

Energy Efficiency and Renewable Energy Opportunities at Lithgow City Council

A Distributed Energy Plan

1.0 Objective

A key output of Centroc's three year Climate Adaptation program 'That's a Good Idea' (TAGI) was the Distributed Energy Plan (DEP) completed at the end of 2012. The initial DEP pilot project involved six Councils from the Centroc region, namely Bathurst, Cowra, Forbes, Orange, Wellington and Young respectively, resulting in the development of a regional framework for renewable energy and energy efficiency planning together with the delivery of an interactive toolkit. It is envisaged that the use of this tool by all Centroc member Councils will enable Councils (a) to identify appropriate sites for plausible and affordable energy efficiency and renewable energy options, and (b) provide the starting point for Centroc member councils to become "grant ready" for further works.

Hence the objective of this note is to provide the remaining Centroc Councils with an introduction to the toolkit, to identify some initial options for energy efficiency at specific Council facilities and to encourage Councils to utilise the toolkit as a key component of its long term planning process for energy management. Using the toolkit, Councils could potentially develop their own long term DEPs.

The draft regional DEP framework is attached to this note for reference together with the toolkit itself and a sample DEP for one of the Centroc Councils not involved in the initial pilot.

2.0 Background

The DEP project comprised two phases.

Firstly, the project aimed to develop renewable and distributed energy plans for four smaller pilot councils – Cowra, Forbes, Young and Wellington - and for the councils forming the Bathurst Orange Dubbo Alliance (BOD).

Secondly, the project aimed to extend the work completed for the pilot councils, linking it with the significant work already undertaken by Parkes Shire Council and the Bathurst Orange Dubbo Alliance, to produce a regional framework for renewable and distributed energy planning.

The aims of the pilot were to have councils adopt the plans with a commitment to implement the recommendations when funds become available; to raise awareness with other Centroc member councils and their communities of climate adaptation and mitigation options; and provide access for all member councils to the collective investment in renewable energy planning, through the regional framework, aiming to enable renewable energy installations across the region.

Key project deliverables were as follows:

1. Draft DEP plans for all seven councils involved;
2. A draft regional framework; and
3. A financial analysis toolkit for use in decision making.

To date, three of the smaller pilot councils had expressed considerable satisfaction with the plans produced and had identified actionable recommendations; whilst the larger BOD councils had commissioned further work to complete their plans.

3.0 Sustaining the Momentum

One of the key recommendations of the TAGI program evaluation report completed by WRI (December, 2012) was that Centroc should continue to play a role in supporting councils both regionally and on an individual basis in applying for grant funding. Centroc has already secured funds through the Community Energy Efficiency Program (CEEP) which aims to deliver a range of energy efficiency measures in council and community owned buildings, facilities and sites including energy audits and energy efficient lighting retrofits.

The DEP work highlighted considerable variation across member councils in terms of resourcing and capacity around energy consumption monitoring, with many smaller councils having limited resources available for such functions. Hence a secondary recommendation of the report was that Centroc should continue to provide centralised guidance and expertise on energy management for member councils.

To this end, the immediate next step is for Councils to embrace this toolkit and identify energy efficient opportunities across Council sites. This will form a starting point for Councils to prepare themselves to become “grant ready” for energy-related Government funding now and in the near future.

4.0 Distributed Energy Planning

The primary goal of the DEP process was to:

- deliver to Councils significant financial and environmental benefits through the reduction of energy usage and substitution of coal-fired electricity with lower carbon, potentially locally generated alternatives;
- Increase the understanding of participating councils of the benefits of distributed energy;
- Provide General Managers and Directors of the respective Councils with an energy strategy for the next 10 years;
- Provide an exhaustive list of options and a tool that enables each option to be evaluated and costed;
- Build on the energy efficiency and carbon work already completed within each council; and
- Allow the nine remaining Centroc councils to utilise and adapt the work to develop their own distributed energy plans and projects.

For the six Centroc Councils involved in the pilot, the deliverables from the plans included recommendations and costing for distributed energy and energy efficiency opportunities across Council facilities across the short, medium and long terms (see sample DEP attached).

Whilst the plans themselves provide interesting background and ideas for energy efficiency opportunities and barriers, the toolkit itself is a critical first step in the energy and financial planning process and will generate and quantify specific opportunities for Councils based upon the base level energy information entered by Council.

5.0 DEP Financial Analysis Toolkit – An Overview

A critical first step in identifying distributed energy and energy efficiency opportunities for the balance of Centroc Councils is to use the Financial Analysis Toolkit developed specifically for the purpose.

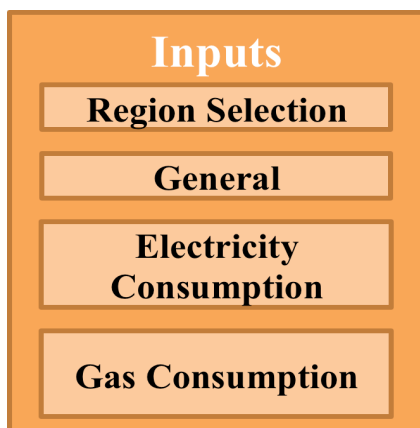
This toolkit has been developed by ARUP for use by Central NSW Councils. The purpose of the toolkit is to provide an indication of the expected energy and financial savings that can be achieved by various energy efficiency, renewable energy and distributed energy technologies for specific facilities.

This User Guide incorporated into the toolkit serves to inform users of the basic operation of the model and the meaning of various icons. Specific guidance is provided where key inputs are required by the user.

5.1 Basic Process

There are four key steps within the toolkit as shown below:

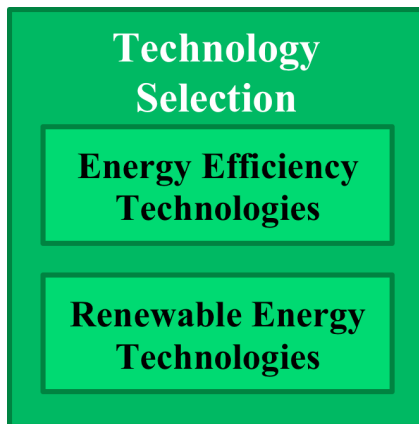
1. **Inputs** – Users are required to input baseline information relating to location and energy consumption for each facility, most notably cost and amount of energy consumed in a given period. These can be taken directly from bills or from the E21 Energy Management System.



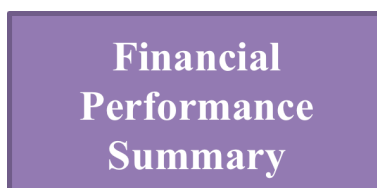
2. **Baseline Results** – The toolkit then generates and displays baseline energy consumption numerically and graphically for the facility.

Baseline Results

3. **Technology Selection** – The toolkit generates costings and savings for a broad selection of energy efficient and renewable energy technologies. Users are able to select the top five options and perform a more detailed financial analysis for each option.

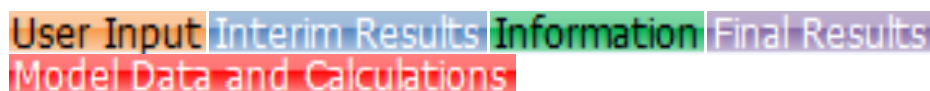


4. **Financial Performance Summary** - This final section displays a summary of the financial performance of the selected technologies in combination at a given Council facility.



5.2 Legend

The model is separated into 'Tabs', shown at the bottom of each window. The following colours have been used to describe the function of each tab:



Within each tab, cells are given different colours to denote their function.

Inputs that are only required for the interim calculations (and are not used for any further calculations) are noted as optional.

5.3 Navigation

The model is designed to take users step-by-step through the input process. Each section has a button which allows users to proceed to the next section or tab. A button is provided at the top of each page to allow users to return to the previous page. Users can also skip to

specific sections using the tab labels at the bottom of the window or by returning to this User Guide and using the model layout above.

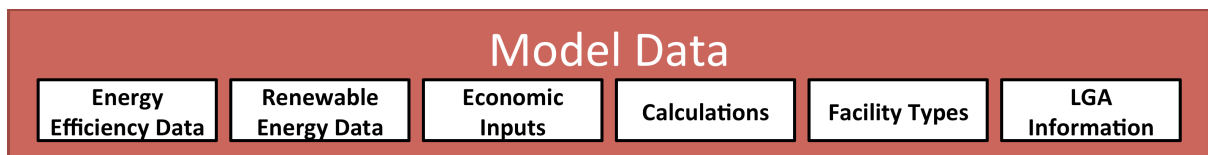
5.4 Re-starting

The model is initially provided with all input values cleared. If users wish to re-start and clear all existing inputs, click on the button below (also on the Region Select page). **Save a copy of the existing version before clearing inputs as the process cannot be undone.**



5.5 Model Data and Calculations

Users may view the background data and calculations used in the model by clicking on the links below or by using the tab labels at the bottom of the window.



This provides a brief summary of how to use the toolkit. The best way to experience the benefits of the toolkit is simply to open the application and follow the prompts.

6.0 Identifying Opportunities for Energy Efficiency at Lithgow City Council

Example: Lithgow Water Treatment Plant, Bell Road

Annual Energy Consumption: ca. 450,000 kWh pa

Step 1

Having self-identified the particular Centroc Council, the user specifies the facility being investigated and enters electricity costs and consumption data (kwh) taken from bills or from the E21 Energy Management System into the 'Input' worksheet of the toolkit.

Based upon this data, the toolkit then identifies and lists all energy efficiency and load shifting (i.e. demand management) options, as well as all renewable energy and distributed energy options. Capital cost and energy savings are calculated for each option.

Step 2

The user is then prompted to select the 5 most attractive options for energy efficiency and renewable energy. The toolkit calculates a broader, more detailed set of data for each technology similar to the energy efficiency worksheet below. The values in the worksheet are taken directly from the toolkit *based upon the actual electricity consumption at the Cabonne Administration Building*. A similar worksheet is generated for all renewable energy and distributed energy options.

<i>Options for Installation 2013</i>	Capex	Energy Savings (kwh)	Energy Savings (\$)	Peak demand Reduction (KW)	Net Annual savings (\$)	Annual Carbon savings (Tonnes)
Conduct pump tests and repair/replace inefficient pumps	50,160	13,582	1,274	2	1,276	12
Operator behaviour management - turn off lights, air conditioners, etc		22,800	2,075	3	2,079	19
Replace/repair aged compressed air systems including new air receivers	45,600	6,791	587	1	588	6
Variable Speed Drives	6,898	45,600	3,883	5	3,890	36
Total	102,658	88,733	7,819	11	7833	73

Step 3

The user is then prompted to progress to the final worksheet which displays an aggregate result for cumulative discounted cash flow and net present values based upon the technologies selected by the user. The 'tick boxes' in the worksheet can be used to include or exclude each technology from the financial analysis. Key financial outcomes can be displayed for each year in the analysis period.

6.0 Next Steps

The financial analysis toolkit is a powerful first step in identifying the most cost effective and energy efficient options for Council for inclusion in a long term energy strategy document. It is recommended that Council dedicates 1-2 days in the near term to use the DEP toolkit to work through all of the feasible energy options for each Council facility.