Demand Management Innovation Allowance Report

FY2019-20

Endeavour Energy

Contents

1. Executive Summary

Endeavour Energy currently have three Demand Management Innovation Allowance (DMIA) projects:

1. Grid Connected Battery Energy Storage Trial which commenced in FY17-18
2. Low Voltage Static Var Compensator Trial which commenced in FY18-19
3. Digital Customer Engagement Platform which commence in FY19-20

The total DMIA claim for FY19-20 is $260,263.

Project	**Operating Expenditure** ($ nominal)	**Capital Expenditure** ($ nominal)	**Total Expenditure** ($ nominal)	**New or Continuing**
Grid Connected Battery Energy Storage System Trial	$0	$41,073	$41,073	Continuing
Low Voltage Static Var Compensator Trial	$0	$21,160	$21,160	Continuing
Digital Customer Engagement Platform	$0	$198,030	$198,030	New
Total	**$0**	**$260,263**	**$260,263**	

2. Background

This report has been prepared in accordance with the AER's Regulatory Information Notice in response to paragraph 6 of Schedule 1. The information provided will constitute the provision of an annual report for the purposes of paragraph 3.1.4.1 of the Demand Management Incentive Scheme (DMIS) applying to Endeavour Energy (as set out in the 2019-24 Distribution Determination).

As per paragraph 6 of the AER's Regulatory Information Notice Schedule 1, Endeavour Energy is requested to provide responses describing its expenditure and the nature of its demand management activities for review by the AER. The annual reporting requirements are outlined below.

Endeavour Energy's response on the Demand Management Incentive Allowance must include:

1. *Identify each demand management project or program for which Endeavour Energy seeks approval.*

2. *For each demand management project or program identified in the response to paragraph 1:*

    - *explain:*
        - *how it complies with the Demand Management Innovation Allowance criteria detailed at section 3.1.3 of the demand management incentive scheme;*
        - *its nature and scope;*
        - *its aims and expected outcomes;*
        - *the process by which it was selected, including its business case and consideration of any alternatives;*
        - *how it was/is to be implemented;*
        - *its implementation costs; and*
        - *any identifiable benefits that have arisen from it, including any off peak or peak demand reductions;*

    - *confirm that its associated costs are not:*
        - *recoverable under any other jurisdictional incentive scheme;*
        - *recoverable under any other Commonwealth or State Government scheme; and*
        - *included in the forecast capital or operating expenditure approved in the 2019-24 Distribution Determination or recoverable under any other incentive scheme in that determination; and:*

    - *state the total amount of the Demand Management Innovation Allowance spent in the Relevant Regulatory Year and how this amount has been calculated.*

3. *Provide an overview of developments in relation to projects or programs completed in previous years of the regulatory control period, and of any results to date.*

3. Previously Approved Projects

This section reports on the progress of projects previously approved by the AER.

3.1 Low Voltage Static Var Compensator Trial

Static Var compensators (Statcoms) have been available for some time, but it is only recently that smaller systems designed for low voltage applications have become available. Statcoms manage voltage through injecting or absorbing reactive power and can help to manage voltage constraints on the network. For example, reducing LV feeder voltage during high solar generation or increasing voltage during peak demand times.

Low Voltage Statcoms are a viable alternative to network augmentation and can help to defer or avoid network investment in edge of grid applications. This trial aims to test the benefits of LV Statcoms to improve customer voltages and manage LV network constraints.

3.1.1 Nature and Scope

Project scope includes:

- Procure 1 single phase and 3 three phase LV Statcom units;
- Identify suitable install locations where voltage regulation is poor;
- Develop designs for installation of the units;
- Commission the systems with remote communications;
- Demonstrate the voltage benefits on constrained feeders; and
- Confirm the cost effectiveness of the technology compared to conventional feeder augmentation, that is, transformer updates and reconductoring

3.1.2 Aims and Expectations

Aims and expectations of the trial include:

- Determine the suitability for peak demand reduction and other network support applications such as voltage, power quality and power factor management;
- Gain an understanding of design considerations such as efficiency, system sizing, system lifecycle, safety, installation, control and monitoring requirements, and any limitations of the equipment;
- Understanding the practicalities of installation, testing and commissioning;
- Ensuring the LV Statcoms can maintain a target voltage of between 216V and 253V; and
- Investigating other applications of the technology such as coordinated voltage regulation across multiple LV feeders.

3.1.3 Project Justification

LV statcoms are an emerging technology that have the potential to increase DER hosting capacity, correct power factor, and alleviate network voltage constraints more cost effectively than conventional network augmentation. This technology will be trialled by Endeavour Energy to determine the benefits and potential use cases. If the trial demonstrates the technology is cost effective further applications of the technology will be investigated on a case by case basis.

3.1.4 Implementation Plan

The trial will be implemented as follows:

- Procure 1 single phase and 3 three phase LV statcom units (10kVar/phase);
- Power quality meter data has been reviewed to identify network constraints and determine suitable install locations;
- Design and installation of the units have been completed in November 2019; and
- Monitoring of the systems will be undertaken for 1 year.
- The benefits and results of the technology will then be reviewed.

3.1.5 Implementation Costs

Expenditure claim in FY2019/20 is $21,160 in CAPEX covering the costs for engineering development and installation works associated with the project. All expenses are accounted in work orders linked to the project.

3.1.6 Results

An evaluation report will be completed by November 2020.

3.2 Grid Connected Battery Energy Storage System Trial

Battery storage can provide several network benefits to Endeavour Energy. Primary network benefits such as peak load lopping, voltage management, load balancing and reliability improvement can be realised in the foreseeable future and may reduce or defer investment decisions. There is strategic value in understanding the operation of battery storage in order to position the company to realise storage related opportunities and applications as they are developed.

Utilising a BESS to defer the construction of a greenfield zone substation (ZS) is one such opportunity. In this application, the BESS can be used as an alternative to a Mobile ZS for deferral periods of up to 3 years. Short term demand growth can be met with supplementary supply from a BESS to defer both the augmentation of the existing network and the establishment of the final supply infrastructure.

3.2.1 Nature and Scope

Project scope includes:

- Identify the functional requirements of the BESS for connection and operation on Endeavour Energy's network;
- Procure a grid connected BESS with a minimum of 1MWh storage capacity, and 500kVA inverter, with a modular and transportable design;
- Deploy BESS onsite at West Dapto;
- Prove the BESS can provide 1MWh at a peak of 500kVA as required for peak shaving;
- Confirm round trip charge/discharge energy efficiency of 80%;
- Understanding the SCADA control and protection requirements for the grid connected BESS; and
- Test the voltage, power quality, power factor management and reliability support functions of the BESS.

3.2.2 Aims and Expectations

Aims and expectations of the trial include:

- Determine the suitability for peak demand reduction and other network support applications such as voltage, power quality and power factor management;
- Test the use of battery storage as grid backup supply for reliability support;
- Gain an understanding of design considerations such as component losses, charge/discharge rates, system lifecycle, safety, installation, control and monitoring requirements, and any limitations of the equipment;
- Confirm the viability of a relocatable storage solution, in terms of cost and ease of relocation;
- Practicalities of installation, testing and commissioning;
- Check the maturity of the technology and suppliers in the Australian market;
- Understand the cost to procure a grid connected BESS; and
- Viability of intended primary application of the battery storage, that is, as a tool to assist in deferral of zone substation construction.

3.2.3 Project Justification

Battery storage is approaching a price point that makes this technology a contender as an alternative network investment option. BESS have the potential to provide NPV positive returns when used for ZS construction deferral and will also provide a potential opportunity return, as the substations may be amalgamated, relocated or further deferred if load growth does not meet forecast levels.

It is in Endeavour Energy's interest to pilot grid connected storage to position the company to realise the benefits battery storage can provide such as peak shaving, reliability support, quality of supply improvement, and better understand the operational impacts of their application to our network.

West Dapto ZS, planned for construction in 2022, has been identified as a suitable location for the pilot. Pending successful testing of the BESS' peak lopping capability, the solution will remain onsite to alleviate demand growth in the West Lakes Illawarra development area and assist to defer West Dapto ZS construction.

3.2.4 Implementation Plan

The trial will be implemented as follows:

- Develop a functional specification documenting the requirements of the BESS for connection and operation on Endeavour Energy's network;
- Tender for a grid connected BESS with a minimum of 1MWh storage capacity, and 500kVA inverter, with a modular and transportable design;
- Following selection of the supplier, finalise design of the solution to meet the BESS functional requirements;
- Work with the supplier to construct and test the BESS;
- Connect and commission the BESS onsite at West Dapto; and
- Complete testing of the BESS functions by the end of the 2019-20 financial year.

3.2.5 Implementation Costs

Expenditure claim in FY2019-20 is $41,073 in CAPEX covering engineering development and testing costs associated with the project. All expenses are accounted in work orders linked to the project.

3.2.6 Results

Endeavour Energy is currently still in the trialling phase of the BESS with the testing of the grid connection and islanding operation, with some functionality still in development. The key learnings from the trial to date are related to the significant nature of the challenges met in the implementation of such a project.

- Integration of the battery system (such as inverter, batteries, transformer, protection) capable of a high voltage connection is a significant task, even when components are understood and at manufacturing maturity.
- A functional specification was used for procurement of the BESS, this permitted vendors flexibility to nominate optimal design of the system.
- The BESS was designed with modular HV and LV containers. Fit out was completed in the workshop before relocation to site for commissioning. This demonstrated the potential to rapidly deploy or relocate the BESS to address network constraints.
- The size of the solution limits the range of workshop testing that can be performed i.e. due to reliance on generator supply and load banks. Grid connection is required to test the full range system capability.
- Existing internal and external standards are not designed for grid sized battery systems, and requirements that are appropriate for household systems are less appropriate for grid scale.
- The market is still emerging for grid battery energy storage technology. This has provided opportunities for innovation and customisation of the solution.
- Protection and Safety systems being implemented require considerable expertise from both battery, inverter and utility backgrounds to achieve an outcome that allows for a safe and reliable connection to the grid.
- Considerations relating to the use of the BESS for network support, and operational use of the BESS.
- Detailed understanding of the capacity and sizing requirements to network functions including islanding operation, peak shaving, and power factor support.
- Maintenance and support needs for the BESS.

The benefits of these key learnings from the battery system will be optimal for use as a deferral of network expenditure in locations where the growth of customers and loading is low and/or uncertain. An evaluation report will be completed at the end of the trial.

4. New Projects for Approval

This section outlines the projects for approval by the AER.

4.1 Digital Customer Engagement Platform

A Digital customer engagement platform (DCEP) is a mobile application and web portal which Endeavour Energy will trial as a customer engagement and recruitment tool for multiple Demand Management (DM) programs. This project provides a non-network option by implementing DM programs as alternatives to network augmentation and to address network limitations where cost effective to do so.

The DCEP trial is marketed to residential customers as the “PowerSaver” program and aims to provide opportunities for customers to employ one or more of the DM programs in their household, as well as provide real-time energy consumption data.

Specific programs target selected areas in our network that currently experience network constraints during peak loading times.

To encourage customers to participate, Endeavour Energy will offer the incentives of gift cards as rewards for meeting energy usage goals outlined by the program. These “PowerSaver” programs will educate customers on how to effectively manage power usage and in turn, their impact on the Low Voltage (LV) network.

Through an Expression of Interest and Request for Proposal procurement process, GreenBe was identified as the successful supplier to provide software and services to develop a DCEP for Endeavour Energy to meet the trial’s objectives.

4.1.1 Nature and Scope

The project scope includes:

- Engage a supplier for the provision of software and services to develop a DCEP (mobile app and web portal) for Endeavour Energy to meet the program objectives;
- Sign up 1,000 residential customers predominantly within the Penrith and Albion Park ZS supply areas;
- Segment participants into the following DM programs and reward-based groups via the DCEP:
    - PeakSaver – voluntary load curtailment program;
    - CoolSaver – air conditioning control program;
    - SolarSaver – residential battery DR program;
    - AtHomeSaver – challenge to save energy and receive personal rewards; and
    - CommunitySaver – challenge to save energy and receive community-based rewards.
- Implement up to 15 DR events for the duration of the trial (two summers and one winter period);

- Engage and communicate with participants;
- Provide near real-time consumption data to participants by integrating internal applications (Historian) to the DCEP. Acquisition of smart meter data from metering providers may be required;
- Conduct a customer survey at the end of the trial; and
- Prepare a project evaluation report at the end of the trial with the view of incorporating the learnings into
- future DM programs either internally or by using external service providers.

4.1.2 Aims and Expectations

Aims and expectations of the trial include:

- Determine the effectiveness of a DCEP including the customer facing mobile application and web portal, and a strategy for the ongoing use of the customer engagement platform for both DM and customer strategy;
- Further improving the network demand reduction delivered from residential customers using the customer facing application and the accompanying communication strategies;
- Finding the most effective communications modes and channels for each program;
- Gaining a further understanding of the most effective and preferred reward mechanism;
- Helping to develop a customer education strategy; and
- Finding the cost-effective means for implementing a DCEP.

4.1.3 Project Justification

A DCEP has the potential to transform the way we approach, communicate and engage customers. The use of a DCEP is an innovative way to engage customers and encourage participation in our programs. This solution offers a cost-effective means of implementing residential DM programs and the communication needs for the company. The solution will not only test app-based engagement of our customers, but also digital recruitment methods to maximise participation in DM programs.

4.1.4 Implementation Plan

The trial will be implemented as follows:

- Approval of business case in September 2019;
- Release of RFP in September 2019;
- Award contract to successful supplier in November 2019;
- Finalise product design with supplier in November 2019;

- Secure involvement of partners (local councils, community groups, schools) in November 2019;
- Internal approval of marketing collateral in November 2019;
- DCEP go-live in January 2020;
- Post summer events review in April 2020;
- Winter events launch in May 2020;
- Post winter events review in November 2020;
- Second summer events launch in November 2020;
- End of trial on 31st March 2021;
- Post-trial customer survey and analysis in May 2021; and
- Final evaluation report in July 2021.

The trial commenced in FY19/20 and will run for two summers and one winter period.

4.1.5 Implementation Costs

The trial has a budget of $849,830 for FY2019-20 to FY2021-22.

Expenditure claim in FY2019-20 is $198,030 in CAPEX covering the costs for engineering, software development, and program setup associated with the project. All expenses are accounted in work orders linked to the project.

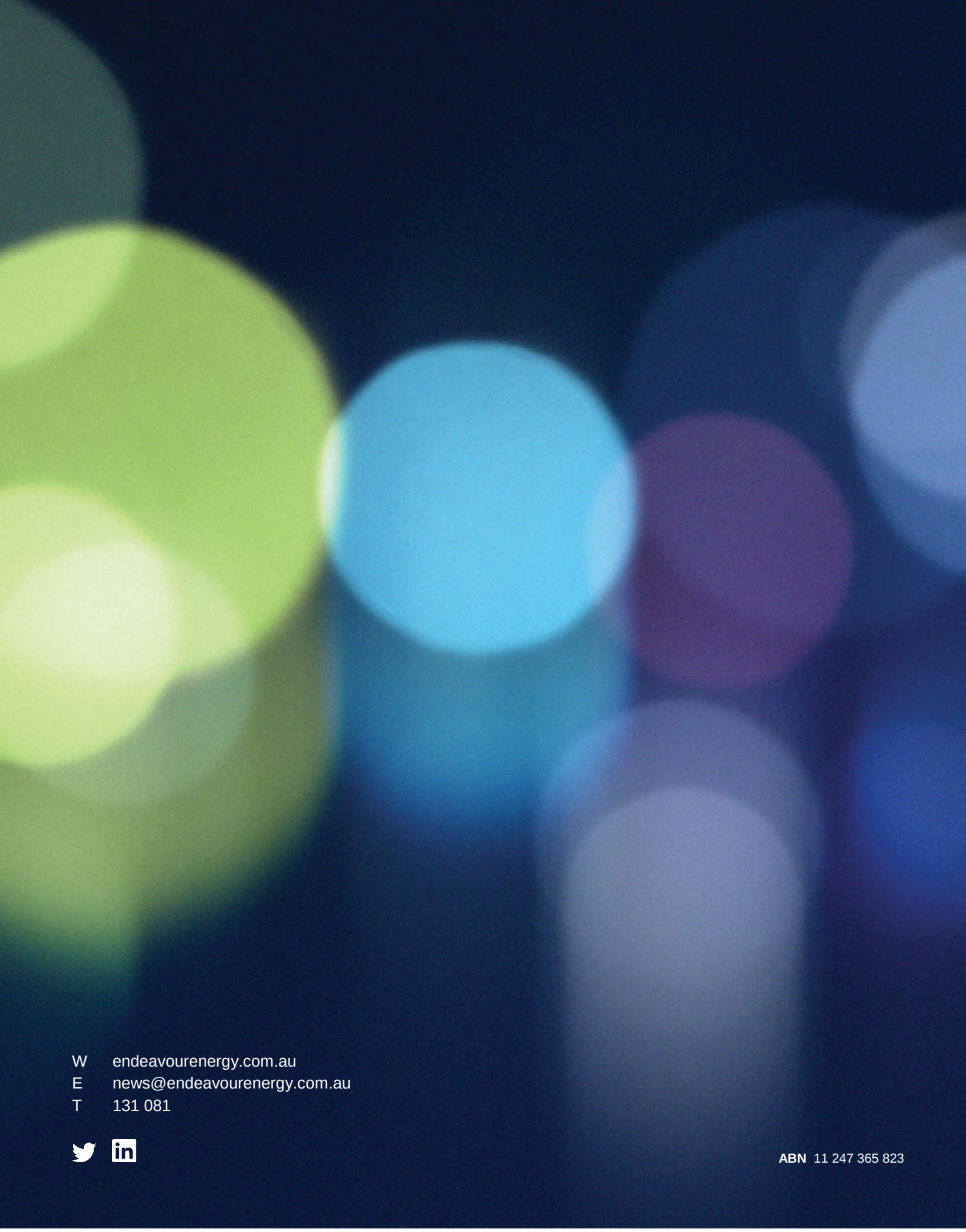
4.1.6 Results

An evaluation report will be completed by November 2021.

5. Background

Endeavour Energy confirms the funding of the projects contained in this report are not:

a. recoverable under any other jurisdictional incentive scheme;
b. recoverable under any other state or Commonwealth government scheme; and
c. included in the forecast CAPEX or OPEX approved in the AER's distribution determination for the next regulatory control period, or under any other incentive scheme in that determination (such as the D-factor scheme for NSW).



W endeavourenergy.com.au
E news@endeavourenergy.com.au
T 131 081

ABN 11 247 365 823

Endeavour Energy