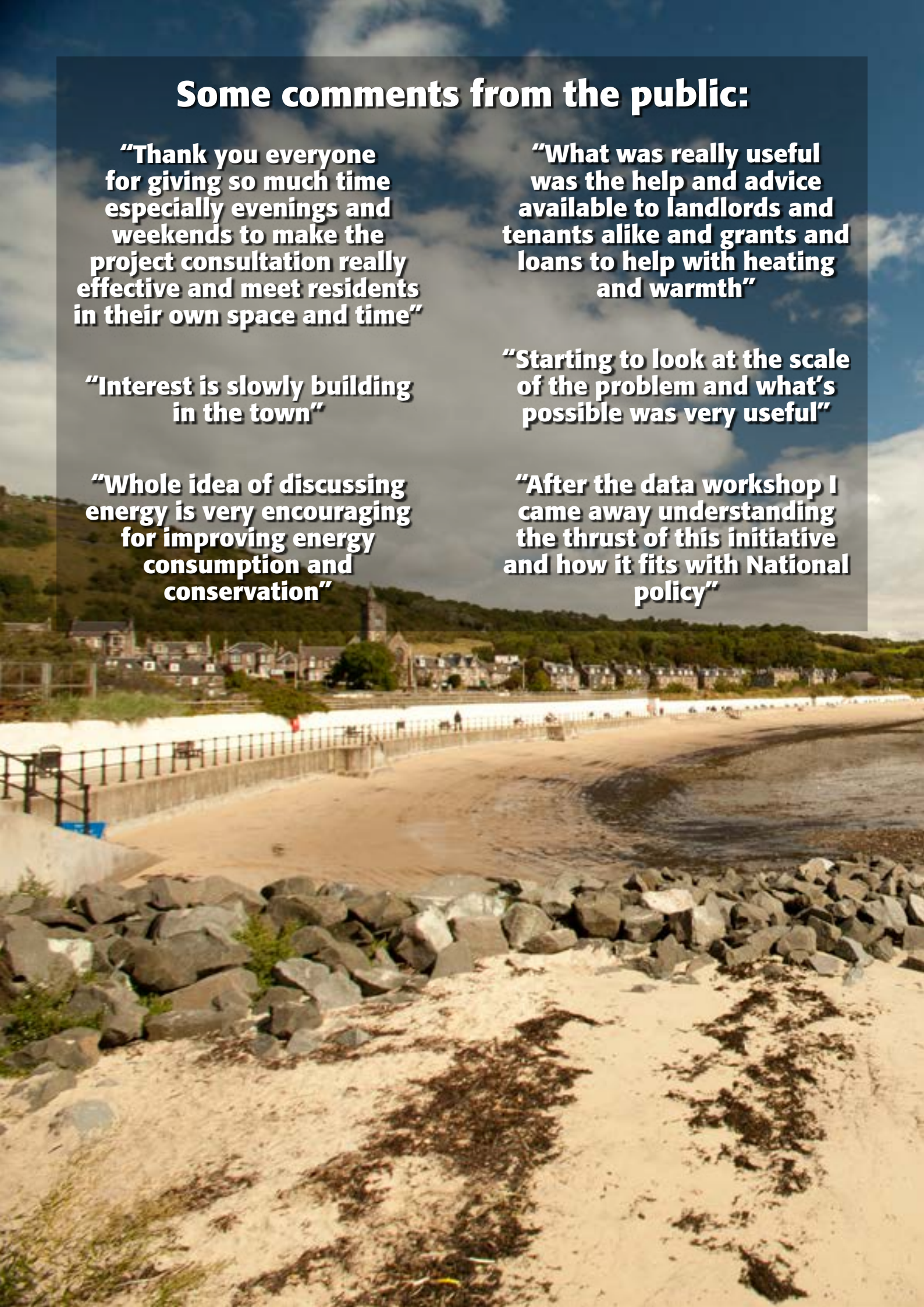
"A local energy story"

Burntisland energy masterplan



Some comments from the public:

"Thank you everyone for giving so much time especially evenings and weekends to make the project consultation really effective and meet residents in their own space and time"

"What was really useful was the help and advice available to landlords and tenants alike and grants and loans to help with heating and warmth"

"Interest is slowly building in the town"

"Starting to look at the scale of the problem and what's possible was very useful"

"Whole idea of discussing energy is very encouraging for improving energy consumption and conservation"

"After the data workshop I came away understanding the thrust of this initiative and how it fits with National policy"

Presenting the Burntisland community energy masterplan.

Fife Council wanted to understand how a community in Fife could reduce its carbon footprint by 80%. Through joint decision making with the local community we found out which low carbon heat and electricity solutions would be most suitable, and how much it would cost.

The purpose of this project was to help the local community understand their energy needs, and how it could be supplied locally in a low carbon manner.

This document will be used to inform the local planning process to help determine development within Burntisland. It will help to ensure that it is consistent with the community's priorities and wishes to enable Burntisland to transition to a low carbon, high resilience settlement. It will also act as evidence for funding applications.

This pilot Energy Masterplan (EMP) is the first of what we hope will be many to cover all of Fife.

The Burntisland Community Energy Masterplan was a collaborative effort between the Burntisland local community, the Burntisland Community Development Trust (BCDT), Resource Efficient Solutions (RES) and Fife Council. The process was supported by technical expertise from Fife Council and external consultancies such as Ramboll (who have provided the technical tools to furnish the evidence base for community decision making). It was a project of three parts, the engagement programme, data analysis and policy section.

A huge thanks goes to the community of Burntisland, and the Burntisland Community Development Trust for all their help and support in making this project such a success.

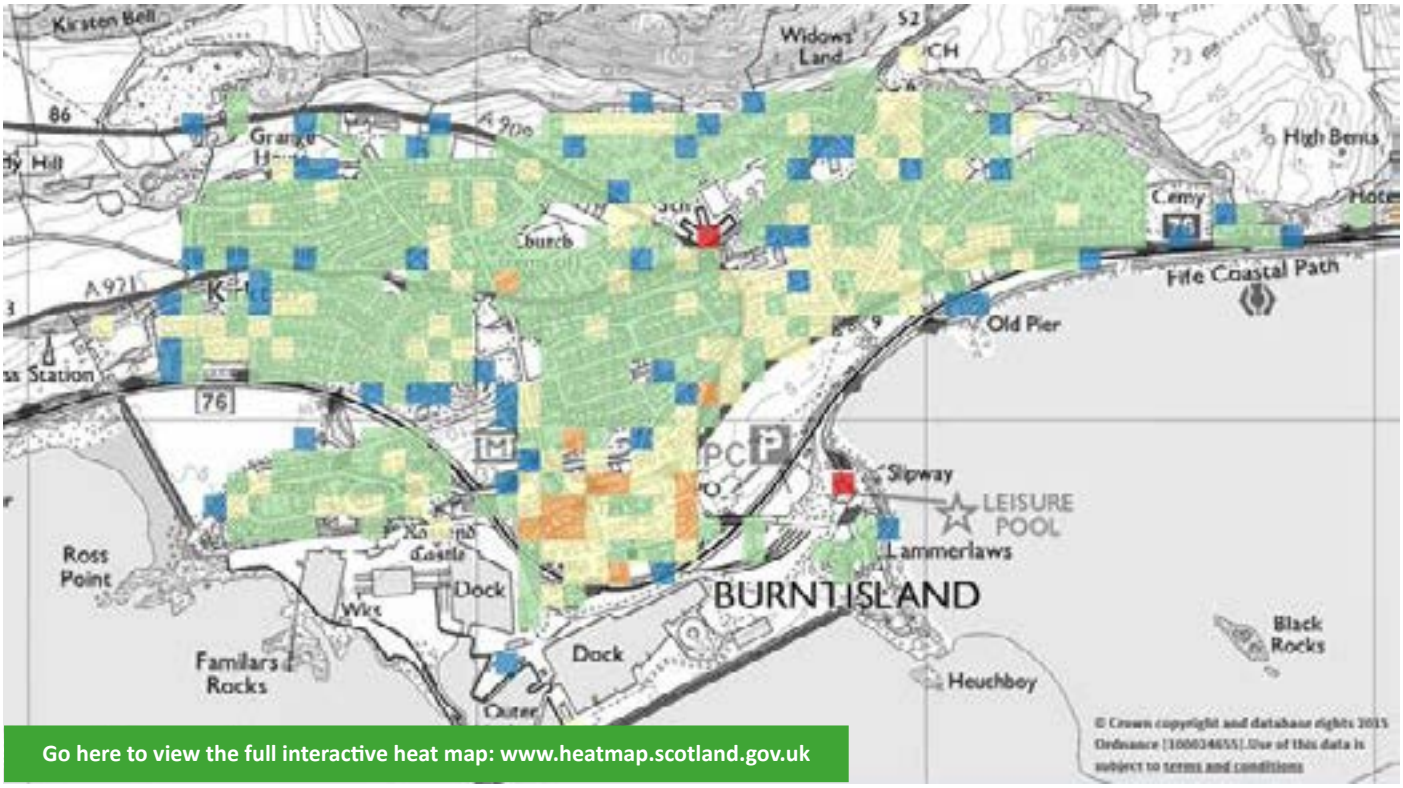
Why Burntisland?

Burntisland has very active community groups including the community council (who commissioned their Community Action Plan) and the newly formed Burntisland community development trust. The Community Action plan already included aspirations for renewable energy and sustainable travel.

The Energy masterplan (EMP) helped unpack those ideas in more detail. The settlement is well located on a south facing slope that runs between the Binn hill, and the Forth coast creating solar energy opportunities. Being near water enables the use of heat pumps from sea water.

What is a community Energy Master-Plan (EMP)?

Energy Master-planning is defined as the assessment of the supply and demand of energy on a regional or sub-regional level. It aims to ensure that energy projects are developed in a planned and structured way, and is used to identify opportunities to connect energy (including heat) resources with demands in the most cost effective, sustainable and low carbon manner.



Why do we need to do EMP's?

The context and challenge

The Scottish Government's new draft Scottish Energy Strategy: The future of energy in Scotland and draft Climate Change Plan were launched in January 2017. They recognise the challenges of climate change and energy security in an increasingly uncertain world, and are seeking to create a transition that is fit for Scotland's future.

Furthermore the Community Empowerment (Scotland) Act 2015 and the Land Reform (Scotland) Act 2016, mean that there is also increasing legislative focus on communities having more say and ownership around local energy issues.

The Scottish Government targets achieved with Burntisland's low carbon energy solutions are as follows:

- 80% reduction in greenhouse gas emissions by 2050
- Total final energy consumption reduced by 30% by 2030

The solutions chosen provide:

- 39% of domestic heat by low-carbon technologies by 2032, but 100% by 2050
- Delivering an equivalent of 100% of gross electricity consumption from renewables by 2032, not 2020
- An increased reliance on electricity to heat homes and power vehicles
- 33% of vans and cars transitioned from petrol and diesel to electric fuels by 2032

These are ambitious targets but achievable as shown in the EMP. They require investment in energy demand reduction and in energy infrastructure. Key to this low carbon transition and meeting of targets will be the move to decentralised energy systems.

The transition to a low carbon economy and implementation of EMP's can have many benefits:

STRENGTHENING COMMUNITIES

Improved local understanding of energy and climate change can inspire others about what can be achieved when communities work together.

Outcomes can improve community cohesion and wellbeing, and reduce inequality by creating shared goals and shared benefits

Secure locally owned energy can increase the resilience of local communities

SECURE STABLE ENERGY SUPPLY

Creating a diversified energy supply locally reduces the risk of blackouts

Creating energy locally offers increased energy security by protecting against raising pricesAffordable energy helps reduce fuel poverty

REDUCING CARBON EMISSIONS

Joint decision making around low carbon energy enables communities to take ownership of, develop local solutions and to reduce carbon emissions from home it also reduces transport emissions (shipping and road) by maximising use of local resources

EFFICIENT USE OF ENERGY

EMPs can help ensure the use of unused heat and energy opportunities, which otherwise may go to waste. It enables planning of technologies so they provide the most efficient use of the fuel from primary fuels

District Heating Network energy solutions are best suited to urban areas particularly those with high heat demand density and / or large cooling demands –advantageous for hard to treat properties and properties that are difficult to retrofit with other sustainable energy technologies

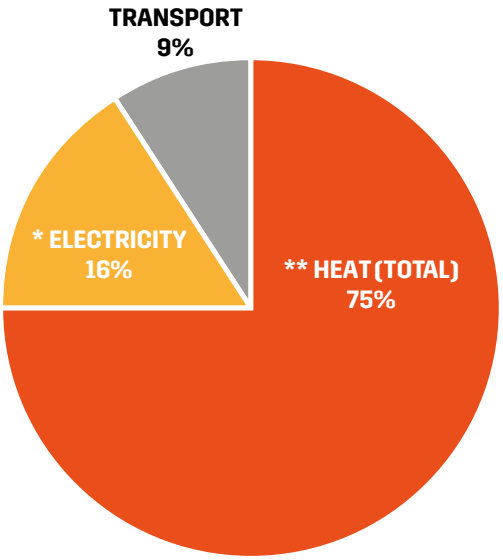
ECONOMY AND HEALTH BENEFITS

EMP's can provide economic opportunities, employment, apprenticeships and training opportunities up and down the supply chain. Implementation of energy options can enable regeneration.

Planning and implementation can reduce fuel poverty by improving energy efficiency and providing affordable energy locally. Improvements can also reduce the health impacts (including early deaths) associated with damp and under-heated homes. Improved local air quality can lead to health and wellbeing benefits within Burntisland.

Burntisland's Current Energy Demand

= 65,632,239KWH



** includes electrical heat.
* does not include electrical heat.

The following figures, from BEIS MSOA gas and electricity consumption datasets were used as the baseline for heat and electricity demand in Burntisland.

BURNTISLAND'S ENERGY DEMAND	CONSUMPTION (KWH)
Gas heat (Domestic)	41,123,184
Gas heat (Non-Domestic)	4,337,798
Gas Total	**45,460,982**
Electric heating	**3,678,739**
HEAT TOTAL	**49,139,721**
Electricity (Domestic)	8,416,796
Electricity (Non-Domestic)	1,983,334
ELECTRICITY TOTAL	**10,400,131**
TRANSPORT TOTAL (Cars and vans using petrol and diesel)	**6,092,387**
ENERGY DEMAND TOTAL	**65,632,239 KWH**

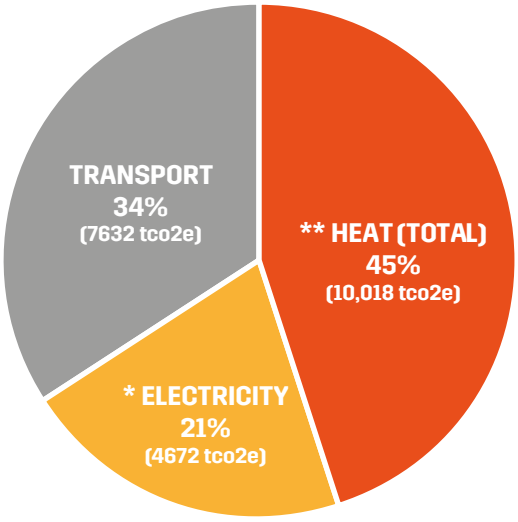
The Carbon Story

Burntisland's current carbon footprint from running buildings and vehicles equates to 22,322 tCO^2e (carbon dioxide equivalents) per year.

To meet the targets of the Scottish Government the greenhouse gas emissions from daily life in Burntisland need to be cut by 66% by 2032 and 80% by 2050 (compared to 1990 levels). This means the carbon footprint needs to fall from 22,322 tCO^2e (2014), to 14,054 by 2032 and 8,267 tCO^2e by 2050.

So every year between now and 2032 (a period of 14yrs) Burntisland will need to reduce its carbon by 459 tonnes per annum.

From 2032 to 2050 a reduction of 321 tonnes pa is needed. The emission reductions required in national decarbonisation targets are front-loaded.



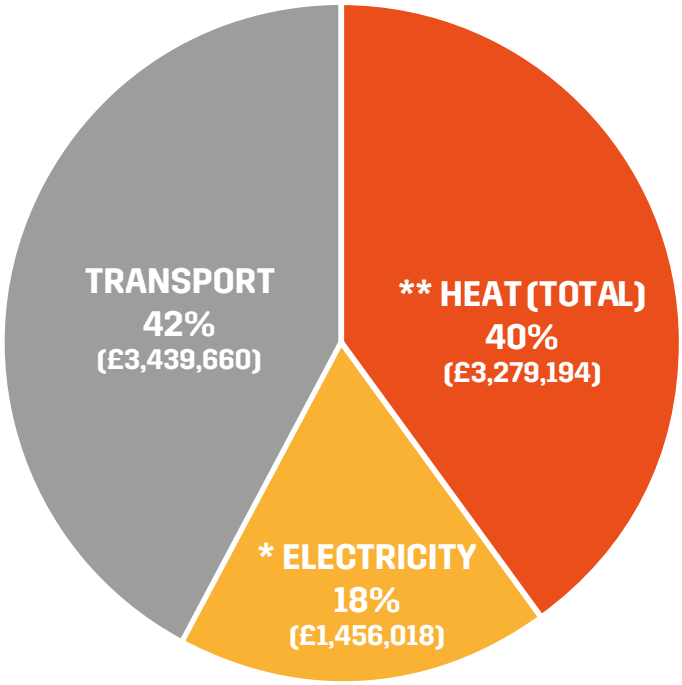
The pie chart shows cumulative GHG emissions (tC02e) for Burntisland.

** includes electrical heat.
* does not include electrical heat.

YEAR	1990	2014	2032	2050
Percentage of emissions (% compared to 1990)	Baseline year	54%	34%	20%
Settlement-wide footprint (tCO^2e)	41,337	22,322	14,054	8,267
Annual emission reduction needed (tCO^2e)	n/a	n/a	459	321
Emission reduction period			14 years	18 years

Burntisland Energy Costs

Pie chart illustrates the breakdown of settlement-wide energy spend from Burntisland by energy end use (£)



** includes electrical heat.
* does not include electrical heat.

AVERAGE USE OF ENERGY FOR INDIVIDUAL HOMES

	HEAT (TOTAL)	ELECTRICITY	TRANSPORT (CARS AND LIGHT VANS)	TOTAL
Kwh	15,366	3,252	1,905	20,523
Emissions CO^2e	3.13	1.46	2.39	6.98
Cost £	£1,025	£455	£1,076	£2,556

On a household level, considering that there are 3,198 domestic properties within Burntisland, this equates to an average of:

- Annual greenhouse gas emissions of 6.98 tCO^2e per year from their building and vehicle energy consumption;
- Annual energy and fuel consumption equivalent to 20,522 kWh per typical Burntisland household for running buildings and vehicles;
- An average household in Burntisland spends £2,556 on energy and fuel, annually. This equates to more than 10% of the average Scottish household income being spent on energy.

Results and Solutions

THE LESS YOU CONSUME THE LESS MONEY YOU HAVE TO RAISE TO BUILD LOW CARBON ENERGY SOURCES

CONSUMPTION + MOVEMENT & STORAGE = ENERGY GENERATION

To meet Scottish Government targets of 30% reduction in energy consumption from base line by 2032 Burntisland would need to reduce its energy demand by 8,671,715 kWh. This could be achieved by installing 2048 loft insulations, 698 cavity wall insulations and 322 outer wall claddings within the next 14years.

Energy reduction methods would be carried out in 2 phases

Phase 1: Loft insulation offers a quick results. A programme targeting opportunities for loft insulation and cavity wall, linked to an at scale delivery programme should be considered as an early action. Loft and cavity wall insulation would make significant progress to the 2030 and 2032 targets.

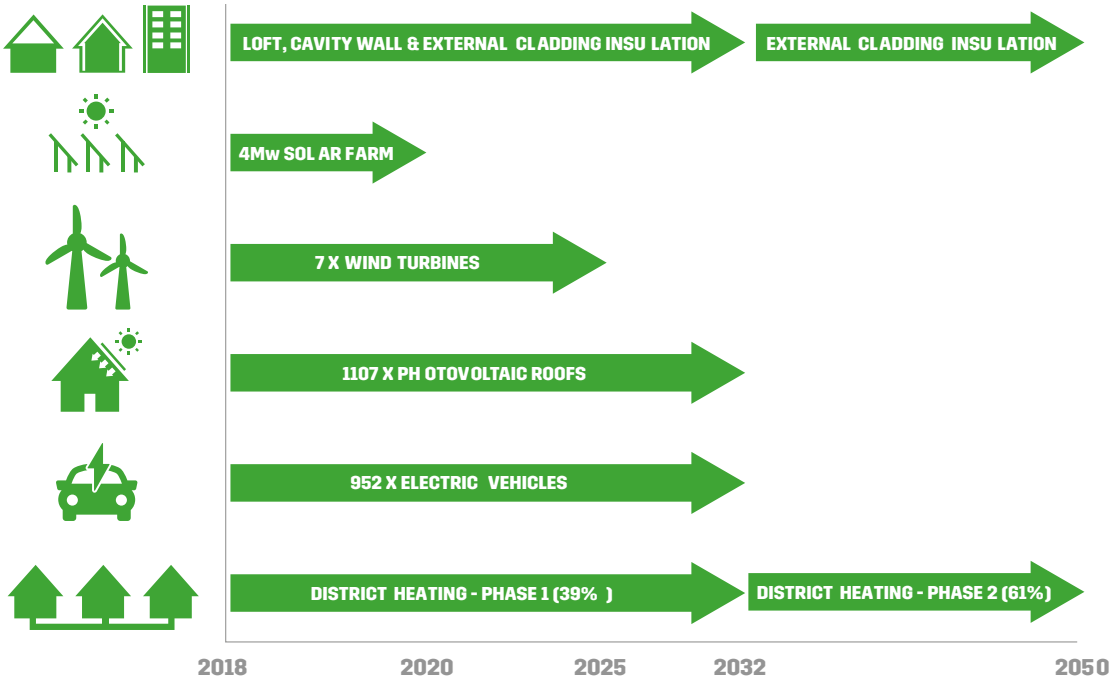
FIRSTLY REDUCE THE AMOUNT OF ENERGY A COMMUNITY DEMANDS THROUGH ENERGY EFFICIENCY AND INSULATION METHODS

External wall insulation offers the next best return. A total of 332 external wall measures are estimated to be needed to meet the energy reduction targets by 2032.

Phase 2: Energy efficiency measures would involve a roll out of external wall insulation across a substantial part of the building stock. Exceptions would include unsuitable buildings and those where external insulation would impact on the building status, for example in conservation areas.

If projects start in 2018 Burntisland can achieve the reductions targets by 2032 and 2050. Below is a timeline showing how chosen projects can achieve carbon emisions reductions and when.

TIMELINE



The Travel Story

The first stage of the assessment was to estimate the number of cars or vans in Burntisland.

The project team used census data to identify the number of cars and light vans owned by Burntisland households in 2011, the latest year for which census data is available.

Average number of cars or vans per household in Burntisland Households (2011)	
Percentage of households with access to no car or van	**30.5%**
Percentage of households with access to 1 car or van	**42.2%**
Percentage of households with access to 2 cars or vans	**21.6%**
Percentage of households with access to 3 or more cars or vans	**5.6%**
Total estimated cars / light vans in Burntisland	**2,855**

The baseline estimation for the total number of cars / vans in Burntisland was then used to estimate the total mileage that this fleet could be assumed to drive, on average, cumulatively, over a year. Calculations were also done on how much electricity would be required using a typical EV rather than petrol and diesel vehicles. Using these calculations the estimated EV demand for the Burntisland vehicle fleet (assuming the same number of vehicles and the same annual mileage driven) would equate to additional electricity demand of 6,139,072.24 kWh / year, or 6,139.07 Mwh / year.

"Electric vehicles are fantastic! Smooth quick and very easy to drive. It's the future."

A sustainable travel event attendee

Cost of car and van fuel in Burntisland

	Petrol / diesel vehicles	Electric vehicles
Per vehicle / per mile	£0.14	£0.03
Total cost of all burntisland vehicles per year	£3,466,018	£798,648
Total Saving:		**£2,667,370**

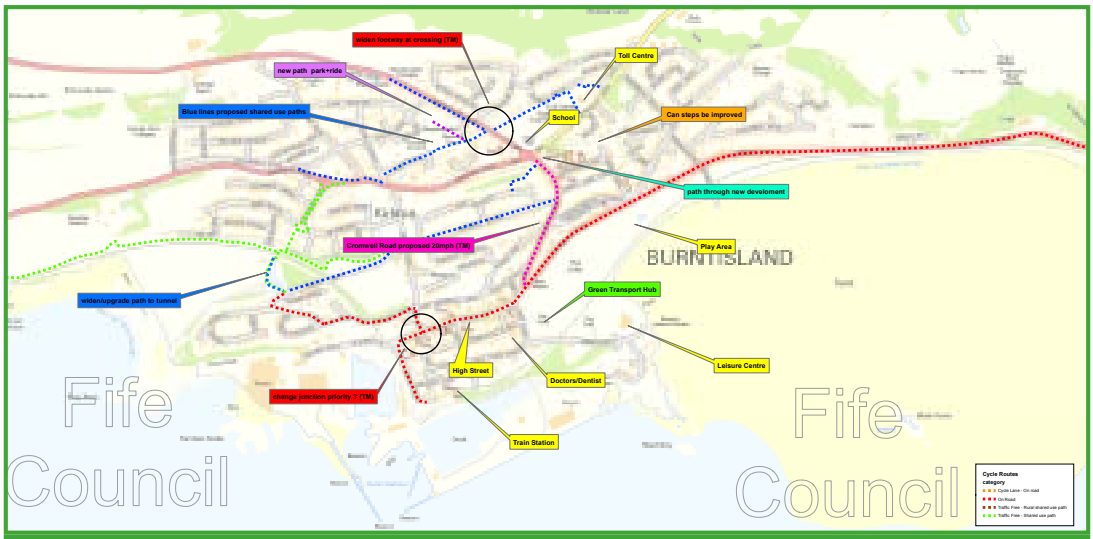
If all light cars and vehicles changed over to electric fuel it would save nearly £2.7 million a year

Tesla model X electric car with Falcon wings

Travel feasibility results for Transport for Scotland report

From November to December 2016 we ran 9 engagement events in Burntisland and asked questions on the following:

- What are the safe walking and cycling routes in and around Burntisland to main trip activators like the school, high street shops and services, train, bus, doctors, leisure centre etc.
- What are the barriers to increased walking and cycling , train travel, bus travel and
- How best to increase walking, cycling and electric cars?



Map of proposed walking and cycling improvements (see full map in methodology paper)

Key findings from those consulted

Train	Accessibility to train station on north access hampered by lack of lift or ramp. No disability access and steep stairs cause problems for pushchairs and bikes on the Northbound platform, encourages car use.
Bus	Bus within town is a valued service. No direct bus route to Edinburgh. Some buses unreliable making it difficult to catch connections. Expensive fares to local towns makes travel difficult for families and those on low incomes. Encourages car use.
Footways and footpaths	Narrow pavements make it difficult for shared use for cycling, walking and disability access. There is a need for wider pavements, more dropped kerbs and safer crossings at a number of identified locations.
Lack of Signage	■ clear walking and cycling signage ■ a cycling and walking map for the town, and ■ better signage needed on how and where to join longer routes: i.e. the Coastal path
Road speeds	There was positive feedback of those consulted for all of Burntisland to be a 20MPH zone. Pedestrians and cyclists highlighted the need for greater protection between larger road users, e.g. HGV's, and cyclists. The Cromwell Road and around the Primary School were raised as potential 20mph zones.
Lighting	2 footpaths were identified for lighting to support safe for walking and cycling to school.
School	Issue highlighted around parents dropping kids off by car. Park and stride options now included in new design. School to monitor increased walking, cycling and scooter use.
Bike maintenance	Nearest bike repair shop in Aberdour. Bike maintenance within the travel hub would help to address lack of facilities in town.
Electric cars	No public electric car charging facilities in Burntisland. Potential sites for public electric vehicle charging were identified.
Increased cycling and walking	The PASF project enabled us to find out physical barriers to increased cycling and walking, Improved routes and accessibility to be linked to behaviour change activities

The Heat Solution

2017 HEAT USAGE

DOMESTIC PROPERTIES + NON- DOMESTIC PROPERTIES = **49,140 Mw**

THE SOLUTION BY 2032

2048 LOFT INSULATIONS + 698 CAVITY WALL INSULATIONS + 322 EXTERNAL CLADDING INSULATIONS = **8,600 Mw REDUCTION**

£4.4M INVESTMENT

DISTRICT HEATING SYSTEM = **15,800 Mw SUPPLY**

£13M INVESTMENT

THE SOLUTION BY 2050

DISTRICT HEATING SYSTEM = **100% SUPPLY**

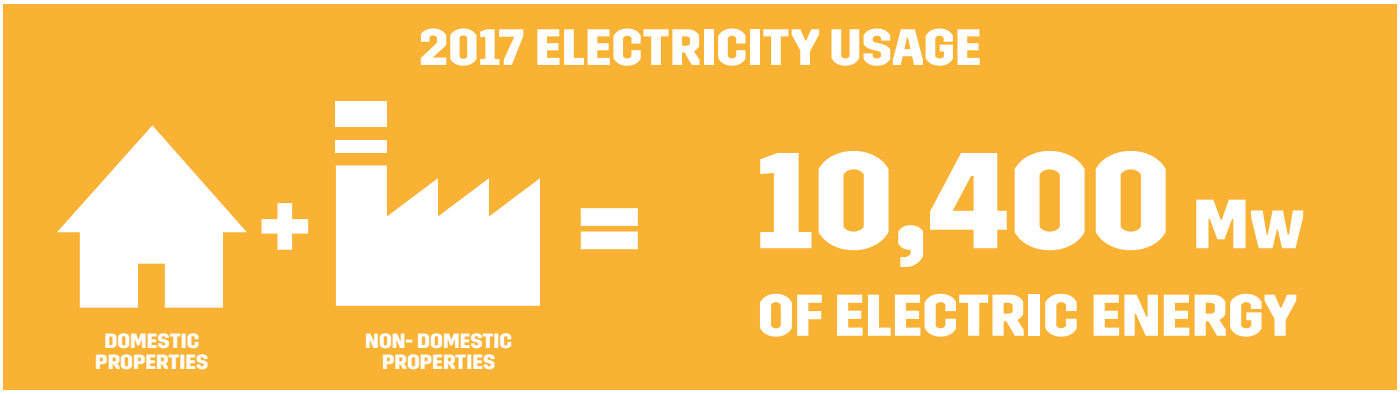
£43M INVESTMENT

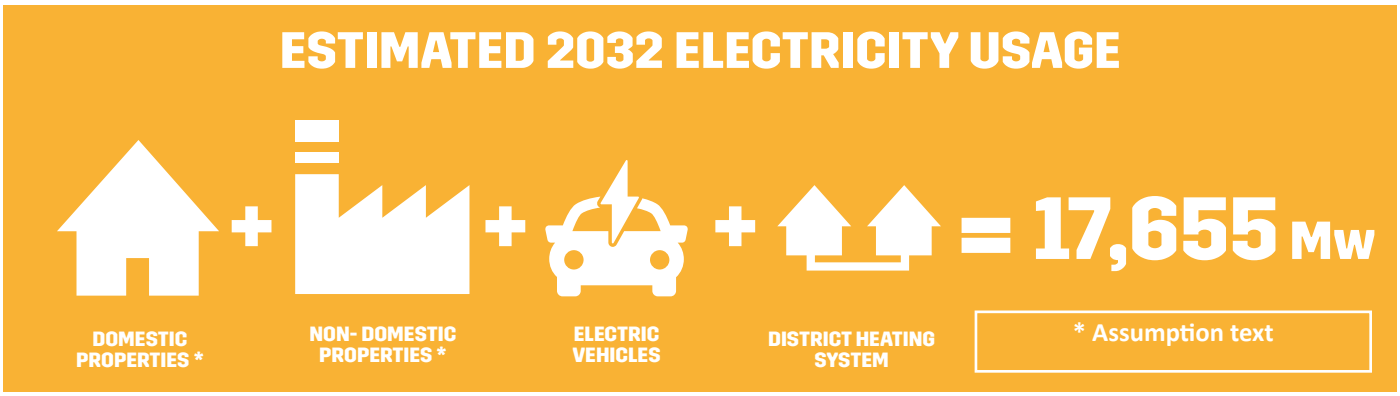
Communal heating solutions were considered against individual low carbon heating solutions. The vast majority of Burntisland returned district heating as the most cost effective solution. The financial return was not commercial (3.6% not 10%) and so District Heating for Burntisland would need to be taken forward as a community or government driven project.

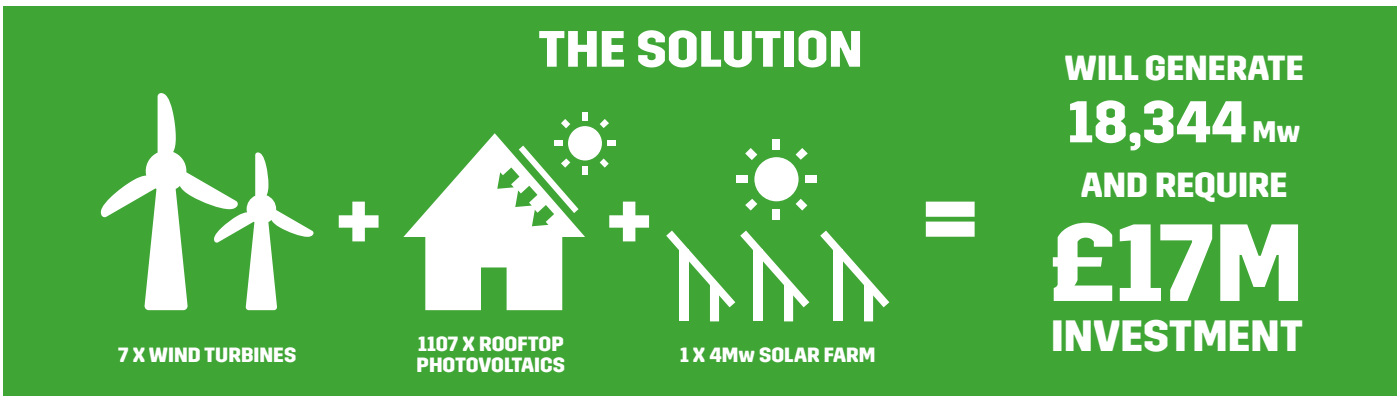
Two heat sources were considered for the district heating scheme. Heat from the Forth Estuary using a large scale heat pump was six times more cost effective than a solar thermal park and large scale thermal store. The inter-seasonal thermal store cost makes it something to reconsider in future years. The estuary heat pump delivers 15,800,000 kWt for 5,266,000kWh electric.

Source Ramboll The initial proposed network, Zone 7 is marked in orange. This would supply 574 buildings, 39% of the heat demand by 2032. Further potential expansion to be delivered by 2050 are marked in purple. The grey/ green zones are most viable for heat pumps due to be completed by 2050

The Electric Solution







Wind turbines

Wind turbines will be important to enable the delivery of 100% electricity for the town. Presently it is the cheapest way to deliver low carbon electricity and takes up the least amount of land (in comparison to a solar farm). The proposal is for 7x EWT 900 turbines to produce 14,000 Mw of electricity. If twinned with appropriately sized local storage the energy can be used locally during the day and night. It could power other projects like the creation of hydrogen or the charging of electric vehicles at off peak times.

Solar photovoltaic

The East of Fife has similar levels of solar potential as areas of Denmark. Solar panels should only be considered for on a well maintained roof. Solar photovoltaic panels provide the best financial return when the energy is used and not sold to the grid. There are many products that are designed to use photovoltaic panels in the home, such as heating water in tanks or storing electricity in heat batteries. There are 1107 roofs that could have solar panels, of 3104 identified in this model. If every one of these solar photovoltaic panel installations was installed the total potential generation for these panels is calculated as approximately 894Mwh/yr.

Solar potential for large scale solar parks was considered. 'Lightsource' provided a presentation for the Burntisland community which suggested a 4Mw solar photovoltaic park on a 20acre site, generating 3,500Mwh/yr for £3.5M. This was converted to potential per hectare 875Mw ha/yr at £875K. The presentation was provided as indicative and further work would be required prior to developing a business case.

Project outcomes

The key outcomes from this project were to produce a Community Energy Masterplan with community-agreed solutions and Planning Services buy in; One that contributes to the evidence base on this topic by providing greater understanding on:

- How best Councils and communities can work together to deliver local energy systems;
- What energy opportunities can be realized at a local level;
- Possibilities for joint and locally owned energy solutions;
- The community benefits which can arise from low carbon local energy systems, and how to maximise the realisation of these benefits for local residents and businesses;
- Mapping how a whole energy system can deliver a healthier, fairer Fife with increased opportunities for economic development, training, jobs and fuel poverty reduction;
- The real world challenges of local energy systems and how they can best be tackled by communities, local and national governments and other stakeholders.
- How local energy systems can meet Scotland's energy and carbon targets for 2032 and 2050.

Acknowledgements

This was a multi-stakeholder project, and we would like to give a huge thanks to our funders and supporting organisations for the development of the methodology and Burntisland Local Energy Masterplan. Appreciation particularly goes to the Burntisland community whose engagement and enthusiasm made this project such a success.

The team included, The Burntisland community (including individual residents and representatives from community groups); The Burntisland Community Council; The Burntisland Development Trust; Fife Council's Planning, Housing and Local Community Development officers; Local sustainability charities and champions (i.e. community engagement and fuel poverty agents: Greener Kirkcaldy); Community renewable energy ownership experts; Heat engineers; Heat Mapping specialists; Researchers from the Universities of St Andrews and Napier ; Ramboll , Highland and Perth and Kinross councils and GIS specialists.

Funding The EMP pilot project delivered the requirements of two funding applications. CARES IIF and the European Regional Development Fund (ERDF) Low Carbon Travel & Transport (LCTT) Pre-Application Support Fund (PASF)

Authors

- Catherine Payne, Carolyn Bell, Hugh Muschamp- Resource Efficient Solutions, Fife Council
- Paul Steen, Ramboll Energy
- Professor John Currie, Julio Bros Williamson Jonathan Stinton -Edinburgh Napier University / Scottish Energy Centre

Appendix 1 - Next steps table

The following potential projects were developed with Fife Council and the Burntisland community during the next steps workshop.

The BCDT (Burntisland Community Development Trust) would like to act as the local leaders, experts and advocates within the town to promote the low carbon energy solutions for a Green Burntisland. They would like the town to become a showcase for how others could do the same across Fife.

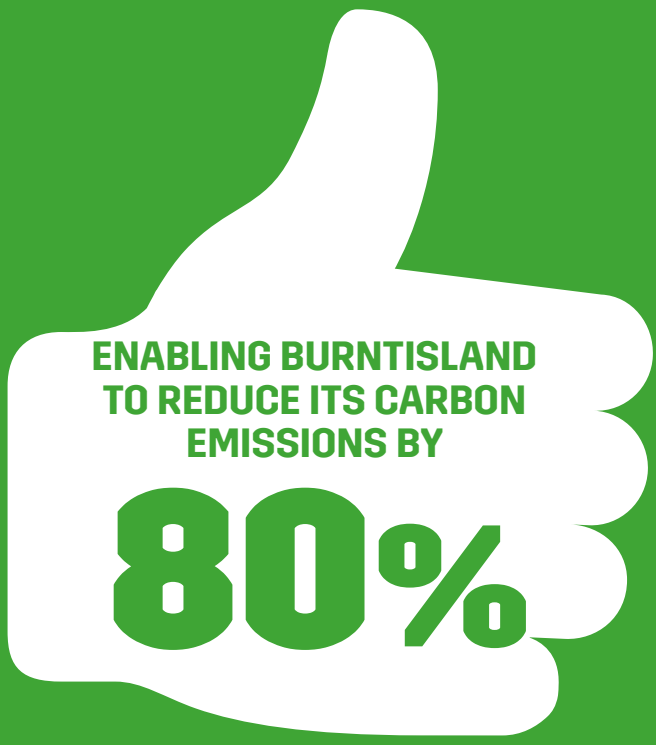
Potential partnership projects from the workshop to investigate:

Energy reduction	Low carbon energy	Transport
Funding for an infra-red survey of all buildings in the town to allow prioritisation of energy efficiency works and to check that the energy efficiency measures installed historically, are not defective.	A solar fly-over over the town to photograph the available roof area, suitability of roof types and orientation of roofs to more accurately measure the potential opportunity for building mounted solar PV / solar thermal, within Burntisland.	Apply for funding to TFS for funding for car club officer.
A joint campaign to promote EWI cladding and solar PV to Burntisland homes and businesses, including (if feasible) a bulk purchase of the measures to reduce the unit price and increase affordability.	A detailed feasibility study for individual solar on buildings that passed the flyover test.	Electric charge points audit. This might focus first on the 869 semi-detached and 677 detached properties. Starting with the low hanging fruit first.
A showcase home or hub to show what can be achieved with energy efficiency and low carbon energy. Somewhere to sell the ideas, products and get people to sign up to joint projects.	A detailed feasibility study for Solar farm.	Run a number of electric EV events to promote the savings electric cars can create locally as well as benefits for air quality and carbon emissions. Look to have a test drive showroom locally.
Promotion materials showing the 5 most common properties with the energy efficiency ideas most suitable to that property. Loft insulation, cavity wall and external cladding.	A detailed feasibility study to gauge the technical suitability of Air heat pumps for individual homes outside the proposed district heat system.	Survey in town on how people use their cars BCDT Set up an EV social club
Funding for a Case study for fuel poverty- using outer cladding on a small area of high FP to monitor reduction rates.	If agreement for the district heating Zone 7 seek funding for next stage feasibility.	Ensure Sustainable travel hub includes charging points for electric bikes as well as cars.
A study on using heat exchangers as well as heat pumps to look at reducing damp within an air tight home.	Review of wind turbine opportunity following the release of the new Fife	Set up meetings with local business Briggs Marine , Scott's Palettes and Bi-fab to discuss electric charging points and hybrid hydrogen haulage trucks and marine tugs.

Policy, agreements and reviews

Fife Council will undertake a short review of the Burntisland Local Energy Masterplan following the formal approval of the updated Fife Council LPD. The short intense nature of the project would benefit from a period of contemplation and wider engagement on the next steps.	Fife Council will take lessons from the Local Energy Masterplan process into account in the development of statutory plans, including the LDP and Local Housing Strategy; and the Fife Sustainable Energy Climate Action Plan
Fife Council gives consideration to the different skills and roles that may be required to take forward local energy policy and projects. These will be fed back to Scottish Government in the ongoing Energy Strategy consultations.	Fife Council to consider a wider area based scheme reflecting the opportunities arising from scale. Area for initial consideration to include: Aberdour, Kinghorn, Auchertool, Kirkcaldy, Glenrothes, Leven and Methil. Encourage discussions with nearby communities regarding Local Energy Masterplanning and shared energy generation opportunities.
Burntisland Local Energy Masterplan to be put forward for consideration by Fife Council Committee early in the next administration.	Initiate discussions between FC/BCDT on potential for Burntisland as alternate fuels fuelling station with hydrogen.

THE AIM IS TO SUPPLY BURNTISLAND WITH 100% LOW CARBON ELECTRICITY BY 2032



Appendix 2 - Information on Burntisland

Demographics

The population of Burntisland is around 6,600 and has grown significantly over the last 15 years. The latest figures available for 2013 show a population growth of 16.74% since 2001, compared to a growth of 5% for Fife over the same period, and 4.6% for Scotland up till 2011.

There are around 3,200 households in Burntisland, compared to just over 2,500 in 2001. This growth has largely been due to significant new-build development, particularly on the site of the former Alcan Aluminium factory in the west of Burntisland, which has brought many families to the town. There is further housing development planned on several sites in the town including on the site of the old primary school.

Economy

Burntisland has a strong industrial heritage but the major industries on which the town was based, historically, have witnessed serious decline in the last half century.

Today Burntisland's economy is characterised by a retail and service centre (centred on the High Street) which features a good selection of independent shops, cafes, fast food outlets, pubs and other service businesses; there are a small number of industrial SME industrial units within Burntisland and a small number of larger industrial employers. The biggest employers within Burntisland today are:

- BiFAB - Burntisland Fabrications Ltd which produces fabrications for the oil and gas industries, and for the renewables sector.
- Briggs Marine – marine and environmental services.
- Scott Pallets – timber pallet manufacturing.

Burntisland is heavily dependent upon tourism. The following facilities cater for tourism in the wider area and represent important assets for local employment and the local economy i.e.

The area is surrounded by farmland but very few people are employed in this industry locally. Today a significant proportion of the town's residents commute out of the town for employment. Burntisland's transport links mean that the town is a popular dormitory settlement for Edinburgh.

Appendix 3

The **community engagement** events programme was agile and flexible responding to the local community interests and needs as well as ensuring we met the deliverables within the funding criteria. In all we had 18 events. Increased local energy knowledge from the programme along with local talent and expertise enabled lively discussion and debate at both Data in and output workshops. This ensured the decisions around energy for Burntisland were locally decided. The final EMP options were presented to the town on 25th of March 2017.

The community also defined what projects they were interested in taking forward within the next steps workshop. These projects are documented in the next steps table in appendix 1. For more details on the engagement programme see the larger methodology paper section 4.

Data and policy modelling

The second strand of the project was the data modelling work stream. This was a process of collating and analysing line, point and other spatial data to support the development of local sustainable energy project options for Burntisland. It covered energy efficiency, low carbon energy and heat generation and distribution, and energy storage. This process required the data team to be able to analyse energy demand in Burntisland, energy generation potential (for a range of different technology options), energy storage opportunities and assumptions made about energy losses from distributing energy and transforming energy into different energy types. These energy datasets were analysed for Burntisland to test and cost different technology options. As well as the creation of an energy model for Burntisland, weighted spatial analysis was also undertaken to assess the impact of planning policies and inform the feasibility of the proposed technology options. To facilitate this a spatial policy review was undertaken. Further information on this work stream is provided in *Sections 6-9* of the methodology report.

Appendix 4 - Background and context to Scottish Government targets

In the past it has been the role of the National Grid, gas network, and multinational energy companies to deliver heat, electricity and transport fuels to Scottish communities via familiar light switches, gas boilers and petrol stations; in the future the generation, delivery of and demand for energy in Scotland will be transformed. The Scottish Government's ambition is to see an increasing number of district heating networks developed across the country to make best use of existing heat sources, including unused and renewable heat. This will help cut carbon emissions, reduce fuel bills and combat fuel poverty.

Energy master-planning can assist developers and local authorities plan this process better and provide for 'future proofing' for communities.

It is recognised that local authorities in Scotland have to start planning today for the coming decarbonisation of our energy systems, to ensure communities can transition away from fossil fuels in a managed approach. Councils are now increasingly involved in planning local energy systems ensuring that local decision making and ownership is at the centre of the new energy strategy for Scotland. It is recognised that future energy systems have to be based within a community instead of outside of it. This is a whole new world of working, thinking and delivery for everyone; from national Government, Local Authorities, Community Councils, infrastructure providers, to utility companies and local communities.

There are a lot of **questions facing stakeholders** when they consider this topic:

- What does a local whole energy system look like? One local system may be different from another. What do they have in common? What factors will necessitate differentiation in different locations?
- All may have different finance and ownership models. How can they all work together? How can we ensure that community benefits and ownership is maximised under different finance and ownership models?
- What type of energy systems do we need to future-proof us against the twin challenges of climate change and energy security?
- How can we plan now for the energy transition that Scottish Government believes that the whole country needs to undergo?

Fife Council believes that many of these questions can best be answered by trialling the Community Energy Master-planning process in partnership with real-world communities.

Guide to Energy Masterplanning - Scottish Enterprise

www.scottish-enterprise.com/knowledge-hub/articles/publication/guide-to-energy-masterplanning

Scottish Energy Strategy: The future of energy in Scotland

www.gov.scot/Resource/0051/00513466.pdf

Draft Climate Change Plan - the draft Third Report on Policies and Proposals 2017-2032

www.gov.scot/Publications/2017/01/2768

Community Empowerment (Scotland) Act 2015

www.legislation.gov.uk/asp/2015/6/contents

Land Reform (Scotland) Act 2016

www.gov.scot/Topics/Environment/land-reform/LandReformBill