Aberdeen Heat & Power

Aberdeen Heat & Power (AHP) is an arm's length not-for-profit company limited by guarantee established in 2002 by Aberdeen City Council to address fuel poverty in the 59 high rise residential blocks it owns. Heat in these blocks has been provided by all electric night storage heaters that are expensive for residents to operate, difficult to control and have a high carbon content. Consequently, they are unpopular with residents, there has been a high incidence of underheating resulting in poor health and a high level of fuel poverty. The Council commissioned an options appraisal from external technical consultants who identified that heat networks with CHP would give the residents lower operating costs and more control over their heating systems as well as reduce carbon emissions.

The Council lacked the knowledge and expertise internally to manage the design, installation and operation of such systems as well as access to capital. By creating an arm's length company, it was able to harness such expertise within it as well as allowing the company to raise external capital anchored by a medium length contract (10 years) with the Council for the provision of services.

Many the blocks are laid out as clusters. The Council has a rolling capital programme for the maintenance and refurbishment of its housing stock. AHP has shadowed this capital programme and installed the new energy systems during the refurbishment. Funds earmarked within the Capital Programme for the normal upgrade of the energy system were ringfenced and provided to AHP. The company augmented this money with funding available from regulatory mandated programmes operated by mainstream utility companies as well as raising debt finance itself. Clusters were addressed one by one resulting in a series of heat islands around the city, each served by its own plant room. There are now four distinct networks. These are shown below with the CHP and boiler capacity in each plant room. It also includes two thermal stores at Seaton and an absorption heat pump on the back of the chiller at the Linx Ice Rink.

City Centre Network	Generators kWh	Boilers kW	Total kW	Max Demand Feb 19
Seaton	2 x 1,200kW	2 x 2,000kW	6,400kW	5,750kWh
Linx	1 x 1,400kW		1,400kW	
Beach Leisure		3 x 1,000kW	3,000kW	
Town House		3 x 340kW	1,020kW	
2 x Thermal Storage	2 x 2,200kW		4,200kW	
Total	**3,800/8,200kWh**	**8,020kWh**	**16,220kW**	**Availability 10,470kW**

Stockethill E.C.	Generators kWh	Boilers kW	Total kW	Max Demand Feb 19
Stockethill	1 x 1,200kW 1 x 330kW	3 x 1,000kW	4,530kW	1,700kWh
Total	**1,530kWh**	**3,000kWh**	**4,530kW**	**Availability 2,830kW**

Tillydrone E.C.	Generators kWh	Boilers kW	Total kW	Max Demand Feb 19
Tillydrone	1 x 1,200kW	2 x 2,000kW	5,200kW	1,174kWh
Total	**1,200kWh**	**4,000kWh**	**5,200kW**	**Availability 4,026kW**

Hazlehead E.C.	Generators kWh	Boilers kW	Total kW	Max Demand Feb 19
Hazlehead School	1 x 440kW	3 x 1,000kW	3,440kW	1,500kWh
Total	**440kWh**	**3,000kWh**	**3,440kW**	**Availability 1,940kW**

				Max Load in Feb19
TOTAL	**6,970kW/4,400kWh 11,370kWh**	**18,020kW**	**29,390kWh**	**10,124kWh Avail: 19,266kWh**

At the beginning this was seen as a series of '*one off's'*. But as each heat island gradually expanded it became apparent that connecting the them together with a ring main would enhance the security of supply, technical resilience and improve the financial case overall. Consequently, **a strategic vison** was developed and this is shown in the attached map.

The first cluster to be addressed was Stockethill. As suggested above, this was perceived as *'one off'* and the plant room was sized appropriate to the Stockethill cluster. As the network subsequently expanded to the neighbouring cluster of Cairncry and beyond it was found to be inadequate to accommodate the expansion. Consequently, a lesson learnt was to adopt a **flexible engineering philosophy** to allow for expansion. In particular, heat mains and plants on the path of the strategic ring main need to be oversized to accommodate expansion. The picture below shows the interior of the Tillydrone plant room. Ample space is allowed for the installation of additional capacity at a later date.

As described above, the expansion strategy closely shadowed the Council's Capital Programme and fulfilled the Council's aim of addressing fuel poverty in the 59 high-rise blocks. As such, AHP has now installed heat networks in 49 blocks and is currently working on 2 blocks. In total 2,569 flats are now connected to the heat networks served by the 4 energy centres identified above. Tenants of the Council are given the option whether to connect or retain the current heating system. Residents who have purchased their flats are required to pay for the installation of the internal wet system and connection to the heat network. Despite it being optional, 83% of occupants (tenants and residents) have chosen to connect in the most recent project whilst 97 – 100% have connected in the earlier projects. This demonstrates confidence in AHP to deliver a valuable heat service to its customers.

In order to deliver the installation and maintenance of the heat network projects AHP has developed a core of 5 staff positions comprising of 4 experienced project managers and one administrative support person. Additionally, the development programme has created 16 jobs in contracting companies in the supply chain. This has created a platform of local **management and expertise in Aberdeen that is able to respond rapidly and flexibly to changing circumstances and opportunities**.

In June 2017 a disastrous fire occurred in the Grenfell Tower in London 72 people lost their lives. Subsequently, an inquiry was mounted into the causes of this fire and what recommendations could be made to mitigate the risk of it re-occurring in other high-rise blocks or a similar age. Such mitigation measure could cost considerable amounts of money. Until the inquire concludes it is uncertain how any such measure will be funded. Consequently, Aberdeen City Council has paused its Capital Programme for the refurbishment the remaining 8 high-rise blocks. This has created a

challenge for AHP to sustain its current level of expansion and provide a pipeline of work for core staff and the local supply chain. Consequently, the company has pivoted to focus on retrofitting connections to non-residential buildings and new build residential properties. In turn a secondary challenge was that non-residential building owners we deterred by having to pay upfront connection charges. However, many of these projects were commercially attractive with high returns of capital a relatively short payback periods. Therefore, a policy was put in place to allow the company's Chief Executive Officer to negotiate with building owners for potential connections in which the company will invest to defray the cost of connection. To date 20 non-residential building have been connected. These are listed below:

Connection	**Energy Centre**
Beach Leisure Centre	Beach
Lynx Ice Arena	Beach
Beach Ballroom	Beach
Aberdeen Sports Village	Seaton
Aberdeen Aquatic Centre	Seaton
Hazlehead Academy	Hazlehead
Denseat Court	Hazlehead
Aberdeen Town House	Beach
Lynx Ice Arena	Beach
Frederick Street Health Centre	Beach
Riverbank School	Tillydrone
Hanover School	Beach
Marischal College	Beach
Constitution Court	Beach
Victoria House x 2	Beach
Aulton Sports Pavilion	Seaton
Frederick St Business Centre	Beach
Middlefield Community Centre	Stockethill
Aberdeen Lads Club Community Centre	Tillydrone
Hanover Community Centre	Beach
Hazlehead Sports Pavilion	Hazlehead
Pets Corner	Hazlehead
St George Church	Tillydrone

A further 6 connections are currently in progress.

Aberdeen is the regional hub for the North East of Scotland and has a vibrant economy based on servicing offshore hydro-carbon extraction and renewable wind generation. This creates a demand for housing. There a range of developers in the market including private developers, housing associations (social housing) and the City Council itself. AHP has engaged with this market at a leading developer level and with contractors undertaking the construction. AHP has now secured a forward pipe line of approximately 1,000 new build home over the next few years. These include:

- Summerhill Housing Development - 369 flatted dwellings for Aberdeen City Council
- Stoneywood Housing Development – 383 flatted dwellings for CBRE

- Kincorth Housing Development – 261 flatted dwellings for Aberdeen City Council
- Tillydrone Housing Development - 103 flatted dwellings for Aberdeen City Council

Many of the non-residential connection projects with high returns on capital and short paybacks will rapidly produce a surplus. This provides the opportunity to cross subsidise other projects that have a low return on capital and long payback periods including many of the new build housing projects. However, this should only be done if such projects either contribute to the strategic expansion or serve the core aim of addressing fuel poverty. To provide guidance on assessing the different classes of connection the company has a developed a **Connections Policy** to provide guidance to the Chief Executive Officer in his negotiations with potential customers. This document is attached.

Conclusion

After 17 years since its establishment Aberdeen Heat & Power has learnt from its experience of developing heat networks in the high-rise blocks for the City Council. This has allowed it to develop project management expertise internally and a local supply chain of skilled contractors. Together with an evolving policy structure this has allowed it to flexibly address the challenges of a changing market and secure a pipeline of future projects. This provides a model for other UK cities with ambitions to develop city-wide networks. Furthermore, the City Council together with neighbouring local authorities of Moray and Aberdeenshire County Council is presently building an Energy-from-Waste facility on the southern edges of the city. The provision of heat from this plant is a condition of its planning permit. It will be available from 2023 onwards. As Aberdeen Heat & Power continues its expansion it is well positioned to handle this heat available and distribute and retail around the city. Consequently, the network is anticipated to grow to 3 – 5 times its current size.

manor walk
B1
B3
B4
B5
B2,6,7,8
B9
B10
B11
henry rae
granite hill house
fullerton court
murray court
smithfield court
smithfield school
smithfield housing
pump house
hilton court
stwart park court
northfield accademy
clifton court
fountain grange
riverside school
meadow court
kings court
elphinstone court
StMachar court
grandholm court
donside court
lads club
Tillydrone CHP station
church
tillydrone court
library
harris drive
riverbank school
st machar academy
pressure zone interface heat exchanger
seaton park
hillhead halls of residence
st ninian court
inverdon court
lordhay court
balgownie court
livingstone court
beachwood court
aulton court
northsea court
donview house
seaton house
seaview house
bayview court
Seaton CHP station
aulton sports pavilion
aberdeen sports village & aquatic centre
woodlands school
linksfield court
regent court
promonade court
beachwood court
castleton court
oldcroft court
stockethill court
cairncry court
rosehill court
cornhill court
woodhill court
Stockethill CHP station
curling ice rink
mastrick land
regensburg court
williamson
Murifield school top up boiler station
rosehill
murifield school
hillylands
summerhill
woodend hospital
denseat court
Hazlehead Academy CHP station
harlow pavilion
pets corner
patterson pavilion
bruce house
rose house
davidson house
wallace house
woodhill house
cornhill hospital
B5
B5a
B2
B12,13,10
B1
B3
B7
broadford works
grieg court
hutcheon court
unite
Aberdeen college CHP station
seamount court
porthill court
pressure zone interface heat exchanger
victoria flats
victoria supported
Frederick business centre
health centre
science centre
constitution court
hanover centre
hanover school
verginia court
marischal court
beach leisure centre
Linx CHP station
ball room north
ball room south
leisure
beach top up boiler station
robert gordon college north
robert gordon college south
denburn court
gilcomston land
thistle court
grammer school
pressure zone interface heat exchanger
mitchell hall
marischal college
lemon tree
office
arts
church
sheriffs court
justice court
queen st housing
town house
Town house boiler station
balmoral court
gairn court
river dee
abbotswell pri-school
margret clyne court
kincorth acc housing
kincorth land
kirkhill pri-school
deeview court
craighill housing
tullos industrial estate
Torry energy from waste / CHP station
b2.7
b2.6
b2.5
b2.4
b2.3
b2.2
b2.1
torry phase2
b2.9
b2.11
b2.12
b2.8
b2.10
b2.13
torry phase2
torry phase1
b1.2
b1.1
b1.3
b1.4
b1.6
b1.8
b1.10
b1.12
b1.5
b1.7
b1.9
b1.11
tullos school
torry phase1
b1.13
b1.15
b1.17
b1.19
b1.21
b1.14
b1.16
b1.18
b1.20
provost hogg
b1.26
balnagask house
b1.25
torry phase1a
b1.24
b1.23
b1.22
deeside centre
morven court
brimond court
grampian court
balnagask court
Torry top up boiler station

Aberdeen Heat & Power

Delivering Affordable Warmth

www.aberdeenheatandpower.co.uk

Connection Policy

Document no. AHP-PO-D02

Revision	Author	Checked	Date	Date Approved by Board	Review date
A	ID	TB	13/06/18		13/06/19

Revision no	Revision date	Changes
A	13/06/2019	First edition in current format. Produced following review by Wylie and Bisset Review May 2019 ID :Ian Davidson; TB: Tina Buchanan

Contents

1 Introduction

This policy deals with situations where a connection has been proposed to AHP and a decision needs to be made as to whether to take the proposal further and then whether the decision to connect needs to go the Board of Directors.

The aim is to streamline the process so that decisions can be made relatively quickly where appropriate and time is not wasted with connections that do not fit the aims of the company.

1.1 Decision Flowchart

This document supports the Decision Flowchart by expanding on the headings.

There are three types of instance where a decision needs to be made and the route to be followed for approval is governed by the situation:

- Connections to the network where the mains pipeline runs close to the proposed connection – these non-strategic connections can be approved by the CEO providing the criteria detailed below in the process are satisfied.
- Strategic developments as described in the process below – these projects need to have technical and financial feasibilities prepared to be reviewed by the development sub committee with a recommendation to be put to the board for approval
- Strategic developments as described in the process below where a decision is required before the next board meeting – these projects need to have technical and financial feasibilities prepared to be reviewed by the development sub committee with a special subcommittee meeting to be called as necessary.

2 Process

2.1 Aims

The company's aims are listed in order of priority in relation to the decision flowchart

2.1.1 Capacity

- Is the heat and/or electricity load of the proposed connection within the CHP capacity available of the relevant energy centre?
- If not, is a new heat source going to be connected in the short term and could the connection be fed by boilers until such time as the new heat supply was commissioned?
- If not, could this connection provide sufficient heat and/or electricity load to make it worth connecting a new energy source? (Strategic decision)

2.1.2 Close to Network

- Is the proposed connection close to an existing pipeline? (Within 100m)
- If not, is it between energy centres where an extension of the network would prove to be strategically advantageous
- If not, could this connection provide sufficient heat and/or electricity load to make it worth connecting a new energy source? (Strategic decision)

2.1.3 Affordable Warmth

- Is the connection providing heat to low income families?
- If not, is it a commercial connection which would contribute additional surpluses to the company's results?

2.1.4 Strategic

- If the connection does not satisfy any of the above aims directly, does it provide a strategic benefit to the company's aims indirectly? For example, the NESCOL connection may not directly satisfy any of the above aims but it takes a strategic step forward to building a new energy centre in the College boiler rooms and extends the pipeline towards areas where affordable warmth can be provided.

If the first three aims are directly satisfied by the connection then the proposal would be taken to the next stage.

If none of the aims were satisfied then the project would not be progressed any further.

If some of the aims were satisfied then consideration would be given to each aim in order of priority and whether it was a strategic decision to be taken to the Board of Directors.

3 Non – Strategic projects

For connections to the network where the mains pipeline runs close to the proposed connection and adequate capacity exists to connect without the need for additional plant, and the project has been approved in relation to satisfying the company's aims, consideration needs to be given to the resources required to be employed by AHP.

3.1 Cash

- Does the project require a cash contribution by AHP?
- If not, then the decision moves to the next stage
- If it does, then how much cash is required?
  - An overall budget limit remitted to the CEO to allocate is set at 20% of the previous year's pre-tax profit (after the 30 year cyclical provision has been accounted for). This amount will be built into the annual budget setting process which requires Board approval.
  - This 20% can be used either for cash payments or to fund loans for larger investments where the annual loan repayments are within the overall budget. Loans taken out in previous year's need to be included in the current year's budget at 50% of the original value – see example below.
  - Projects which are less than this value can be approved by the CEO without prior approval from directors providing a financial feasibility model is prepared by the Financial Controller and the following criteria are met:
    - Payback within 15 years
    - Positive IRR

3.2 Personnel

- Does the project require management support?
- If this is provided by external parties then the project should be approved if all previous requirements have been satisfied.
- If AHP employee support is required, does the company have sufficient resource?
- If not, is there sufficient demand to employ additional personnel?

Progress on all such projects will be reported to the next available Development Sub along with a running account of the amount committed to date out of the 20% of the previous year's pre-tax profit. If this budget is exhausted part way through any financial year any further non-strategic projects of this type will require the consent of the Development Sub and the Board before being progressed by the CEO.

3.3 Project Examples

3.3.1 Science Centre

Capital cost - £26,000

Annual heat load – 384,000kWh

Aims: 1 – YES **(2.2.1)**

2 – YES **(2.2.2)**

3 – Commercial connection contributing a surplus **(2.1.3)**

Cash : Requires cash contribution of £32,000

< budget (£86,000)

Payback = 3 years

IRR – 24%

Personnel : Small project – would require minimal input

Decision can be made by CEO

3.3.2 Mitchell Hall

Capital cost - £52,000

Annual heat load – 1,795,000kWh

Aims: 1 – YES (2.2.1)

2 – YES (2.2.2)

3 – Commercial connection contributing a surplus (2.1.3)

Cash : Requires cash contribution of £52,000

Plus previous connection < budget (£86,000)

Payback = 2 years IRR – 42%

Personnel : Small project – would require minimal input

Decision can be made by CEO

4 Strategic Projects

Where a project covers one of the three following areas, it would be considered to be strategic:

- New energy centre or new generator within an existing energy centre
- Extension of a mains pipeline
- Development in a new area not currently supplied
- Any proposed project that requires a cash contribution from AH&P in excess of the 20% of the previous year's pre-tax profit.

Certain criteria need to be considered in making a decision to progress:

- Does it satisfy the aims of the company?
- Is there sufficient heat load with the right balance to demand a new energy supply?
- Can private wire be supplied from a new energy centre?
- Does a pipeline extension allow connections to good quality additional heat loads along the way?
- Does a pipeline extension to a connection move the pipe further towards another good quality heat load?
- Does a pipeline extension move towards another existing energy centre to support creation of a ring main?
- Does a development in a new area link two existing energy centres?
- Does a development in a new area have opportunities to connect other good quality heat loads?
- Do any of the above provide opportunities to connect to an alternative, renewable heat supply?

If a project is deemed to be strategic, consideration needs to be given to the resources required both in terms of cash and personnel.

Technical and financial feasibility studies are required for all strategic project proposals covering the following:

- Energy supply and demand
- Capital cost

- Financing – grants or loans
- Payback and IRR
- Financial appraisals showing the expected impact on AH&P's projected income from the new connection, consequences for cashflow of making the capital contribution, and hence impact on our stated aim of holding available funds to the tune of 3 months turnover
- Personnel requirements
- Timescales
- Reliability of connections
- Possible future connections

When more than one new strategic connection is recommended to the Board within a financial year a report explaining the cumulative financial effects will be required covering as a minimum the impacts on cashflow and projected income.

4.1 Examples

4.1.1 Summerhill

New development which sits between Hazlehead and Stockethill, linking two existing energy centres.

Capital cost - £150,000

Annual heat load – 2,767,500kWh

Aims: 1 – YES (2.2.1)

2 – YES (2.2.2)

3 – YES (2.2.3)

Cash : Requires cash contribution of £150,000

> budget (£86,000)

Payback = 20 years IRR – 4.87%

Personnel : New build project – would require medium level input particularly with regard to domestic metering

Decision needs to be made by Board of Directors

4.1.2 NESCOL

Extension of the mains pipeline to good quality heat load (NESCOL), extends the pipe towards other good quality connections (city centre multis and Broadford Works), enables possibility of creating new energy centre in the future with good private wire connection in NESCOL.

Capital cost - £724,000

Annual heat load – 3,221,000kWh

Aims: 1 – YES (2.1.1)

2 – NO (2.1.2)

3 – NO (2.1.3)

Cash : Requires cash contribution of £724,000

> budget (£86,000)

Payback = 30 years IRR – 2.0%

Personnel : Project management during build then minimal thereafter, ongoing maintenance and billing

Decision needs to be made by Board of Directors

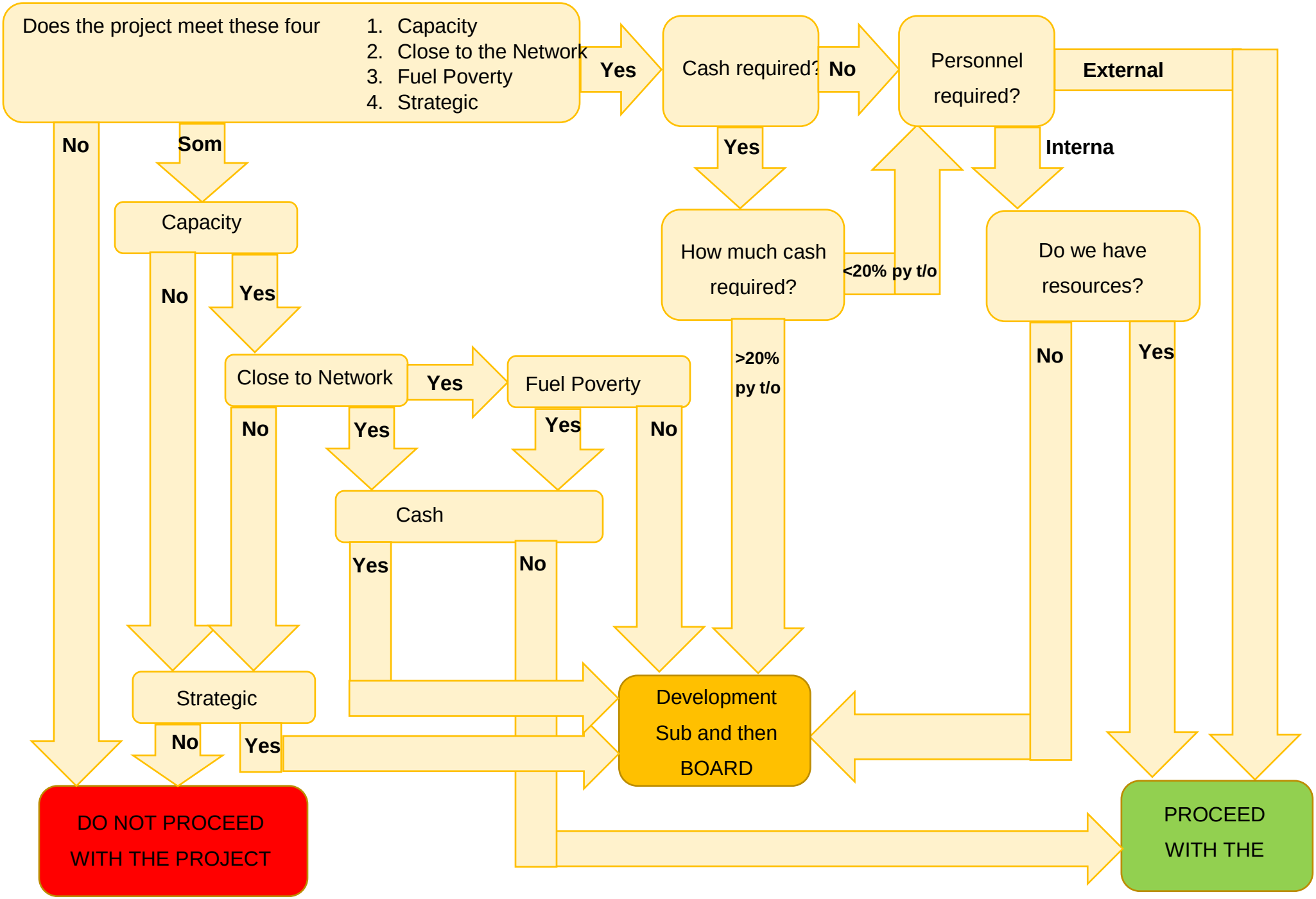
5 Procedures related to this Policy

Aberdeen Heat & Power have produced procedures associated with this policy. Relevant procedures shall be consulted when this policy is utilised.

Procedure Number	Title
AHP-PR-B01	Declaration of interests
AHP-PR-D01	Potential Projects
AHP-PR-D02	ACC Projects
AHP-PR-D03	Liaison Between AHP & the Council
AHP-PR-D04	Liaison With tenants and Owners
AHP-PR-D05	Working with Home owners
AHP-PR-D06	Disturbance and Disruptions
AHP-PR-D07	Project Management
AHP-PR-D08	Stock Procedure
AHP-PR-D09	Tendering Procedure
AHP-PR-D10	Procurement
AHP-PR-D11	Void Installations
AHP-PR-D12	Site Visits

Appendix 1

Decision Flowchart-Connections


Does the project meet these four
1. Capacity
2. Close to the Network
3. Fuel Poverty
4. Strategic
Yes
Cash required?
No
Personnel required?
External
Interna
No
Som
Yes
Capacity
How much cash required?
<20% py t/o
Do we have resources?
No
Yes
Close to Network
Yes
Fuel Poverty
>20% py t/o
No
Yes
Yes
No
Yes
Cash
Yes
No
Strategic
No
Yes
Development Sub and then BOARD
DO NOT PROCEED WITH THE PROJECT
PROCEED WITH THE