CESAR tool setup and user guide

The Community Energy Saving and Renewables tool (CESAR) is designed to help a group of community participants to think about how they would provide some or all of their energy needs using energy generation and energy saving developments that they think are appropriate for their local area.

The exercise should be facilitated by an individual with a decent understanding of renewable energy and energy saving technologies, for example a local authority planner with an energy specialism. You should allow 2-3 hours to work with a group of local residents to produce a Future Energy Landscapes (FEL) community energy plan from CESAR. It is recommended that this is done as part of the FEL workshop process, where the group has already spent time looking at wider landscape and community issues.

The full workshop guide for a FEL day can be downloaded at www.cse.org.uk/fel

The exercise requires strong facilitation to keep the process on track, and to ensure that discussions on one technology do not dominate for such a long time that other technologies do not get considered at all. To keep the introductions to all the technologies short and to the point, and to allow the the exercise to get underway in a timely fashion, videos are provided. These can be downloaded at www.cse.org.uk/fel

Materials needed

In order to run a CESAR tool session you will need:

- A laptop

Two large tables

- The CESAR tool printable cards and posters*
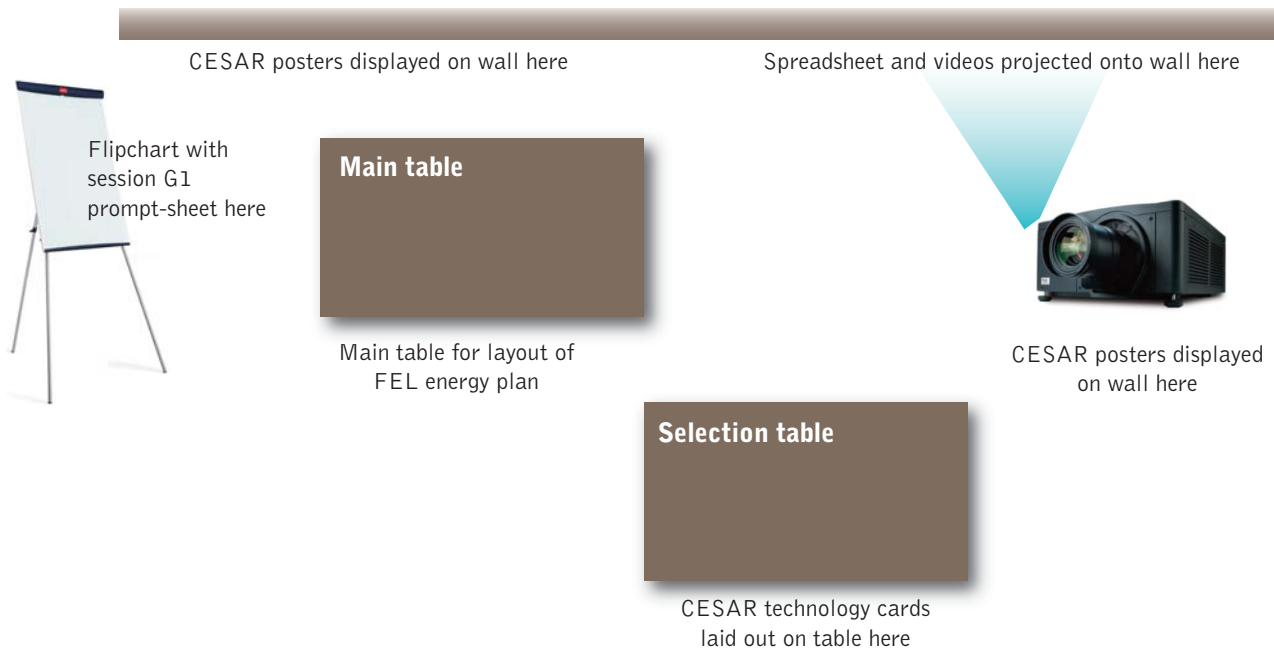
- CESAR tool Excel workbook*

- A projector

- Speakers

- A white wall or sheet for projecting onto

- Internet access for streaming the technology videos

- The 'Session G1' prompts poster, to aid discussion*

* Can be downloaded from www.cse.org.uk/fel

CESAR posters displayed on wall here

Spreadsheet and videos projected onto wall here

Flipchart with
session G1
prompt-sheet here

Main table

Main table for layout of
FEL energy plan

CESAR posters displayed
on wall here

Selection table

CESAR technology cards
laid out on table here

Arranging the room

Ideally this exercise will be carried out mainly around a large central table, around which the participants will stand, and on which the FEL energy plan will be developed. The introductory videos and CESAR spreadsheet, projected onto a nearby clear surface, should be visible to all participants at the table. A second table is needed to lay out all the CESAR cards, from which the participants will make a selection. Selected cards will be brought to the main table. You will also need an area of wall or a third table to display the posters that give further information on the technologies. An ideal layout would be as above:

People needed to run the exercise

Two people should ideally run this exercise. The lead facilitator will lead on probing, raising discussion points, seeking reasoning for the group's selected energy technologies, and keeping the exercise running on time. The second facilitator will input the results from these choices into the spreadsheet for all participants to see , and will record on flipcharts the key points that arise from the discussion about technologies, as well as any over-arching themes that emerge.

Using the computer, the second facilitator will need to ensure that the group's attention is drawn to the contribution that the different selections would make to the community's energy demand. This facilitator should be familiar with the CESAR spreadsheet, including how it is used, before beginning the exercise as they are likely to be called upon to make quick changes to visually show the result of certain decisions, and may be asked to explain some of the assumptions behind the spreadsheet.

Full instructions for running the exercise

In order to get this exercise ready to run, you will need the following data:

• The population of your community

• The number of domestic electricity meters in your local authority area

• The number of non-domestic electricity meters in your local authority area

The following two sub-sections explain how to get this data.

Population of your community

This is usually very easy to find out. Visit www.neighbourhood.statistics.gov.uk and select the area that best matches your community from the drop down list. This will allow you to access the full census data for your area, even if it is a small area, such as a parish or super output area.

If there has been significant housebuilding in your community since the 2011 census, the figures from the Neighbourhood Statistics website may not be accurate enough. You can approximate the extra demand caused by new housing by multiplying the national average household occupancy rate (2.3 people) by the number of new homes to calculate the increased population.

Screengrab from www.neighbourhoodstatistics.gov.uk

Domestic and non-domestic electricity meters in your local authority area

Gathering this piece of data is slightly more complex. Firstly you need to determine what local authority your community is situated in. You likely already know this but if in doubt you can enter your postcode into this website (www.gov.uk/find-local-council) and it will tell you. Now that you have the name of your local authority you can now consult the supplied spreadsheet titled 'Energy Monitors Spreadsheet (dwnload from www.cse.org.uk/fel).

At the bottom of the screen you should select the most recent sheet titled '2013r'. Here you will see all of the local authorities in the UK listed and you will first of all want to find your local authority. You can either scroll through to find it or you can press 'Ctrl + f' and type in your local authority's name to find it.

Once you have found your local authority you want the result from 'column G'. This will be the total number of domestic electricity meters in your local authority area. You will need to record this number for using later.

Next consult 'column I' to get the number of **non-domestic** electricity meters. Again you should write down this number to use later.

Note that the figures for both domestic and non-domestic meters are in thousands, so you will need to multiply the number in the cell by 1000 (eg. 116 = 116,000).

Tailoring the CESAR tool to your community

Now that you have these 3 bits of data you can edit the CESAR tool spreadsheet to make it fit your community.

There are 2 choices of spreadsheet to use depending on whether you have Excel 2003 or a newer version. These are placed in separate folders. Try the newer version first but if it is not displaying the information correctly then open the Excel 2003 version of the spreadsheet. In each of these folders there is a copy of the relevant spreadsheet. Leave this version as a backup so you only use it if you have issues with the main version and it no longer works properly.

Open up the spreadsheet titled 'Energy saving game worksheet'. You will see that various energy generating and energy saving technologies are entered. Blue rows signify technologies that generate electricity as the principal output, peach/orange rows are technologies that principally generate heat, and green rows are for energy saving options.

This spreadsheet is heavily reliant on formulas linked across sheets and multiple cells, therefore to ensure the spreadsheet works correctly only edit cells that have orange text on a black background. As a precaution it is recommended that you make another copy of the spreadsheet before making any changes.

Though it looks complicated, you will only need to use two of the worksheets within the spreadsheet. These are titled 'Energy saving game', which will be the one you use when conducting the exercise, and 'Working', which is used to input the data you have just gathered and to make alterations to the exercise where necessary.

Inputting your data

Navigate to the sheet titled 'Working' and you will see and a table split horizontally into three different colours. Scroll down on this sheet until you see the section underneath the green table, on rows 24-41. Enter the **population of your community** that you obtained earlier into cell B24. This will be a black cell with orange text. Next enter the number of **domestic electricity meters** into cell B28 (remember that the value you obtained needs to be multiplied by 1000 before being entered) and finally enter in the number of **non-domestic electricity meters** into cell B29.

Customizing the spreadsheet

Now that the spreadsheet has the correct data you will need to make some changes before the exercise can be carried out.

Scrolling up on the 'Working' tab you will notice column H is composed of black cells with orange text. These values represent the number of cards that will be available to the group during the exercise for each type of installation. There are already values in place but you may wish to scale down/up the numbers to accommodate your own community or take out technologies that you know to be unsuitable (e.g. hydro where there are no rivers).

There are no set rules on what these numbers should be but try to be realistic with what resources are available to your community. Are you in a dense urban area? You will be unlikely to install any large wind turbines, unless there is a dockyard or other major industrial site with obvious potential. Do you have a river? If not, take the hydro cards away. Since the aim of the exercise is to promote discussion and reasoning the group should not be given a ridiculously large number of any particular card – for example it would be easy for the average rural community to show that they could meet all their energy demand with seven large anaerobic digesters, but in reality there wouldn't be enough waste locally to service them. These values can be changed at any time during the exercise if you feel that they do not fit so feel free to alter them and see what works.

For the energy saving technologies, the spreadsheet is rather different. Instead of giving an absolute number of a particular installation (e.g. 3 wind turbines), they instead show a certain proportion of the community

using that particular group of measures. Each card represents 10% of the buildings in the community being subject to that intervention (e.g. a group that puts down 6 cards of 'Energy Saving – Behavioural Change' is a group that thinks they can persuade 60% of the homes in the community to change behaviours in the way described on the card).

Setting up the game ready to be played

You will need to set up the CESAR tool while the participants are out of the room, it's best to schedule this session for after a break to give you time to do this. On the main table (see diagram above), lay out the 'technology type' cards as shown below.

On the 'selection table' lay out the 'technology choices' cards so that the participants can see all the options.

Set up your laptop and projector with the game spreadsheet ready, so that the participants can see the 'Energy Saving Game' tab, as shown below. At the start of the game, there should be a '0' in every row for the different technologies, and you should be able to see the totals for heat and electricity demand, which are shown at the bottom of that worksheet in cells B25 and B28.

At this point you can open the first technology type video (electricity) so that it is ready to play.

Before playing the video, explain to the group what they will be doing. There is a 'script' for this at the end of this document, but it is worth getting to know this reasonably well yourself so you don't feel like you're reciting.

Once the participants are clear on what they will be doing, introduce them to the technology groups by using the videos provided. Play the four videos one by one, allowing about two minutes between each for any questions and clarifications.

The four videos are: Electricity (4 mins); Heat (5 mins); Heat & Electricity (3 mins); and Energy Saving (2 mins).

	Number of Cards	Number of installations	MWh Produced / Saved	Cost
Wind small	0	0	0	£0
Wind medium	0	0	0	£0
Wind large	1	1	5500	£2,500,000
Micro hydro medium	1	1	876	£400,000
Solar PV domestic	2	200	640	£1,200,000
Ground-mounted PV	2	2	950	£1,200,000
Anaerobic Digestion - electricity	0	0	0	£0
Anaerobic Digestion - With CHP	0	0	0	£0
Solar thermal domestic	0	0	0	£0
Air source heat pump - Domestic	1	100	1200	£840,000
Biomass domestic	0	0	0	£0
Biomass community building	1	5	625	£250,000
Biomass district heating (300 homes)	1	1	999	£1,605,000
Energy saving - Old Houses - High cost	0	0	0	£0
Energy Saving - New Houses - High cost	0	0	0	£0
Energy Saving - Old houses - Low cost	0	0	0	£0
Energy Saving - New houses - Low cost	2	291	172	£43,713
Energy Saving - Old homes - Very high cost	0	0	0	£0
Energy saving - Behavioural Change	2	291	249	£0

Your Electricity Demand (MWh)	5475	1,935 Homes
7216		1,753

Your Heat Demand (MWh)	4186	293 Homes
24883		1,753

Total Cost
£8,038,713

The total video time is 15 minutes 20 seconds which means that the total time including Q&A after each video is a little under 25 minutes.

Once you've done this, then let the group start choosing and discussing technologies. Stress that they don't need to put lots of cards out at once, their plan will emerge organically over the course of the session. Sometimes it is tricky to get someone to start, so if they are slow to start, just suggest that a particular individual picks up a card representing a technology or means of energy saving they think the group should consider, and lays it down next to the colour coded row-header card representing that type of energy technology. For example, they may pick up a card that says 'biomass district heating – 50 homes' and they will lay it down in the row next to the card that says 'heat', as both will have orange colour coding.

See right for an example of a FEL energy plan produced with the CESAR tool by a community in Somerset.
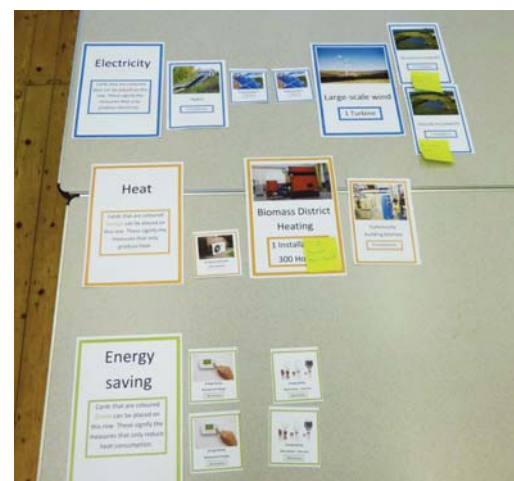
Working with the group while they create their FEL community energy plan

You should have the 'Energy use game' tab open on the spreadsheet. The rough goal for this exercise is to get the group to think about how they would provide some or all of their energy needs using installations and energy saving activities that they think are appropriate for their local area. It may not be possible for them to generate a plan that makes them self-sufficient, or the group may simply not be willing to do enough to cover all of the energy requirements because of concerns about wider impacts, which is fine.

Avoid at all costs trying to guide the group into a 'game' scenario where the aim is simply to get their total demand to match the technologies available.

The desired outcome is simply to stimulate discussion and to get the group thinking about what their current energy demand is, and how they would like to see energy infrastructure developed locally. As they select options, the conversation will naturally move into who might develop this particular energy generating or energy saving initiative, and how. You should encourage these discussions and record key points about ownership structures or how they would like to see benefits distributed locally, if these are discussed. If this doesn't emerge from the group, you should ask questions by referring the group to the Session G1 prompt sheet downloadable from www.cse.org.uk/fel.

As the group discusses the different potential energy generating and energy saving measures they will add cards to each of the different colour-coded rows to represent installations that they would theoretically be happy to see in their community. The person operating the computer is there to add the number of cards for each selection they have made, so that the group can see how much energy they are producing and/or saving. This is done by selecting the values in the drop down menus in column E on the 'Energy saving game' tab. These values are automatically summed to show how much electricity/heat is produced or how much energy is saved by the combined installations or energy saving activities they have chosen.

The number of cards available to select from in column E in the 'Energy saving game' tab are derived from the values you entered into column H on the 'Working' tab. You can change these in the 'Working' tab during the CESAR session if you need to. For example, you may have allowed for the group to have 5 cards for ground-mounted solar PV, totalling 2.5MW, however the group may be interested to see what would happen if they were to stretch that to 5MW. You can quickly change the value in the 'Working' tab to 10 then switch back to the 'Energy use game' tab where you can now select 10 from the drop down menu for Ground mounted PV. But in such a case, where the group is asking for larger numbers of installations, you would need to push them to discuss the appropriateness of such an increased level of development in their landscape.

Once the group begin to coalesce around acceptance of any particular technology, the lead facilitator should, wherever possible, get them to look at their large community map and identify actual locations where they think such an installation would be suitable. Forcing the group to consider placement will raise further discussion about who will be impacted and how, and this can lead to them reconsidering the type, size, or siting of the installation or energy saving measure under consideration at hand. The map should be marked up accordingly.

The second facilitator should make notes on a flipchart of each technology discussed, including any pros and cons put forward, and the lead facilitator should encourage the group to consider the notes on the flipchart and agree that they are a fair record of the discussion before moving on to the next card they are discussing.

As the exercise progresses you will begin to build up a picture of the potential energy landscape the group has decided upon, and also any thoughts they have about how they would like to see such projects come forward, and under what ownership/control structures they would see them being developed. At the same time you will be displaying the spreadsheet on a projector so that the group can easily see the effect of their decisions on demand at the same time as considering the effects of their decisions on landscape and the wider community.

At the end of the exercise, remind the group that they will be asked to reconsider the plan at the follow-up workshop.

Introductory script for the CESAR tool

The CESAR tool is designed to get you talking about how you could both generate and save energy locally. It's set up so that you can consider options under four broad headings, and begin to lay out a plan for things that could become part of local energy policy for your area. You'll be looking at:

• things that will generate electricity

• things that will generate heat

• things that will generate both electricity and heat at the same time, and

• things that will save energy.

You'll see you've been given some cards that represent these things – cards showing different sizes of wind turbines, hydro plants, biomass heating systems, insulation and so on.

You're going to work as a group to discuss whether you think they're appropriate for your community, bearing in mind all you have already discussed about the places, people and landscapes that have meaning for you all. Someone in the group needs to kick this off – when it's time to start, just pick up a card that represents something you think is worth considering, lay it down next to the card marker for that kind of technology, and then discuss whether you think something like that could work in your area. Would it be just one, or more than one? Who would it affect and how? What would be the landscape impacts or impacts on heritage? What would it achieve? What would be the alternatives? Who would develop such a project, or drive forward that kind of activity? Who would own it, and where would the profits go? If you think it's worth pursuing further, leave it there, and choose another option to discuss. It would also be very useful if you could annotate the large community map with places that you think any energy generation projects could be located – this will help you think about whether they really are appropriate in the landscape.

Once you've agreed that something is going to stay on your plan, we will enter it on the spreadsheet. This will show you roughly how much energy it will generate, or save, as a proportion of the energy your community currently uses. You can also see from the spreadsheet the likely costs to install it. Don't worry too much if these look like large sums; commercial scale energy projects are costly to implement but, once they have planning permission, they are relatively straightforward to finance.

The aim is that at the end of the session, you will have a series of cards laid out that represent the technologies for generating and saving energy that you think could be appropriate in your area, with some ideas for locations marked on a map, an idea of what proportion of your energy use that could meet, and some notes about what you discussed.

But before we can get started, you'll need a very brief introduction to all the technologies on offer, so we will watch a few short films covering electricity, heat and energy saving technologies.