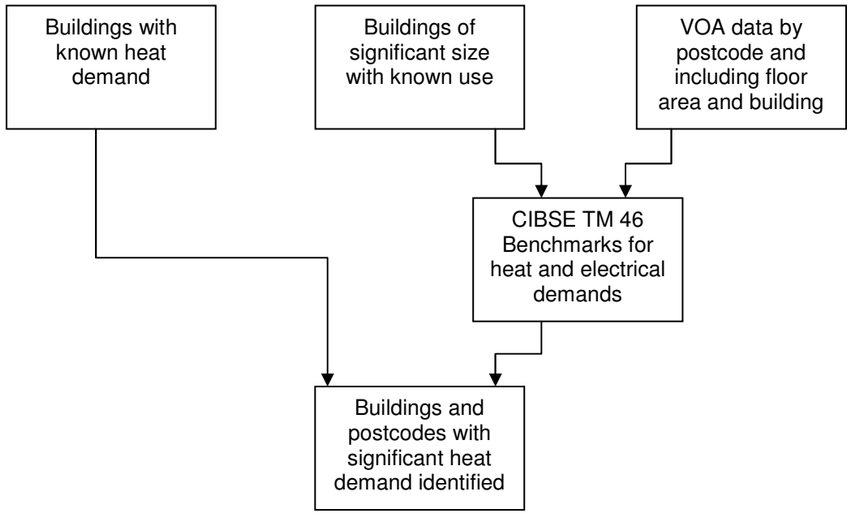
[33] Household Spaces and Accommodation Type, 2001, Office for National Statistics
[34] Cornwall Fuel Poverty and Energy Efficiency Action Plan, 2007, Centre for Sustainable Energy
[35] Communities and Local Government
[36] Dwelling Stock by Council Tax Band, 2007, Communities and Local Government, Housing Data and Statistics
[37] Permanent dwellings complete, by house and flat, number of bedroom and tenure, England, Communities and Local Government. Available from: http://www.communities.gov.uk/housing/housingresearch/housingstatistics/housingstatisticsby/housebuilding/livetables/

Loft Insulation

- EHCS uptake of loft insulation showed that for most age bands, the spread of loft insulation thickness is relatively uniform, because the retrofit of insulation to dwellings is applicable to dwellings of all ages. Therefore, the RDSAP U-value used is based on the current thickness of insulation for dwellings built before 1919, between 1919 and 1975, and after 1975.

All U-values improve over time to reflect business as usual uptake based on projections taken from CERT[38]

Existing non-residential development



Buildings with Known Heat Demand

- Data supplied by Cornwall Council provided the heat and electrical uses of all of the healthcare buildings, retirement homes and leisure centres in the CPIR area

Buildings of Significant Size with Known Use

- Data supplied by Cornwall Council identified the relevant schools and colleges. The number of pupils in each school was used to infer its size in terms of floor area (m^2)
- Any hotels with potentially significant heat demands were identified and their floor areas (m^2) inferred from the number of bedrooms
- Any individual buildings with estimated or recorded heat demands greater than 300MWh per annum were deemed to be sufficiently significant to take forward to the heat mapping stage

VOA Data by Postcode and Including Floor Area and Building Use

- Data from the Valuations Office Agency (VOA)[39] was used to build up as full a picture as possible of the amount and type of non-residential floor space trading in the CPIR area

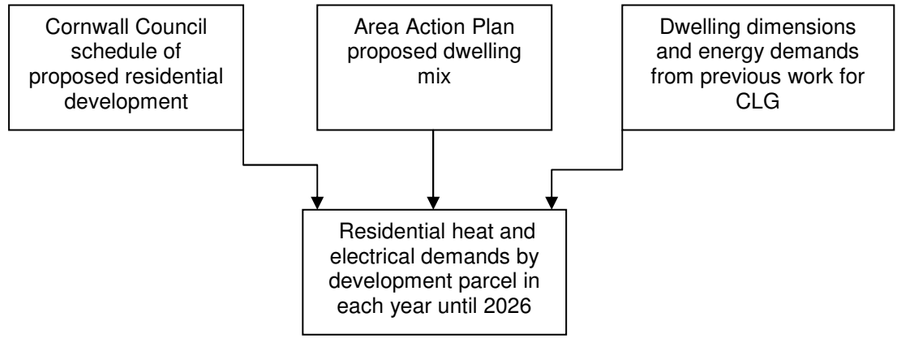
CIBSE TM46 Energy Benchmarks

- CIBSE TM 46 benchmarks[40], degree-day adjusted for the Devon and Cornwall region, were applied in order to estimate a heat and electricity demand for each building identified above, according to its primary use and based on its total floor area

Buildings and Postcodes with Significant Heat Demand Identified

- Any individual buildings with estimated or recorded heat demands deemed to be significant (greater than 300 MWh per annum) were plotted on the residential heat density map as point loads
- VOA energy demand data was summed into postcodes and the postcodes with the most significant estimated heat demands (greater than 1,000 MWh per annum) were also plotted as point loads on the residential heat density GIS map

Future residential development



Cornwall Council schedule

- A schedule of proposed residential development has been provided by Cornwall Council that gives the number of dwellings planned in each year for each parcel of new development.

Dwelling Mix

- Kerrier Local Development Framework Area Action Plan for Camborne, Pool, Illogan and Redruth states that the Council will be seeking to achieve the following dwelling mix: 8% flats, 42% 2 bedroom houses (assumed terraced), 40% 3 bedroom houses (assumed semi-detached) and 10% 4+ bedroom houses (assumed detached).

Dwelling dimensions and heat demands

- The above proportions are applied to the Council's schedule of future housing development and heating and electrical demands for each house type (based on AECOM's previous work for Communities and Local Government on Zero Carbon Homes) are used to establish energy demands for new development parcels, taking into account future changes to Building Regulations.
- Energy efficiency backstops are increased in 2013 from current 2006 levels to a current 'best practice' level. This level would yield a 10% carbon emission reduction measured against current 2006 Part L1A (i.e. 10% against the 44% reduction expected in 2013)

[38] Delivering Cost Effective Carbon Saving Measures to Existing Homes http://www.defra.gov.uk/environment/climatechange/uk/household/supplier/pdf/bre-tech-backgrnd.pdf

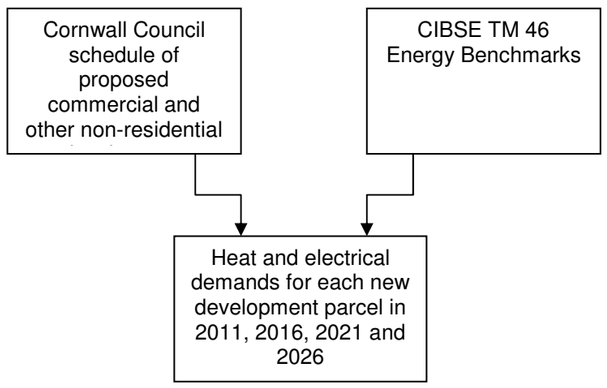
[39] VOA Data supplied by Valuations Office Agency, www.voa.gov.uk

[40] TM46: 2008, Energy Benchmarks, Chartered Institution of Building Services Engineers

Heat and electrical demands

- Residential heat and electrical demands are then summed into development parcels, and later added to the estimated future energy demands of proposed non-residential development

Future non-residential development



Schedule of proposed non-residential development

- A schedule of proposed commercial and other non-residential development was provided by Cornwall Council.
- This schedule identifies the year that each development would be completed, its relevant planning class, floor area and development parcel code. Some new development is proposed each year from 2008 until 2012; from then all further development is built "post-2012". For the purposes of providing five-yearly "snapshots" of change in heat demand as development progresses, and to end in 2026 in line with the RSS, it has been assumed that all post-2012 development will be built out by 2016.

CIBSE TM46 Energy Benchmarks

- The relevant TM 46 Energy Benchmarks were aggregated in order to give reasonable estimates of heat and electrical demands for each of the proposed planning classes. For example, energy demands for development under planning class A1 (Shops) were based on the mean average of TM 46 Benchmarks for General Retail, Large Non-Food Shop, Small Food Store and Large Food Store.

Heat and electrical demands for each new development parcel

- The total heat demand from future non-residential development in each year for each development parcel could then be summed and added to the heat demand from planned future residential development in the same format and plotted spatially in GIS.
- Snapshots of years 2011, 2016, 2021 and 2026 have been provided, with the 2026 map to represent the proposed development in the CPIR area in its entirety and to coincide with the end of the period to which the RSS and AAP apply.
- The tool provided to Cornwall Council allows the end user to enter or change any number of development parcels in terms of the area of development (m^2), the planning class and the year of completion, and the final output will update to reflect any changes.

Appendix 2: Assumptions for financial modelling

Energy and carbon baseline

Energy consumption from heat use in terms of a given fuel type can be converted to carbon emissions by using the following carbon conversions, taken from the Building Regulations Part L[41]:

Table 10: CO_2 emissions factors

Fuel	CO_2 emissions $kgCO_2/kWh$ delivered
Gas	0.194
Electricity (grid)	0.422
Electricity (grid displaced)	0.568
Biomass Fuel	0.025

Determining strategic sites

Benchmark Cost of Carbon Emission Compliance for Dwellings

In order to assess the viability of setting targets on strategic sites we first benchmarked the cost of compliance without any district heating. Without strategic targets it would be up to individual developers to decide how to meet the legal maximum standard for carbon emissions set out in Part L1A of the Building Regulations.

As the criteria of future amendments to Part L1A of the Building Regulations have not yet been decided, we made the following assumptions[42]:

- Energy efficiency backstops are increased in 2013 from current 2006 levels to a current 'best practice' level. This level would yield a 10% carbon emission reduction measured against current 2006 Part L1A (i.e. 10% against the 44% reduction expected in 2013)
- The overall permitted carbon emissions cap (Target Emission Rate, TER) is tightened by 25% in 2010 and 44% in 2013.
- The 2016 zero carbon definition leaves the on-site carbon compliance level as is forecast for 2013 (44% reduction on 2006 TER)
- Allowable solutions are used to reduce the residual carbon emissions from the carbon compliance level of 44% to net annual zero carbon.

We estimated that the benchmark route to compliance, based on experience in modelling, will be photovoltaic panels. Therefore we have benchmarked the on-site compliance cost to a combination of current best practice energy efficiency and PV panels.

Costing of district heating options

The cost of a district heating scheme can be divided into the:

- energy centre
  - energy centre building
  - LZC plant (i.e. gas CHP unit)
  - thermal storage
  - gas back-up boilers
- district heating network
  - main backbone transferring heat from the energy centre
  - district branches transferring heat from the backbone to development areas
  - street branches transferring heat from the district branches to separate streets
- dwellings costs
  - local connection to the street level district heating network
  - a heat exchanger to take heat from the network
  - a heat meter

We used a combination of previous quotations and modelling to arrive at a cost for the above as outlined the below.

The Energy Centre

For gas CHP and biomass heating, energy centre sizes were calculated from benchmark sizes, which are based on previous projects that AECOM has been involved with. For biomass CHP, plant sizes are estimated from existing plants in Europe. The cost of the energy centre building was estimated using a benchmark cost of £1,000/m^2 based on previous project experience. The cost of LZC plant and back-up gas boilers was based on benchmarks used in a recent report by AECOM and POYRY[43]. The above capital costs are summarised in Table 11. The capital cost thermal storage was based on previous costings provided by ESCo for AECOM at £90k/ MW of peak heating demand.

Table 11: Table of LZC plant capital costs

	Min Size (MW_{th})	Heat efficiency	Electrical efficiency	Capex/kW_e	Maintenance p/kWh_{th}	Lifespan Years
Gas boiler	0.1	85%		£60/KW_{th}		
Gas CHP	0.9	42%	32%	£864	0.5	15
Gas CHP	1.2	40%	35%	£657	0.5	15
Gas CHP	2.2	42%	38%	£657	0.5	15
Biomass CHP (ORC)[44]	4.8	71%	16%	£3,400	0.5	20
Biomass	All	80%		615/KW_{th}	0.35	15

The District Heating Network (DHN)

We estimated the length and diameter of the district heating branches for each development parcel and output area from a model. The model, which is based on previous heat main layouts, includes the following variables:

- housing mix, i.e. number flats, terrace, semi detached and detached dwellings
- density of housing
- the area of the overall development parcel/ output area
- the peak load of each building
- the fraction of soft dig available (i.e. 100% on new build sites)

[41] Approved Document L2A, Conservation of fuel and power in new buildings other than dwellings, 2006 edition, Office of the Deputy Prime Minister.
[42] Definition of Zero Carbon Homes and Non-Domestic Buildings – *Consultation*, Communities and Local Government - Dec 2008
[43] The Potential and Costs of District Heating Networks, DECC, April 2009
[44] ORC stands for Organic Rankine Cycle. See Techno-economic evaluation of selected decentralised CHP applications based on biomass combustion in IEA partner countries, IES, 2004

The overall mix of accommodation was taken from the Area Action Plan[45], page 8:

- Flats (approx 8%)
- 2 bed houses (approx 42%)
- 3 bed houses (approx 40%)
- 4 bed houses (approx 10%)

We assumed that the above housing mix correlated to house types in terms of;

- 2 bed houses: terrace houses
- 3 bed houses: semi detached
- 4 bed houses: detached

As no specific mix was available for each parcel we assumed that any parcel with a density of over 60 dwellings/ha was entirely flats, and that under 60d/ha was split between the other house types according to the AAP mix. This gives the correct overall mix in 2025 when all parcels are assumed to have been built out. We calculated housing density based on the number of houses and the overall development parcel size, we did not take into account where only part of a parcel may be built out. The exception to this calculation was for the urban extensions, on the advice of CC we assumed a constant density of 45d/ha.

For existing housing we took the absolute numbers calculated from the heat mapping exercise. Because the area of an output area often significantly exceeds the developed area we assumed a constant density of 30d/ha.

The floor area of new build houses was taken from the Definition of Zero Carbon Homes consultation modelling that AECOM completed for CLG.

We estimated peak space heat loads for existing housing from SAP Models, and for new housing approximated the peak heating to 60W/m^2. For residential domestic hot water we approximated the diversified peak heat demand to 2.5kW per dwelling. We estimated new build non-residential peak loads to be 80W/m^2 of floor area. For existing non-residential peaks loads (where the floor area was not known) we established the peak load from the ratio of peak load to/ annual space heating demand benchmarks.

The term 'heat main' refers to a pair of buried pre-insulated pipes, one of which carries hot water (flow) from the energy centre, the other (return) carries cooler water back to the energy centre. Between the pipes, heat loads are connected in parallel, as with radiators in a domestic central heating system.

District heat main costs are taken from previous AECOM models and take account of the cost of the pipe itself (as quoted by Logstor) and the civil cost adjusted for the fraction of soft dig. This adjustment is intended to take account of the difference between removing and re-instating roads vs. new build soft dig.

The backbone diameter was based on the peak heat demand figures outlined above and a 30ºC difference between flow and return temperature, and a maximum flow rate of 1.5 m/s.

Dwelling Costs

An allowance per dwelling connection was included for connection to the heat main including; a small spur of heat main to reach the street main, the heat exchanger and heat meter.

The cost for a new build dwelling was assumed to be £1,800 based on the following figure, taken from work AECOM completed for CLG.

Connection to dwelling	£400
Heat exchanger	£1,200
Heat meter	£200
Installation	£500
Total connection cost	**£2,300**

For existing owner occupied dwellings the assumption around uptake rate (see next section) relies on the householder paying for connection to the value of a new condensing gas boiler. Therefore, the total connection cost would be £1,500. A larger heat exchanger is assumed in line with the higher peak heat load for an existing dwelling. Cost data is taken from figures used in a previous study by AECOM and POYRY[46].

Connection to dwelling	£400
Heat exchanger	£1,600
Heat meter	£700
Contribution from householder:	-£1200
Total connection cost	**£1,500**

For existing social dwellings the avoided gas boiler was not deducted from the cost of connection as in most cases the dwellings will not immediately need to have their boilers replaced. This is thought to be a conservative assumption with regards to capital cost, as some dwellings may need new boilers at present to meet Decent Homes Standard. A larger heat exchanger is assumed in line with the higher peak heat load for an existing dwelling. Cost data is as above.

Connection to dwelling	£400
Heat exchanger	£1,600
Heat meter	£700
Total connection cost	**£2,700**

Cash flow modelling

The cashflow modelling exercise informs the viability of a strategic option with regard to financial performance. We made general assumptions about district heating performance and economics and specific assumptions around each LZC energy technology. These are set out below.

General assumptions

Timeframe
A 30 year timeframe was modelled as this should represent a conservative district heating infrastructure lifespan.

Uptake rate
We assumed that all new buildings connect to the district heating system as they are built and that this would be required by policy.

For existing non residential buildings and social dwellings we assumed connection occurs at a date chosen for the specific option. For owner occupied dwellings we assumed that connection only occurs in dwellings that require a new boiler, to a maximum of 75% of the total number of dwellings. We estimated that domestic boilers require replacement every 15 years, giving an uptake rate of 6.7% per year.

District Heating Network Build Out
District networks and street networks, and the backbone for new build residential is assumed to be built out as required. The backbone for existing buildings is assumed to be built out to the final length at the start year for existing building connection. This follows the assumption that the first buildings connected may not be adjacent.

Heat Load at the Energy Centre and Lead Boiler Sizing
We calculated the heat load at the energy centre with an assumed distribution efficiency of 94%. We sized the lead LZC boiler plant to meet 90% of the annual heat load operating at a 50% capacity factor i.e. 50% of its maximum possible annual output.

[45] Area Action Plan for Camborne, Pool, Illogan and Redruth – February 2009

[46] The Potential and Costs of District Heating Networks – DECC – April 2009

Energy Costs and Sale Prices

The cost and selling price of fuels was taken from figures used in a previous study by AECOM and POYRY[47], which were supplied by DECC. The selling price of heat to domestic customers is based on a survey of duel fuel online tariffs with no standing charges. The selling price of heat to non-domestic customers is based on the commercial gas cost and an assumed gas boiler efficiency of 85%. These are given in the table below:

Table 12: Table of fuel costs

	Cost p/kWh	Relative annual inflation	Note
Gas cost to commercial customer	2	0.4%	From DECC
Electricity cost to commercial customer	8.48	0.2%	From DECC
Wood chip cost to commercial customer	1.29		From DECC
Wholesale electricity price	5	0.2%	From DECC
Heat cost to residential customer	5.25	0.4%	From survey of online tariffs
Heat cost to commercial customer	3.2	0.4%	From commercial gas cost
CCL on gas to commercial customer	0.16		

Incentives and additional payments

We assumed that a standing charge for heat to domestic customers was £100/ dwelling/year in line with an annual boiler service charge.

Incentives considered are the Renewables Obligation (RO), the Feed in Tariff (FIT) and the Renewable Heat Incentive (RHI). The value of one ROC was taken at £43 / MWh[48], double ROCs were assumed to be allowed for biomass CHP[49], which assumes it is fuelled by biomass only.

The value of Climate Change Levy exemption certificates was taken at £4.70 / MWh[50].

A one-off charge of £500 has been assumed to be charged to the developer on connection to the district heating system in lieu of the charge that would be made by an utility for gas connection.

Capital Cost Assumptions

We assumed that the capital cost for the energy centre building, thermal storage and gas boilers to meet initial peak demands would be incurred in year zero. The capital cost for heat mains are assumed to be incurred as the heat mains are built out, see above. For lead LZC plant capital costs we assumed that the plant would be installed when there was sufficient heat load to operate the plant at a 30% capacity factor. For energy from waste the plant is assumed to be installed over year zero and one.

Operating Cost Assumptions

[47] The Potential and Costs of District Heating Networks – DECC – April 2009

[48] http://www.berr.gov.uk/energy/sources/renewables/policy/renewables-obligation/microgeneration/page39851.html

[49] http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/explained/microgen/strategy/green_cert/green_cert.aspx

[50] http://www.ofgem.gov.uk/Sustainability/Environment/cclrenexem/Pages/CCLRenewablesExemption.aspx

We have assumed that the operating costs of an energy centre are as follows:

Table 13: Energy centre operating costs

Lead LZC energy unit O&M	-taken from the AECOM and POYRY report[51]
Pumping electricity	1kWh/1MWh of delivered heat at commercial electricity rates
Fuel for the Lead LZC energy unit	as per specific technology
Fuel for the backup gas boilers	at commercial gas rates
Meter Reading	At fixed cost of £60k per year
Business rates	at 0.4% of CAPEX
Insurance	at 1% of capital cost
Admin	at fixed cost of £60k per year
Design costs	£50K

Revenue Assumptions

Heat is assumed to be sold to the connected buildings at rates stated above.
Electricity from CHP options is assumed to be sold at wholesale rates (i.e. no private wire).

Gas CHP

We calculated that total installed capacity of gas CHP as described above, assuming that 90% of the total annual load is met at a 50% capacity factor. Because it may take a prohibitive amount of time for sufficient buildings to connect to the system to run this capacity of CHP effectively, we assumed a number of smaller installations. We assumed two installations where the total capacity required was greater than $2MW_{th}$, assuming that installing units less than $1MW_{th}$ would not be preferable. Each unit was assumed to be installed, as outlined above, when the heat load has built sufficiently.

Biomass CHP

Biomass CHP total installed capacity was calculated as for other technologies described above. We assumed that only one installation would be made as the sizes of unit available make multiple installations unlikely.

Biomass Heating

Biomass boilers were assumed to be installed in two instalments as above, or one instalment if the size would be below 250kW.

[51] The Potential and Costs of District Heating Networks – DECC – April 2009

Appendix 3: GIS data used

Table 14: List of GIS layers used in the wind constraints assessment

GIS Layer	Category	Source
Study Area	Wind Constraint Study Area	Output Areas
Proposed Residential Development	Residential Property	Cornwall Council
Proposed Mixed Development	Residential Property	Cornwall Council
Existing Residential	Residential Property	Local Land and Property Gazetteer
Roads	Transport Infrastructure	OS MasterMap
Trunk Roads	Transport Infrastructure	OS MasterMap
Railway Line	Transport Infrastructure	OS MasterMap
Site of Special Scientific Interest	Environmental	Cornwall Council
Special Areas of Conservation	Environmental	Cornwall Council
Local Nature Reserve	Environmental	Cornwall Council
Area of Outstanding Natural Beauty	Environmental	Cornwall Council
Listed Buildings	Cultural Heritage	Cornwall Council
Scheduled Ancient Monuments	Cultural Heritage	Cornwall Council
Conservation Areas	Cultural Heritage	Cornwall Council
Proposed Conservation Areas	Cultural Heritage	Cornwall Council
Telecommunication Masts	Telecommunication Links	Cornwall Council
National Air Traffic Service	Telecommunication Links	NATS

Appendix 4: Stakeholder workshop attendees and key outputs

CPIR Energy Opportunities Study – Stakeholder Workshop
24 June 2009
Cornwall Council, Camborne Office

Attendees:

Name	Job Title	Organisation
Andrew Richards	Senior Conservation Officer	Cornwall Council (West)
Simon Thorpe	Heritage Officer	Cornwall Council (West)
Denise Pascoe	Senior Planner Minerals & Waste / Natural Resources	Cornwall Council
Gavin Lincoln	Sludge Treatment & Recycling Manager	South West Water
Phil Markham	Historic Environment	Cornwall Council
Neil Bloomfield		Clifton Homes
Russell Geake		Community Energy Plus
Mark Taylor	Building Control Officer	Cornwall Council (West)
Michael Bennett	Area Property Manager (West)	Cornwall Council (West)
Mike Shilston	Energy Manager	Cornwall Council
Bill Holliday	Economic Development Officer	Cornwall Council
Michelle Foster	Director of Development	Coastline Housing
Stephen Whitehurst	Environmental Health Officer	CC
Chris Selby	Environmental Protection Manager	Cornwall Council
Simon Williams		Percy Williams & Sons Ltd
Mark Pearson		CABE
Mark Summers	NHS Energy Manager	Cornwall NHS
Marcus Healan	Planning Officer	Cornwall Council (West)
Dan Nicholls	Planning Officer	Cornwall Council (West)
Peter Rugg	Planning & Development Co-ordinator	Low Carbon Cornwall
Stephen Ward	Regional Director	AECOM
Rob Shaw	Associate Director	AECOM

Apologies

Alyson Cooper	Acting Historic Environment Advice Manager CC
Freya Phillips	EDF Energy
David Wheeler	Design & Standards Manager HCA
Karen Clowes	Sustainable Development Advisor CPR Regeneration
Tony Norton	RegenSW / Exeter University

Group Discussions on Solutions:

- Is it possible to identify heat sinks so that turbines/generators don't have to be turned off during periods of low demand, resulting is loss of revenue from the power generated.
- Underground hydro-power is a key resource that is available in the CPIR.
- Support an approach that is highly innovative
- Wind – the A30 site and the Portreath MoD site were preferred. A30 site already has high ambient noise levels from the trunk road and the MoD site could be developed with complimentary uses.
- Other solutions
  - greenfield and large brownfield sites appear to be most deliverable
  - the decentralised heat main in Redruth has more potential than Camborne due to the mix of existing and new build and the presence of good anchor loads.
  - Scenario 4 was broadly supported, but energy from waste (scenario 5) was favoured as a fuel source.

Other comments from group feedback:

- The proliferation of microgeneration installations should be factored into the future demand analysis.
- Support small scale energy from waste to allow other communities in Cornwall to do the same with their waste.
- Concerns were raised that gas options are too easy and do not go far enough to address the carbon emission and energy security agendas.
- A basket of solutions was recommended in preference to a single approach to the area. However, a strategic heat main for the whole area should be considered if viable.

Group Discussions on Next Steps:

- Using the railway link is unlikely to gain support of Network Rail at the present time,
- Pool represents the best option because the heat main can be developed as the plots are built out.
- Energy security could be an equally important driver of decentralised energy supply, particular if supply is interrupted at any point – should not preclude any opportunities to be able to react to future supply issues.

Key Actions

- Pursue the Pool heat main infrastructure – safeguard the heat main route and ensure the incoming applications provide the opportunities to bring this forward.
- Develop funding mechanisms to bring forward the heat main infrastructure
- Develop the wind turbine analysis and connections to the grid
- Bring infrastructure and housing developers on board.
- Bring outcomes to the attention of the Low Carbon Leadership Group (Tim German being the likely route to this group).
- Develop opportunities in waste
- Review work done by CCC to date and take forward
- Explore opportunities to sort waste at source
- Consider NHS (clinical) waste
- Involve the University
- Public consultation – soft approach to bringing people on board
- Remember low development value in CPIR – perhaps facilitating zero carbon by 2016 is an appropriate approach for the area.

Appendix 5: Output area references

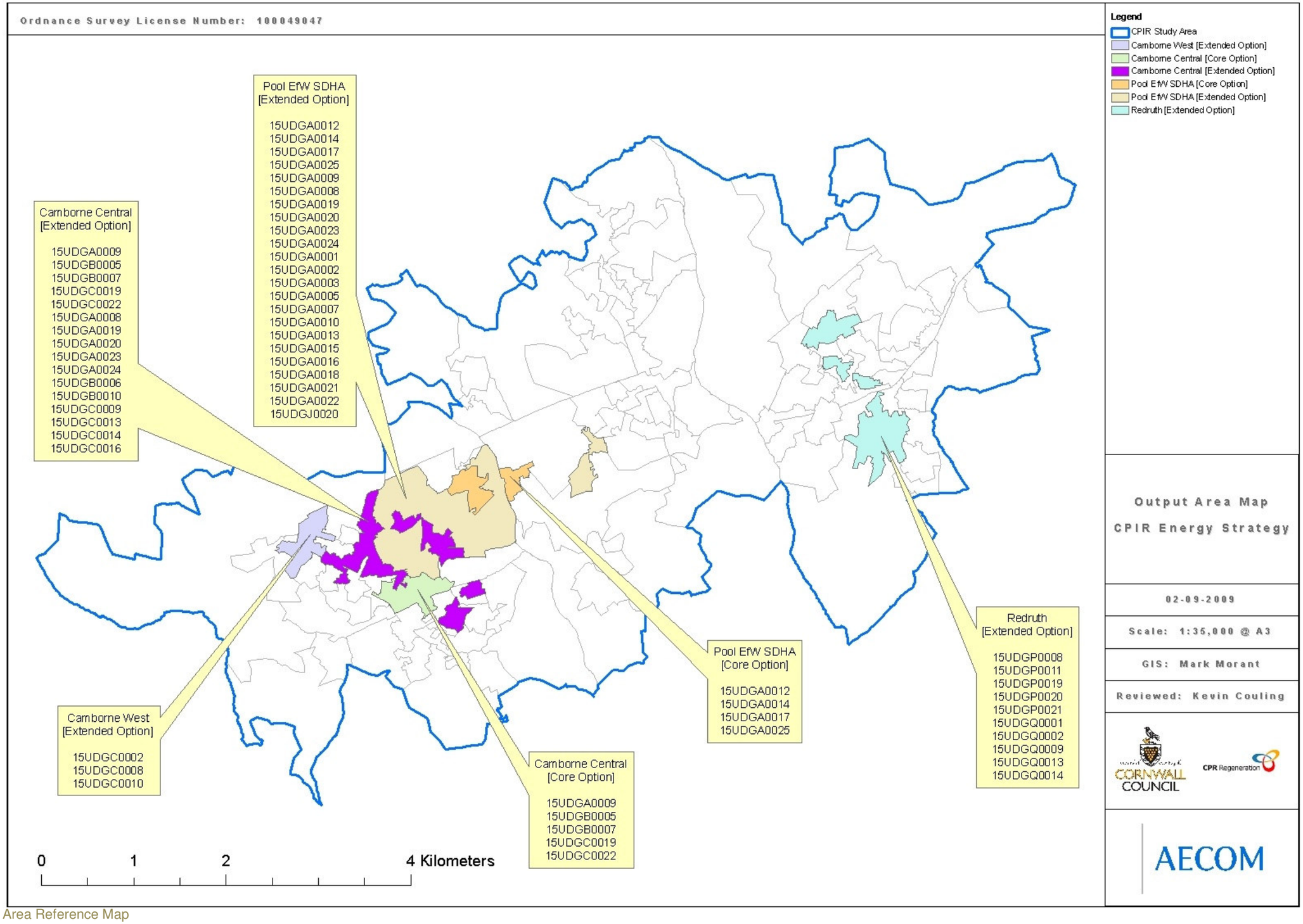


Figure 29: Output Area Reference Map