NET ZERO BANCHORY
A summary and proposal

Deeside CAN, 2022



Introduction
What is Net Zero, carbon footprint & sequestration?

Net Zero is the target is to reduce net greenhouse gas emissions by 100%, relative to 1990 levels. This will happen when the amount of carbon we add to the atmosphere is no more than the amount removed. The Scottish Government has set a target to get to Net Zero by 2045.

A **carbon footprint** is the total amount of CO_2 and other greenhouse gases (GHG) created by an event or someone's way of life. These greenhouse gases contribute to warming up the atmosphere which leads to climate change, affecting all our lives.

It is difficult to calculate precisely, but we can all think about the carbon footprint left behind by our lifestyles. Four main activities add to your carbon footprint:

- the **transport** you use
- how much energy you use in your **home** for heating and general use
- the **food** you eat, and how much of it you waste
- how much **stuff** you buy, and how much you reuse, repair, and recycle

Carbon can be removed from the atmosphere and stored using natural and artificial processes (**sequestration**). The carbon needs to be removed from the atmosphere on a long-term basis to mitigate or defer global warming.

Carbon can be sequestered by different processes:

- **biological:** trees, plants, soil, peatbogs, and seaweed
- **chemical:** making limestone or flakes or carbon
- **physical:** carbon capture and storage

Net Zero Banchory

This work was done by Deeside CAN for the Banchory Town Team in 2021/2022.

The purpose of the work is to:

- Establish the scale of the effort required for Banchory to reach the Scottish Government's target of Net Zero by 2045
- Provide the basis for a project to get Banchory to Net Zero by 2045

Scotland's average carbon footprint per person

Calculating the average carbon footprint per person can be a complex exercise, particularly in large cities where things like highly variable home energy use, traffic and industrial emissions need to be taken into account.

In smaller towns, a more general approach can be taken by looking at the country as a whole and taking an average for the population. For simplicity, this is the approach we've taken for Banchory. Results are approximate, but still useful. Using Scottish Government data (see Figure 1 below):

- Total emissions are about 50 million tonnes GHG per year
- Population is about 5.5 million people
- So, Scotland's average carbon footprint is about 9 tonnes per person per year
- *This fits in the range 6-12 tonnes per person per year quoted by various sources for UK*

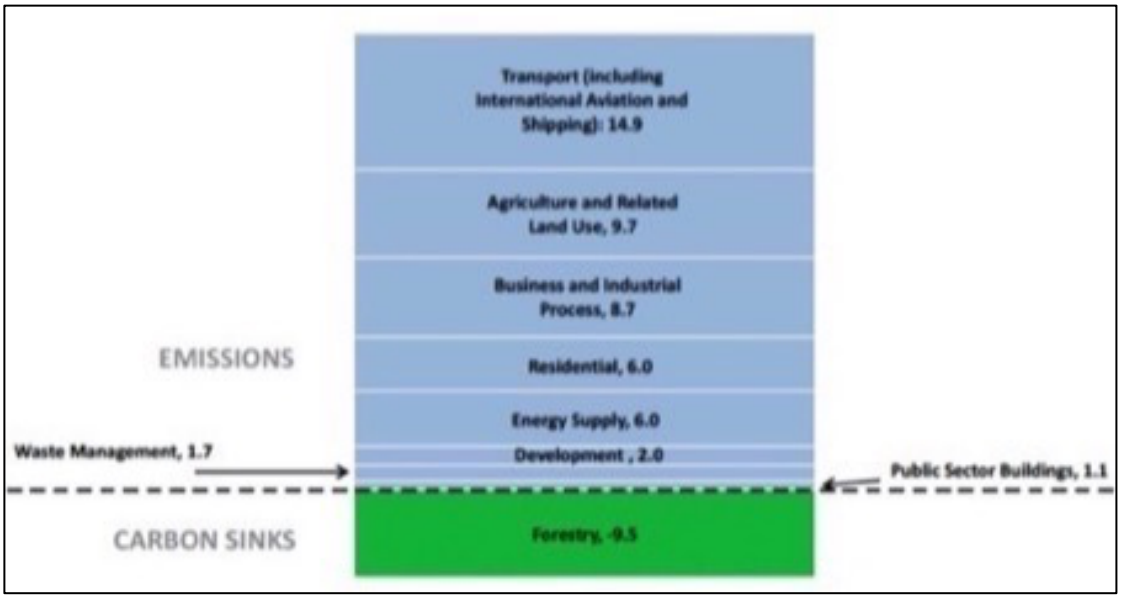


Figure 1: Scotland's greenhouse gas emissions 2017
Source: https://www.gov.scot/publications/scottish-greenhouse-gas-emissions-2017/pages/3/

Scotland's average sequestration per acre

We've used a similar approach to estimate what the average carbon sequestration per acre due to forest cover is in Scotland. Using Scottish Government data (see Figure 2 below):

- Total carbon sequestration is about 9.5 million tonnes per year absorbed by our forests (see Figure 1)
- Forests cover ca. 18% of Scotland's land area, 3.5 million acres
- So, Scotland's average sequestration is about 2.7 tonnes per acre per year
- *Ignoring the effects of peat bogs, this fits with sequestration of 2.5 tonnes per acre per year quoted by various sources*

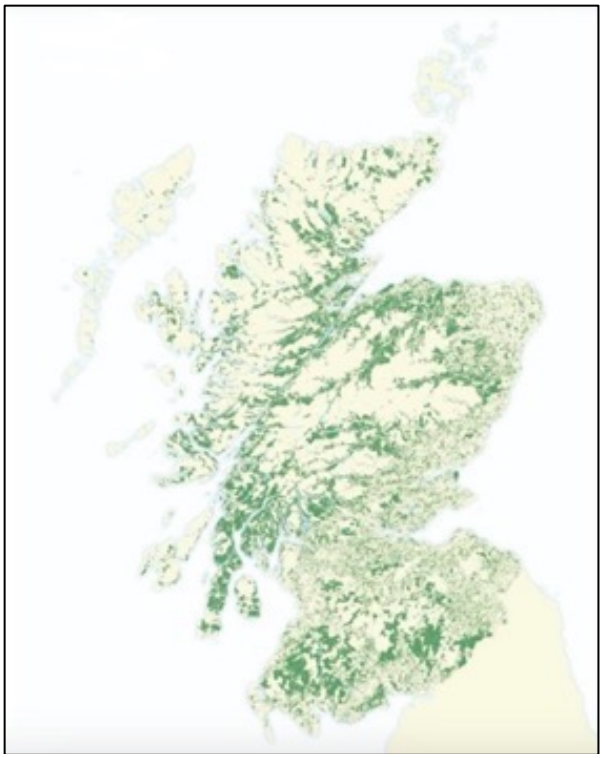


Figure 2: Scotland's forest cover 2019
Source: https://www.gov.scot/publications/scotlands-forestry-strategy-20192029/pages/4/

We need a lot of trees to absorb our GHG emissions!

The calculations above indicate that in Scotland each person has an average of 9 tonnes GHG emissions per year, whilst an acre of forest will absorb on average 2.7 tonnes per year.

This means it will take about 3.3 acres of forest to fully offset each person's emissions per year.

To get to Net Zero, we need to focus BOTH on reducing our average carbon footprint AND increasing sequestration, e.g., by planting more forests.

We should all be aiming to have as small a carbon footprint as possible, and one that we can offset, so that our net carbon footprint is zero. Experts advise that the global average carbon footprint needs to fall to about 2.5 tonnes per person per year by 2030 and to 0.7 tonnes per person per year by 2050.

The next few pages will look at the scale of the issue in a town like Banchory and what options we have to get to Net Zero.

Banchory's net carbon – Town only

We've applied the average figures to Banchory Town, as defined by the Local Development Plan (LDP) outline (Figure 3).

For the carbon footprint:

- Population is ca. 7,500
- Average carbon footprint is 9 tonnes per person per year
- Banchory's carbon emissions are ca. 67,500 tonnes per year

For sequestration:

- Assuming the same tree cover as the Scottish average, this is about 18% of the town – ca. 190 acres. This would lead to a sequestration of just over 500 tonnes per year (0.7% of total carbon emissions)
- Satellite data however indicate that this may be higher, up to 30% (see right of Figure 3) – ca. 315 acres, giving a sequestration of just over 850 tonnes per year (1.2%)



Figure 3: (Left) Banchory LDP outline is the dark dashed line on this map; (Right) Banchory tree cover estimated from satellite readings (source: i-Tree Canopy v7.0)

Banchory's current net carbon emissions are about 67,000 tonnes per year.

Banchory's net carbon – Town considerations

Other effects within the Town may impact Banchory's carbon footprint, for example:

- What effect does the biomass boiler have?
- New houses have a lower carbon footprint that older properties – by how much?
- How many homes are already on green electric tariffs?
- What is the impact of the new solar panels installed on council houses?

We haven't taken these into account yet.

Banchory's net carbon – Rural considerations

For a rural town like Banchory there are other considerations such as:

- How far from the LDP boundary should we go?
- Should we include local forests? Which ones?
- What impact does cutting down local forests have?
- What types of trees should be planted to maximise sequestration & biodiversity?
- Should we include local peat bogs and wetlands? (These areas are much better at capturing carbon than forests)

It's also important to realise that actions to get to Net Zero in rural areas are different from towns and cities.

Banchory's carbon sequestration – local forests

Several forests owned by Forest Enterprise Scotland are located next to Banchory, as shown in Figure 4 below. (There are other local forests too).

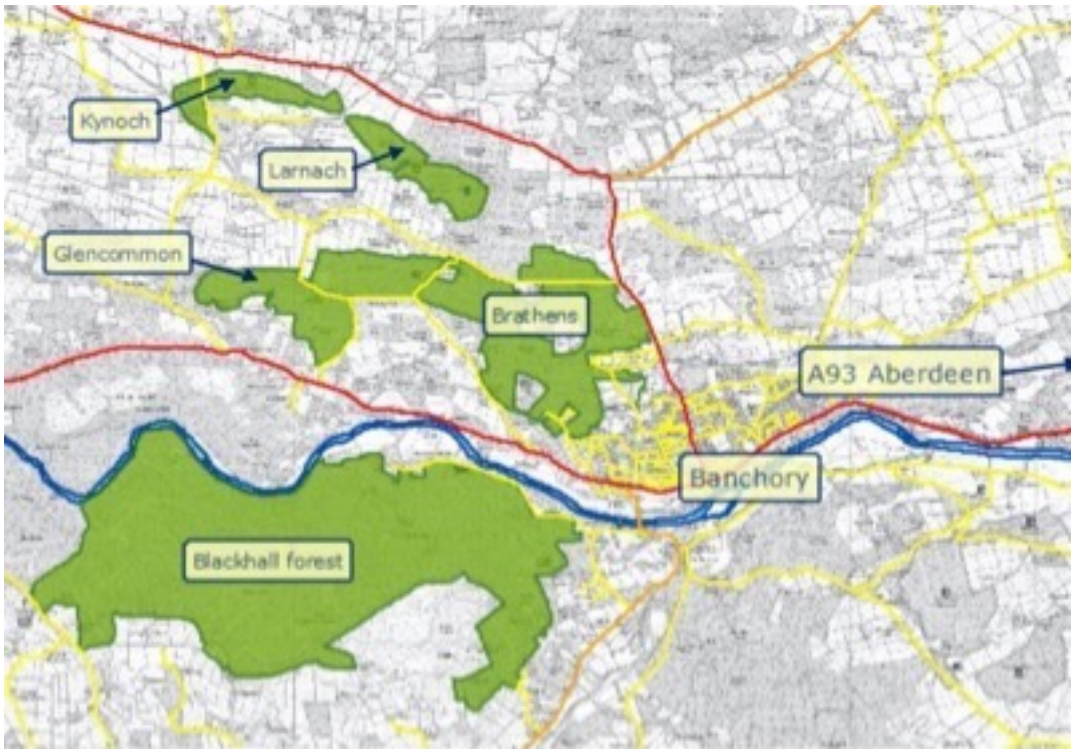


Figure 4: Forest cover near to Banchory town owned by Forest Enterprise Scotland, source: https://forestryandland.gov.scot/images/corporate/design-plans/moray-aberdeenshire/banchory-woods-plan-summary.pdf

These forests cover about 3,650 acres, which could sequester about 9,900 tonnes per year (ca. 15% of total carbon emissions of the town).

How do we get to Net Zero Banchory?

Three scenarios have been modelled that get Banchory to Net Zero by 2045, assuming that the population remains the same. These are summarised in the table below (Figure 5a).

In the first one (the top line in the table) it's assumed that the forest cover stays the same, so that getting to Net Zero relies on everyone reducing their carbon footprint by about 7.6% per year. This is a major effort and would lead to the average individual carbon footprint being 4.5 tonnes per year in 2030 and 1.4 tonnes/year in 2045.

In the third scenario (the bottom line in the table) it's assumed that the average carbon footprint stays the same, so that getting to Net Zero relies on increasing the forest cover by about 8.5% per year.

The third scenario is a combination of reducing the average carbon footprint and increasing forest cover and is illustrated in the middle line in the table. In this example, everyone reduces their average carbon footprint by 5% a year, and forest cover increases by 3% a year.

Decrease individual carbon footprint per year	Increase town/forest cover per year	Individual carbon footprint in 2030 (tonnes per year)	Individual carbon footprint in 2045 (tonnes per year)	Comments
-7.6%	0%	4.5	1.4	Forests stay the same – need large individual carbon footprint decrease
-5%	+3%	5.7	2.7	
0%	+8.5%	9.0	9.0	Individual carbon footprints stay the same – need large increase in forests

Figure 5a: Table illustrating 3 scenarios to get to Net Zero Banchory

What do these scenarios look like in practice?

The tables below (Figure 5b) illustrate two of the three scenarios described above.

The table on the left shows the case where Net Zero is achieved through carbon footprint reduction only and no forest cover increase. Everyone would need to reduce their carbon footprint by 0.7 tonnes per year in 2022, and 0.6 tonnes per year in 2023, etc. The next page shows examples of how to achieve that.

The table on the right shows the combination case of reducing carbon footprints by 5% a year and increasing forest cover by 3% a year. Even this modest forest cover increase would require an additional 115 acres of forest to be planted in 2022 and 119 in 2023, etc., which is significant, and increases to 228 acres by 2045.

Year	Carbon footprint reduction per year (tonnes per person)	Areal increase per year (acres)
	7.6% reduction per year	0.0% increase per year
2021		
2022	0.7	0
2023	0.6	0
2024	0.6	0
2025	0.5	0
2026	0.5	0
2027	0.5	0
2028	0.4	0
2029	0.4	0
2030	0.4	0
2031	0.3	0
2032	0.3	0
2033	0.3	0
2034	0.3	0
2035	0.2	0
2036	0.2	0
2037	0.2	0
2038	0.2	0
2039	0.2	0
2040	0.2	0
2041	0.2	0
2042	0.1	0
2043	0.1	0
2044	0.1	0
2045	0.1	0

Year	Carbon footprint reduction per year (tonnes per person)	Areal increase per year (acres)
	5.0% reduction per year	3.0% increase per year
2021		
2022	0.5	115
2023	0.4	119
2024	0.4	122
2025	0.4	126
2026	0.4	130
2027	0.4	134
2028	0.3	138
2029	0.3	142
2030	0.3	146
2031	0.3	150
2032	0.3	155
2033	0.3	160
2034	0.2	164
2035	0.2	169
2036	0.2	174
2037	0.2	180
2038	0.2	185
2039	0.2	191
2040	0.2	196
2041	0.2	202
2042	0.2	208
2043	0.2	215
2044	0.1	221
2045	0.1	228

Figure 5b: (Left) Table showing details of getting to Net Zero through carbon reduction only; (Right) getting to Net Zero through 5% carbon reduction and 3% forest increase per year

Examples of how to reduce your personal carbon footprint

Figure 6 shows how personal behaviour changes can lead to carbon footprint reductions. The largest impacts are related to transport (red bars) especially flights and cars, followed by home energy use (blue bars) and food (orange bars).

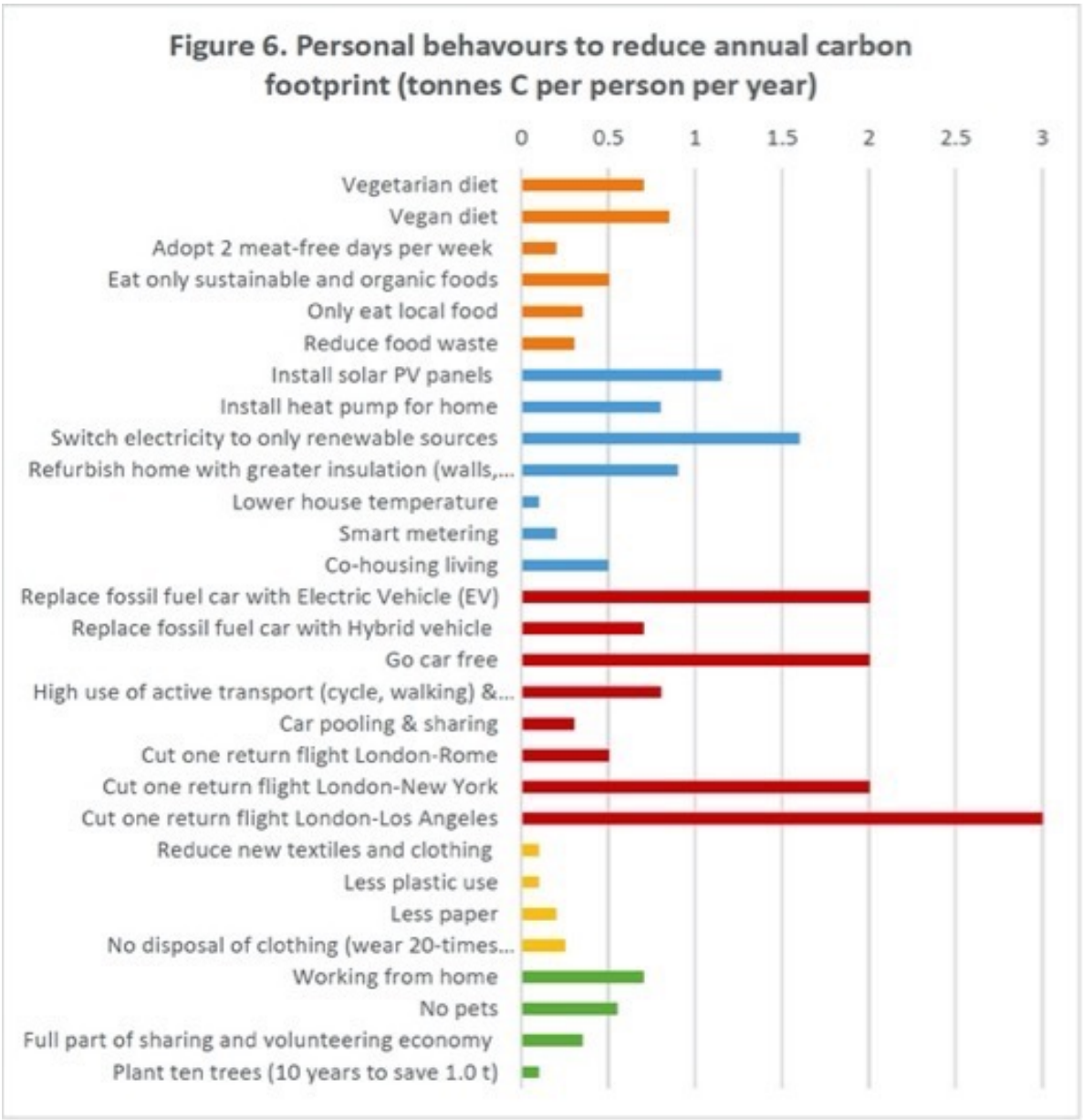


Figure 6: Personal behaviours to reduce annual carbon footprint (tonnes carbon per person per year) Source: https://www.plymouth.ac.uk/uploads/production/document/path/19/19319/The_Good_Life___Low_Carbon_Living__J_Pretty__2021_1_.pdf

Town Team actions for Net Zero Banchory - General

The following Town Team actions are suggested to help Banchory to get to Net Zero:

- Agree a shared vision
- Agree a shared action plan
- Organise carbon footprint workshops, help people to make a plan
- Set up groups to support behavioural change
- Lobby politicians to make changes
- Share experiences and celebrate successes

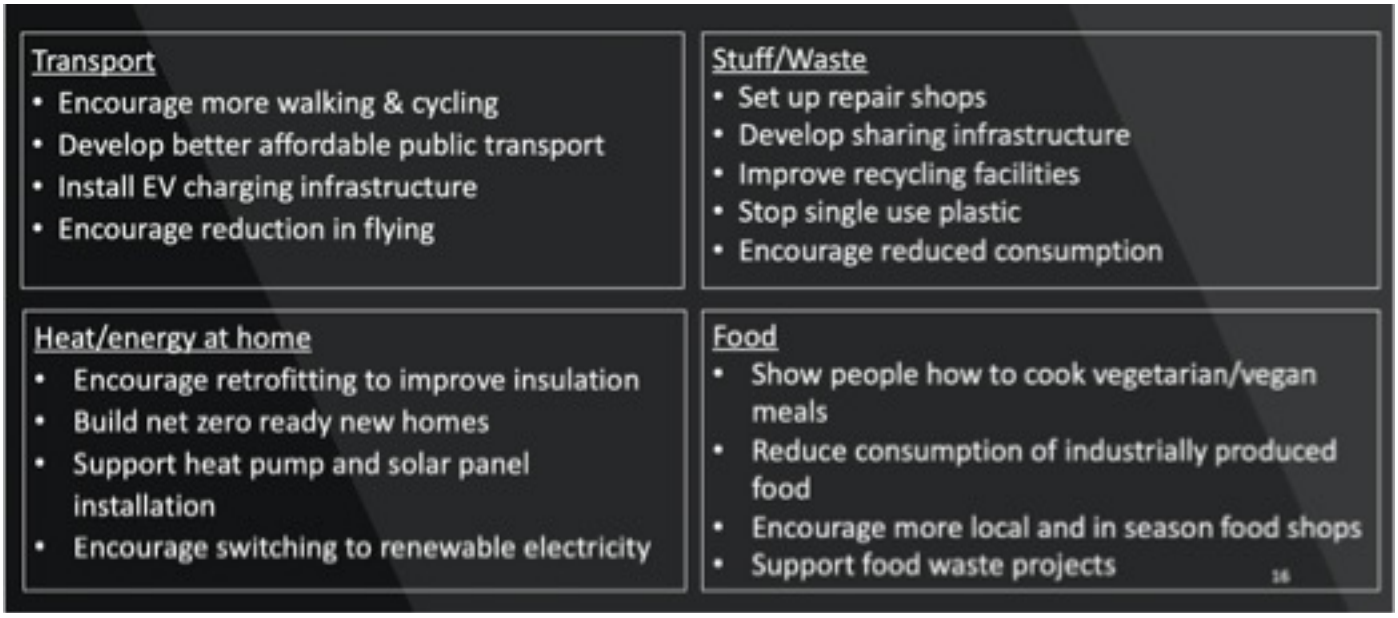
Areas to focus on are:

- **Decreasing carbon emissions**. Reducing every person's carbon footprint each year means making incremental changes and building on them every year:
    - Transport
    - Heat/energy at home
    - Food
    - Stuff/waste

- **Increasing sequestration**:
    - Increase tree planting
    - Decrease use of peat

How do we get to Net Zero Banchory?

Examples of projects to decrease carbon emissions are as follows:



Examples to increase sequestration are shown here:



About Deeside CAN

Deeside Climate Action Network – our aim is to care and nurture our communities, our environment, our planet.

We believe in a joyful reconnection with nature so we can consciously live more sustainably and safeguard our world for coming generations. We aim to help improve the quality of life and well-being of all while reducing unnecessary consumption and waste. We want to show that we CAN.

Our vision is to help communities understand the huge benefits to be gained through making the natural environment central to all our decision making, by following ex-president Al Gore's three focusses, using:

- Our voices, to raise awareness
- Our votes, to pressure politicians to make the changes needed
- Our choices, to live more sustainably

Deeside CAN is working on seven projects at the moment:

- Reducing our Carbon Footprint through raising awareness and running workshops.
- Reversing biodiversity loss through working to make our villages Wildlife Friendly.
- Reducing food waste (together with Number One).
- Banchory's 1st Wee Forest.
- Net Zero Banchory.
- Resilience planning.
- Deeside Way Green Walk.

Find out more at https://www.deesidecan.org.uk
And at https://www.facebook.com/DeesideCAN
Contact us at deesidecan@gmail.com